TOWARDS DEVELOPING AN INTEGRATED MODEL OF INFORMATION BEHAVIOUR

by

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Abstract

Information behaviour (IB) is an area within Library and Information Science that studies the totality of human behaviour in relation to information, both active and passive, along with the explicit, implicit, and tacit mental states related to information. Few studies have explored how humans integrate all the various aspects of information behaviours related to information seeking, searching, organising, and information use within their day-to-day lives, and even less on how these categories of behaviours are interleaved with everyday behaviours.

This study researched these various and related aspects of information behaviours within the everyday lives of participants. The research instrument was a two-weeks-long diary study wherein 34 participants from across 6 countries and many walks of life maintained a continuous and descriptive private daily information journal or diary (mainly through a web log), to an aggregate of 2305 separate diary entries of information behaviour. The diary data was first analysed manually using the naturalistic Grounded Theory method of inquiry. Then, the results from the Grounded Theory were validated through an automated qualitative content analysis and a statistical analysis of quantitative coding data.

The findings indicate that people engage in several information behaviours simultaneously and that sense-making is entangled in all aspects of them. Findings indicate also that information avoidance – both active and passive avoidance – is a common phenomenon, and that there are three kinds of information seeking behaviours: information seeking through direct asking, information seeking through public asking, and information seeking without asking and they are increasingly occurring on social networks. Findings point also to information organising behaviours or the lack thereof as a key element that caused the most problems for participants.

The results are described and mapped to existing theories of information behaviour and an integrated model of information behaviour is proposed. No other study has integrated the various models of IB through empirically examining information behaviours in people's day-to-day lives through daily diary studies. This study has an additional significance within IB research in using a multi-method qualitative-quantitative approach to data analysis. The results have implications for all information services and information professionals.
Dedication

This dissertation is dedicated to my late father R. L. Narayan, my Appa, who is still very much with me in many ways; strong in my memory of all our wonderful times together, and even more within me as an expression of all that he has taught me by example. I couldn’t have achieved this document and everything that it entailed without applying all the mindfulness, knowledge, wisdom, dispassion, patience, and equanimity that he taught me everyday of his life.
Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature:

Date:

ENDORSEMENT

Supervisor's Signature:

Date:
What you have learned is a mere handful.
What you haven’t learned is the size of the world.

-Lady Avvaiyar
Tamil Poet, India, 12th Century C.E.

Whatever I have done with my mind, my intellect, and my other faculties,
I offer wholly to my teachers, who are my Gurus.

-Veda Vyasa
Sanskrit Poet & Composer of The Mahabharata, India, 8th Century B.C.E.
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CHAPTER 1 : INTRODUCTION

“A new discipline does not arise simply because practitioners of the old get better at their jobs, but because dynamically new relations arise with other fields.”

D.J. FOSKETT

Information behaviour (IB) is an area within Library and Information Science that studies the totality of human behaviour in relation to information, both active and passive, and the explicit, implicit, and tacit mental states related to information. Thus far, information behaviour theories and models have primarily focused on one of three broad aspects of information behaviour, either information finding, conceptualised as information seeking, searching, foraging, or sense-making; information organising; and information using. However, in reality, none of these information behaviours exist alone, nor are they clearly delineated as separate behaviours, for they are interrelated and interleaved into the totality of humans’ everyday behaviours. Nevertheless, very few studies have explored how humans integrate all three categories of their information behaviours with each other and within their day-to-day lives, and even less on how these three categories of behaviours are interleaved with other everyday behaviours. In short, there are many theories and models of IB but there is no integrated model of information behaviour that is all-inclusive of existing models and can be applied as a general model of information behaviour.

This study researched these various and related aspects of information behaviours within people’s day-to-day lives with an aim to build an integrated model of information behaviour, taking into account all the aspects mentioned above. The research instrument was an intensive two-weeks-long diary study wherein 34 participants maintained a continuous and highly descriptive daily journal (or web log) of their information-related

1 D. J. Foskett, “Informatics” Journal of Documentation (December 1970, 26: 4)
activities and thoughts, to an aggregate of 2305 separate diary entries of information behaviour, with an average of 25 lines per entry, for a total of 468 participant days spread over 5 months. The data thus collected was manually analysed by the researcher using the naturalistic Grounded Theory method of inquiry against the template of existing theories of IB, and then compared and contrasted with the results from an automated qualitative text analysis and statistical analysis.

The results are described, compared, and contrasted with existing theories of information behaviour, along with some new findings, and an integrated model of information behaviour is proposed, for the results of the data analysis indicate that the existing theories do indeed fit well with each other. The significance of this study arises from the fact that no other study has attempted to integrate the various models of IB by examining if any of these often context-specific models form part of a general model that represents information behaviours in day-to-day lives. In addition, no other information-behaviour study has used this many participants in such a detailed diary study thus far.

This chapter provides the background to the subject of this dissertation research, some operational definitions of the concepts and variables that have been used in the study, the theoretical background that frames the study, its problem statement and research goals, the research instruments and methodology used, and a brief description of the organisation of the remaining chapters. More about the existing theories and the definitions associated with them are provided in Chapter 2 and a complete list of all the definitions used in this study (given to participants and used in the data analysis) are provided in Chapter 3.
1.1 **Background to the study**

The term *information behaviour* (IB) was coined in the late 1990s, but its roots lie in the concept of *information needs and uses* research that arose in the 1960s (Case, 2006). Since then, there has been a gradual but continuous shift in the focus of IB research from a systems orientation to a user orientation. Systems-oriented studies focused on formal information systems, their artefacts [e.g. books, articles] and venues [e.g. libraries, schools, radio and television] (Case, 2007). In the 1970s, the research studies began to shift toward its contemporary emphasis on the individual as information seeker and user. Today, IB is a sub-discipline within the field of information science. By its very nature, it is an inter-disciplinary field and has drawn on insights from varied fields like cognitive psychology, human learning, organisational behaviour, communications, philology, anthropology, evolutionary biology and philosophy.

The term information behaviour arose because scholars have moved away from a preoccupation with library and user studies and its emphasis on institutional sources and searches, and toward a focus on how individuals encounter and make sense of their environment (Case, 2008 p. 4) including their engagement in behaviours like information avoidance and sense-making. Information behaviour describes how people need, seek, manage, give and use information in different contexts (Pettigrew et al., 2001 p. 40). It is often also described as *human information behaviour* or HIB. Human information behaviour is conceptualised also as complex human information-related processes that are embedded within an individual's everyday social and life processes (Spink and Cole, 2005). An individual's information behaviour is governed by the convictions of both what is relevant and meaningful in the environment and what will support a normative life (Pettigrew et al., 2001) and for most people, most of the time, information-related behaviour
consists of absorbing and using the learning and information that comes our way during the course of our daily lives (Bates, 2002).

By a strict definition of the word theory, scholars of information behaviour acknowledge that there is no single theory of information behaviour per se. Information-behaviour approaches within theoretical information-science research are generally regarded as models because they focus on specific problems. Traditional model building may be said to involve the observation of unexplained phenomena in search of a theory (Stonier, 1990, p. 112). These models serve as a representation of information, activities, relationships, and constraints (Case, 2007) within the contexts where those specific phenomena arise.

The current study examines information behaviours in a broad, non-specific context. It examines information-related behaviours as they apply to the lived experience of a person in their day-to-day lives from within their own natural environments in an all-inclusive manner, rather than examining specific problems within specific contexts that have a narrow set of activities and purposes. Although the term “lived experience” might sound tautological, it has its roots in philosophy as something that connotes what one personally and immediately experiences for oneself apart from all the hearsay, conjecture, or imaginative and ratiocinatory constructions (Burch, 2005). It implies that the essence of this experience lies precisely in its lived character [and] consists not simply in what is felt or undergone by sentient beings in the passage of time but of what is meaningfully singled out and preserved from this experience (Burch, 2005). Thus, it combines the lived immediacy of an experience with the reflection on the experience after the fact.

Experience is inherently personal, existing only in the mind of the individual who has been engaged on an emotional, physical, intellectual or even spiritual event (Pine & Gilmore, 1998). According to Buchenau &
Fulton Suri (2000), lived experience is dynamic, it unfolds over time and is the outcome of a human engagement – it may be passive [listening to music], active [singing] or interactive [dancing with someone] or all three at once but the meaning of this experience is shaped and interpreted after the fact. Forlizzi and Battarbee (2004) identify three types of experience:

- **Experience**: “the constant stream of ‘self-talk’ that happens while we are conscious”; our understanding of our external environment and internal state of mind, often formed in relation to other actors, events and environments.

- **An experience**: a particular episode that is remembered with specific connotations (positive or negative) and having a distinct start and finish.

- **Co-experience**: an experience in a social context that is shared, interpreted and given meaning with others.

All three types of experience above (as recorded in participants’ daily diaries) are considered lived experience for the purposes of this study. A model of information behaviour through the study of people’s lived experience along with a record of their interaction with information not only integrates the models of IB arising from different contexts, but also integrates the various theories by using their various perspectives as reference templates in the analysis of the diary data through Grounded Theory.

### 1.2 Operational Definitions

From within the larger purview of information behaviour studies, some delineations of behaviour are identified in this section, along with operational definitions of some key terms used in this study. Some of the
theories and models that describe and categorise these behaviours are discussed in greater detail in Chapter 2 under the review of the current literature. The key concepts in information behaviour that guide this study are detailed here using some oft-cited definitions of the concepts used by various researchers over time, along with some comments about how the current study has used these concepts.

1.2.1 Information

Information is conceived of as any “perceived difference that makes a difference” within a conscious, human mind (Bateson, 1972, p.453). This includes one's memory traces, the objects that convey information, and the ideas and knowledge contained in other minds (Belkin, 1978). Information is whatever appears significant to a human being, whether originating from an external environment or a (psychologically) internal world (Case, 2007, p. 40); anything that enables us to discern patterns of matter and energy in the world around us (Johnson, 1996).

According to Edwards (2006), only the material component of an item of information can be communicated (words, a book, images, documents, sounds, people, or any other medium of transmission), and not the meaning of the information. Hence, “information is a human construction, and therefore, what we are attempting to do when we search for information is to make sense of what we have found. That is, we construct our own reality from what we find” (Edwards, 2006 p. 25), and what we find transforms itself into information only in our minds. According to Spink and Cole (2006) the conundrum of researching any information use process is that “it is inside a black box with only inputs and outputs that are observable” (Spink & Cole, 2006 p. 29 ). Sometimes, all of these inputs and outputs can be hard to document also. The current study, while not claiming to be able to read this black box, nevertheless has an insight
into it through the participants' own descriptions of their thoughts and feelings through the primary research instrument used, which is the participants' personal information journals, or daily diaries, which is an instrument often used in the field of psychology, and is designed to capture the “little experiences of everyday life that fill most of our working time and occupy the vast majority of our conscious attention.” (Wheeler & Reis, 1991, p. 340)

1.2.2 Information Behaviour

Information behaviour is the totality of human behaviours with reference to information, including “unintentional or passive behaviours (such as glimpsing or encountering information), as well as purposive behaviours that do not involve seeking, such as actively avoiding information” (Case, 2007 p.5). In short, it refers to the actions or reactions of a human in relation to their information environment, including the environment within their own mind. Information behaviour can be conscious or subconscious, overt or covert, and voluntary or involuntary. Information behaviour is an ubiquitous behaviour that is interleaved and interwoven with our other everyday activities, and hence, this current study considers it within a whole-life context in order to get an insight into how it interacts with and informs every aspect of our daily lives.

1.2.3 Information Seeking Behaviour

Information seeking behaviour is defined as “a subset of information behaviour that includes the purposive seeking of information in relation to a goal.” (Spink & Cole, 2006, p.25), and can include information retrieval, as in retrieving information from an external source. Information-seeking behaviour is generally conceived as an active or conscious information behaviour that is prompted by a gap or uncertainty or need in one's
knowledge or understanding. According to Marchionini (1995) information seeking connotes the process of acquiring knowledge; it is a problem-oriented approach and the solution may or may not be found. Some, but not all seeking behaviours, can include information retrieval. For example, Marchionini (1995) points out that seeking spiritual enlightenment makes sense, but retrieving enlightenment does not. Retrieval is [only] applicable to database management and most applied problems, [and is task-based] but seeking is closer to answering questions on learning, [and] is closely related to problem solving (Marchionini, 1995 p. 6). Information seeking studies tend to conceive of human contexts and even life itself as a problem state or problem space (Newell & Simon, 1972; Belkin 1984; Dervin & Nilan, 1986; Saracevic 1988; Ingwersen 1992) with information seeking as a means to a solution or as a need that is related to the uncertainty of life itself (Dervin, 1983). According to Olsson (2205) “this view tends to bracket information seekers as needy individuals hunting for information from various sources and channels and defines them by their areas of ignorance and uncertainty, rather than their expertise” (Olsson, 2005). This conceptualisation constrains information behaviours within a problem space that does not take into account the majority of our encounters with information, let alone the majority of our day-to-day lives. Hence, this study views information seeking as just one aspect of information behaviour within an indeterminable range of information-related behaviours.

1.2.4 Information Searching Behaviour

Information searching behaviours are the behaviours exhibited during the process of searching and locating information (Spink, 1997). It includes observable actions on formal information-retrieval systems and informal information sources, and also includes the non-observable internal cognitive shifts within a person’s mind (Spink & Dee, 2007). Information-
searching theories describe the interactive elements between a user and an information system, and are often conceived of as a process. Generally, information-searching research examines the processes that people go through in their search for information within an organised information system such as libraries, on-line databases, Web, and the Internet, as in the studies of Kuhlthau (1999b) and Spink et al. (1991) and often within a learning or educational context as in the studies of Kuhlthau (1991) or Edwards and Bruce (2006). The current study treats the information searching process as a part of the broader information behaviours of people in their everyday lives and does not attempt to study it separately, for the research is not just about organised information systems nor is it situated exclusively within a learning context.

1.2.5 Information Use Behaviour

Information use behaviour, according to Spink and Cole (2005) involves incorporating information into an individual's existing knowledge base (Spink and Cole, 2005). Savolainen (2008) conceives of it as a process that is preceded by information seeking. In information use, the usefulness of an information source is assessed in terms of the information that is deemed valuable and is absorbed, in order to solve a problem or make sense of a situation (Savolainen, 2008). Dervin sees information use as related to the bridging of the uncertainty or gap during the sense-making process where the information serves to bridge the gap in one's perceived sense of continuity in life (Dervin, 1992). The current study includes all of the above approaches, and also considers the manipulation (either for creative or other purposes), dissemination, and suppression of information by an individual or a group under the information-use category of behaviours.
1.2.6 **Information Organising Behaviour**

Information organising behaviour is the process of analyzing and classifying materials into defined categories, e.g., the Dewey Decimal Classification System (McIlwaine, 1997). This also includes an individual’s or group’s own organisation methods and schemas or the lack of it. According to Morin and Bellanger (1992), organisation is the fundamental concept which makes information intelligible. Morin and Belanger (1992) declare that “the most strange and remarkable characteristic of information is that it can only be understood through the idea of organisation” (Morin and Belanger, 1992). According to Taylor (2004), there seems to be a basic drive in humans to organise [ for] psychologists tell us that babies' brains organise images into categories such as faces or foods, and that small children do a lot of organising during play. Taylor (2004) gets to the core of this issue with the statement that “we organise because we need to retrieve” (Taylor, 2004, p. 1). Thus, within a person's everyday life, information-organisation is related to their anticipated information need and they could either use the available organisation systems to organise the information they have or use a system of their own devising, dependent on their individual preferences. The current study will examine people's information-organisation behaviours as an integral part of their information behaviours.

1.2.7 **Information Journal**

The term Information journal, as it is used in the current study, is defined by the researcher (and to the research participants) as a daily written record or diary of personal experiences and observations, written by the participant about his or her information-related tasks, activities, thoughts, and actions or reactions. Some guidelines were provided and categories of behaviours were defined and a securely accessible private web-log was
set up for the participants who wanted to utilise it to record their journal instead of maintaining a paper diary. These methods are detailed in Chapter 3, and also outlined in Section 1.5.1 in this chapter. The guidelines provided to the participants are appended in Appendix Nos. VI through Appendix XII.

1.3 Theory and Modelling in IB

As noted in Section 1.2.3, not all information behaviour originates as a need, and similarly, not all information needs necessarily lead to observable information behaviours. This is where the various existing theories of information behaviour fit in, for they not only try to explain and describe certain information-related behaviours, they also try to predict it, and according to Talja et al. (1999) it is a widely shared notion that the aim of [information] studies is to build models of information behaviour which show how different factors or variables influence information seeking (Talja, Keso, & Pietilainen, 1999, p. 753). It is also true that these models are often defined in relation to theories (Case, 2007). Therefore, this study will first examine the theories within information behaviour research through a review of the previous research and examine the associated models as the need arises.

According to Case (2007) a theory is a set of related statements that explain, describe, or predict phenomena in a given context. Both theories and models are simplified versions of reality, yet models typically make their content more concrete through a diagram of some sort (Case, 2007). A model can represent an activity or a system—natural or otherwise. In information behaviour research, modelling generally starts with the external observations or experimental investigations of actual behaviours, which are then described in a physical model representing their structure and characteristics, and are often seen through the lens of
one of the conceptualisations chosen by the researcher, whether it is the categories of information behaviour, or theoretical orientations like behavioural, cognitive, discourse analytic, psychosocial, hermeneutic, constructivist, positivist, or phenomenological perspectives. A conceptual model abstracts the more fundamental structures, characteristics, and the relationships between the various behaviours. Information behaviour studies have produced not only theories of information behaviour, but also models of information behaviour, and they are discussed in more detail in Chapter 2.

A model serves as a representation of information, activities, relationships and constraints that information creators, providers, and disseminators can use as an analytical tool to assist in evaluating existing information environments and in making forecasts of information need, information use, information activity, and their effects on the quality of information resources and access (Case, 2007). It can represent the interactions between variables and can also be used as a stand-alone tool to evaluate or improve information retrieval, information organisation and design, finding aids, and information architecture. Existing models of information behaviour were developed within specific and particular contexts, but are generally considered representative of how most humans seek, search, organise, and use information.

Information science, although a relatively new discipline, deals with some fairly old practices, and new studies are being conducted using evolutionary approaches (Spink, Currier & Narayan, 2005; Spink & Currier, 2006 a & b) and also anthropological approaches that draw an analogy between our hunting and gathering ancestors foraging for food and our present-day “information foraging.” (Sandstrom, 1994; Cronin & Hert, 1995; Pirolli & Card, 1999).
1.4 Problem statement and research question

The problem statement guiding this study and the research question that this study hopes to answer are both detailed in the following sections.

1.4.1 Problem statement

Spink and Cole (2006) highlighted the lack of integration across various approaches and models of information behaviour. Each of the existing information behaviour models takes a different viewpoint, and yet, although every approach has a level of validity as a representation of reality, they are relatively incomplete in and of themselves, for each approach highlights the selective and various aspects of the same process. Often, each approach provides a different language for similar processes (Spink & Cole, 2004). The existing IB models, although widely accepted within their specific domains, are highly conceptual and contextual and do not explain how they relate to other IB concepts or to information behaviours in contexts different to the ones studied. Furthermore, they do not address their connections and inter-relationships with the other equally valid models.

Context in information behaviour studies may be defined as the particular combination of person and situation that serve[s] to frame an investigation of information behaviour (Case, 2007). Three types of contexts that are commonly studied are occupation, social role, and demographic grouping (Case, 2007). Despite these different contexts “the most basic theories are generic to human nature and not situation specific” (Kuhlthau, 1993). Hence, models and theories of information behaviour borrow from varied disciplines including communications, information systems, information retrieval, social network theory, cultural studies,
evolutionary biology, behavioural psychology, experimental psychology, evolutionary anthropology, health sciences, and social psychology. This also means that each has its own terminology and jargon that it introduces into IB. Sometimes, the theories describe very similar processes but use different lexicons, and their metaphorical nature makes them even harder to compare. Irrespective of context, a person engages in more than just one of those behaviours in their daily lives. Nevertheless, no information-science research has attempted to observe, categorise, and describe these behaviours within a naturalistic setting of the participants' everyday lives using qualitative methods.

1.4.2 Research Question and Research Goal

One of the questions that arises after an examination of the existing information behaviour models (from the review of previous research described in Chapter 2) is as follows:

_Is it possible to derive a unified model of information behaviour that integrates the insights from the existing IB models and allied theories by using them as a template to analyse observed and recorded everyday information behaviours?_

Finding an answer to this question is the main aim of this research. The results indicate that there are indeed points of convergence and overlap between the models, and hence these findings are used in the creation of a newly integrated model that unifies the individual models based on their commonalities and interactions with each. This integrated model is the ultimate goal of this research. This model is a general model that is applicable in multiple contexts including peoples' day-to-day lives, and not a model focused on any particular demographic—task, discipline, social role, demographic grouping, or profession. This new model is an all-
inclusive model that subsumes existing IB models and provides a framework that includes the ideas and concepts from them.

The construction of such a truly integrated model is possible only through an exhaustive study of the existing models within information behaviour research, as these models form the basis of the research question. Nevertheless, for the purposes of the current study, the research goal is limited to examining, interpreting, and integrating some of the oft-cited and prevalent models of IB within the discipline of Information Science, with the inclusion of other relevant theories as and when the data points to them.

1.5 **Program of Research and Investigation**

The program of research, including the research methods and methodology used, along with the theoretical orientation guiding the investigation and analysis of the data is detailed in this section.

1.5.1 **Research Instruments**

The research design centres around a diary study wherein 34 participants from all walks of life from six countries (Australia, USA, Canada, China, Jordan, and India) were asked to maintain an information journal of their information-related activities and thoughts (on-line or via a regular diary) on a continuous basis for two weeks. Chapter 3 describes this approach in more detail, along with the justifications for this approach, and the processes that were involved. This approach resulted in rich data that has high research value, as it was carried out *in situ* in the participants’ own everyday environments and provided *thick descriptions*. A thick description of a human behaviour is one that explains not just the behaviour, but its context as well, such that the behaviour becomes meaningful to an outsider (Geertz, 1973).
The diary or journaling instrument has been used successfully in a single-subject case study of information behaviours by Spink (2004), who found that a key advantage of this method is the short term between event occurrence and recording, and hence less subject to memory lapses and retrospective messaging, as may be the case with interviews (Spink, 2004). Julien & Michels (2004) used a 10-week diary in a single-subject case study of intra-individual information behaviour in daily life and found that the diary provided opportunities for the participant to reflect on his information behaviours and recall specific details that would not have been possible with a survey or other methods of recording data (Julien & Michels, 2004).

Allen (1966) used diaries to collect data from scientists and engineers, Kuhlthau (1991) used diaries in her study of school students, Bystrom and Jarvelin (1995) used structured diaries to study civil servants' information seeking and use behaviours, and Vakkari and Hakala (2000) used the method in their research on students' task performance. More recently, Hyldegård used this instrument to study group-based information behaviours (Hyldegård, 2006a). According to Corti (1993) diaries are a reliable alternative to the traditional interview method for events that are difficult to recall accurately or that which are easily forgotten. The self-completion diary followed-up with an interview by the researcher asking detailed questions about the diary entries is considered to be one of the most reliable methods of obtaining information (Corti, 1993). It has distinct advantages over ex situ research in that it does not rely on the reconstruction of information from memory, but rather involves reporting on thoughts and experiences as they occur, thus minimising recall bias.

1.5.2 Approach to Analysis

The primary method used to analyse the data collected through the
information journal is Grounded Theory (GT). GT is an approach to qualitative analysis that is an inductive, theory-discovery method that allows the researcher to develop a theoretical account of the general features of a topic [through patterns of association] while simultaneously grounding the account in empirical observations of data [through the coding of categories] (Martin & Turner, 1986). However, after the emergence of a theory, it can be deductively examined alongside existing theories in the literature to find out how compatible or incompatible the emergent theory is with the existing body of literature (Mansourian, 2006). Thus, Grounded Theory, by its very nature, provides for a triangulation of theories. The current study, with its aim of integrating the existing models of information behaviour, is uniquely suited to the Grounded Theory method. More details of the GT research method and how it is used in this study is described in Chapter 3.

In addition to the Grounded Theory analysis that was done through manual reading, coding, and re-reading in order to elicit meanings, patterns, and categories of information behaviour, an automated content analysis was undertaken through two software tools: one is called ManyEyes, a text-visualisation tool available on the public Web through IBM Alphaworks, and the other is Leximancer, a thesaurus-learning based content analysis, theme-discovery and data mining tool that maps the concepts arising out of the text itself, along with a map of the concepts specified by the researcher. The results of this automated analysis was used to confirm and validate some of the findings from the hand-coding of the information journals.

This process was done only after the manual analysis was complete so it did not preempt anything in the researcher's mind that did not organically arise from the data. Nevertheless, when it was performed, it helped to validate and confirm some of the key findings from the grounded
This automated content analysis, along with some statistical analysis, provided a cross-reference in the analysis of the diary data, and provided for a methodological triangulation. As Cohen and Manion (1986) point out, triangulation helps map out, or explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint (Cohen & Manion, 1986). The current research study benefits from a threefold triangulation:

- **Data triangulation:** Diary data was collected from 34 different people, from 6 different countries, with 3 different methods – word processor, blog, and paper diary – and at different 14-day time blocks within a 5 month period,

- **Theory triangulation:** Many different existing theories and models of information behaviour were used in the Grounded Theory analysis, and

- **Methodological triangulation:** Three different methods were used in the analysis of the textual data: hand-coding and discerning of patterns with Grounded Theory analysis, a concept analysis with the help of a content and text-analysis software, and a statistical analysis of the main concepts arising form the diaries.

According to Henwood and Pidgeon (2006) this kind of triangulation validates and opens up different facets of a complex phenomena to view, and deepens and widens one’s understanding (Henwood & Pidgeon, 2006).

### 1.5.3 Key Findings

Participants engaged in many of the behaviours described by the various models, but some more often than the others, and there were some
notable patterns and co-occurrences of certain information behaviours. The key findings include:

- **All information behaviours are entangled with each other:** The participants engaged in the many information behaviours concurrently and these different behaviours were naturally and organically coordinated in a seamless way and integrated within participants' everyday-life information behaviours, and hence the question of whether these different models can be integrated was answered in the positive. Participants conceived of information behaviours in terms of “Looking” “Checking” “Finding” “Using” and “Sharing” rather than as seeking, searching, browsing, foraging, surfing, berrypicking etc. as described in the literature, and they all involved various levels of affect or sense-making. Chapter 5 lays out an integrated model based on these findings.

- **Monitoring leads to encountering and to sense-making:** One of the main triggers for several information behaviours is the encountering of some new information during the process of monitoring one's information environment or a chosen domain which leads to a conflict in one's mind between one's internal perceptions and apparent external realities. Monitoring and sense-making behaviours were observed to occur more frequently, and also co-occur quite often, while both of them were closely related to socialising online and to seeking information through social networks, which were observed to serve as the information grounds for the majority of the participants, and were part of their information horizons.

- **The role of sense-making:** Sense-making played a major part in participants' information behaviours, but it was noticed that it was more dominant during the course of the information seeking or
information searching process rather than at the beginning of these processes or as a trigger for information behaviours as assumed in the literature. The problem-solving model of information-seeking studies and the sense-making concept are both interleaved, but even together, they do not explain all of participants' information behaviours, and depending upon the participants' own internal states, they either perceived the information gap as a positive and cognitive challenge that led to a happy and productive sense-making interaction and positive Flow experience or a negative and affective confrontation that led to either information distress or information avoidance.

- **Uses and gratifications**: When an information need was inchoate or abstract and required some creative and analytic input, participants often procrastinated – not avoided, for they were continually thinking about the information problem without acting on it – whereas task-based information problems like fact-finding, along with other clearly defined and non-abstract information problems got attended to right away. This concept is closely related to both instant and delayed gratification behaviours and related to both information seeking and information searching. Most externally imposed information behaviours were time bound and information found for these purposes was generally forgotten and not processed beyond its deadline, whereas most internally-generated information behaviours based on curiosity and innate interest was ongoing and the results were filed for future use or for building upon existing knowledge. Sometimes it lasted a very long time or provided “food for thought” as one participant put it, and led to long-term interest and engagement with the subject.

- **Information Avoidance behaviours**: One anomaly again is an
active information avoidance behaviour, which occurs when participants seem to either instinctively already know the answer to a question in their mind, or think they know the answer, but do not want it confirmed through a simple but active information seeking. Information avoidance had two aspects to it: passive and active information avoidance.

- **Kinds of information seeking:** Three kinds of information seeking behaviours were observed: information seeking through direct asking, information seeking through public asking, and information seeking without asking by consulting public repositories of frequently asked questions, so one can either find an answer or formulate a better question.

- **The key role of information use:** Information use is an inseparable part of information behaviours and is connected not only to every aspect and stage of the process of looking for information, but also to every aspect of everyday life. Information is used not only to reduce uncertainty or to fill a cognitive gap in one's mental model, but was used to achieve several other goals in participants' everyday lives. Besides, during any process that involved looking for information, information use was constantly at play, for one could only understand and make sense of the constant input of information by constantly reorganising and reusing previously found or experienced information.

- **The complex role of organising information:** All behaviours involving the acquisition, organisation, and use of information involve the process of making meaning through complex acts of coordination including organisation, reorganisation, prioritising, and use. In a way, encountering new information was just a matter of coordinating one's present mental model with the new information,
whereas *organising*, and *searching* through an organised or disorganised collection of one's own previously found information – that have presumably altered one's mental model to some extent already – is fraught with problems as it involves facing one’s past in some manner, and one's anticipated future, for we organise so we can retrieve, and the longer the time between the two, the more changes are likely to have happened within oneself, and in the information environment. Hence the process of organising information was one of the most problematic for many participants as it involved the coordination between one’s mental models with other's mental models, and also the coordination between one's own past mental models with one's current mental model.

- **No dichotomy between cognitive and affective, and between cognitive-affective and social contexts:** Participants did not see as much of a dichotomy between thinking (cognitive responses) and feeling (affective responses) as the information behaviour theories in the literature seem to suggest, for feelings were a consequence of thinking, and so were behaviours (their actions) related to information. Thought, feeling, and behaviour all involved some sort of *sense-making*, and since their thinking and their feelings were both situated within a participant’s social-cultural context, what they thought affected how they felt and how they behaved, but all of them were involuntarily mediated by their socio-cultural and immediate contexts.

Participants generally used certain *information grounds* within their *information horizon* to monitor information on a daily basis, and when they *encountered* something that created a conflict with their current *mental model*, then *sense-making* occurred, which led either to their deciding to
look for information, or reject or ignore information in order to avoid conflict, in an anomalous information avoidance behaviour. The looking for information process involved every aspect of information behaviours from searching to seeking to organising and use, along with several other allied concepts like gratifications. Chapter 4 describes many of these information behaviours and how they relate to each other, and a new integrated model of information behaviours is presented in Chapter 5 based on the results.

1.6 Contribution to Research

The new model that integrates the existing models of information behaviour is not only very useful in and of itself, it also helps reinforce the validity, credibility, integrity, and importance of the existing models as it explains and elicits their relationships with each other. Additionally, the inter-relationships between the existing models provide new insights into information behaviour by parsing the language of the existing theories and models and classifying and categorising them within the structure of an overarching and integrated model. According to Swanson (1986), in order to deal with the information explosion, disciplines and expertise are becoming increasingly specialised and insular with little awareness of kindred, or potentially allied, specialisations. As a consequence, disparate bodies of knowledge form, and with them “undiscovered public knowledge” (Swanson, 1986). All scientific disciplines attempt to unify apparently disconnected behavioural observations in the course of the development of the discipline. IB research is no exception. Just as electricity, magnetism, and light – all considered separate fields of study within the physical sciences – were eventually unified into the study of the electromagnetic field, advancing a unified theory of information behaviour is useful in aggregating the research on the various aspects of information behaviour within the social sciences. It helps us see these various
elements represented within the disparate theories and models as different properties of a single aggregate, in order that information science may advance significantly.

In addition to the theoretical contribution to the field of information science, the current study also makes a significant contribution in the methodological area through the research instruments used for data collection. Diaries or information journals have previously been used in the field of information science as detailed in Section 1.5.1, but they have been used in single-subject case studies or in the form of a structured diary for a short period of time. The current study, with its 34 participants who each maintained a 14-day diary (30 of them through a web-log) that produced a rich dataset of thick descriptions could also be conceived as 34 separate case studies and hence the data collected has the potential for future analysis using different qualitative and quantitative methods and other theoretical frameworks beyond the temporal scope of the current study, and will be available for future research. Additionally, the insights gained from the diary method including the design of the web-log in the current study, detailed in Chapter 3, will prove highly useful to future researchers in data collection methods. Hargittai (2009) has found that while the methods literature is extensive in IB, researchers rarely discuss the practical issues and challenges they routinely confront in the course of their research projects. As a result, each new research cohort is forced to reinvent the wheel, making mistakes that previous generations have already confronted and resolved (Hargittai, 2009). Accordingly, some of the challenges faced in this study are detailed in Chapter 6.

1.7 Scope and limitations of the Study

Since information behaviour is a complex mix of variables and processes both behavioural and cognitive, the majority of these behaviours are quite
subtle and cannot be directly observed or recorded, whether by a trained researcher or by the participants themselves. The theories arising from information behaviour studies in general, including this one, allow only for identifying concepts, relationships, and hypotheses, not for indicating the relative importance of variables or distribution across individuals. Moreover, the very act of maintaining the information journal affects the information behaviours of the participants to some degree. Therefore, a theoretical model of such behaviour created by this study is limited in its scope in so far as it can only represent the external reality or the subjective descriptions of such behaviours by the participants and are purely hypothetical descriptions or simplified frameworks designed to illuminate complex processes.

Some of these simplified frameworks may even seem self-evident or obvious, but according to the French Sociologist Edmond Goblot (Ifrah, 2000) these opinions and self-evident thoughts do not assume a scientific character until it possesses a universal application. A known fact is not scientific except to the extent that it applies to the whole of the mind [and is accepted by every mind]. Opinion, even collective belief, is at odds with science if it has no means to be applied universally (Ifrah, 2000 p. 357). After all, as Einstein says, all science is nothing more than a clarification of day-to-day thinking (Ifrah, 2000 p. 356), and according to the psychologist Gordon Allport (1942), an acquaintance with the particulars of life is the beginning of all psychological knowledge, scientific or otherwise (Allport, 1942 p. 56). This study gets a closer look at the “particulars of life” in a way that is hard for most non-diary studies to do.

The information behaviour model resulting from the current study, although just a prototype or surrogate of a complex situation, fulfils the goal of the research as it is a model that depict[s] a sequence of behaviours by referring to relevant variables, rather than merely indicating
a sequence of events, [and] indicates something about information needs and sources, as any IB model should (Case, 2007 p. 122).

The research instruments (the information journals) used in the current study have certain inherent limitations: participant burden, participant errors, and intrusiveness into participants' lives thus perhaps affecting their very behaviours. On the other hand, since diary studies require a commitment and dedication from the study participant that is rarely required in other types of research studies, the information journals of the 34 participants' who did finish the 14-day study should indeed be considered valid for research purposes. As Mihaly Csikszentmihalyi (1990), who has used diaries extensively in his psychological research using the experience sampling method points out, even the severest critic must agree that, at the very least, the participants' responses measure what the person decides to communicate about his or her inner states. We will probably never know their true inner state, but in real life we take such verbal accounts quite seriously. We are often willing to share life and property with someone who says, “I love you,” even though we really don't quite know what this other person means by “love.” Of course we always have to take such communications with a healthy dose of scepticism, but by and large these verbal accounts are the currency of life (Csikszentmihalyi, 1990 p. 11).

According to Huang (2009), diary studies have the same advantage as some longitudinal studies have of observing the world for longer periods of time than most experimental studies do without manipulating it, but it has been argued that they may have less power to detect causal relationships than do experiments. Nevertheless, such long observational studies, because of the repeated observation at the individual level, have more power than cross-sectional observational studies or snapshot studies like surveys and questionnaires by virtue of being able to “exclude time-invariant unobserved individual differences, and by virtue of observing the
temporal order of events” (Huang, 2009, p. 387) albeit only for 14 days in the case of each of 34 participants in the current study.

Other limitations such as researcher bias and selection bias that are present to some degree in all observational studies are addressed in Chapter 3 and 5. The researcher bias begins with the very research design that a researcher chooses, and in the interpretation of the findings, and also in the very choice of a research topic. The selection bias arises from the very fact that this study, like any other study involving human participants, only studies participants that were willing to participate, hence excluding all those who aren’t.

1.8 Overview of this thesis document

Chapter 1 (Introduction) gave an introduction to the subject of the thesis, along with some key terms, the theoretical framework for the current study, the research design and methodology, and the scope and significance of the research.

Chapter 2 (Overview of IB Research) surveys the previous research studies in the area of IB, in order to understand where the current thinking is on the subject of this research study, and how the literature relates to the research question. This chapter is organised in terms of the variables and concepts used within IB studies, and the theories and models associated with them.

Chapter 3 (Research Design) considers the data requirements of the current study and describes the research design, the research instrument, and the methodological triangulation used to analyse the data, and the justifications for the same.

Chapter 4 (Results) presents the results of this empirical research into peoples' everyday information behaviours with the help of some
extracts from the participants' information journals where needed.

Chapter 5 (Discussion) discusses the results of the study in relation to the previous research and also the existing models of information behaviour detailed in Chapter 2, and integrates them into a unified model based on the findings from the current study.

Chapter 6 (Conclusions) discusses the implications of the preceding chapters and draws conclusions based on the results of the research. The current study's contribution to the research on information behaviour and its methodological contributions are considered, and the limitations are acknowledged, along with recommendations for further research based on the results of this study.
CHAPTER 2 : OVERVIEW OF IB RESEARCH

“All of philosophy consists of unlocking, exhuming, and recanting what’s been said before, and then getting riled up about it.”

V.S. RAMACHANDRAN

This overview of IB research aims to create a thesaurus of theories and models that have arisen from within IB research along with theories from other disciplines that have informed IB research. This is done with a view to determine some of the common themes, findings, and theoretical perspectives that run through the literature. This process is ever more important for this particular study as it aims to integrate the existing models in information behaviour by using them as templates to map and code the data collected.

This review first provides an overview of the theoretical perspectives used in IB research including the variables that influence IB, and then a list of the conceptual frameworks most often employed in IB research with selected studies that exemplify the frameworks. The selection is based on what is relevant to everyday information experiences, and hence includes both well-known theories and some lesser-known ones. Next, the existing general models of IB are discussed. All of the theories and models reviewed are then tabulated so they can be used as a template for the content analysis of the diary data.

This chapter reviews selected theories and models in IB research that are considered by this researcher as relevant for the study of people's

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everyday lived experience, rather than presenting a historical, chronological, or ideological review. It is not meant to be an exhaustive review of all the works in IB research, but does reveal the need for an integrated IB model that is applicable to everyday human information behaviours.

2.1 Introduction

As stated in Chapter 1, the roots of information-behaviour studies lie in the user-needs studies of libraries and information systems. Over the years, this research reflected a shift in interest from system-centred studies, such as library usage, to user-centred studies. User-oriented studies did not gain popularity until the 1960s, when researchers started examining the information needs and uses of scientists (Menzel, 1966). Menzel (1966) identified the year 1963 as a "take-off point" for user-oriented studies, and identified 23 studies in the three years following 1963 that dealt with information behaviours. These studies examined scientists' preferences and evaluations of information sources and channels, information use, and information dissemination. In addition, the American Psychological Association (APA) contributed in stimulating user-oriented information behaviour studies in the 1960s as part of its Project on Scientific Information Exchange in Psychology (Menzel, 1966). Nevertheless, the majority of these studies considered users only in relation to information systems.

One of the earliest mentions of something akin to the current information-behaviour viewpoint within Information Science is the mention of User Needs as an entry in the Encyclopaedia of Library and Information Science in 1995 (Westbrook, 1995). The article entry lists several questions as guiding the principles of user-needs research:

What constitutes a need for information? What do people think and
do while trying to meet a need? How do they feel, and how does their feeling affect their search? What internal and external factors support or inhibit their search? What do they appreciate and value during the process? What are the possible components of the process? How do they make use of or understand what they find in their search to meet their needs? Do some groups of people hold certain characteristics of their information in common? What research methods will best answer these questions? How can an understanding of these concerns best support information system designers? How does it apply to the daily practice of librarianship? How does it apply to the praxis taught in LIS graduate programs? (Westbrook, 1995, pg. 316)

The palimpsest of research conducted since to address many of the above and more questions constitute a major body of information-behaviour research studies to this day. Fisher & Julien (2009) provide an exhaustive review of this IB literature in a 2009 Annual Review of Information Science & Technology (ARIST) chapter on information behaviour where they also call for information behaviour researchers to work more closely with people sharing cognate interests in academic, corporate and government sectors (Fisher & Julien, 2009). Previously, Fisher, Fidel, and Bruce (2001) summed up the conceptual frameworks used in IB in a 2001 ARIST chapter and concluded that a unifying theoretical body is emerging within IB that, beyond its user-centred core, emphasises the contextual interplay of cognitive, social, cultural, organisational, affective, and linguistic factors, and asserts that information behaviour is part of the human communicative process. Other IB reviews include Allen (1969), Dervin and Nilan (1986), Hewins (1990), Julien and Duggan (2000), and McKechnie, Baker, Greenwood, and Julien (2002) that trace the chronological and thematic history of information behaviour research, but that is not the focus of this chapter.

Donald O. Case's Looking for Information (Case, 2007), a book-length survey of information behaviour literature, a veritable vade mecum
for the field of information behaviour, presents a cogent argument for categorising the literature into one or more of the following areas:

- Information seekers by occupation (e.g., scientists, managers).
- Information seekers by role (e.g., patient or student).
- Information seekers by demographics (e.g., by age or ethnic group).
- Theories, models, and methods used to study information seekers.

Case (2007) reviews the literature within all of these categories in great detail, but the current study concerns itself with the fourth category of the theories, models, and methods that have been used to study information seekers. Since the scope of the current study is to build a general model of information behaviour irrespective of the occupation, role, or demographics of the participants, the research within the first three areas does not guide the framework of this study. Nevertheless, they are mentioned briefly whenever they are relevant to the concepts and frameworks, and will be acknowledged where they inform theoretical model building. Such instances are identified and mentioned in Chapter 4 and Chapter 5 as and when the data relates to them.

2.2 Perspectives in IB

Researchers in information behaviour have primarily examined the activities of information seeking and information use (Spink and Cole, 2006). Since the majority of IB studies focus on seeking and use, and since “use” is often conceptualised in relation to where one goes to find (or seek) the information (Vakkari, 2007), the result is that almost all information-behaviour research is limited to one aspect of information behaviour – seeking. Often, this is studied within the context of an information system or other organised information source – termed as Information Retrieval or IR. Furthermore, many information seeking and use studies take a narrow conception of information seeking as they see it
as a goal-directed, problem-solving activity involving the kinds of questions that can be posed to an information system. The majority of these research studies even provide the very questions that participants are asked to find an answer to, thus creating an artificially imposed information environment. A few studies have asked different research questions about information seeking and have elicited concepts like *information encountering* (Erdelez, 1997), *incidental information acquisition* (Williamson 1998), and *serendipity* (Foster & Ford, 2003).

Another dominant approach in information behaviour studies has been the focus on specific demographic groups. Other perspectives used by information-behaviour studies are “cognitive, sociological, organisational, affective, and linguistic” (Pettigrew *et al.*, 2001). The following sections list the perspectives based on some key variables that have served as theories or concepts in the study of information behaviour.

### 2.2.1 Key variables in IB

Humans have a propensity to gather and use information to adapt to everyday problems in the world, leading George Miller (1983) to theorise that mankind might be conceptualised as a kind of *informavore* (Miller, 1983). This propensity for information, or *information need*, inasmuch as it is a need, arises within the context of an individual's physical, social, physiological, cognitive, or affective state, while the fulfilment or non-fulfilment of the information needs depend on several internal and external variables. Together, these variables interact with each other to determine a person's information behaviour within any given context. The variables and some examples of studies that highlight some of the variables are listed below within five major groups. It must be mentioned here that most studies involve variables and perspectives from across these groups.
below, but frame their research inquiry around a few that are relevant to their purposes.

2.2.1.1 Cognitive and affective variables

The *Merriam-Webster Dictionary* defines 'cognitive' as relating to, being, or involving conscious intellectual activity (as thinking, reasoning, or remembering). These pertain to the mental processes of perception, memory, judgement, and reasoning, as contrasted with emotional and volitional processes. Hence, cognition can be interpreted as thought processes that include high-level functions like information processing and memory, and executive functions such as planning, problem solving and self-monitoring. The so-called *cognitive revolution* in psychology began in the 1950s as an intellectual movement that established the information-processing model of the human mind as a meta-theoretical foundation to understand how individuals interact with and process information (Hinsz, Tindale, Villrath, 1997; Anderson, 1990; Lachman, Lachman, & Butterfield, 1979; Massaro & Cowan, 1993; and Wickens & Flach, 1988).

Although various models of information processing exist, they generally include similar elements. According to the researchers who employ this cognitive viewpoint in information behaviour research, information problems originate as an information need in the human mind, and we seek and process information in order to find sense and order in the world, or to explain and make sense out of phenomena. We all have a certain *mental model* of how things are or how they work, and when we encounter something that does not fit into this mental model; we seek to resolve the differences with new information. All humans have in their memory store, some map, some model of the universe. According to Stonier (1990), the *need* to create a mental map accounts for the fact that all human cultures exhibit considerable inventiveness in creating a mental construct of the universe. A great deal of theory goes into these mental
constructs to explain a whole host of phenomena, ranging from illness to weather (Stonier, 1990). The various theories of the mind, originating in cognitive psychology (Byrne and Whiten, 1988; Baron-Cohen, 1995) are representations which help us to detect what is going on in other minds – and to cope with the uncertainty that we can ever really know, or the certainty that we can never really know what another person is actually thinking or experiencing.

Ironically, the current research study in itself would fit into this very need for building a mental model – a unified theory of information behaviour – or an integrated model of how we as human beings need, seek, search for, find, organise, and retrieve information. Gary Marchionini (1989) characterised information need as emerging from a defect in one’s mental model and that if the defect cannot be mended (either correctly or through rationalised guessing), then information seeking is initiated by activating one’s personal information infrastructures (Marchionini, 1989). Inadequacies in one’s mental model or image of the world can be of many types, such as gaps, lacks, incoherence, different frames of reference, or merely a real or perceived wrongness.

Belkin and Robertson (1976) state that when reality as perceived fails to correspond to reality as experienced, a person becomes aware of an anomaly in knowledge and is said to be in an anomalous state of knowledge (ASK) until this difference is resolved (Belkin & Robertson, 1976). Awareness of an anomaly of knowledge occurs because of a “reality check” when reality as perceived fails to correspond to reality as experienced. One specific example of a reality check is the experience of failed intersubjectivity (Allen, 1997) or bafflement at why another person perceives a situation or even a word in a very different way for oneself. Even when people recognise that they lack knowledge and need some information to fill the lack they find it impossible to specify precisely what
information is missing. Belkin (1980) used the ASK framework in order to propose a better model for an information retrieval system which guides the user through the various cognitive levels from generality to specificity as the user moves up the cognitive scale (Belkin, 1976).

The ASK idea is akin to the cognitive dissonance idea proposed by social psychologist Festinger (1957), which is the uncomfortable feeling experienced by a person when two contradicting ideas hold sway over their minds. According to Festinger (1957), “dissonance and consonance are relations among cognitions that is, among opinions, beliefs, knowledge of the environment, and knowledge of one’s own actions and feelings. Two opinions, or beliefs, or items of knowledge are dissonant with each other if they do not fit together; that is, if they are inconsistent, or if, considering only the particular two items, one does not follow from the other” (Festinger 1957, p. 25). This uncomfortable feeling can be reduced by seeking information which can confirm or verify one or the other idea, for human beings in general have a need to reduce this discomfort of holding contrary thoughts in their minds (Festinger, 1957). On the other hand, there are also some who reject or avoid the information that causes this kind of discomfort, and hence the theory of information avoidance (Case et al., 2005) discussed in more detail in section 2.3.8.10.

Belkin’s 1990 review of the cognitive viewpoint in information behaviour defines it as an approach and set of constructs that focuses fundamentally upon attributes of the individual (Belkin, 1990). Hence, the basic idea in the cognitive viewpoint is that people will experience different information needs in identical situations because they have different understandings of these situations based on their experience and other factors unique to them (Allen, 1997).

The cognitive approach is different from other approaches in that it seeks an understanding of humans’ information behaviour via the
fundamental processes and structures inside the human mind, whereas the other approaches, such as the social approach, use the cognitive approach merely as a touchstone to explore other concepts. One of the key ideas in the cognitive approach is that given the exact same situation, different people will have different information needs. The cognitive approach has been the dominant perspective in the field of information behaviour through the 80s and the 90s. Some of the major research conducted using this viewpoint includes Ingwersen (1982), Ellis (1989), Saracevic et al. (1988), Bates (1989), Marchionini (1995), and Spink (1997); the majority of them examined information behaviour in the context of information-retrieval systems, primarily electronic databases.

Jansen, Spink, and Narayan (2007) investigated peoples’ Web-search queries using a cognitive viewpoint and studied how they reformulate their search queries and found that the majority of query reformulations are done for switching between Web and image collections. Most people often moved from broad to specific query terms (from macro conception to micro conception) before reformulating their queries in a progressed manner, exhibiting a cognitive shift in their mental model of the information they were seeking (Jansen, Spink & Narayan, 2007). Edwards (2006) modelled students’ information searching experiences on the Web using students’ own perceptions and categorised four mental models of information-searching in students looking for information on the Web – looking for a needle in a haystack, finding a way through the maze, using the information retrieval tools as a filter, and panning for gold – each with different outcomes, and proposed a theoretical model that integrates web-search strategies with information literacy outcomes (Edwards, 2006).

Although the cognitive approach initially examined cognitive phenomena exclusively, it soon grew to encompass affective factors, i.e., investigating what the user feels during the information seeking
experience, and how it influences the search outcomes. *Affect* entails the feelings that people experience may or may not relate to a particular object or event (Berkowitz, 2000). Kuhlthau (1991) examined students' thoughts, actions, and feelings during the information search process. Kuhlthau's study of school students' search for information to fulfill assignments led to an information behavior model called the *Information Search Process* (Kuhlthau, 1991), which in turn was based on George Kelly's (1963) *personality construct theory* which conceives of learning as a process of testing constructs. In George Kelly's (1963) *personality construct theory*, each person devises his or her own personal construct system that establishes a personal orientation towards the events that are encountered, and hence their behavior is determined by the constructs a person already holds. Personal constructs are clustered by subordinate and superordinate relationships into a hierarchical system, which minimises incompatibilities and inconsistencies enabling him or her to find *meaning* and predictability in the events he or she encounters (Kelly, 1963). This idea of *personal constructs* is also akin to the theory of *personal myths* in psychology introduced by Ernst Kris (1953) who connected it to an autobiographical set of selective or invented memories that serve as a protective screen carefully constructed to cover significant omissions and distortions in the life history of a person.

Note how this *personal construct theory* corresponds also to the *cognitive dissonance* theory and the *cognitive coordination* mentioned in the previous section and also the *hierarchy of needs* theory mentioned in the next section. Section 2.4.3 provides more details on Kuhlthau's Information Search Process (ISP) model.

Nahl (2001) lists many of the cognitive-affective variables under what are termed as psycho-dynamic variables and elucidates some of them:
The process of personality involvement in information seeking entails certain feelings and thoughts that are universal to all information behaviors. They include feelings of uncertainty or hesitance and doubt (affective behavior), confused thoughts (cognitive behavior), resistance to new information (affective behavior), frustration and anxiety (affective behavior), not reading instructions and procrastinating using the library, or not manipulating the physical elements of the information environment (sensorimotor behavior). Along with negative affect, there are positive affective behaviors in information seeking, such as experiencing feelings of victory and elation, strengthening one’s feelings of self-efficacy and self-esteem, confirming one’s feelings of acceptance of and valuing the information world, feeling the reward of joy after satisfying an information need, and so on. (Nahl, 2001).

The cognitive-affective viewpoint has become increasingly used in information behavior research and considers both cognitive and affective aspects of information needs, seeking, evaluation, and usage. In this approach, information behaviors are understood as a function both of mental processes and of psychological or emotional factors. Some of the major studies using this viewpoint are compiled in Diane Nahl and Dania Bilal's 2007 book titled *Information and Emotion: The Emergent Affective Paradigm in Information Behaviour Research and Theory* (Nahl and Bilal, 2007). The range of affective factors examined in the book include the role of user-confidence in library anxiety and information literacy (Kwon, 2007 & Julien, 2007) and user-frustration and its relationship to user interaction and its implications for information-systems design (Mentis, 2007).

### 2.2.1.2 Personal variables

Personal characteristics, including personality, influence, choice, and a person’s hierarchy of needs (physical, personal, familial, social, cultural, environmental, spiritual etc.), and how strong they are, is presumed to influence people’s information behaviors and are the focus of some IB
studies. Research into the relationship between personality and information behaviour includes Heinström's (2003) investigation of personality dimensions and their relationship to students' information behaviours, which identified three information-seeking patterns that could be related to personality traits, and approaches to studying.

The fast surfers experienced problems in both relevance judgements as well as the critical evaluation of information and they often chose documents on the basis of easy access and least effort. The broad scanners had an open, competitive and outgoing personality and sought information actively from a wide range of sources. Their information seeking was flexible and they often retrieved information just by chance. The deep divers were intrinsically motivated and searched for information in order to extend their topical knowledge. These students were quality conscious and worked hard in order to obtain reliable and scientific information (Heinström, 2003).

Hyldegård (2009) investigated personality traits in relation to group-based information behaviour and her findings point towards social context and group influence exerting more influence on information behaviour than individual personality traits (Hyldegård, 2009). The psychologist Abraham Maslow developed a Hierarchy of Human Needs model in 1943 in which humans' needs are categorised within five basic categories from self-actualisation, self-esteem, social needs, safety needs, to physiological needs, in increasing order of importance (Maslow, 1943). This model has been applied in various disciplines for understanding human needs and motivation, and has been proposed also as a basis of a model of human information needs (Spink & Narayan, 2006), as described in Section 2.4.5.

Shoham and Strauss (2008) studied immigrants' information behaviours in terms of Maslow's Hierarchy of Needs and found that they fit in with a parallel hierarchy of information needs—the satisfaction of information needs leads to the fulfilment of other human needs for the
immigrants—personal, familial, communal, and societal, in that order. This in turn leads to achieving a sense of belonging and a sense of self. Finally, it was shown that satisfaction of information needs leads to successful absorption into the immigrant's new country, life and society (Shoham & Strauss, 2008).

2.2.1.3 Professional variables

Irrespective of a person’s cognitive, affective, or personal predisposition as mentioned above, an individual’s information needs differ from profession to profession for they may conform to behaviour patterns established or codified within their profession or group, be it government, law, science, technology, arts, humanities, education, medicine, or health-related. Taylor (1991) defines the professional information environment as “a set of elements that affect the flow and use of information messages into, within, and out of any definable entity, and also determines the criteria by which the value of these information messages will be judged” (Taylor, 1991, p. 280).

Kuhlthau and Tama (2001) investigated the information-search process of lawyers, and found that the lawyers preferred print sources to digital sources because of the function of accidental information discovery that is possible through the print sources and not possible with the high relevance afforded by the digital retrieval systems. Leckie et al. (1996) modelled the information-seeking of professionals derived from research on engineers, health care professionals, and lawyers, and found three factors affecting information seeking: awareness, sources, and outcomes. Auster and Choo (1994) investigated how senior managers acquire and use information in their environmental scanning and found a strong positive association between environmental uncertainty and the amount of environmental scanning undertaken (Auster & Choo, 1994). McKnight (2007) examined the information behaviours of on-duty critical-care nurses
using the Grounded Theory methodology and found that nurses had five levels of information interactions – nurse to nurse, nurse to chart, chart to nurse, nurse to patient, and nurse to patients' family – and none of them involved published or authoritative sources of information (McKnight, 2007) which has implications for evidence-based practice.

Spink (2004) explored the information behaviours of a business executive using the diary methodology, and found evidence to support a multitasking perspective for information behaviour discussed in section 2.4.1. Narayan and Spink (2008), while investigating the needs of the users of a digitised special collection of historical schoolbooks, found that the demographic that used this publicly accessible collection most were not historians as expected by the curators, but home-schooling parents (Narayan & Spink, 2008). This kind of online material and free online access has implications for education, for no contemporary school would use these schoolbooks as texts any more.

In studies of family physicians' information behaviours, Gorman and Helfand (1995), and Ely et al. (1999), found that physicians' pursued answers related to their patient-care questions only 30-36% of the time. They indicated that 64-70% of their questions remained unasked because of time pressure and lack of immediate access to patient-care information, which has implications both for medical librarians and evidence-based practice among physicians. More recently, Bennet et al. (2005) found that although almost all physicians had access to online resources from their offices, there were still many barriers to their use in patient care, like credibility of the source, relevance of the results, access restrictions, speed, too much information, lack of specific information, and navigation or searching difficulties (Bennet et al. 2005).

### 2.2.1.4 Psychological variables

Among the psychological variables influencing a person’s information
needs are an individual's outlook on life, their value system, political orientation, memory, style of learning, self-efficacy, emotional condition (also part of the cognitive-affective variable, mentioned above), implicit and explicit attitudes, stereotypes, obsessions, prejudices, and self-perception. Self-efficacy is a term that is derived from Albert Bandura's social-cognitive theory (2001) and is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives (Bandura, 2001).

Ren (2001) investigated the use of government-information sources by small-business managers and found that the executives with higher self-efficacy used the Internet and government information sources more frequently than the executives with lower self-efficacy. Partridge (2007), in a study of the digital divide examined the internal or psychological forces that motivate an individual to refrain from integrating technology, such as the Internet, into their lives, and found that self-efficacy was positively correlated to Internet use (Partridge, 2007).

Various other psychological conditions have been described as relevant to and influencing information behaviours, such as continuous partial attention (Stone, 2009), a focus on being 'in touch' and 'connected' (via e-mail or social networking) which results in stress and attention deficit trait, a distractability and impatience due to too much mental stimulus (Hallowell, 2005). Kirsch (2000) identifies a condition of cognitive overload, which negatively influences information seeking, and also when information overload (Simmel, 1950) is added to multitasking and interruptions. This idea of interruptions somewhat relates to the flow theory (Csikszentmihalyi, 1990) discussed in section 2.3.8.11 which is on the opposite end of this experience and is a productive and happy process when interruptions are ignored.

West (2007) identifies information overload as a contributor to techno stress in library settings. Related studies also mention pathologies
of information (Bawden & Robinson, 2009) such as technophobia (Brosnan, 1998), technostress (Brod, 1984), information anxiety (Wurman, 1990), and paralysis by analysis, a state of not being able to discern the truth from the information sources because of the large numbers of conflicting reports available and getting stuck in the decision tree (Langley, 1995). They are all related to the so-called information explosion, which seems increasingly common in the current information environment.

Issues related to loss of identity and authority, emphasis on micro-chunks of contextualised information and shallow novelty (Brabazon, 2007), and the impermanence of information all affect information behaviours (Bawden & Robinson, 2009).

Nahl (2001), in a study of library-school students, even proposes an information counselling routine based on a taxonomy of technophobia that includes computer aversion, library avoidance, depressing uncertainty, and even information rage. Nahl (2001) proposes a behavioural approach to overcome technophobia through measures like orienting encouraging through to advising coaching and on to reassuring consoling, all designed to overcome resistance to information literacy (Nahl, 2001). On the other hand, Bawden & Robinson (2009) warn that information specialists and academic librarians promote solutions to problems which are largely recognised only by themselves and applicable just to academic library settings—problems like the need for information literacy (Bawden & Robinson, 2009). Notwithstanding these criticisms, these are the same students that go on to become productive members of the larger society, and hence it is important that they have information skills that they can use within the larger society.

Diane Nahl (2004) studied the information behaviours of graduate-level students, and found that a compound psychological variable consisting of irritation, anger, frustration, and rage, which is called affective load, a kind of uncertainty multiplied by time pressure, plays a part in the
students' success in their information tasks. The information seeker needs more coping skills, a combination of self-efficacy and optimism—as the affective load increases. If this affective load becomes too high, then the information seeker cannot manage the uncertainty and abandons information seeking in despair (Nahl, 2004).

Lansdale (1990) investigated the role of memory in personal information management and found that information recall was positively correlated to recognition and categorisation, and Mentis (2007) found that the memory of frustrating user experiences affected the way users approached electronic and Web information searching. Steinerová and Šušol (2007) studied gender stereotypes as they apply to information behaviour and found that men prefer individual information seeking and women apply collaborative information use and that women tended to manifest a pragmatic way of information use while men preferred analytic information processing (Steinerová and Šušol, 2007).

### 2.2.1.5 Social and Demographic Variables

The social and demographic variables that influence a person's information behaviours include everything from one’s personal, social, national, and physical environment to one’s sex, age, status, education, economic situation, experience, and above all, access to information. Some of the studies using this perspective overlap with the other categories mentioned above, and some of the most frequently studied groups include students, academics, nurses and engineers. There are also studies that investigate the information behaviours of janitors (Chatman, 1991), retired women (Chatman, 1992), small farmers (Case & Rogers, 1987), and also sex-workers, new immigrants, and hairstylists (Fisher et al., 2003).

A large-scale study of low-income African-American households in Texas by Spink, Bray, Jaeckel, and Sidberry (1999; also reported in Spink
indicated that there were gatekeepers of information within the community that its members trusted and relied on for information while sceptical of outside sources. Spink et al. (1989) linked their results also to Bourdieu’s (1984) theories of habitus—acquired patterns of thought, behaviour, and world-view along with habituated individual perceptions that guide one's choices in life. Abrahamson & Fisher (2007) proposed a certain kind of information behaviour they termed Lay Information Mediary Behaviour or (LIMB) which they defined broadly as people who seek information on behalf of others without necessarily being asked to or engage in follow-up with the recipient. These so-called lay information mediaries acted as information conduits and filters on behalf of their respective audiences (Abrahamson & Fisher). Twidale et al. (1997) referred to a similar phenomenon and introduced the term serendipitous altruism to describe a willingness among online database searchers to assist one another despite whether or not they were directly responsible for the search outcome and termed it serendipitous altruism (Twidale, 1997). A study of homeless parents by Hershberger (2003) found that some of the main sources of information they had were the social workers, and that their own networks were small and often unconnected. They used secrecy and deception to protect themselves from other homeless people and people from outside their small world that might harm them and their children (Hershberger, 2003).

A lower socio-economic status is also associated with a culture of information poverty that, when combined with other handicaps, can lead to extreme helplessness and a sense of isolation (Childers & Post, 1975). A study of blind information-seekers (Jeong, 2007) that used government-provided computers revealed how they express satisfaction with the [outdated] technologies that they were accustomed to in order to access information, with no apparent knowledge of some of the more innovative and more helpful technologies available to them that might make their life
easier (Jeong, 2007). Tilley et al. (2006) studied the needs of the severely mobility-impaired in a virtual-community environment specific to them and found that a sense of control or the lack of it was one of the key factors that either enabled or hindered their information behaviours within the virtual community (Tilley et al., 2006).

Dervin (1989) criticised the focus of many of the demographic-oriented user studies with the argument that they help perpetuate the divide between the haves and have-nots by considering the individuals within a particular demographic as passive recipients in need of information rather than active participants in their information environment (Dervin, 1989). Nevertheless, as Case (2007) rightly notes, when a background characteristic such as having a disability results in persistent situational differences, a study of that small segment of the population makes more sense (Case, 2007).

2.3 Theoretical Frameworks in IB

McKechnie & Pettigrew (2002), following an analysis of 1160 articles in six information science journals for the six years from 1993 to 1998, described library and information science (LIS) research as being atheoretical. Previously, Wilson (1994) stated that so much work has been done in IB without reference to any theoretical framework that it must either be ignored completely or the miscellaneous category would be very large indeed (Wilson, 1994).

The Oxford English Dictionary defines theory as a scheme or system of ideas or statements held as an explanation or account of a group of facts or phenomena; a hypothesis that has been confirmed or established by observation or experiment, and is propounded or accepted as accounting for the known facts; a statement of what are held to be the general laws, principles, or causes of something known or observed. By
that definition, and in contrast to the aforementioned criticism, information science has indeed engaged in theory, albeit with various different orientations borrowed from other allied disciplines such as communications, cultural studies, psychology, and sociology.

George Kelly (1963) considers theory as a way of binding together a multitude of facts so that one may comprehend them all at once. Kuhn (1970) noted that theories are at best only approximations of the observed reality and that the theories and models arising from them “attach to nature only here and there” (Kuhn, 1970, p. 21). Entman (1993) observed that research paradigms in Information Science have “remained fractured with pieces here and there” with no comprehensive statement to guide research, and proposes the concept of framing as a means of bringing together insights and theories that would otherwise remain scattered in other disciplines. Entman defines framing as the selection of some aspects of reality, making them more salient in a research inquiry in a way that promotes a particular problem definition, causal interpretation, or solution (Entman, 1993, p. 51).

Because of the very nature of information behaviour, it is a harder topic to study and to interpret, for behaviour is mostly instinctive, and non-deterministic; one's behaviour is generated by one's ideas and these ideas are mostly within a black box (Spink & Cole, 2006, p. 29). Nevertheless, just three years after the McKechnie and Pettigrew (2002) survey of theory in library and information science, Fisher et al. (2005) published a monograph on Theories of Information Behaviour that introduces more than 70 different theoretical concepts and models that have been used or are being recommended for use by researchers in Information Behaviour (Fisher et al., 2005).
2.3.1 Cognitive framework

The term cognition is non-technical in that it is not a scientific term but a metaphorical term for the purposes of identifying a particular concept. If we consult a dictionary, we are likely to come upon some reference to knowledge or thought. More specificity was provided by Ulric Neisser (1967), in a seminal book in the field, who defined cognition as “...all processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used” (Neisser, 1967, p. 4). Cognitive psychologists study such varied phenomena as perception, memory, problem solving, concept formation, and language. An important assumption guiding research in cognitive psychology is the idea that information processing is a complex activity, driven more by the nature of the system (human mind vs. computer) than by the material being processed. In other words, cognitive scientists believe that “environmental information only makes sense because of the way humans, as biological organisms, are designed” (Morgan, 2002) and that the human mind is designed to process certain kinds of information and is characterised by certain biases in information processing (Crawford & Kerbs, 1998; Newell, 1994).

The cognitive framework in IB research encompasses information seeking, information searching, and problem-solving theories. Spink and Cole (2006) define information seeking as a sub-set of information behaviour that includes the purposive seeking of information in relation to a goal (Spink & Cole, 2006). The initial state of the information seeking process is conceptualised as an information gap or anomalous state of knowledge (the ASK model) as proposed by Belkin (1980) or as an information need proposed by Dervin (1992).

The construction of this information seeking process evolves in stages and alternates between relevance judgements and uncertainty and depends on the key variables mentioned above. The goal state of the
information seeking process is the resolution of a problem or the satiation of a need, and humans adopt different strategies and exhibit different information behaviours at different stages of their information seeking process in order to solve these information problems (Case, 2007; Kuhlthau, 1993; Marchionini, 1995; Krikelas, 1983). Additionally, these strategies are related to social behaviour (Brown, Ganesan & Challagalla, 2001; Butler, 1993; Deutsch, Ruble, Fleming & Brooks-Gunn, 1988; Hildebrand-Saints & Weary, 1989; Morrison, 1993).

However, as mentioned in Chapter 1 (Section 1.2.3) there are limitations to the information-seeking theories and models, including the limited explanatory power of the concepts that underpin the information seeking/problem solving level (Case, 2007). In general, the information seeking theories are more suited to studying human interactions with information-retrieval (IR) systems than to human information behaviour at a broader, everyday level. Many of the studies using this cognitive framework have previously been mentioned in section 2.2.1.

2.3.2 Cognitive-Affective framework

In an attempt to go beyond the accepted paradigms of information seeking, Kuhlthau (1991) ventured into the subjective inside world of the searcher. Phenomenologically, this world is unknowable and beyond inquiry, but Kuhlthau’s methodology of asking 26 academically-capable high school students to journal their thoughts and actions related to their library-search yield some interesting results that positively correlate confidence and focus to grades. According to Kuhlthau’s theory of the ISP (Information Search Process), information-seeking is an individual process related to the individual’s affective state, for knowledge is constructed based on the individual’s past experience. Besides, no matter how many times we use an information process, a certain level of uncertainty always
results when one encounters new or unique information. Kuhlthau (1991) also addresses the effects of anxiety, the impact of uncertainty, and the importance of making sense of information as they relate to the information search. Kuhlthau defines this process of making sense, or learning, as being driven by a desire to seek meaning (Kuhlthau, 1991).

Although in information retrieval research, seeking meaning is associated with the identification of semantic structures in documents (Korfhage 1997, p. 239), Grice (1957) explains that the utterance of meaning reveals cognition, which is the very attitude and intention of conveying or constructing meaning, and the focus of much cognitive-affective research. Kuhlthau (1991) asserts also that people “purposefully construct meaning by selectively attending to that which connects with what they already know” (1991, p. 362). From a social and cultural aspect, this points to meaning as fundamentally a shared concept, or shared meaning (Dervin 1992) and a sense-making process within a personal frame of reference (Kuhlthau, 1991).

One must add that this meaning or sense making is not just a shared meaning with others, but also a shared meaning or a form of sense-making with one’s own past through lived experience or learned second-hand experience. Schutz rightly describes meaning as “nothing else but the attitude of the experiencing mind toward its past experiences” (Schutz, 1964, p. 271).

In her later work, Kuhlthau (1999) also introduces the concept of good enough. She defines the concept of good enough within information behaviour as what amount of information an information seeker thinks is enough to make sense of a phenomenon for oneself within a context in order to accomplish a task (Kuhlthau, 1999, p.6). This concept of enough is similar to economist and psychologist Herb Simon’s (1957) concept of satisficing discussed in section 2.3.8.6 and has since been used in many
studies of information behaviour in the context of students and scholars, and in regard to the role of emotions such as frustration in IB (Prabha et al., 2007; Parker & Berryman, 2007).

Motivation also plays an important role at the searching level. According to Kuhlthau, the role of motivation is particularly noticeable in the first stage of the ISP, during which students’ thoughts are commonly centred on “What does the teacher want?” (Kuhlthau, 1999, p.6). This relates to the cognitive coordination problems mentioned in Section 2.2.1 (a), as the student is not just looking for the right answer, but is looking for what he or she thinks that the teacher thinks is the right answer. For such an information search to proceed effectively, the individual must develop an understanding of what makes sense for oneself and then think about what others may think also. This brings us to the set of theories based on the concept of sense making.

A considerable body of information behaviour research focuses on the sense-making aspects of information seeking. Since 1972 Brenda Dervin has developed a needs-based theory called sense-making (not capitalised) based on the making and unmaking of sense within the human mind, and an associated methodology called Sense-Making (capitalised) that focuses on behaviours that people exhibit during their everyday experiences by analysing a broad spectrum of complex human activity. The sense-making model aims at understanding user situations and gaps in knowledge through a combination of non-purposive and purposive information behaviours. Inputs are bits and pieces of data that the individual gathers both consciously and unconsciously for the purpose of making sense of a problem situation. The problem situation can be very broad indeed, such as the problem of human survival or simply an existential angst.

Interestingly, the sense-making process starts only when the
individual achieves a sense of comfort or coherence, for this is a knowledge-based output where the individual has made temporary sense or coherence from what Dervin suggests is the “constant discontinuity of human existence” (Dervin, 1992). In this theory, seeking information helps bridge the gaps that makes our reality discontinuous. The goal state is assumed to be the *mastery of life*. In the sense-making theory, the information user is believed to construct information based on the values and specific environments of the *small world* in which the user exists, also termed as *life in the round*, concurrently apart from and as a member of the larger society (Chatman, 1991; Savolainen, 1995).

In the sense-making approach, humans are conceived as hard-wired theorisers about their world—sense-making posits that theory-making is a mandate of the human condition but because we live in a world of continuous discontinuity we must continuously make new theories (Dervin, 1992). This is somewhat akin to the *mental models* theory discussed earlier, except it is a combination of both cognitive and affective variables. According to Dervin (1992), when a gap in sense under an old theory develops in the individual’s world, the individual tries to make new sense, thus creating a new theory. The individual makes new sense by seeking information from the environment, which the individual interprets to build a bridge over the gap. Dervin defines the bridge as “the sense made over a gap between one time-space moment and another and simultaneously between material and interpretive worlds” (Dervin, 1992). Part of the bridge consists of information created by the individual on how to use the information found. The sense-making model of information behaviour is illustrated in section 2.4.2.

### 2.3.3 Cultural and contextual framework

Some studies have moved away from sense-making’s linkage of information seeking and use to the individual user’s mind and toward a
broader information behaviour perspective, including cultural contexts. According to Huotari and Chatman (2001), the distinct social and the psychological pre-conditions that determine information behaviour in the user’s own small world is in turn based on the division of people into insiders and outsiders who either inhabit this small world or wish to penetrate it with information and larger societal values. Insiders, however, share a common cultural, social, and occupational perspective (Huotari & Chatman, 2001), which is stronger and more important than the values and information coming at them from the outside, larger society. In Chatman’s 1991 study of school system janitors, for example, insider janitors do not accept or act upon information from outside their group if doing so negatively affects established relationships within the insider group.

Savolainen (1995) and others (Spink & Cole, 2001) have branched off from sense-making to concentrate on the situational aspect of information seeking called contextual information behaviours which provides a deeper contextual analysis of the situational aspect of information behaviour in everyday-life-information-seeking (ELIS) contexts or non-work information seeking contexts. Typically, ELIS studies discuss the ways in which people use various information sources to meet information needs in areas such as health, consumption, and leisure (Savolainen, 1995). The concept of insiders and outsiders from the small world perspective is also examined by ELIS researchers through an anthropological perspective, where the observations are analysed from the perspective of the user’s own small world rather than from the researcher’s information seeking paradigm.

Nardi and O’Day (1999) proposed an information ecologies perspective of information behaviour wherein they conceived the information space as an information ecosystem, and applied it to a contextual setting, both in workplaces and at home. Instead of a
professional-environment variable, this model stresses the diversity of human activities that takes place within a contextual setting like a home. The home environment has been explored in some empirical studies (Davenport, Higgins, & Somerville, 2000; Green & Davenport, 1999; Rieh, 2004), with an emphasis on family and social interactions and information activities. Davenport et al., in a study of Irish households, see the home as a discrete micro-organisation but Rieh on the other hand found that the home is not a discrete contextual environment but instead contains contextual elements that interact with larger spheres of information activity outside the home.

Savolainen (2008) has also proposed the notion of everyday information practice (EIP) and distinguishes it from IB by defining it as a set of socially and culturally established ways to identify, seek, use, and share the information received from various sources such as television, newspapers, and the Internet. These practices are often habitual (not unlike the idea of Bourdeiu's habitus mentioned in section 2.2.1.5) and can be identified both in job-related and non-work contexts (Savolainen, 2008).

This habitual behaviour can also be explained by Alasuutari's (2004) view on the role of routines in daily life – routines are crucially important and even necessary for the performance of necessary everyday actions in an automated fashion because the actors cannot stop to reflect on all the steps that they take daily (Alasuutari, 2004). According to Savolainen (2008), these everyday information practices are also part and parcel of something that people call “making sense of the everyday world and its events.” (Solomon, 1997). The cultural and contextual framework for ELIS and EIP research are both still closely allied with the sense-making theory (Dervin, 1992) and hence the Sense-Making methodology is often used in studies that utilise this framework.
2.3.4 **Anthropological framework**

In addition to the information seeking, sense-making, ELIS, and EIP approaches, some studies view information behaviour specifically from an information *foraging* perspective, which is derived from anthropology. This *information foraging theory* assumes that information behaviour is based on hard-wired strategies and tactics we have evolved over millennia beginning with our first hunter-gatherer ancestors. According to this framework, information input and output involves the same unchanging, hard-wired intrinsic knowledge that helped our hunter-gatherer ancestors in the wild, including storytelling strategies around a camp fire (Sandstrom 1994; Pirolli & Card 1995; Cronin & Hert, 1995; Pirolli, Pitkow & Rao, 1996).

Foraging is a concept used in anthropology and evolutionary psychology (Kurland & Beckerman, 1985; Mithen, 1990) and is increasingly recommended for information science (Sandstrom, 2001; Spink & Cole, 2002). Pamela E. Sandstrom initially developed the information foraging theory within Information Science in her work on scholarly communication through a bibliometric analysis of a network of scholars in the field of behavioural ecology where she drew connections between subsistence foragers and scholarly information seekers (Sandstrom, 1994). Blaise Cronin and Carol Hert (1995) described a very similar process in their study of the then emerging World Wide Web.

Foraging for information on the Web and foraging for food share common features—both resources tend to be unevenly distributed in the environment, uncertainty and risk characterise resource procurement, and all foragers are limited by time and opportunity costs as they choose to exploit one resource over another (Sandstrom 1994; Cronin & Hert, 1995). According to this theory, successful foragers are those who adopt strategies that maximise their harvest rates and their chances of survival.
As a model in evolutionary biology, foraging theory requires some proxy currency as a measure of survival fitness. Since information does not deplete no matter how many scholars have been ‘feeding’ on it, Sandstrom (1994) considers another characteristic of information, namely its novelty, as the currency.

Pirolli and Card (1999) and Mantovani (2001) examine human interaction with information retrieval and Web systems within an information foraging level that is based on the optimal foraging theory from evolutionary ecology. Optimal foraging theory (OFT) is concerned with the “searching efficiency” of cognitive systems, both human and non-human, for food and mating opportunities in the environment, as natural selection penalises any cognitive system whose searching deviates from “the optimal design for their environment” (Bell, 1991). Consequently, cognitive systems “evolve toward stable states that maximise gains of valuable information per unit cost” (Pirolli & Card, 1999). The evolution toward such a stable state is constructed by the human forager through a process of constructing effective foraging patterns and continuously fine-tuning or adapting these patterns to the ever-changing environment and the constantly depleting patches. Accordingly, the initial state involves patches, clues, and internal and external decision states. The information foraging process is an interaction between the person and their environment that includes the concepts of cues and diet enrichment—the human information forager, not unlike her Neanderthal ancestor, uses what Pirolli and Card call the proximal perception of information scent to assess profitability of an information source in relation to other potential sources (Pirolli & Card, 1999). The goal state is a stable state that maximises gains of valuable information per unit cost.

Although information foraging theory provides insights into how we seek information just the way we seek sustenance, it is more suitably applied with reference to information retrieval (IR) systems and Web
searches, as it pertains to activities associated with assessing, seeking, and handling information sources. Such activities need to optimise the value of information in relation to the expected costs of accessing and extracting the relevant information (Pirolli & Card 1995; Pirolli, Pitkow & Rao 1996). Humans seeking information adopt various strategies, sometimes with close parallels to those of animal foragers. Pirolli and Card (1995) point out that the strategy of the wolf seeking its prey resembles classic information retrieval, whereas the the strategy of the spider that builds a Web and waits for its prey is akin to information filtering. Pirolli, Pitkow and Rao (1996) note that the optimal selection of Web pages from a collection of related pages (or an information patch) is a kind of optimal information diet problem. The optimality of the foraging strategy chosen by users will depend on their ability to rapidly categorise the Web page types, rank category members, assess their prevalence on the information patch, assess the expected amount of return over cost of pursuit, and decide which categories to pursue and which to ignore (Pirolli, Pitkow and Rao, 1996). Presumably, we do all of that without much premeditation, for the foraging theorists assume that these strategies are hard wired in humans.

An allied theory named berry-picking (Bates, 1989) states that humans use the same passive scanning and sampling and selecting behaviours (akin to berry-picking in the wild) derived from millions of years of evolution in our online search for information (Bates, 1989). This theory is often used to frame studies in Information Architecture (IA), or user experience studies of Web pages and other retrieval systems and their design (Zachman, 1987; Hemminger, Vaughn, & Adams, 2007). The field of Information Architecture deals mainly with the usability of websites and the findability of information within them through a combination of design and organization. The user studies in IA are not reviewed here but will be discussed along with the diary data analysis where relevant.

Another interesting anthropological perspective is related to
information organising and use and is termed as information farming wherein people farm information by a process of weeding and tending in order to reduce the effort of information seeking, and tend to it on a regular basis to keep it under control, and harvest it when the need arises (Bates, 2002). Other anthropological terms use in IB include hunting, or predicting the likeliest location to find an useful item of information (Wilson, 1968); picking or selecting items based on a description (Wilson, 1968); browsing or hunting for sustenance in an area where finding and evaluating information sources are issues, or foraging for an unknown among uncertainties (O'Connor, 1993); and grazing, which is foraging in a space where evaluation and supply are not issues, or foraging among known sources (O'Connor, 1993).

2.3.5 Information Use Framework

IB studies have focused on processes involved in the seeking, searching, and finding of information, but very little on what humans do after finding the information, especially how humans use or utilise information, as opposed to the sources or strategies used to find information. Although a key concept in information behaviour, information use has received little attention from information science researchers (Kirk, 2002). Sense-making theory states that the information we seek (and presumably find) helps bridge the gap or uncertainty that triggers information seeking, but there are very few studies on how people do this, and what else they do with the found information. There are some studies of this post-finding phase of information, but they focus on “keeping found things found” (Jones, 2007) or organising found information for later access, the subject of section 2.3.6., but not how the information is put to use. According to Dervin (1983a), one can’t assume a necessary and predictable connection between information and its use, and Davenport et al. (2000) found that often decisions are made long before information is collected to support
that decision (Davenport et al., 2000), thus giving new meaning to the concept of information use.

Moreover, we often ignore or suppress information we find. We also use information in ways that we did not conceive of when we set out to seek (or encountered) the information, like sharing, manipulating, broadcasting, or creating new information. There are studies within the fields of organisational behaviour and organisational decision making that deal with some of these information use aspects, mainly within a collaborative or group environment, but IB studies have not investigated them to any significant degree. Kirk (2002), in a study of fifteen senior managers from two organisations found that the managers understood and experienced information use in five different ways: as information packaging; as information flow; as developing new knowledge and insights; as shaping judgements and decisions; and as influencing others. These five different ways of experiencing information use are related in a hierarchy that reflects three different views of information: as an object; as a construct; and as a transformative force (Kirk, 2002).

Moving from the external perspectives of information use to the internal perspectives within a person's mind, the modular thinking theory of information derived from Fodor's (1983) Modularity of Mind, posits that information use begins with preconscious data pick-up from the environment while the individual is attending to other information activities. ‘Use’ is defined as incorporating this picked-up information into knowledge – a knowledge that helps us survive (Spink & Cole, 2006). How we organise this data within our own minds is still a matter of hypothesis within brain science. The evolution of human cognition points to abstraction as the key mental survival skill, enabling us to more efficiently exploit our environment, cope better with extremes, and be more flexible in our social behaviour. There are also internal use behaviours [e.g., comparing, categorising, polarising] and external use behaviours [e. g.
listening, agreeing, disagreeing] involved in the process (Spink & Cole, 2006).

A problem-solving definition of information use is the incorporation of the found information into one’s pre-existing knowledge base by thinking, by taking notes, or in some way cognitively processing the acquired information (Ford, 2004; Todd, 1999). Investigating how humans incorporate found information into their pre-existing knowledge structure provides a link to the wider notion of human information behaviour because it describes the precise moment when the human information environment and the human come together. Overall, few studies have investigated information use behaviour in relation to other information behaviours, for a part of this equation is still within the unknowable region of the human mind.

2.3.6 Anticipated-information-need framework

The anticipated-information-need framework includes information-organising theories, for we organise in order that we may retrieve (Taylor, 2004), thus anticipating a future information need (Bruce, 2005). In our increasingly information-rich society, how do we deal with all the information we gather, voluntarily or involuntarily? Individuals who are not information professionals are organising and categorising large amounts of external information both for their own use and for use by others, through browser bookmarks and social bookmarking (Jones, et al. 2002). This is a potentially significant change, for until recently, classification of information was a top-down, structured process, and was organised according to predetermined schemas based on authority control, as in libraries or online database. Now, much like the increasing customisation of goods and services available to us (think of an entire life’s music collection available as individually accessible songs on a device the size of an eraser), the power of computer networks has put a powerful
organisational capability in the hands of ordinary information consumers.

In recent years, the IA community and the Web search engine studies community have both been fascinated with a concept that is variously termed as social tagging, ethno-classification, social classification, electronic tagging, social ontologies, collective categorisation, or collective tagging, and some even see it in terms of a folk taxonomy (Albrechtsen et al., 1998; Udell, 2004). They all refer to a concept wherein users are able to add their own tags to objects and documents on the Web. More recently, a newly coined term *folksonomy* is the term employed by the information architecture community for this phenomenon (Wright, 2004). This has implications both for the organisation and the retrieval of the information, for users may not share a single perspective on topics. A photo that one person may tag as ‘freedom fighters’ may well be tagged by another person as ‘terrorists’. Moreover, ambiguity of the tags can emerge as users apply the same tag in different ways. At the opposite end of the spectrum, the lack of synonym control can lead to different tags being used for the same concept, precluding collocation. On the positive side, folksonomy could provide for greater serendipity on the Web (Mathes, 2004), just like browsing a physical collection may do, in contrast to an electronic retrieval system which provides high relevance and hence less browsing.

Despite all these information management tools available to us, many information behaviour studies indicate that the majority of people “prefer to seek information internally first” or in other words, from a personal store of information sources and channels (Bruce, 2005). In Chen and Hernon’s (1982) study of voters' information-seeking behaviours, 89% of the 3548 respondents said that they first and foremost accessed information from a taxonomy of their “own experience” (Chen & Hernon, 1982). Nevertheless, no studies have examined humans’ information-organising and use behaviours in relation to other information behaviours.
2.3.7 Multitasking framework

Time, by its very nature, is one of the biggest equalisers, for all of us have exactly the same amount of time in a day, and we cannot buy or sell time, although we can buy or sell the use of our time. Multitasking serves as one of the ways people get more out of their time, and such a prevalent phenomenon in everyday modern life must surely also influence our information seeking behaviours.

Termed variously as simultaneous activities, overlapping activities, concurrent activities, parallel activities, primary and secondary activities, multitasking, and as *polychronic time use* (Ironmonger, 2003), this phenomenon has long been recognised as important (Szalai, 1972), yet it is only in the past decade that researchers have begun to seriously record and analyse multitasking related data. In the realm of information behaviour research, the process of seeking information concurrently over time in relation to more than one, possibly evolving, set of information tasks (including changes or shifts in knowledge, beliefs, cognitive, affective, and/or situational states) is called *multitasking information behaviour* (Spink, Ozmutlu & Ozmutlu, 2002).

Studies of multitasking information behaviours have provided some initial insights into this aspect of information behaviour. Some information behaviour studies like Spink, Jansen, & Park (2004) have studied multitasking but mainly within electronic information seeking environments. Spink (2004) reports results from a single-subject diary study exploring the multitasking information behaviour by an executive where it was found that the information seeker often sought information on up to four unrelated personal information tasks and found that the information seeker engaged in a process of seventeen information task switches over two information seeking episodes. In a single-subject ethnography study, Laurier (2004) discusses the use of travel time by mobile workers, describing the (often
disturbing) level of multitasking information behaviours undertaken by ‘Ally’ whilst driving, including reading e-mails, arranging meetings and communicating with clients on the telephone (Laurier, 2004). While not all multitasking may be that extreme, it is nevertheless a fact of life.

More recently, Spink and Dee (2007) found that people also experience cognitive shifts during multitasking web-searching behaviour, shifting between different cognitive functions like planning, problem solving, coordinating, and self-monitoring. Spink and Du (2007) and Spink, Park, and Cole (2006) explored the relationship between multitasking and cognitive coordination during Web search, and found that cognitive coordination processes are important for constructing users' Web search behaviours. Cognitive coordination is defined as the management of dependencies, or conflicts, between goals, tasks, and resources of various agents (Spink & Du, 2007). Coordination problems are different from information problems as they require one to think about not only what one believes, but also make an informed guess about what others believe (Surowiecki, 2005), or in other words, one needs to know how another person might have described or organised a resource in order to be able to find it or use it. Hence, cognitive coordination can be viewed as a form of mental translation when we switch seamlessly from our own perspective to another person's perspective and back. This is similar to the problem of intersubjectivity mentioned in section 2.2.1 (a).

In a survey-study of public library patrons, Spink et al. (2007) found that sixty percent of people visiting a public library are seeking information on multiple topics and are engaged in multitasking behaviours. The public library users often construct a multitasking process consisting of multiple information tasks interleaved with electronic access, library search, browsing tasks, and communication tasks. Public library users coordinate and construct a process of switching between these information and non-
information tasks. Based on these findings, Spink et al. (2007) proposed a multitasking and information-task switching model of human information behaviour. Du (2010) found in a dissertation research that users experience cognitive shifts during Web search and use multitasking strategies to shift between different cognitive states during a Web search session (Du, 2010).

2.3.8 Other miscellaneous frameworks

There are other theories mentioned within studies of information science, but they have been used to a lesser extent in IB research, either because the information behaviours they describe are either ubiquitous or are not observable or definable with many of the research instruments commonly used. Nevertheless, there are some general human behaviour approaches that have been accorded the status of a theory within information behaviour. Below are a few notable ones:

2.3.8.1 Uses and Gratifications

The uses and gratifications theory arose from communication studies and is used specifically in the context of media studies. This theory states that contrary to the hypodermic needle idea of media information consumption where the audience are passive consumers, the audience actually uses the media to obtain specific information gratifications (Chou & Hsiao, 2000; Morris & Ogan, 1996; Newhagen & Rafaeli, 1996). According to this approach, social situations and psychological characteristics motivate a need for information from media such as television, which in turn inclines towards certain information expectations from that media. This causes us to selectively expose ourselves to media information content that seemingly fit our expectations, and which leads to our ultimate gratification in some form—information, entertainment, sharing with peer group, and a
sense of community, or simply to ward away loneliness (Morris & Ogan, 1996; Newhagen & Rafaeli, 1996). Chatman (1991) concluded after a study of university janitors’ information needs and information seeking behaviours that the theory of uses and gratifications is applicable to information-seeking studies, for participants were found to selectively be open to information in the same way (Chatman, 1991). More recently, the theory has been applied to IB research concerning mobile Internet, social networking, and political information seeking (Chigona, Kwamkvenda, & Manjoo, 2008; Bumgarner, 2008; Jackson & Lillekar, 2007). According to Case (2007) this approach has not been used widely within IB because of the difficulty in generalising the often simplistic and individual findings it elicits (Case, 2007).

2.3.8.2 Delayed Gratification

According to the risk-taking model of behaviour (Atkinson, 1957) people choose a task by evaluating: 1) the level of difficulty, 2) success and failure probability in completing the task, and 3) the incentive they might get for choosing the task. Their decision to gratify or to delay divide them into failure-oriented people and success-oriented people. The ability to postpone a gratification in favour of a bigger reward, or defer gratification is usually construed as a personality trait which is important for life success. (Ray & Najman, 1986; Sorrentino, Hewitt, Raso-Knott 1992; Heckhausen & Heckhausen, 2008). This deferred gratification, according to Daniel Goleman (1995), is an important component of emotional intelligence, which in turn plays a part in a person’s life success. People who lack this trait are said to need instant gratification and are presumed to suffer from poor impulse control. Alvarado-Albertorio (2007) whilst studying the multitasking information behaviours of Web users, discovered that participants’ use of the Web closely resembled audience’s use of media such as television and could be explained by the uses and
gratifications theory, where their use of websites aligned with their expectations of gratification they obtained from it. Additionally, it was found that delayed gratification or deferred gratification influenced information problem-ordering and information tasks within an empirical study of assigned or externally imposed information-searches on the Web. While some participants seek instant gratification or immediate results in their Web searching tasks or Web browsing activities, some participants deliberately put aside an easy or pleasurable information task for last, and plan for a delayed gratification, presumably so they can finish their experience with a feeling of success (Alvarado-Albertorio & Spink, 2007).

2.3.8.3 Principle of Least Effort:

The principle of least effort is derived from linguistics and philology wherein an individual's actions will involve the “probable least average” of his or her efforts or “the least average rate of probable work” (Zipf, 1949). Durrance (1988) found that people prefer the most-accessible channels of information like oral channels or asking another person as they prefer to “take the path of least resistance.” People prefer to ask their colleague or family member first before seeking information from other alternatives (Durrance, 1988, p. 161), although it is possible that the results might be very different if the study were repeated today, as information has become more accessible to the user directly. This approach could be confused with the optimal foraging approach and the cost-benefit analysis approach (Pirolli & Card, 1999) mentioned in Section 2.3.4 and often used in the study of online settings, but the Principle of Least Effort is more often used in the context of inter-personal settings, where the behaviour is not exactly optimal or rational (Case, 2007). Poole (1985) identified that the concept of least effort applies to people’s information behaviours and provides the explanation for a set of findings from seventy-nine case studies of information seeking and use (Poole, 1985).
2.3.8.4 Cognitive Authority and Scepticism:

Patrick Wilson (1983) proposed the idea of cognitive authority through his sociological research and posited that all that people know of the world beyond the narrow experience of their own lives is through others, and this constitutes the majority of what we know. Nevertheless, only those who we deem as people who “know what they are talking about” become cognitive authorities (Wilson, 1983). Chatman (1991) used the framework of cognitive authority in an information seeking study of low-skilled and low-income workers and found that they placed greater cognitive authority on human sources available within their immediate social milieu (Chatman, 1991), thus preferring second-hand experience from people they trusted within their community rather than external cognitive authorities such as newspapers, books, or other media. This led to a theoretical perspective that is termed as life in the round in which a closed cultural group and its social norms influenced its members’ world-views and their information behaviour patterns (Chatman, 1991).

Other concepts related to cognitive authority in regard to information behaviour are peoples’ scepticism of information, and credibility of information but it has not been the specific focus of any information behaviour research. Julien and Michels (2000), found that scepticism plays a significant part in the information resources that people used. Rieh and Belkin (1998) found that participants assessed credibility of information sources based on the consequences of use, level of commitment, and the focus of inquiry, and that they employed different sets of rules and criteria with respect to Web and traditional information systems (Rieh & Belkin, 1998). Hilligoss & Rieh (2008) repeated the study in 2008 and the difference between the 1998 and the 2008 studies was that in 2008, the participants depended more on the credibility judgements of other people on the participatory Web except where the information
obtained affected other people, in which case the credibility concerns increase (Rieh & Hilligoss, 2008).

2.3.8.5 Information Manipulation and Issues of Memory

Jin and Bouthillier (2008), in a diary-and-interview study of the information behaviours of competitive intelligence (CI) professionals from various organisations in Canada, found that manipulation of information was an important part of their information behaviours and went hand in hand with information seeking, and helped transform information into intelligence (Jin & Bouthillier, 2008). Weick (1995) in his monograph titled Sense-making in Organizations, makes a direct connection between manipulation and sense-making by stating that manipulation is indeed a process of sense-making and that “manipulation involves simplification of the perceived world by operations on the world itself rather than the perceiver” (Weick, 1995). In communication studies, information manipulation is viewed as a form of deception (McCormack et al., 1992). On the other hand, orally-transmitted second-hand information always evolves in strange ways as it is passed on from person to person, as in a game of Chinese Whispers, and depends on a person's memory and has been the primary context of humans' everyday information behaviours for millennia. It may or may not involve intentional manipulation. Information can be transmitted incidentally, deliberately or accidentally between people and ideas may just be evolving as they are translated down the line.

Memory researchers (Brainerd & Reyna, 1998; Loftus, 1980; Loftus & Loftus, 1980; repeatedly found that human memory is a fallible source of information, for the human brain manipulates information, and is very prone to building upon mere suggestions. In Loftus’ (1975; 1980) theory of memory for complex experiences there are two main processes. The first process deals with the acquisition of data, and the second
process delves into the retrieval of that data. The acquisition can further be divided into two components. The first is the acquisition of the original experience. Clearly not everything that happens to us can be stored in our memory. The mind separates what is and is not to be stored by the amount of attention we give a particular object. How many times have you read a paragraph only to discover you have no idea what you have read? In order to acquire a particular memory we must concentrate on what it is we want to store. Once our attention is focused, the mind transforms the information into some form or representation that can be stored in the brain. This newly acquired information is not carved in granite by any means. It is subject to future alterations by a mixing of the actual event with subsequent or even prior information. This illustrates the second component of the acquisition process, the acquisition of additional information. In the example of witnesses in police cases, it is at this step where “leading questions (by interrogators and police) enter into the picture and are able to distort the true representation stored in the memory of crime witnesses” (Loftus 1975; Loftus, 1980).

According to Ramachandran (2004), sociologists and anthropologists have a long-standing hostility to psychological explanations of human behaviour but if the object of study is memory it is hard to see why there should be a problem, especially if it can be related to neurobiology, as neuroscientists have done. Ramachandran (2004) states that many social scientists feel rather deflated when informed that beauty, charity, piety and love are the activity of neurons in the brain, but their disappointment is based on the false assumption that to explain a complex phenomenon in terms of its component parts is to explain it away and is a sort of reductionism. Ramachandran argues that contrary to explaining it away, such research helps to reinforce and confirm the lived experiences of human beings (Ramachandran, 2004). In research related
to both memory and learning information, behavioural psychology researchers (Soler & Ruiz, 1996; Harris, 1980) have found that students have a greater preference for external memory aids (such as written notes, diaries etc.) to remember information over formal memory aids (mnemonics) because formal memory aids require careful learning which are not common in everyday life. This was not the only explanation, however, for students who already had knowledge of formal memory aids still did not use them any more than other students did and hence difficulty in using them provided an alternative explanation, along with the theory that they preferred the method that required the least cognitive load even if it may not provide the best recall. Of the students who did use formal memory aids, verbal was the most commonly used and images the least (Harris, 1980). These findings are in accordance with Zipf's Principle of Least Effort previously discussed in section 2.3.8 (c).

Historically, the oldest way of organising information was through memorising the names of one's ancestors in order to maintain one's identity, and in many ancient civilisations like the Indus Valley civilisation, oral transmission and rote learning were encouraged, for reliance on language in its written form was seen as crippling, and not giving true control over the content; hence this ancient Sanskrit proverb – "Knowledge in a book; money in another's hand" (Kautilya, 1990). Mayans believed that outsiders write things down not to remember them, but so as not to remember them. In Plato's Phaedrus, Socrates narrates a story where the king of Egypt refuses a gift of the craft of writing from the gods fearing that it will encourage forgetfulness in the minds of learners for lack of practice in memory. Even today, memory plays the most important role in an individual's information behaviours, for "a person who cannot remember is cut off from the knowledge of prior experience, unable to build patterns of consciousness that bring order to the mind (Csikszentmihalyi, 1990, p.
2.3.8.6 Satisficing and Optimising

The economist and psychologist Herbert Simon coined the term *satisficing* which has levels of meaning between satisfying and sufficing, wherein a person often decides to terminate a cognitive activity when they feel that they have adequate information to make a decision (Simon, 1957), rather than *optimise* and plod through for an optimal solution. Diane Nahl (2007) used the *satisficing and optimising* framework in the discourse analysis of three text sources – web-searches, student papers, and magazines – and found that people’s self-descriptions of their information practices contain references to a continuous processing flow between satisficing and optimising behaviours (Nahl, 2007). Previously Nahl (2005) discovered that searchers who have strong, positive affective coping skills such as high *self-efficacy* and *optimism* make use of *satisficing* procedures with less variability than searchers who obtain lower optimism and self-efficacy scores (Nahl, 2005).

Prabha *et al.* (2007), in a study of academic library users found that the users make both a qualitative and quantitative assessment of the information, which leads them to make rational choices for determining when the amount or quality of the information they found, and/ or the amount of effort they put in, is *good enough* to *satisfice* their need. The situational context of the participants’ specific information need and their role in academic society also affects every stage of their search – from the selection of the first resource, to ongoing search strategies, to decisions on how much information is enough” (Prabha *et al.*, 2007).

2.3.8.7 Information Horizons

Diane Sonnenwald (1999) suggests that within any context and situation there is an “information horizon” in which we act. This concept was
empirically derived from a study where participants were asked to describe several recent information seeking situations for a particular context, and to draw a map of their information horizon, graphically representing the information resources (including people) and their preferences. The resulting graphical representation of their information horizons, analysed in conjunction with interview data, identifies information seeking as an activity located within specific contexts and situations that have their individual boundaries or information horizons, within which we act (Sonnenwald, 1999). An information horizon may consist of a variety of information resources such as colleagues, librarians, books, documents, information retrieval tools, and web pages (Sonnenwald, 1999). Building on this idea, Savolainen and Kari (2004) defined information horizon as an imaginary field that opens before the “mind’s eye” of the onlooker or information seeker and is a subset of one’s “perceived information environment” (Savolainen & Kari, 2004).

Savolainen (2008) also associates this concept of information source horizons with everyday information practice discussed in section 2.3.3 for this perceived information environment is driven by the user’s interests on an everyday basis, and these interests structure the subject areas of daily life into an order of importance or regions of relevance. These preferences, in turn, are reflected in the construction of information source horizons (Savolainen, 2008). In other words, this could be explained as a sort of information monitoring behaviour within a defined environment specified and driven by the user’s interests or capabilities. For example, monitoring certain sources for news everyday or on a more frequent basis. O’Connor (1993) states that monitoring occurs as one is constantly watching or scanning surroundings in anticipation of information that could stimulate thought (O’Connor, 1993). One could do this through browsing, which could be interpreted as a strategy used to put oneself in a particular situation in order to encounter information.
Sonnenwald's (1999) concept of information horizon is analogous also to the concept of information field (Cool, 2001), which is an individual's starting point for information seeking. The information field idea originally comes from psychology and is a combination of Gibson's (1979) Affordance Theory and Stamper's (2001) extension of it to physical affordance and social affordance. Physical affordances are repertoires of behaviour attached to the properties of the physical environment, as in how we know that the door is an affordance into the other room, and that the doorknob is an affordance to the door, just as we know many other design features of everyday objects and their use. Social affordances are repertoires of behaviour tuned to the social environment. Because a person’s knowledge of physical affordances is heavily dependent on the knowledge that has been built up and has been handed down from generation to generation in a community, these physical affordances can be social in nature as well as with knowing who to approach for information. Therefore the “information field can be seen as a set of physical and social affordances that are shared in a community” (Stamper, 2001). Social affordances are socially constructed, and are therefore often only valid within a certain community, and are temporal. Affordances can also be viewed as opportunities for action. For example, when a window pops up on your computer monitor with a message, it is providing you an affordance or opportunity for further action. Donald Norman introduced this idea in his book The Psychology of Everyday Things (Norman, 1988) which posits that humans seem to know an object's intended use, even when the object is something that they have never seen before, because they instinctively apply their past knowledge and experience to their perception of things around them (Norman, 1988). All the same, an object's intended use (its real affordance) can be different from its use as perceived by any given user (its perceived affordance). Affordance theory is widely applied in graphic design within the gaming industry to create a
easily usable information environment for the user.

In the field of information science, Sadler and Given (2007) applied the concept of affordance to study if graduate students’ perceptions of the affordances provided to them by the library (books, databases, instructional sessions, librarians, physical spaces etc.) were aligned with the intended affordances of these same resources as perceived by the librarians. The findings suggest that there is a disparity between the two and that this has implications for information literacy. Either the librarians were not actually providing the affordances in a way that was accessible to the students, or the two groups had different conceptions of the same. These same graduate students, who themselves did not use the resources afforded by the library, often also taught undergraduate courses. Hence it is possible that they were passing on this disparity and its implied lack of information literacy on account of this communication gap (or two different mental models of the library) between librarian and students, which could presumably affect their learning goals (Sadler & Given, 2007).

2.3.8.8 Learning and Information Literacy

One of the central concepts in psychology concerns whether or not concepts of mind such as memory, thinking, and problem-solving are needed to explain behaviour, particularly human learning behaviours. The theoretical psychologist Clark Hull, in his work on behaviour theory (Hull, 1951) argued that concepts such as mind, thinking, and even learning were unnecessary in a theory of behaviour. He conducted experiments to show that habit, strength, drive, and incentive by themselves could account for quantifiable learning behaviour.

Edward Tolman (1951) took the opposite position and argued that concepts involving the mind, such as “cognitive maps” were necessary to explain the learned behaviours of even of something as simple as rats
running a maze. In the meanwhile, John Watson (1930) had already extended Ivan Pavlov's 1903 findings (reported in Pavlov, 1960) on Classical Conditioning from animals to humans, and set out to prove that the concept of mind was unnecessary in explaining learning behaviour; as behaviour could be controlled by controlling the environment in which a person was placed. B. F. Skinner (1950) followed the same line of reasoning and conducted experiments showing how manipulating schedules and reinforcement could control learning and behaviour. Later, Albert Bandura, in his Social Cognitive Theory gave a central role to cognitive, vicarious, self-regulatory and self-reflective processes in learning (Bandura, 2001), very much akin to the uses and gratification theory mentioned in section 2.3.8.

Newell and Simon (1972) found that to model information processing with computers, which they considered analogous to the human brain, they had to include concepts such as memory, learning, decision making, and problem-solving (Newell & Simon, 1972). This latter information-processing model of the human brain, human learning, and human behaviour has been the dominant one in the cognitive perspective in IR and IB research.

Nevertheless, many contemporary cognitive scientists, educational psychologists, sociologists, and learning experts follow Lev Vygotsky's constructivist example (Vygotsky, 1978) and conduct learning research that shows how learning and the construction of knowledge is socially mediated. Vygotsky strongly stated that the community played a major role in the process of "making meaning" in a person's life, very similar to the sense-making theory applied in IB. Vygotsky's theory named MKO or the More Knowledgeable Other (Vygotsky, 1978) is very similar to the theory of Cognitive Authority mentioned in section 2.3.8.4 and his theory of the Zone of Proximal Development or ZPD (Vygotsky, 1978) is very similar to
the *information field* and *information horizon* concepts previously mentioned in section 2.3.8.7. MKO implies that the learner seeks information from someone who has a better understanding or a higher ability level than the learner with respect to a particular task, process, or concept (Vygotsky, 1978) and ZPD refers to the processes the learner goes through in learning from the MKOs in graduated stages with scaffolding at every stage, thus gradually increasing his or her learning horizon (Vygotsky, 1978). In some ways, MKO is very similar to the idea of *cognitive authority* (Wilson, 1983) in the sense of looking up to someone who we think has a better knowledge or understanding of something.

Following Vygotsky’s example, the research question in the field of learning and education is no longer mind versus no mind, or even the biological and sensorimotor development model of learning as expounded by Piaget (1985). Now, the question has been replaced by how environment and human cognitive, social, and emotional characteristics, taken together, influence observable behaviour. Undoubtedly, one of the main behaviours related to the mind and to learning is information behaviours, for these behaviours provide the affordance of information into a person’s mind, whether or not the person is in an explicit educational setting or other situations that involve learning, which, theoretically, would include a person’s whole lifetime, and even human evolutionary and socio-cultural history.

In a research area closely allied with IB that spans both information behaviour theories and learning theories and is termed as information literacy, there is much research that is relevant to human information behaviours. Information literacy is defined as “the ability to recognise when information is needed and have the ability to locate, evaluate, and use effectively the needed information” (American Library Association, 1989). The majority of the studies in IB research are carried out in educational
settings like schools, colleges, universities, and public and academic libraries, and hence the research, although explicitly studying information behaviour, implicitly includes information literacy. Much of the IB research discussed in this review (Edwards, 2006; Kulhthau, 1991, 1993; Nahl, 2001; Sadler & Given, 2007) certainly would fall in this category. Nevertheless, much of the research that is explicitly about information literacy (including computer literacy), have more implications for specific organisational settings and for information policy at a macro level as in universities, governments, and other organisations, and have not been applied widely in the context of everyday life information behaviours.

2.3.8.9 Information Grounds and Information Ecologies

Dervin’s research focused on how everyday communications are a form of information transfer and diffusion (Dervin, 1977, 1983, 1989, 1992 &1994). Taylor (1991) connects information to communications with his statement that “information is the property of communication” (Taylor, 1991, p. 92) thus establishing information as something that occurs within the context of a communicative act, whether it is through a retrieval system or otherwise. Pettigrew further extended this social information transfer and information-sharing idea to spatial contexts, especially the physical spaces where information sharing occurs, and coined the term information grounds, based on a study of the nurses and patients at a chiropodist’s office (Pettigrew, 1999).

Information Ground is described as a synergistic environment temporarily created when people come together for a singular purpose (like in a doctor’s office or a hair salon) but from whose behaviour emerges a social atmosphere that fosters the spontaneous and serendipitous sharing of information (Pettigrew, 1999, p. 814). Since then, there have been many studies of various information-sharing spaces that use this
concept (Fisher et al, 2004; Savolainen, 2009; Meyers, Fisher & Marcoux, 2009). Since these information grounds are dynamically created by the people sharing a given space at a given time, and are temporal, and any number of such information grounds can exist at any given time, although certain spaces lend themselves more to this sort of information behaviour, especially spaces like beauty parlours, coffee shops, doctor's offices, nurse's stations, social groups, libraries, classrooms, hobby groups, tattoo salons, and bus stops, not to mention the proverbial water cooler (Fisher, Landry, & Naumer, 2006).

In a related theory of information ecologies, an information environment is perceived through the metaphor of ecologies and focuses on the individual in a particular physical, social, and cultural environment and the dynamics therein (Williamson, 1998). Nardi and O' Day (1999) applied the idea to describe a library as an information ecology that is ever-evolving and has relationships and inter-relationships and dependencies within (Nardi & O' Day, 1999). The difference between the the idea of information grounds and the idea of information ecology is that the information grounds are temporal creations whereas the information ecology is a stable, albeit not static entity and can even hold several information grounds within.

On the opposite end of the information-sharing spectrum is the idea of hoarding information, which may be considered a form of manipulation of information. Sheen (1992) found that some scientists draw a boundary around their expertise to protect their status within an organisation and do not always share all the information that they gather. In a more mundane sense one could argue that this is a common human behaviour that relates to protecting one's information grounds or foraging patch. This idea of hoarding, controlling, or suppressing information is also expressed in the old adage “information is power.” This has been studied within the
disciplines of Information Ethics and Information Policy in the form of library ethics relating to information filters and government policies related to so-called classified information and information suppression, including Internet filters, and issues related to copyrights, patents, data privacy and security, and open-source information (Capurro, 1985; Neelameghan, 1981; Oppenheim, 1998).

2.3.8.10 Information Avoidance

The assumption that individuals actively seek information underlies many of the information theories and communication practice, as well as many models of the information-seeking process. However, much research has also noted that sometimes people *avoid* information, if paying attention to it will cause mental discomfort or dissonance (Case *et al.*, 2005). According to Maslow, we can seek knowledge in order to reduce anxiety and we can also avoid knowing in order to reduce anxiety (Maslow, 1963).

According to Rogers (1983), individuals generally tend to expose themselves to information that is already in accordance with their interests, needs, or existing attitudes and avoid information that contradicts them, thus employing *selective exposure*, and consciously or unconsciously avoiding or rejecting information that does not agree with their world-view. Ditto *et al.* (2003), in a study of patients' responses to favourable and unfavourable medical diagnoses, have proposed that the patients more readily embrace information that is consistent with their preferred judgement conclusion and avoid or reject information that is inconsistent with their preferred judgement conclusion. They posit that this stems from the simple fact that “the former is less likely than the latter to initiate effortful cognitive analysis” (Ditto *et al.*, 2003, p. 1121). This idea is very similar to the one of *cognitive dissonance* proposed by Festinger (1957) and discussed in section 2.2.1
This phenomenon of information avoidance is often noticed in attitudes toward genetic screening for diseases like Huntington's and cancer, and is discussed in detail in Case et al. (2005). Other related concepts include monitoring or vigilance where a person under stress or threat actively monitors an information environment. Stress-related information behaviours also include repressing, blunting and rejecting of information wherein a person voluntarily or involuntarily blocks out some information (Krohne, 1993; Miller & Mangan, 1983). This concept of information avoidance has been studied with respect to medical contexts, but may be applicable in other contexts too, although few such studies have been done within IB.

2.3.8.11 Flow Theory

Flow theory, developed by Mihaly Csikszentmihalyi (1990) and described in the book Flow: The Psychology of Optimal Experience, describes a positive mental state akin to happiness that a person experiences when he or she becomes intensely engaged and absorbed in a given activity. It suggests that in this optimal state of motivation, engagement meets skill, and temporal impediments to creativity like hunger or other necessities and distractions fall away, and the person is in a state of flow, or in the groove or zone of productivity or happiness. The theory was empirically derived from a large-scale investigation using the experience sampling method (ESM), a highly structured electronic diary, wherein participants were asked to record their feelings on a periodical basis following a prompt from the researchers. Csikszentmihalyi (1990) describes how new information creates order or disorder within an individual's mental state depending on how it is processed, thus enabling or inhibiting Flow (Csikszentmihalyi, 1990).

Within IB, the concept of Flow has been studied in the context of
information seeking on IR systems and surfing on the Web (Trevino & Webster, 1992; Artz, 1996; Chen et al., 1999) but not in the context of people's everyday lives. In an information processing theory that is somewhat akin to the Theory of Flow, Miyata and Norman (1986) stated that there are two styles of human information processing: task-driven processing and interrupt-driven processing. In a task-driven state, people become engrossed in the task which they are paying conscious attention to and do not process other events. In an interrupt-driven state, people are usually sensitive to extraneous events, easily distracted by extraneous thoughts and external signals. Individual differences play a role in deciding whether a person is in a state of task-driven or interrupt-driven processing. Some people are more easily controlled by task-driven structures; others are more interrupt-driven and are distractible by extraneous events or thoughts (Miyata and Norman, 1986).

These findings are closely aligned with the Temporal Motivation Theory of procrastination in psychological research wherein procrastination is strongly associated with sensitivity to delay; specifically, people who are more distractible, impulsive, and have less self-control tend to procrastinate more (Steel, 2002). There have been few studies in IB that examine procrastination but they do so mainly in the context of student procrastination and managerial decision-making (Onwuegbuzie and Jiao, 1998; Lavoie & Pychyl, 2001; Heinstrom, 2003).

2.4 Information Behaviour Models

Models typically focus on more specific problems than do theories, and both theories and models are simplified versions of reality, yet models typically make their content more concrete through a diagram of some sort (Case, 2007, p. 120). Many of the models in IB are allied with some of the aforementioned theories or have elements from more than one in them.
Since the goal of this study is to create a unified and integrated model of information behaviour, only the oft-cited and more general models are reviewed, along with an example of a study that has used each of the models.

2.4.1 Behavioural Models

2.4.1.1 The Ellis Model

Ellis (1989) developed a behavioural model (Figure 2-1) of information seeking that is considered a seminal work in the field. Although this model was developed in the context of information retrieval design for use of social scientists, it is mentioned here as it has had considerable influence over how successive models were developed, including Kuhlthau's Information Search Process model (Godbold, 2006).

![Figure No. 2-1. The Ellis Model: Figure based on Ellis (1989).](image)

This oft-cited model has had a profound impact on information seeking research because it demonstrates patterns across situations and contexts. Six primary behaviours in information finding are identified:

- **Starting**: Identifying relevant sources of interest
- **Chaining**: Following and connecting new leads found in an initial source—backward or forward.
- **Browsing**: Scanning contents of identified sources for
subject affinity—looking at Table of Contents, Index, Title Lists, Subject Headings, and so on and is “a semi-directed search in areas of potential search.”

- **Differentiating**: Filtering and assessing sources for usefulness and filtering and selection of sources “by noticing differences between the nature and quality of the information offered.”
- **Monitoring**: Keeping abreast of developments in a given subject area by regular checking of “core” sources.
- **Extracting**: Systematically working through a given source for material of interest.

Although the model itself is static in that it does not provide for a feedback loop between the various behaviours, it is important to note that this categorisation of behaviours does not necessarily indicate a unidirectional process for information seeking. Rather, the importance and involvement of each one of the behaviours in a given search is variable and situational. Actual occurrences of these behaviours can be, and usually are, iterative as well.

The Ellis model has been revised and extended through many studies since. Meho and Tibbo (2003) studied academic social scientists and found that a few more categories of activities had to be added (Figure 2-2).
Meho and Tibbo (2003) found (as Ellis did also) that the activities identified in their study – starting, chaining, browsing, differentiating, monitoring, extracting, accessing, networking, verifying, and information managing – are not necessarily entirely or always sequential. Scholars move from one research activity to another based on their momentary or changing needs. In general, however, the information-seeking activities of academic social scientists – based on the group of scholars studied here – are best divided into four interrelated stages: searching, accessing, processing, and ending (Meho & Tibbo, 2003).

### 2.4.1.2 The Krikelas model

When looking for information, searchers constantly recheck and re-evaluate their progress and adjust their procedures. According to Case (2007), human information seeking is not so simple. It is neither straightforward nor typically complete; it is more like "a series of
interruptions, punctuated by other interruptions” (Case, 2007, p. 328), and the Krikelas model (Figure 2-3) illustrates this very well.

![Figure 2-3: The Krikelas Model: From Case (2002, p. 120)](image)

Krikelas defines information need as the recognition of uncertainty, and states that people make “an attempt to continually construct a cognitive environmental ‘map’ to facilitate the need to cope with uncertainty” (Krikelas, 1983, p. 8). He saw people as storing information to meet needs they might have in the future. Within this need-creating environment of uncertainty, a person possesses two types of information needs: immediate and deferred. Deferred needs can be stored in the person’s memory or addressed later; immediate needs are handled by the person with a sense of urgency (Case, 2007, p.126). To meet an immediate need, the person “is assumed to consciously select a source”
Sources can be internal, coming from memory or direct observation, or sources can be external, coming from direct (interpersonal) contact or recorded (literature) sources.

As Case (2007) points out, the boundaries between the types of external sources have blurred in this age of new media, and direct contact could occur over a telephone or a videophone, or by way of e-mail, voice mail, or a videotape as well (Case, 2007). As with Johnson’s model (Figure 2-4), Krikelas emphasises the need for personal information sharing before going to the literature. In this way, both models emphasise information sharing. In this library information model, Krikelas hypothesises that the librarian acts as a mediator to the information residing in the library materials (Krikelas 1983). Krikelas also associates activities related to satisfying immediate needs as information-seeking behaviour, and activities associated with deferred needs as information-gathering behaviour. This latter behaviour is probably better defined as “information hoarding” rather than deferred needs, for deferred needs would signify deferred information-seeking rather than anticipated information use, as is the case with hoarding.

A literature search revealed that Krikelas’ model has been cited in studies of the information-seeking behaviour of nurses and CEOs alike, and also of communication difficulties between physicians and nurses. Ironically enough, Krikelas even envisioned the behaviour of a researcher conducting reviews of literature related to their own work (Case, 2007), but the model does not restrict itself to one type of occupation (Case, 2007, p. 126). Case adds that while the Krikelas model could be applied to ordinary life, it nevertheless “retains the flavour of a library search model” (Case, 2007, p.127). Whilst the Krikelas model may have been a library model in 1983 (before the Web) when online databases could only be accessed from some sort of library, it may prove more relevant in the current environment where one can access both library and non-library databases.
from almost anywhere.

Williamson (1998) critiques Krikelas’ model and states that perhaps because he was considering information needs in work-related settings, Krikelas did not include in his model the notion of “unconscious” needs, and therefore appeared to ignore situations in which a need is perceived only when information is “discovered” (Williamson, 1998). One could argue that such a need would be part of the need-creating environment or are deferred needs from before, or even just an encountered need, along with all other factors that create the need.

2.4.2 A Cognitive-behavioural model

The Johnson Model
The Johnson Model (Figure 2-4) is intended as a basis for empirical research and has been used in information studies related to health and communications studies.

This model contains seven factors under three headings. It is pictured as a quasi-causal process flow from left to right, beginning with four “antecedent” factors. According to Case (2007, p. 132-133) the antecedent factors in this model motivate a person to seek information. The first two are grouped together under the label of “antecedents,” for example, “demographics” (i.e., one’s age, gender, and ethnicity, along with socio-economic variables like education, occupation, wealth, etc.). An antecedent is far more difficult to characterise, as is one’s “direct experience” in relation to the domain of interest.
The concept of experience brings up issues of knowledge representation and memory, for typically, one starts out by already knowing something—perhaps little or a great deal—about the phenomenon of interest, as well as about the ways one can find out information about it, and hence meaning is created based on that knowledge. A key concept under the heading of experience is the “social network” of the individual with an information need: “Who do I know who might know the answer to my questions or know how to find out?” For example, Johnson focuses on information about cancer, and thus a prime determinant of knowledge is: “Who do I know who has had cancer?” (Case, 2007).

According to Johnson’s model, people tend to go to other people to get information in a face-to-face or interpersonal channel. The other channel most often accessed is a mediated one, which may consist of print or mass media (Case 2007). This model is more suitable to specific contexts, and Johnson’s model is more closely related to Dervin’s idea of
information seeking occurring only within a “gap” in one’s existing knowledge base (Dervin, 1992). Johnson’s model lacks the feedback loops between actions and antecedents, for every action becomes an antecedent when a new action is undertaken.

2.4.3 Cognitive-affective models

The difference between a cognitive and a physical approach is largely one of unit-of-analysis. In the physical approach, the focus is the document or the information-system provider while the cognitive viewpoint uses the individual and the ways in which they construct information as the unit of focus, combined with experimental and quasi-experimental methods. The physical approach provides a strategy for carving clearly defined, researchable questions out of the bigger theoretical questions. In the cognitive approach, a person’s world-view consists of knowledge structures (or cognitive structures) which are determined by the individual and his/her social/collective experiences, education, etc. According to Ingwersen (1992), a cognitive model is a model of the individual itself and his/her environment, images, expectations, emotions, intentionality, experiences, imagination, intuition and values, as well as conceptual knowledge of domains, including affective domains, cognition, perception, and work space, state of knowledge, problem space, and state of uncertainty (Ingwersen, 1992, p. 227). In the last twenty years, a number of new cognitive viewpoints have appeared for studying information behaviour. Two of the most respected and established cognitive models is discussed below.

2.4.3.1 The sense-making model

Dervin’s Sense-Making Methodology conceptualises information seeking and use as a sub-set of human sense-making and sense-unmaking (Dervin, 1983). According to this model, sense-making is implemented in
terms of four component 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. In this model, the information is put to use to fill the gap, and hence Dervin conceptualises sense-making also as theory of information use. However, not all information behaviour is towards a use or an outcome (e.g., encountering information) and not all gaps in information lead to an information seeking episode (e.g., avoidance), and therefore, Dervin’s model only explains a limited range of information behaviour. Although Dervin’s sense making theory is quite detailed and describes the information gap that instigates the information need in such a way that the information itself forms the bridge that connects the gap, the original model (Figure 2-5), below (Dervin, 1983), does not articulate this.

![Dervin's sense making model](image)

**Figure 2-5** Dervin’s sense making model: recreated from Dervin (1983)

Dervin (1999; 2003) later successively redesigned the model
(Figure 2-6 and Figure 2-7) to explicate it more, but calls it “a metaphor that serves as foundational guidance for framing research questions, interviewing, and analysing data in Sense-Making guided studies.” In this model, information needs occur within the dimensions of space time. Information needs can focus on the past, present, or future, and be located in an aspect of time-space within a matrix of categories. This categorisation is based on answering the questions of who, what, when, where, why, and how (Dervin et al. 1982, 430-431).

![Figure 2-6: Dervin's sense-making model of information needs (Dervin, 1999)](image)
2.4.3.2 The Information Search Process Model (ISP)

Kuhlthau (1991) developed a model of the information search process from the common patterns which emerged from a longitudinal investigation of high school students' information seeking behaviours. The model is called the Information Search Process (figure 2-8) and is presented as a table that encompasses the development of thoughts about a research topic, the feelings associated with the search process, and the actions of seeking and using sources. The model goes beyond the mere mechanics of information seeking and incorporates three realms: the affective (feelings),
the cognitive (thoughts), and the physical (actions and strategies). These realms are common to each stage of the search process, as described below:

- **Stage 1: Initiation**: This is the stage when a person first recognises that information is needed to complete an assignment or solve a problem. It is similar to the information seeking behaviour models previously discussed, where the user identifies perceived information need in a given environment.

- **Stage 2: Selection**: The task in this stage is to identify and select a general topic to be investigated or the approach to be pursued.

- **Stage 3: Exploration**: The task in this stage is to investigate information on the general topic in order to expand one's personal understanding as well as to provide a focus for the topic. This stage involves gathering information that is general to the topic, rather than information which is specific or especially pertinent.

- **Stage 4: Formulation**: From the information gathered during the pre-focus exploration stage, the user now forms a focused perspective on the topic on the basis of the information found. A clear focus enables the user to move to the next stage. As the students' understanding of the topic grows, the information search can be more focused and direct.

- **Stage 5: Collection**: The user interacts with information systems or mediators (e.g., librarians, experts, friends, etc.) effectively and efficiently. Information specifically focused to the defined topic is gathered. This stage comprises the major portion of the model.

- **Stage 6: Search Closure or Presentation**: The task is to complete the search and to prepare the written document. The
search closure may be completed because all the necessary information was located, or because the deadline for the paper is near. In this case, not all the information required may have been retrieved.

**Figure 2-8:** Model of the Information Search Process or ISP.

From Kuhlthau (2004, p.82)

Kuhlthau's model is based on an intensive longitudinal study of a group of high school students. She verified the process model by conducting additional studies: two studies which used larger and more diverse library users in different information environments, as well as two longitudinal studies of small groups of students. She determined that the model is valid across diverse user groups as well as appropriate for describing the search process longitudinally. Kuhlthau's model is important as it suggests that the user is an active participant in the information search process. The student's knowledge grows as s/he interacts with the information. More importantly, cognitive processes are involved in information seeking.

Throughout the process, the student engages in cognitive strategies such as brainstorming, contemplating, predicting, consulting, reading, choosing, identifying, defining, and confirming. However, Kuhlthau's model
does not seem to incorporate manipulation of the information—analysing, digesting, organising, synthesising, and evaluating the found information. Turning information and data into knowledge is not assumed in the model. The model, however, does highlight how those affective feelings such as apprehension, uncertainty, confusion, anxiety, anticipation, doubt, optimism, and confidence interplay as the search for information proceeds. Kuhlthau stresses that students move through each stage sequentially. The stages of initiation, selection and exploration assist the student in exploring and identifying a topic of interest. The three stages lead the student from a general topic to a specific one. These stages of preliminary initiation, selection, and exploration are not evident in the other models discussed.

Similar to the other models, though, Kuhlthau’s model focuses on the information seeking process, or the acts associated with finding information, rather than how the students use, synthesise, and evaluate the found information.

2.4.4 Integrated models of IB

There are no integrated models in IB research that are based on empirical observations of information behaviour, but there are a few calls for the need for such models from some of the leading researchers in the field, with associated suggestions for integration. The existing models are generally proposed as high-level conceptual models based exclusively on the literature and not on empirical research.

Wilson (1981) proposed a model that has since been periodically upgraded by including other models within the original model (Wilson, 1996; 1999). According to Wilson (1999) his model is a “framework for thinking about the problem” of the need for a general model and “a map of the area” rather than an integrated model (Wilson, 1999).
Sonnenwald and Ivonen (1999), in an attempt to integrate IB research, propose an interesting conceptual framework for designing research studies that explore information behaviour in the context of social, institutional, individual needs, or a combination thereof, along with the uses of information, and is based on S. R. Ranganathan’s PMEST classification concept (Ranganathan, 1957; 1963). PMEST was developed for subject analysis of human knowledge and is well known in the field of classification research. This was later developed into a Faceted Classification Theory and has current applications in Internet directories and e-commerce websites.

Faceted Classification uses five facets or elements (PMEST, for Personality, Matter, Energy, Space, and Time) to classify all subject matter. For example, if one were to classify an embroidered silk robe from the Byzantine period, it would be as follows:

- **Personality = Robe** = what the object x is primarily “about” – a person, animal, thing, or event. This is considered the “main facet.”
- **Matter = Silk** = what x is made of or the material of the object.
- **Energy = Embroidered** = how x changes, or the processes or activities that take place in relation to the object.
- **Space = Byzantum** = where x is, or where the object originates from, happens in, or exists.
- **Time = Mediaeval period** = when x happens, or when the object is created or occurs in.

S. R. Ranganathan is considered the father of modern library science, as he devised a detailed library-classification scheme called the Colon Classification scheme based on the PMEST classification which is still used in some parts of the world and is considered the most elegant classification scheme, albeit intellectually complicated and hence
challenging for cataloguers (Garfield, 1985). Sonnenwald and livonen (1999) provide an idea of how his PMEST concept could work to classify information behaviour research with an illustrated model that combines both the PMEST and the Faceted concepts (Figure 2-9).

![Figure 2-9: PMEST Model of Information Behaviour Research from Sonnenwald & livonen (1999)](image)

Whilst this kind of integration will serve on a meta level to help classify the research on human information behaviours, it may not help in classifying the information behaviours themselves, although this is an idea that requires further attention and is perhaps a viable subject for future research.

Bates (2002) proposed integrating the models of seeking and searching and incorporating social and cultural models with the underlying
biological and physical anthropological layers of human experience. This is a proposed conceptual and theoretical model and some of the anthropological and evolutionary aspects of this model have to remain a conjecture. Nevertheless, this model can be used to guide the current study as it provides several insights into information behaviour including the notion that the majority of our information behaviours are passive and undirected.

2.4.5 Evolutionary Models of IB

In recent years since evolutionary biology has made a significant impact on all aspects of science, some information behaviour researchers have been using an evolutionary perspective on information behaviour reasercch.

2.4.5.1 A Hierarchical Model of Information Needs

Spink and Cole (2007) propose that information behaviour is a human socio-cognitive ability and an evolutionary adaptation resulting from social competence and that studying the evolution of information behaviour is key to understanding human social and cultural evolution (Spink & Cole, 2007). One of the ideas applied in this theory is Alexander's Ecological Dominance Social Competition (EDSC) model (Alexander, 1990). This model suggests that many human psychological adaptations evolve primarily to contend with social relationships and the need for dominance and control in social competition, with ecological constraints being a secondary source in recent human evolutionary change (Spink & Narayan, 2006). Spink & Narayan (2006) proposed a model (Figure 2-10) of the evolution of human needs in relation to information needs, combining Alexander's EDSC model and Maslow's Heirarchy of Needs (1947) discussed in section 2.2.1.2
This evolutionary approach to IB is predicated on the assumption that along with other cognitive structures like language, information-seeking behaviours have been shaped by biological evolutionary processes over time, and can be fruitfully studied in the same way as the evolution and function of a complex body organ. The cultural innovations resulting from this enhanced biological capacity for information seeking have had great impact on human evolution and to some extent on the differential success of human populations. Although there is a strong connection between organismal evolution and cultural development, evolution of particular cultural features like languages and information behaviours need to remain a metaphor, for such cognitive structures could “stem from differences in teaching, learning, imitation, and innovation as well as chance events” (Mindell, 2006).
Nevertheless, just as the study of language evolution and other culturally transmitted units within populations has provided us with an insight on how human genetic variations might have evolved (Cavalli-Sforza & Edwards, 1967; Cavalli-Sforza & Bodmer, 1971; Cavalli-Sforza & Feldman, 1981), the study of the evolution of information behaviours through human history could provide insights on how this uniquely unique human trait evolved (Spink & Cole, 2007; Spink & Currier, 2006; Spink & Narayan, 2006).

2.4.5.2 An Integrated Human Information Behaviour and Evolutionary Model

Spink and Cole (2006) published an initial integrated IB model (Figure 2-11) as one part of a more complex model of information behaviour that also incorporates theories of modular cognitive architecture from the field of Evolutionary Psychology. Whereas traditional cognitive scientists assume that the human mind is mainly driven by generalised cognitive abilities which are basically jack-of-all-trades and applicable to all knowledge domains, evolutionary psychologists, on the contrary, forcefully argue that the human mind must consist of numerous specialised modules for processing information, problem solving, and acquiring language, and that successful adaptation would simply be unthinkable in the absence of such innate structures that are unique to their domains and do not handle anything else (Buss, 1999; Cosmides and Tooby, 1994; Pinker, 1997). This extends the Rationalist philosophical argument of Rene Descartes (1596-1650) that human beings come into the world equipped with certain fundamental ideas or knowledge and concepts such as self, God, and infinity, which are irreducible properties of the human mind. This was later opposed by John Locke (1632-1704) who proposed the Empiricist view that all human knowledge is derived from experience, and that learning
and cognition consist of the two separate processes of *sensation* and *reflection*.

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**Figure 2-11:** Evolutionary HIB model. (Spink & Cole, 2006)
In the *modular thinking* approach derived from evolutionary psychology, information use begins with preconscious or precognitive-attentive data pick-up from the environment while the individual is attending to other *information foraging* activities; it assumes that when a *metaphor instantiation* (a form of unconscious associative learning) occurs, it creates adaptive knowledge. The initial state is pre-conscious data foraging, *via* what has been called “inexperienced stimuli” (Barsalou & Prinz, 1997). Data picked up in this way, which leads to human adaptation for survival may even be attached to other information that is being attended to (Seitz & Watnabe, 2003). One view is that humans pick up all sensory data, including “inexperienced” data, that is then stored in a sensory register for possible processing at a later date (Fodor, 1983; Pinker, 1997).

In the evolutionary perspective, unattended-to-data is picked-up and sensory-registered data is stored for later processing, and constitutes constructive, even generative elements in information behaviour. The information behaviour process is constructed through a modular architecture of *metaphor instantiation*. The goal state is related to knowledge-base modification, adaptation and survival (Spink and Cole 2006). The Spink and Cole (2006) integrated model that combines the insights of IB research with insights from evolutionary biology research is reproduced in Figure 2-11.

In the Spink and Cole (2006) model (Figure 2-11), the constitutive information behaviour elements are divided into two main parts. The top half places the model in the broad framework of information behaviour, both over human history and a human lifetime, which takes place inside some information environment with channels. The lower part of the model places the various information behaviour sub-processes in relation to each other, and in relation to the totality of information behaviour at the top part of the figure. Nevertheless, the Spink and Cole (2006) model, although a significant step towards integrating the various
approaches within information behaviour research, both empirical and cognitive, with the help of concepts from evolutionary psychology, fails as a model because of its complexity, and furthermore, is not really a unified model that integrates existing models, but is an entirely new one. Therefore, the need for an integrated general model of information behaviours remains.

2.5 *The Need for an Integrated IB Model*

The literature review revealed that IB has a growing body of research that highlights the importance of information for everyone in the information age. IB researchers have studied information seeking, searching, organisation and use in various contexts and are now aiming to build integrated theoretical frameworks that model the relationships between them. Nevertheless, the existing integrated IB models are largely theoretical propositions based on the literature rather than models based on observational empirical data.

This literature review points also to the fact that the emphasis within much of the literature has been on two contrasting set of perspectives: (1) the system-centred IR perspectives that emphasise human interactions with systems, and; (2) the human-centred perspectives that emphasise the needs of the people using (or not using) the information resources within specific information environments, or the availability or lack of them within an environment. Nevertheless, both perspectives ultimately seek to gain insights into human information behaviours. Each of the two perspectives makes different assumptions on the central concepts of human information behaviours.

The system-centred perspective focuses on externally observable and quantifiable behaviours of the interactions between users and systems across situations and channels, whereas, the human-centred perspective
focuses on the internal processes of a person within the context of their socio-cultural environments. The other differences in the two perspectives are:

- **Information**: The system-centred perspectives see information as an objective entity like a document, be it printed or digital, with which the user interacts, whereas the human-centred perspectives see information as a subjective construction that impacts on the person's knowledge structures and his or her search for meaning from the messages that they constantly receive or seek from their personal and socio-cultural environment.

- **Information User**: The system-centred perspectives treat the person as an information user who demands or makes use of information resources without taking into account their context, or even asking questions on how they use the information, whereas the human-centred perspectives consider the person as an active participant in information searching and processing, and as a purposive seeker of meaning in their lives through the information.

- **Information Needs**: The system-centred perspectives see information needs in the narrow context of specific information needs related just to documents and organised information channels, whereas the human-centred perspectives look at the conditions that create the information need, be it physical, mental, emotional, or social needs.

- **Information Use**: The system-centred perspectives see information use as the use of specific information sources and channels and the retrieval of information from them, whereas the human-centred perspectives see beyond into how the information thus obtained is used or not used in the context of personal, work, or social situations.
In other words, the systems-centred perspectives seem to focus on the aspect of information-seekers as passive receivers of objective information, while the human-centred perspectives view them as active processors of information who are also constantly constructing information. It is possible that this distinction in the two research perspectives occur on account of the very methods used by the two sets of sub-disciplines within IB. The system-centred IB researchers generally employ empirical studies that capture observable information behaviours within specific and well-defined situations, whereas the human-centred IB researchers use more of ethnographic, cultural, and social sciences approaches and their studies are more contextual. Although these two sets of perspectives are often juxtaposed against each other and contrasted in the literature, it seems an artificially imposed disjunction because both of these perspectives quite obviously play their part in human information behaviours.

In addition to the main disconnect in the literature as mentioned above, there is a further delineation and division of IB research in the form of cognitive, cognitive-affective, and social approaches. The cognitive approaches emphasise the mental models and information needs of the person, the cognitive-affective approaches emphasise both the mental and emotional information needs of the person, while the social approaches emphasise the information needs of a person within a given social context where they share their values and world-view with others within their environment. Again, these approaches need not be mutually exclusive, for they all have equal validity in a person's information behaviours.

As stated in Chapter 1, Section 1.4.1, Spink and Cole (2006) highlighted the lack of integration across various approaches and models of information behaviour. Each of the existing information behaviour models takes a different viewpoint, and yet, although every approach has
a level of validity as a representation of reality, they are relatively incomplete in and of themselves, for each approach highlights the selective and various aspects of the same process. Often, each approach provides a different language for similar processes (Spink & Cole, 2006).

The approach taken by the present study is one that integrates all these approaches wherein the information seeker is considered as one who not only seeks information from organised information systems, but also from others including family, friends, and the rest of the world, and also information from his or her own past experience, and they do so not just within silos of work, personal, or social contexts but on a continual basis in their everyday lives. They share information not just with others but also with themselves by organising and retrieving information for later use and also retrieve from personal memory and historical memory. This is a holistic approach that looks at all aspects of human information behaviours, but this approach means also that this current study cannot confine itself to any one perspective or even to just any one of the cognitive, affective, or social approaches. Hence, this study does not confine itself to any one methodology, and will use a mixed-method approach, so as not to privilege any one methodology over the other, just as it does not choose any one theoretical framework or model over any other, and more on this is explained in detail in Chapter 3.

Rather than create a new IB model that would stand as yet another silo that is removed from and out of context with other IB research, this study will instead take the insights from all the established theories and models reviewed in this chapter in order to examine information behaviours from within an everyday life context, with the awareness that everyday life subsumes work, personal, and social contexts. This process will lead to an organic and empirical integration of the IB models as opposed to the integrated models reviewed in this chapter that integrate
the various models based purely on a theoretical basis. This type of theoretical research is indeed valid on its own, for theories and models within IB concern themselves with not just empirical data, but also ideas. Such theories are in the realm of philosophical theories and are contrasted with scientific theories, and a philosophical theory is not necessarily testable through experiment. Nevertheless, new philosophical insights can be gained by examining the different theories in order to find associations and new ideas in the interstices where these different theories meet everyday life. That is what this study aims to achieve.
Table 2-1: A table of the concepts, frameworks, theories and models reviewed

<table>
<thead>
<tr>
<th>Framework</th>
<th>Approach</th>
<th>Selected Models</th>
<th>Possible activating triggers</th>
<th>Processes that may be involved</th>
<th>Results, Associated concepts or theories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>problem solving; information seeking</td>
<td>ASK (Belkin)</td>
<td>knowledge gap; Information needs; encountering; anomalous state of knowledge; uncertainty; defect in mental model; failed intersubjectivity</td>
<td>information seeking; searching; browsing; retrieving; stages; relevance; accuracy use and non use of services; usability; simplification</td>
<td>behavioural conditioning; problem state; learning theories; mental models; information infrastructures; cognitive dissonance</td>
</tr>
<tr>
<td>Cognitive</td>
<td>Sense-making</td>
<td>Avoidance (Johnson); Information Search Process (Kuhlthau); sense-making (Dervin)</td>
<td>uncertainty; need; stress &amp; coping; confidence</td>
<td>internal motivation; seeking;</td>
<td>Cognitive authority; bridging the gap, personality construct; personality types; self-efficacy; learning theories (operant</td>
</tr>
<tr>
<td>Framework</td>
<td>Approach</td>
<td>Selected Models</td>
<td>Possible activating triggers</td>
<td>Processes that may be involved</td>
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<tr>
<td>Contextual</td>
<td>sense-making; cultural; social constructionist</td>
<td>Everyday Life Information Seeking (Savolainen)</td>
<td>insider-outsider; need to belong</td>
<td>intra-group and inter-group information exchange</td>
<td>organisational culture; mastery of life; life-in-the-round; small-worlds; conditioning) satisficing and optimising; good enough; least effort; affordance theory (design of systems) emotional intelligence; user frustration; rejecting and avoidance; monitoring and vigilance; affective load; information anxiety; information counseling; anticipated information need; memory; information manipulation; creating meaning</td>
</tr>
<tr>
<td>Framework</td>
<td>Approach</td>
<td>Selected Models</td>
<td>Possible activating triggers</td>
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<td>gatekeepers of information; scepticism; validity judgement of source; habitus; stereotyping; selective exposure; resistance to information; confirmation of own opinions; information grounds; information ecology; information source horizon; information fields; information poverty; environmental uncertainty; environmental scanning; everyday information practice; information sharing; environmental complexity; new concepts learned in successive approximations from old ones (Empiricism)</td>
</tr>
<tr>
<td>Framework</td>
<td>Approach</td>
<td>Selected Models</td>
<td>Possible activating triggers</td>
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<tr>
<td>Anthropological</td>
<td>cultural ecology</td>
<td>information foraging (Pirolli); foraging (Sonnenwald) Berrypicking (bates)</td>
<td>information scent; cues; internal; external;</td>
<td>information foraging; person-environment interaction cues; diet enrichment; information scent; information pathways; hunting and gathering</td>
<td>personality construction; experiential learning</td>
</tr>
<tr>
<td>Multitasking</td>
<td>cognitive coordination and cognitive shifting</td>
<td>Multitasking model (Spink &amp; Park, 2006)</td>
<td>conflicting sources; cognitive style;</td>
<td>synchronous processes; poly-chronic time use; sensorimotor behaviours; associative thinking; insight into others' minds,</td>
<td>Flow; coping with stress; cognitive coordination; cognitive shifting; poly-chronic time use; temporal motivation;</td>
</tr>
<tr>
<td>Framework</td>
<td>Approach</td>
<td>Selected Models</td>
<td>Possible activating triggers</td>
<td>Processes that may be involved</td>
<td>Results, Associated concepts or theories</td>
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<tr>
<td>Evolutionary</td>
<td>Modular thinking</td>
<td>Integrated IB and Evolutionary Model Spink &amp; Cole (2006)</td>
<td>pre-conscious modules; data foraging; instinct; survival</td>
<td>information use; modular architecture; metaphor instantiation; units of cognition that communicate via metaphors</td>
<td>Rationalism (opposed to Empiricism and presumes innate concepts); knowledge-base modification; Evolutionary instinct; Language instinct</td>
</tr>
<tr>
<td>Information</td>
<td></td>
<td></td>
<td></td>
<td>experience</td>
<td>procrastination; Information processing; procrastination; perfectionism; delayed gratification; technostress; paralysis of analysis; idiosyncratic search behaviour; non-linear information seeking; telepresence associative creation of new information or knowledge.</td>
</tr>
<tr>
<td>Psychology</td>
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<tr>
<td>Framework</td>
<td>Approach</td>
<td>Selected Models</td>
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<td>Processes that may be involved</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>adaptation; survival</td>
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</tbody>
</table>
Figure 2-12: A Branching diagram of the overview of Information Behaviour in the Information Science Literature (a 2-page pull-out of this diagram is provided at the end of this document)
2.6 Chapter Conclusion

The literature from library and information science, cognitive psychology, evolutionary psychology, educational psychology, anthropology, sociology, and management sciences were selectively reviewed and interpreted in order to provide a background understanding for the research question stated in Chapter 1:

*Is it possible to derive a unified model of information behaviour that integrates the insights from the existing IB models and allied theories by using them as a template to analyse observed and recorded everyday information behaviours?*

In the context of the research question, the literature review provided the elements of a framework or template that this study will employ for a systematic approach into the exploration of the characteristics of human information behaviour and can be synthesised as follows:

- The chapter identified key theories and models in IB keeping the research question in mind, and created a thesaurus table (Table 2-1) and a branching map of the various terms and concepts across the discipline (Figure 2-12)

- The chapter identified key inter-disciplinary concepts that have been applied in IB research, as these may possibly help fill the gaps in IB research and provide a means for integrating them.

- The chapter gave evidence to support the need for an everyday life IB perspective that integrates the existing perspectives and approaches. The chapter justified the need for an integrated model through a review of existing research that revealed a lack of such a
Human Information Behaviour is a complex and rich subject, and despite the voluminous literature filled with theories and models and findings, the field has not yet achieved an integrated and unified understanding of the human mind within the context of everyday life information behaviours, and hence this study should be seen as an initial attempt at integrating the theories and models, rather than extending any one of them. Such recognition guided this research to take an exploratory approach and to use the existing theories and models as guides for research design, data collection, and analysis in order to take advantage of the cumulative nature of IB research.

All the theories, frameworks, concepts, models, and terminology discussed in this chapter are included in the table (Table 2-1) and a branching diagram (Figure 2-12) at the end of this chapter. This study will incorporate the theories and models in this review within the template for coding the diary data, and discuss any additional theories and models that become relevant during the course of the creation of the integrated model.

The next chapter (Chapter 3) identifies and justifies the main methodological assumptions underlying this study, performs a brief methodological review, identifies, justifies, and describes the research design, data collection method, and methods of analysis, along with the methodological limitations.
“Whenever we turn [solely] to measurements, we forfeit some uses of intellect. Currencies and magnitudes help us make comparisons only by concealing the differences among what they purport to represent. We turn to using quantities when we can’t compare the qualities of things.”

MARVIN MINSKY

3.1 Introduction

This chapter describes the overall research design and procedures undertaken for this study, including the assumptions underlying the research, the methodological challenges, the research instruments, data collection and analysis methods, and the limitations of the methods used. This study took an exploratory approach, because existing research and findings in IB reviewed in Chapter 2 provide very little understanding of the phenomenon of information behaviours in regard to people’s everyday lived experience even though the topic has been extensively studied.

The research design centres around a diary study wherein 34 participants from all walks of life from six countries (Australia, USA, Canada, China, Jordan, and India) were asked to maintain a detailed information journal of their information-related activities and thoughts (online or via a regular diary) on a continuous basis for two weeks. The research design and why this method was chosen over other methods is described in section 3.5.4 of this chapter.

The primary method used to analyse the data collected through the information journals is Grounded Theory (GT), a qualitative method of

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categorising empirical data to form theories, and the reasons for choosing this method of analysis for this study are described in detail in section 3.6.3 of this chapter and this method comprises the main thrust of the data analysis.

In addition to the Grounded Theory analysis that was done through manual reading, coding, and re-reading in order to elicit meanings, patterns, and categories of information behaviour, an automated text and content analysis was undertaken through two software tools, one a text-visualisation tool, and another a thesaurus-learning based content analysis and theme discovery tool that maps the concepts arising out of the text itself, along with a map of the concepts specified by the researcher. These methods are often used in qualitative Grounded Theory analysis through various tools collectively known as CAQDAS (Computer Assisted Qualitative Data Analysis Software) and are useful as complementary methods of analysing qualitative data (Coffey & Atkinson, 1996). Lastly, a statistical analysis was performed on the categories that emerged from the Grounded Theory analysis to gain additional insights into the aggregated data.

These additional levels of analysis were performed only after the manual analysis was complete so that it did not preempt anything in the researcher’s mind that did not organically arise from the data. Nevertheless, when it was performed, it helped to validate and confirm some of the key findings from the grounded analysis. This automated content analysis, along with some statistical analysis, provided a cross-reference in the analysis of the diary data, and provided for a methodological triangulation. As Cohen and Manion (1986) point out, this kind of data triangulation helps map out, or explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint (Cohen & Manion, 1986). The current research study benefits from a threefold triangulation:
• **Data triangulation:** Diary data was collected from 34 different people, from 6 different countries, with 3 different methods – word processor, web log, and paper diary – and at different 14-day time blocks within a 5 month period,

• **Theory triangulation:** Many different existing theories and models of information behaviour were used in the Grounded Theory analysis, and

• **Methodological triangulation:** Three different methods were used in the analysis of the textual data: hand-coding and discerning of patterns with Grounded Theory analysis, a concept analysis with the help of a content and text-analysis software, and a statistical analysis of the main concepts arising form the diaries.

The key methodological issues that will be addressed in this chapter are:

• Assumptions underlying the research design.

• Methodological challenges.

• Research design.

• Research instruments, data collection, and analysis techniques.

• Quality of the method.

• Limitations of the methods used.

### 3.2 Assumptions Underlying the Research Design

Information Behaviours have been previously studied extensively using various theoretical perspectives and methodological frameworks varying from simple user studies of specific populations and their use of information resources through to complex studies that take one or all of the following aspects into account: human cognitive abilities, human affective variables, and socio-cultural and other contextual variables, all the way to
anthropological and evolutionary aspects. Some are empirical studies based on observational data while many others are theoretical constructions based on other studies. This provides for a wide range of results and opinions but the underlying consensus is that human information behaviours are a complex group of behaviours that people engage in on a day-to-day basis. Nevertheless, there are very few studies of people's everyday life information behaviours that have empirically studied this to establish the relationships between the various well-established theories within the discipline. Hence, based on the overview of the literature in Chapter 2, the study asked the following research question:

*Is it possible to derive a unified model of information behaviour that integrates the insights from the existing IB models and allied theories by using them as a template to analyse observed and recorded everyday information behaviours?*

There are several assumptions inherent in this very research question that has implications for the research design, research instruments, and the research methods for this study. Some of the key assumptions are described in the following sections.

### 3.2.1 Assumption 1: A conceptual template of existing IB research

The research question relates directly and explicitly to the existing theories and models in IB, and one of the assumptions is that a template or conceptual map of existing theories and models is needed for the analysis, and for the eventual creation of a unified model. This template was developed through a systematic and structured review of the existing research in IB as detailed in Chapter 2 by extracting the main themes, connections, and common threads running through them. A thesaurus of
these *a priori* themes and concepts elicited through the review was tabulated into a template (Table 2-1), and a branching diagram (Figure 2-12) was created to understand the structure of their hierarchy. These were presented in chapter 2. This template was used as the basis for the creation of codes, tags, categories, and themes during the diary data analysis. A justification for using *a priori* themes is that the importance of certain themes in relation to IB are so well-established that one can safely expect them to arise in the data. For example, “need” and “uncertainty” may be safely used as an *a priori* theme, given its prominence in the literature. The actual codes and tags used are presented in Chapter 4 so they can be examined along with the findings.

### 3.2.2 Assumption 2: A research instrument that can be integrated into everyday life.

The research question relates to recording people’s everyday life information behaviours. Hence, there is an inherent assumption that the research instrument can be easily integrated and accommodated into people's everyday lives, while also providing a record for the researcher. This instrument needed to be something that is not so intrusive in a participant's everyday life that it actually affects the behaviour itself, for this intrusiveness can cause the so-called *observer effect* or *Heisenberg effect* (after the physicist) in diary studies, wherein the act of observing changes the observed (Reiman, 1993). In experimental research, this type of reactivity or expectancy whereby subjects consciously or unconsciously improve an aspect of the behaviour being experimentally measured simply in response to the fact that they are being studied is also called the *Hawthorne Effect* (McCarney *et al.*, 2007). Nevertheless, no one knows the mechanism behind these effects, but they can be minimised as much as possible through the use of non-intrusive observations.
After a consideration and comparison of other methods of obtaining such descriptive everyday-life data (questionnaires, daily web surveys, PDAs, AV recordings, screen-capture software etc.), the diary method was chosen as the best and most viable choice of research instrument under the circumstances, as it is capable of capturing the dynamic processes of everyday life over a long period of time, and is not prone to spatial constraints as the participants can be spread out over any geographic area, thus also facilitating a wider socio-demographic participation. Moreover, almost everyone is already familiar with the concept of a daily diary, making it cognitively and affectively easier on the participants. Nevertheless, the diary can seem intrusive to many people and the very nature of this data collection method may have excluded those people from this study that were unable to invest the effort, discipline, or were uncomfortable with it in any other way.

For this study, the length of the data collection period was determined based on the fact that it needed to be long enough to capture the behaviours under investigation, but also short enough to lessen participant fatigue – according to the literature, later entries can get less and less inclusive as the diaries get longer (Verbrugge, 1980; Goodall, 1994; Gibson, 1995; Keleher & Verrinder, 2003). In addition, the pilot studies helped determine the length of the diary to a 14-day period, as it was found that a week was too short to encompass many periodical behaviours that seemed to follow a fortnightly cycle. For example, since salary cheques often were a fortnightly occurrence, many information behaviours related to a person's finances tended to have a fortnightly cycle. The participants were given the option of maintaining the diary for any two weeks that was convenient to them, thus reducing the chance that any single major globally significant news event could influence all of their behaviours in a uniform manner.
3.2.3 Assumption 3: The analysis schema can be matched up to the observed behaviours.

The research question requires an analysis of the diary data against the existing theories and models. This was predicated on the assumption that the observed data will at least agree in parts with the template created through the literature overview, but it also assumes the coding of the diary data in order to identify those parts of the diary that are relevant to the research question. This coding schema was accomplished through listing the major themes in the literature and using them as “tags” for the diary data. If the emergent codes or tags encompassed one of the a priori themes, they were “attached” to the identified section on the existing template. When a feature recurred several times within the data, it was considered a theme, whether or not it existed in the template, and was noted as a new theme that organically emerged from the data. If a single comment made by one participant was particularly helpful in elucidating behaviour, the researcher devised a new code that encapsulates it and included it in the template. Below are some operational definitions for “themes” and “coding.”

- **Themes** are defined here as features of participants’ diary accounts characterising particular perceptions and/or experiences that the researcher sees as relevant to the research question. In this study, it was explained in a simplified manner to participants as “tags” which they could use to self-categorise their behaviours into the different themes. This was done for the sake of avoiding any confusion with those participants who used the web log and used its “tagging” function to self-categorise their information behaviours.

- **Coding** is defined as the researcher’s process of identifying themes (or tags or categories) in the diary accounts and attaching labels
(codes) to index them.

The main benefit of using the *a priori* themes that are derived from the literature is that they help accelerate the initial coding phase of analysis, which is normally very time-consuming. There are, though, some important dangers to be aware of that are associated with their use. Firstly, by focusing on data that already fit the *a priori* themes, one may overlook material that does not relate to them. Secondly, one may fail to recognise when an *a priori* theme is not proving to be the most effective way of characterising the data. To guard against these pitfalls, it was crucial to recognise *a priori* themes as tentative – equally subject to redefinition or removal as any other theme. For example, one could remove some of the original *a priori* top-level themes and include them along with others under a new top-level theme. This can be done during the analysis, although for purposes of self-coding by participants in this study, the number of *a priori* themes was restricted on purpose so as not to overwhelm the participants or end up with a blinkering effect on account of participant misinterpretation.

It is important also to state here that themes in qualitative research are not hiding in the data, waiting to be discovered by the researcher. Rather, they arise from the engagement of a particular researcher with the text, as she attempts to address a particular research question. As such, they are pragmatic tools to help the researcher produce her account of the data.

### 3.3 Methodological Challenges and Decisions

This study began with two main methodological challenges. One was to find a way to capture participants’ naturally occurring information behaviours in their everyday life environments, and the second was to find
a way to analyse the considerable amount of thick descriptions that resulted from the diary data in a practical manner. The following sections articulate these challenges as well as the way this research addressed them.

3.3.1 **Challenge 1: Capturing naturally occurring human information behaviours and eliciting all the factors involved. Solution: the diary method**

The notion of everyday life is often associated with personal life and posed as the opposite of work, which is generally equated with public life. And this kind of work environment is one of the most often studied within information behaviour research, but as the information society introduces forms of work that take place in the home, “the familiar dichotomy creates a shallow analysis, at once oversimplifying the interplay of emerging tendencies” (Schement & Curtis, 1995). Work and personal life are increasingly interleaved together in our contemporary day-to-day lives and the delineation between personal and work-related information seeking is thus progressively fuzzy. Apart from the fact the we use new tools including computers and personal digital assistants (PDAs) to access, manage, and disseminate information, we as individuals also directly interact with a variety of institutional systems such as government agencies, businesses, and other organisations, whereas these interactions have traditionally been mediated by professionals and other people, often considered “obtrusive gatekeepers to information” (Marchionini, 1995).

Artificially developed information environments or other externally-imposed experimental conditions as found in much experimental information retrieval (IR) research might impact significantly on the internal (cognitive and/or affective) and external (socio-cultural or environmental) situations of users. Hence, the study took a naturalistic approach so as to
capture naturally occurring information processes within people's everyday lives while minimising the introduction of distortions into this process as much as possible. Based on a separate review of the literature specifically for assessing methods of such naturalistic data collection, and described in detail in section 3.5.4, the diary method was deemed as the best fit for this study's aims and purposes and the best research instrument to help answer the research question which relates specifically to people's everyday-life information behaviours. This entails access to all of a person's information-related activities as they go about their daily lives, and no single information-capture method short of a physical monitoring of the person can record this sort of data, and even then would not give us access to their thoughts. All other methods that can collect everyday data, like hand-held electronic devices which a participant can record into on a regular basis, and used extensively in the Experience Sampling Method (Csikszentmihalyi, 1990) were considered and rejected for purposes of this study for reasons of geographical, financial, temporal and methodological constraints. Diaries, on the other hand, are something people relate easily to in their everyday lives and are non-threatening and non-intrusive, for “diaries are good research instruments to collect detailed information about behaviour, events and other aspects of individuals' daily lives, and can help determine the “antecedents, correlates, and consequences of daily experiences” (Bolger, Davis, & Rafaeli, 2003).

3.3.2 Challenge 2: Finding the best way to analyse the thick descriptions from the diary data. Solution: a multi-method qualitative-quantitative approach

There is some confusion in the literature about qualitative versus quantitative methods of analysis, and inductive versus deductive methods, along with subjective versus objective data, and there is an inherent
assumption in the natural sciences that privileges the quantitative methods over the qualitative ones, along with deductive methods and so-called objective methods. This is further confounded by the distinctions between quantitative and qualitative data. According to Witte (1989) “when, among a set of observations, any single observation is a number that represents an amount or a count, then the data are quantitative, whereas, when, among a set of observations, any single observation is a word, or a sentence, or a description, or a code that represents a category then the data are qualitative” (Witte, 1983). Some qualitative data can be analysed quantitatively, as is often done in the social sciences, and some quantitative data can indeed be analysed with qualitative methods to look for reasons for the quantified factors and their relationships. Indeed, these techniques can be integrated, such as in mixed methods research.

A related distinction is one between the subjective and the objective data. Subjective data result from an individual's personal opinion, judgement, or perception, and not from some external measure. Objective data on the other hand, are external to the mind and concern facts and precise measurements of things that exist in the physical world. The data collected in this study is inherently subjective in nature, but since the data is also being measured against concepts that have been established over the years through IB research, it can be quantified and analysed objectively, especially if the number of occurrences of particular behaviours can be counted in the aggregate. The meaning of the data thus emerges from a combination of insights from both types of analysis.

Another tension perceived in the analysis of research data is the one between inductive methods and deductive methods of analysis. Induction is usually described as moving from the specific to the general and helps in the creation of theories, as in the “observation of unexplained phenomena in search of a theory” (Stonier, 1990), while deduction begins with the general and ends with the specific, and helps not only in the
testing of existing theories, but can also “create unexplained theories in search of a phenomenon” as is often the case in Mathematics and Physics (Stonier, 1990). Data based on experience or observation are best analysed inductively to generate theories, while data based on laws, rules, or other widely accepted principles are best analysed deductively in order to test their validity.

This study, with its aim of integrating the participants' own thoughts, feelings, and actions that are self-reported by the participants themselves, is inherently textual and qualitative in nature and needs to be analysed with qualitative methods that are flexible and adaptive to surprise and discovery. On the other hand, the codes assigned to the themes and the information behaviours are based on some selected conceptual principles and add up to a numerical quantity, and it would be meaningless to collect them if they are not analysed with some kind of quantitative method. Hence, this study will use a multi-method approach to analysis that consists of both inductive and deductive, and qualitative and quantitative methods.

However, the potential for problems exist when attempting to combine such divergent research paradigms; one may end up not doing either type of research well. This integrative approach can also be time-consuming, labour-intensive and expensive, but “as researchers have increasingly demonstrated that such research is necessary to fully understand and address many issues, the research norms and scientific dogma regarding appropriate methods may shift to a new, more integrative paradigm” (Creswell, 2002). Considering all of the factors mentioned above, qualitative analysis (both manual and automated) is the main method employed to analyse the information behaviour data collected during the study, but some quantitative analysis was undertaken in order to validate the coding similarities between the researcher and the participants, for example, and also to examine the concurrence of certain
behaviours within certain contexts. Such an integration of quantitative and qualitative research methods lends some depth, clarity, and validity to the findings.

3.4 Overview of Research Design

This study consisted of three research phases. Figure 3-1 describes these phases at the conceptual level, while Table 3-1 synthesises the major activities performed by the researcher. The details are explained in the sections following this overview both for purposes of documentation and replication.

The quality of the study, its authenticity, and its trustworthiness is described in detail in section 3.8, after the research design and methods are first discussed so as to explain it in context.
Figure 3-1: Conceptual summary of research design
Figure 3-2: Summary of major research activities
3.5 Phase I: Framework and Overview

The following sections describe the activities, procedures, and processes involved in this phase of the research and was conducted between July 2006 and November 2007 at the Queensland University of Technology.

3.5.1 Developing the framework

This study is an initial attempt to investigate how people construct, coordinate, and integrate information behaviours in their daily lives, and how these findings fit in with existing theories of IB, rather than serve as a mere extension of a existing research. Specifically, the study is designed to capture yet-to-be investigated situational factors and variables by making use of existing research findings and models as guiding tools. Chapter 1 reported on this process and posed a research question that organically arose from the literature review presented in Chapter 2.

3.5.2 Overview of existing research/literature review

The purpose of the literature review, in terms of the research process, is to reveal the stated and unstated assumptions underlying the problem of the study and prepare the researcher as a master of the theories and findings relevant to the phenomenon of study (McCraken, 1988). The researcher's experiential knowledge guided her to locate and examine appropriate literature for the purposes of the study, while the activity of reviewing the literature and observation of the users (through the pilot studies) enriched the structure of the researcher's domain knowledge.

The researcher found that the majority of the theories and models mentioned in Chapter 2 have not yet been integrated into a unified model based on empirical studies. Although this study utilised models, concepts,
theories and findings of existing research as guiding tools, it could not use an experimental or quasi-experimental research design. This is because the research question relates to integrating these findings and models through an empirical and observational study of people’s everyday lives rather than to test a hypotheses drawn from these models and findings. The literature review performed in Chapter 2 was hence oriented toward eliciting theories, concepts, and models rather than to serve as a comprehensive history of IB research.

3.5.3 Development of a preliminary model

The review of the relevant literature, helped by the expanded experiential knowledge of the researcher, helped derive the research question and the initial framework of existing theories and models of information behaviours from IB and other allied fields. Specifically, a template of the IB theories was developed, first as a table presented in Table 2-1, and then as a branching diagram presented in Figure 2-12 as an initial framework for analysing and categorising the different information behaviours and the observable variables associated with them.

3.5.4 Development of the Research Instruments

As stated earlier in section 3.3.1, the diary method was chosen as the research instrument for this study. The following sections provide further justifications for this decision, along with decisions about what kind of diary to employ, and recognising the limitations of the method.

3.5.4.1 Advantages of the diary method

Gordon Allport, the founder of the study of personality psychology, called for researchers to acquaint themselves with “the particulars of life which are the beginning of all psychological knowledge, scientific or otherwise”,

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and called for studies of “life as it is lived, with significant total-processes of the sort revealed in consecutive and complete life documents” (Allport, 1942, p. 56). Methods for documenting life as it is lived have only expanded and improved over the years, and the diary study method is now employed by many disciplines, such as psychology, health and medicine, education, anthropology, architecture, and so on, and increasingly in IB. Social scientists have long considered diaries to be of major importance to construct pictures of social reality from the study participants' perspective as they have high ecological value (Butcher & Eldridge, 1990; Verbrugge, 1980). Diaries are good research instruments to collect detailed information about behaviour, events and other aspects of individuals' daily lives, and can help determine the “antecedents, correlates, and consequences of daily experiences” (Bolger, Davis, & Rafaeli, 2003).

Self-completion diaries also have advantages over other data collection methods to examine life as it is lived. According to Corti (1993), diaries are a reliable alternative to the traditional interview method for events that are difficult to recall accurately or that which are easily forgotten (Corti, 1993). Simultaneously, “they recognise the importance of the contexts in which these processes unfold” (Bolger, Davis, & Rafaeli, 2003) as they are designed to capture the “little experiences of everyday life that fill most of our working time and occupy the vast majority of our conscious attention” (Wheeler & Reis, 1991). The diary method has distinct advantages over ex-situ research like using single reports or retrospective questionnaires in that it does not rely on the reconstruction of information from memory, but rather involves reporting on experiences as they occur, thus minimising recall or retrospection bias, and also avoids something called state-congruent recall, “wherein the participants current state of mind influences their reporting of past events, resulting in a biased report” (e.g., Bower, 1981).
Another advantage of the diary studies method is that the information is ordered sequentially, shows a good profile of the processes involved including the thoughts and feelings of the person, and also provides information about the time framework. Moreover, participants feel less constrained to explore “aspects of their own life, personal history, and so on, as they do it in their own privacy, as opposed to answering questions during an interview” (Breakwell, 2006). Furthermore, participants understand the tasks involved in maintaining a diary, as almost everyone is familiar with the concept of a daily journal or diary.

In IB research, the diary instrument has been successful in recent studies of information behaviours by Spink (2004), who found that a key advantage of the diary method is the short term between event occurrence and recording, and hence, less subject to memory lapses and retrospective messaging, as may be the case with interviews. Wildemuth (2002) found that the diary functions as a very good surrogate for direct observation of the participants (Wildemuth, 2002). Other studies within IB research that have used this method include Fabritius (1999, 2000), Julien & Michels (2004), Hyldegård (2006 a & b, 2009), Mick & Buehl (1992), and Reneker (1993).

3.5.4.2 Limitations of the diary method

Despite the advantages of the diary method, it is still physically impossible for the researcher to directly observe the situational and other factors involved in the various information behaviours reported by the participants, or even know what is involved in the various daily decision making processes of the participants. Even if the researcher was doing a real-time observational study, for example, the internal processors within the participants’ minds are still a black box to the researcher. Thus, the research inevitably relies on the participants’ self-reporting of their perception in regard to their information-related activities throughout the
day. Self-reporting of such internal processes are known for several drawbacks or biases including but not limited to rationalisation (Ericsson & Simon, 1993), selection (Petty & Cacioppo, 1986), lack of articulation (Simon & Burstein, 1985), and memory bias (Schacter, 1999). Nevertheless, the diary was chosen as the research instrument because of the constraints of needing data from within the natural habitats of the participants, and also because the advantages of the diary method overweighted the disadvantages. Additionally, the diary method is “particularly valuable in accessing accounts which are 'hidden' or muted because they do not fit into categories structured in terms of the researcher's frame of reference” (Elliot, 1997).

3.5.5 Design of the diary

After identifying the diary method as the appropriate research instrument for this study, concrete decisions regarding the design of the diary had to be undertaken, for “diary research is most effective when their design and the research question are complementary in form” (Bolger, Davis & Rafaeli, 2003). The following sections describe this process of designing the diary instrument.

3.5.5.1 Types of diaries

Diary study methods have been classified under three main categories (Bolger, Davis & Rafaeli, 1993) as follows:

- An interval-contingent diary that requires participants to report on their experiences at regular, predetermined intervals.

- A signal-contingent diary that relies on some signalling device to prompt participants to provide diary reports at fixed, random, or a combination of fixed and random intervals.

- An event-contingent diary that requires participants to provide a
self-report each time the event in question occurs.

Signal-contingent diary methods are time-based like the interval-contingent diaries, and have the additional advantage of forcing the capture of events at the time they occur, avoiding problems like selective memory and reconstruction of events. They require that the participant carry some sort of electronic device with them at all times that can receive a periodic signal set up by the researcher as an indication of when to record the entries. This is a very powerful diary method and has been used very effectively by Csikszentmihalyi (1990) in his study of Flow using the experience sampling method, as it forces the capture of events at the time they occur, avoiding problems like selective memory and reconstruction of events. Nevertheless, they may be construed as more intrusive than diaries in participants' everyday lives as they depend on them carrying a signalling device all the time and also, the signals may intrude their daily activities. Besides, the phenomenon being studied, namely information behaviours, does not necessarily follow a strict hourly, daily, or any other periodical routine. Hence, the signal-based diary was rejected, and a combination of event-based and interval-contingent diary was decided upon as the best instrument for this study. This method requires a clear definition of the “triggering event” (the information behaviours) to the participants and also some participant training. The interval between the recordings was actually left to the participants' convenience, just as in a regular daily diary, but the participants were encouraged to write as often as they could during the day but were required to write at least one diary report every day for 14 days —any 14 days of their choice. Bolger et al. (2003) state that maintaining an ongoing contact with participants in a personal yet non-intrusive manner helps in retaining participants in all methods of diaries, and this was done by the researcher once the participants were recruited.
3.5.5.2 Format of diary

After participant recruitment, each and every participant was briefed about the research and provided with guidance sheets (Appendix IX though XII) and were asked to make detailed notes in regard to their information-related tasks, along with their thoughts and feelings, if any, throughout the day. The study participants’ information tasks were not predefined, and the participants were asked to follow their everyday routines as always, and record it in their diary. Typical tasks may include organising recipes or family information, using lists of information, searching the Web, asking for information during telephone calls, etc. According to Case (2002) “many people use formal sources rarely, relying instead on informal sources such as friends and family, or knowledgeable colleagues at work,” indicating that people often turn to other people when seeking everyday information. This diary approach resulted in capturing such otherwise-missed data and thus had high research value, as it was carried out in situ, in the participants’ own everyday environments, and the participants were assured of complete anonymity so they did not feel restrained in their communication.

Hyldegård (2006a), in using diaries in group based information behaviour research found that the structured design, requiring the participants to assign their recordings into predefined categories may counteract the quality inherent in the diary genre to elicit personal thoughts and experiences. The free form, in turn, generated more text data but still needed some structure and instruction to control the amount as well as the validity and reliability of data (Hyldegård, 2006b). According to Myers (2000), researchers often have an epiphany when they become aware of important components that needed to be examined, but had not been built into the study (Myers, 2000). Since a diary that is too structured would exclude such discoveries of as-yet-unknown elements and defeat also the purpose of the Grounded Theory methodology being employed, this study
employed the open-format diary, which allowed for greater opportunity to code and analyse the diary data. Most importantly, in using the unstructured narrative or open-diary format, the study avoided the pitfalls of investigating “something (researchers) call information, rather than something users call information” (Dervin, 1983a). All the same, a broad guideline on the maintenance of a diary, especially the frequency – as often as they like, but definitely once a day – along with a few example entries from the researcher’s own daily diary entry from the pilot study was provided to the participants so they do not feel completely unguided and at a loss of words.

3.5.6 Methods of recording the diary

Generally, diaries can be of two formats: paper-and-pencil diaries, or electronic diaries. Both have their advantages and disadvantages. Paper-and-pencil diaries may be more prone to forgetfulness, retrospection errors, and uncertain compliance, and lack of accurate response-time information. Moreover, they can be harder to code and analyse.

On the other hand, electronic diaries have advantages in terms of data entry, management, and accuracy, and also ease of coding and analysis, and hence less prone to errors overall. Nevertheless, by opting to use just an electronic diary, one could be at risk of perpetuating the “digital divide”, namely the differential access of various groups to participation in the research (Bolger, Davis, & Rafaeli, 2003). Given that all the participants in this study had to fill out a textual document, the inherent assumption is that the participants are literate, but computer literacy could become an issue if just the electronic diary method is used.

Considering these factors above, along with those already discussed in Section 3.2.2, it was decided that the participants would be given the option to maintain the information journal in either format, and with a further choice of two different electronic formats. One choice of
format was in the form of a private web log (blog) online, the other was in the form of a self-maintained electronic document on participants' computers, and a third was in the form of a traditional hand-written paper journal or diary. Recent studies have shown that the method of collection of diary data is not as important as study design and participant motivation. Green et al. (2006) analysed diary entries from two previously published studies and conducted a third, original study to track the differences between paper and electronic diary compliance, and found very little evidence for any bias and found utility in both tools (Green et al, 2006). The pilot studies conducted for this research confirmed this also.

3.5.7 Piloting the diary formats

Before commencing the participant data collection, three pilot studies were carried out in the course of the development of the methodology for this study, in order to evaluate the participatory experience for the three different methods (paper-and-pencil diary, electronic diary, and web log) and also to develop an initial framework for the integrated model based on the existing theories and the everyday life information behaviours of the three pilot study participants. The results of these pilot studies are reported here in the following sections. These three pilot study journals were examined in detail in order to delineate patterns of behaviour that might constitute stages in a process, and to identify discrete behaviours that would constitute the components of that process. The major IB categories that emerged from the pilot studies were used to develop the IB categories and tags in the subsequent diaries.

Three different preliminary studies or pilot studies were conducted the pen-and-paper journal was maintained by a volunteer, the Web log maintained by another volunteer, and an electronic diary was maintained by the researcher herself. This kind of participatory self-study or action research (Berg, 1988), also called auto-ethnography (Ellis & Bochner,
is both valuable and valid in qualitative research and especially useful in building models (Lincoln & Guba, 1985) and also in educational research (Evans, 2002).

The pilot studies helped develop the overall format and guidelines for the research instruments used in the final study that included:

- an open format diary, allowing respondents to record activities and events in their own words, in a narrative form,
- booklets in A4 format with an inside cover page containing a clear set of diary completion instructions for those who wanted to maintain a hand-written journal. [Note: This was not used after the pilot study at all, as no participant opted for this format],
- an example of the format of a correctly completed electronic sample diary (the researcher’s own pilot study diary, uncoded) was provided to the participants with guidelines. [Only 3 participants, including the researcher herself used the electronic word-processed diary format], and
- a secure and private web log that was set up for every participant where they could write their entries as often as they wanted to. The participants were provided with guidelines and with a sample web log drawn from the researcher’s own pilot study diary (uncoded) to practice on before they began their study. [30 participants including a pilot study participant opted for this web log format.]

3.5.8 A Preliminary conceptual process model

The preliminary conceptual model developed through the pilot study is presented in Figure 5-1 in Chapter 5. It identifies the information behaviour categories and processes that were observed in the pilot studies, using the informed perspective derived from the overview of literature in chapter 2.

The preliminary conceptual unified model is an eclectic process model that envisions information behaviours in everyday life as a complex
phenomenon that encompasses the insights from existing models along with the categories of IB identified through the pilot studies. Although every stage of the process in this model can be isolated as a discrete entity and studied in its individual form under experimental conditions, the model functions as a unified explanation of the relationships between the various components of information behaviour. Although it may be possible for an external observer or researcher to witness one stage of this process leading into another stage in a seemingly seamless fashion, the internal contexts and processes are much more complicated and harder to model as they are mostly within the realm of the person's mind. The diary instrument is one of the best and most effective methods for a researcher to get a glimpse into these processes that involve a person's thoughts and feelings. These internal processes influence a person's information behaviours in a significant manner, and hence it is important to include them in any model of information behaviours.

Every stage of information behaviour, whether it be the original motivation stage, the planning stage, the searching stage, the seeking stage, the organising stage, the using stage, or the sharing/withholding stage, is effected and affected by the information seeker's knowledge base, emotions, personality, likes and dislikes, and environment. Though the information sought is not always constructed by the receiver, the knowledge, the meaning, and the beliefs gained by the receiver is constructed solely by the receiver, and the key to the receiver's internal processes is his or her cognitive and affective state. This preliminary conceptual model also helped in the decision to let the participants maintain a descriptive narrative diary of their everyday life information behaviours rather than proscribe a structured journal as it would preclude a lot of the behaviours observed in the pilot studies and many of the behaviours construed from the existing theories.
3.5.9 **Categories of information behaviours**

The pilot studies, along with the overview of the literature, helped formalise the tags that were used to categorise the information behaviours. All the participants were provided with a list of tags that they could use with their diary entries wherever appropriate, along with some guidelines and some definitions. These were explained to them in detail before they started maintaining their diaries and were also made available to them as printed documents and as separate help pages available through the web log for those who maintained the web log. The sheet with the tags provided to participants are appended (Appendix VI through XII) along with all other guiding materials provided to participants. Although the tagging was optional, they were explained in detail (along with some examples) to all participants on a one-on-one basis. Below is a list of the tags / categories provided to the participants for reference, to get them started with their diaries.

- **Information:** INFORMATION is any difference that makes a difference to a conscious, human mind. It is whatever appears significant to [you], whether originating from [your] external environment or [your] internal world.

- **Information Behaviours:** INFORMATION BEHAVIOUR is the totality of information-related activities including unintentional or passive activities (such as glimpsing or encountering information), as well as purposive behaviours that involve seeking or searching for information and behaviours such as actively avoiding some information.

- **Information Avoidance:** Avoidance as it relates to information means a purposive avoiding of some specific information that you know exists, but don’t want to know the contents of, as it may change the way you think or act, or plan something. For
example, you may avoid some unpleasant news because it upsets you.

- **Berrypicking:** Information BERRYPICKING behaviour as it relates to information seeking is when you gather bits and pieces of information from different information sources or websites using a variety of techniques and search terms and piece together the information into a coherent whole for yourself, instead of finding all the information you need within one information resource as a single document or a grand set of documents.

- **Browsing:** Information BROWSING behaviour is the exploration of information sources, based on the organisation of collections or casual scanning of lists (like browsing the results of a web search), as opposed to direct searching within a known resource using a very specific question or query. It is a purposive scanning of an information environment but without a clearly-defined goal or plan.

- **Encountering:** Information ENCOUNTERING happens when new knowledge seemingly lands on one’s lap without having actively gone out searching for it. You may or may not decide to actively act on it or react to it in any way.

- **Information foraging:** INFORMATION FORAGING is a general term for describing a search for information in terms of biological models of animals foraging for food. On the Web for example, each site could be seen as a foraging patch where information is the prey. Leaving a site is easy, but finding good sites has not always been as easy. One may follow the ‘information scent’ of a website to discover if they are rich in the resources one wants.

- **Monitoring:** Information MONITORING behaviour is when you
continually or periodically watch or scan certain familiar or unfamiliar information surroundings or sources in anticipation of information that could stimulate something in you: thought, action, response, motivation etc. Examples include scanning your physical environment on some regular basis or subscribing to blogs, listservs, alerts, or other notifications online.

- **Multitasking**: MULTITASKING behaviour as it relates to information seeking is when you handle several parallel information-related tasks or thoughts that are unrelated to each other and switch between them often.

- **Organising**: Information ORGANISING behaviour is the process of analysing and classifying materials into defined categories, directories, folders, or using other methods. This includes your own organisation methods or an established one, or the absence of it.

- **Searching**: Information SEARCHING behaviour is the process of searching and locating information. It can include observable behaviour within formal information retrieval systems and informal information sources, and includes your internal thoughts, feelings, and other mental shifts within your mind. Searching is different to seeking in that you can “search” a website for some information or search a bookshelf for a book, but you are seeking some specific information within the results you retrieve, or seeking some specific information within the book you retrieve.

- **Seeking**: Information SEEKING behaviour is defined as the purposive seeking of information in relation to a specific goal. It is different also from the ‘retrieving’ of information as explained above, for you can ‘seek’ happiness or knowledge through
reading the book you just retrieved, but you cannot ‘retrieve’ happiness or knowledge from the book or from the information.

- **Sense-making**: SENSE-MAKING behaviour is the process of seeking information in order to fill a gap in your understanding of something or to remove an uncertainty that you may have. Some think that ALL of our information seeking fills some gap in our understanding of the world and our own lives, and that we are all constantly trying to make sense of the world and our existence through SEEKING information. Of course, we do not always think in that way when we are trying to find specific information about something.

- **Surfing**: Information SURFING behaviour is specific to browsing among Web sites, especially through using web links provided on sites to move from one site to another.

- **Use**: Information USE behaviour consists of the physical and mental acts involved in incorporating information into your existing knowledge base. You can use information that you just found or use something you remember from the past, or use information by connecting the two or more in your mind, or use something by just passing it on or sharing it with someone, or even by broadcasting it. You may also use information by hiding it from others.

It is acknowledged that some of these concepts are more granular and easier to delineate for the participant than others are, but it is accepted as the nature of information behaviour itself and perhaps a limitation in the methods we currently have to study it, and hence also a limitation of this study.
3.6 Phase 2: Data Collection and Analysis

The following sections describe the activities, procedures, and processes involved in this phase of the research that were performed between January 2008 and July 2009.

3.6.1 Participant sampling method

The diary method is indeed labour-intensive to analyse, and hence the sample size needs to be small enough to handle within the physical, temporal, and fiscal bounds of this research. It was decided to recruit a total of 40 participants including the 3 pilot study participants who had already completed the diary, so that in case of non-completion or other unforeseen issues, there would still be diary data from enough participants so as not to compromise the quality of the research. Of the 40 participants that agreed to maintain a diary (including the 3 pilot study participants), only 34 diaries were begun and completed successfully.

Patton (1990) identifies and describes 16 types of purposeful sampling methods in qualitative research. These include: typical case sampling, critical case sampling, extreme or deviant case sampling, criterion sampling, maximum variation sampling, snowball or chain sampling, confirming or disconfirming case sampling, politically important case sampling, convenience sampling, and others (Patton, 1990, pp. 169-183). According to Lincoln and Guba (1985), the most useful strategy for the naturalistic approach is maximum variation sampling, as this strategy, according to Patton (1990)

...aims at capturing and describing the central themes or principal outcomes that cut across a great deal of participant or program variation. For small samples a great deal of heterogeneity can be a problem because individual cases are so different from each other. The maximum variation sampling strategy turns that apparent weakness
into a strength by applying the following logic: Any common patterns that emerge from great variation are of particular interest and value in capturing the core experiences and central, shared aspects or impacts of a [phenomenon]. (Patton, 1990, p. 172).

*Maximum variation sample* is a purposefully selected sample of persons or settings that represents a wide range of experience related to the phenomena of interest, where the goal is not to build a generalisable sample but to “represent a range of experiences related to what one is studying” (Maykut & Morehouse, 2000). Maximum variation sampling seeks representativeness through including a wide range of population rather than through equal probabilities and works when the sample size is 30 or less (List, 2004) as is the case with this study. Maximum variation sampling is recommended for both qualitative and quantitative studies (Patton, 1990). This sampling method is sometimes also called *maximum diversity sample* or *maximum heterogeneity sampling*, and can be effective when combined with *snowball sampling* (or sequential sampling) wherein one casts a wide net for participants by selecting only a few participants suggested by each source. Maximum variation sampling can yield detailed descriptions of each case, in addition to identifying shared patterns that cut across cases (Lincoln & Guba, 1985). Hence the *maximum variation sampling* method, combined with a sequential sampling (or snowball sampling) method was used in this study.

The reason for choosing to solicit such a heterogeneous pool of participants from a wider socio-demographic range than just from within one specific setting had additional justifications as follows:

- This study is predicated on studying the various existing models and theories, and these models and theories were each generated through studying various different participant pools. Therefore, a study that is part of an effort to integrate these pre-existing models needs to have as wide and varied a range of participants as
possible. The models that are being integrated researched a wide variety of participant pools including cancer patients (Johnson, 1997), university janitors (Chatman, 1991), low-income African-American households (Spink, Jaeckel & Sidberry, 1997) high-school students (Kuhlthau, 1991), a multiracial inner-city population (Dervin, 1976), social scientists (Ellis, 1989), faculty members from across the world (Lokman & Tibbo, 2003), computer programmers (Pirolli & Card, 1999), retired women (Chatman, 1992), battered women (Harris, 1988/1989), library users (Bates, 1989), and street-level sex workers, new immigrants, and hairstylists (Fisher, 2003). Although an exact representation of all these populations cannot be achieved, a proactive effort was made to recruit participants from as a wide a variety of experiences and socio-demographics as possible.

- This research studied people from all walks of life because any commonalities in their information behaviour that emerge from the data will be all the more powerful, and truly belong in the integrated model, for they would eventually be much more generalisable than if only one or two socio-demographics were studied.

- Many of these pre-existing theories and models were developed through an aggregation of single-subject studies wherein the researcher gained a personal understanding of the information behaviours of their specifically chosen demographics over time. The small sample size of 34 participants and the diary instrument used for this research allow for a more in-depth understanding of the study results, resulting in sufficient details in the data for the researcher to grasp the idiosyncrasies of each participant. In a way, each participant diary is analogous to a single-subject case study, and together, any commonalities found between all the participants is better aggregated into an integrated theory or model in a more
generalised manner. Hence, this study has the same validity that a series of 34 separate case studies would have, on account of the thick data that it generated, but it has also the additional advantage of being more generalisable (within certain bounds of literacy and access to technology) than a single-subject study.

3.6.2 Participant recruitment procedures

According to Alaszewski (2006) a diary is a document created by an individual who has maintained a regular, personal and contemporaneous record. Since maintaining such a diary on a daily basis over two weeks involves considerable effort and input on the part of the study participants on a daily and continuous basis over a two-week period, it is fair that each participant is compensated with some sort of honorarium. There is evidence to show that paying respondents in research surveys increases response rates, and Thompson (1996) has shown that in contrast to the conventional arguments about the perils of paying respondents, by valuing the participants who are willing to dedicate to the research by compensating them for their time and contribution, the researcher gains access to their knowledge and experience as part of a consultative process (Thompson, 1996). Although this research did not use the survey method, this evidence can be generalised to research study participants in general, especially those that are contributing much of their own time for this research. Moreover, honorarium payments help avoid the bias that might have resulted from the omission of those who declined to participate because they put greater value on their time, energy, and views. Furthermore, the researcher must be mindful that work conducted in a particular way alerts the researched about the investigator’s value and the importance of the study, and therefore, the more valued the researched participants feel, the better their cooperation and completion of participation. The suggested honorarium for this study was a gift voucher.
equivalent to AUD $ 100 at retail value, which amounted to a total of AUD $ 3100 for the 31 participants (not including the 3 pilot study participants who were not paid). A separate grant application was made to the university for obtaining the funding for the same, which was granted. There is a precedent for paying an honorarium to research participants within the university, and the Research Ethics committee approved the proposal for the same. The documentation calling for participants for the aforementioned study is included are included in Appendix Nos. IV and V. The step-by-step procedures adopted to recruit the participants were as follows:

- Ethical Clearance for human-subject research was applied for and received through the Research Ethics committee within the Queensland University of Technology (Appendix I)
- Flyers calling for volunteer participants were printed and distributed within the researcher’s faculty and school, within the classrooms where she taught, and on other campuses and faculties within the university (Appendix II)
- E-mail messages calling for volunteer participants were posted on list-servs that the researcher is affiliated with from past universities, campus bulletin boards, and alumni groups in the USA (Appendix IV)
- Requests for volunteer participants were posted on various different social networking sites through a targeted snowball or sequential sampling method (Appendix V)
- Requests for volunteer participants were sent by the researcher’s friends and family to their respective social circles, both in person and online.
- The researcher recruited some volunteer participants through posting flyers at conferences such as the American Library Association’s Annual conference 2008 and the ASIST Annual
The researcher recruited a few volunteer participants from her acquaintances from within her own commonly-frequented “information grounds” – places such as beauty parlours, doctor's offices, board-gaming clubs, and libraries.

Each one of these channels above yielded about 3 or 4 participants each. The final detailed participant demographics is included in Chapter 4, in Table 4-1)

Each and every volunteer study participant completed a study-participant consent form using the guidelines established by the Queensland University of Technology’s Research Ethics Committee.

Two informational sessions were conducted with each volunteer study participant over the two-week data collection time frame, one at the beginning of the study and one at the end of the study, as needed. Since the participants were spread over 6 countries, this was done through various different methods: face-to-face sessions, video conferencing, phone calls, e-mails, and through a sample web log set up for each participant, depending on their convenience. The first session was an introduction to determine participant's preferences of time-frame and to make sure they understood the kind of commitment that is required of them, along with providing a broad overview of what an information journal/diary is, and providing them the choice of tools and the examples. The second session was conducted after reviewing each study participants' diaries and contacting them as required to clarify any ambiguities, and to thank them and make sure their honorarium payments were duly processed.

The participant recruitment process proved to be the single-most challenging process in this study as it was hard to find volunteers who
could commit to the study for a period of two weeks and complete the study. This participant attrition has been mentioned in the literature as one of the drawbacks of the diary method (Bolger, Davis, & Rafaeli, 2003).

3.6.3 Technology used for data collection

A thorough review and evaluation of the technologies available for collecting data was performed before deciding on a service to use. Apart from the participants that opted to maintain an electronic or word-processed diary, it was decided that the participants who chose to use a web log would use a secure and private web log set up by the researcher separately for each participant following the ethical and privacy guidelines necessary for data collection. The steps involved in this process are described below:

- The technology options within the university were considered first, including a Sharepoint portal and Wiki available within the university. Both of these options were over-ruled on account of access restrictions and permissions, because the majority of the participants were outside the university and did not have easy access.

- It was decided that a freely and publicly available weblog service could be used as they were Web-based and easy for participants to use from anywhere – work, home, or anywhere else.

- The requirements for this web log service were listed and the web log services were compared for their suitability for the data collection. The criteria were: 1) ability to create a private web log with restricted access that was easy to use; 2) ability to block search engines from indexing the blog; 3) ability to mirror the web log onto the researcher’s hard drive as and when the data was entered so that the researcher would not have to depend exclusively
on the web log service for the data storage; 4) ability to download the diary data onto XML files that could be used with the text-analysis and statistical-analysis software; 5) ability to categorise the diary entries both with the researcher’s pre-coding and the participants' own tags; 6) ability to micro-blog which is a method by which participants could make a quick diary entry on their blogs either through the Web or through their Internet-enabled phones without having to bother with a fussy administrative interface to compose blog posts as many web blogs have.

- The researcher personally used and tried out all the various web blog software available (Blogger, Typepad, WordPress, Moveable Type etc.) for their suitability and ease of use and found that WordPress was the one that fulfilled all the requirements, above.

- Several published comparison charts were consulted including one published by the University of Southern California Annenberg School of Communication's Online Journalism Review that published a blog software comparison chart (Annenberg Online Journalism Review, 2006) the findings of which were in line with the researcher’s findings also.

3.6.4 Set-up procedures

Each participant had to be set up with a separate and independent web log both for reasons of privacy (so they could not read each others' entries) and for having the ability to separate the participants' entries for purposes of analysis. Besides, the participants' own e-mail address could not be used as the researcher needed control of the blog once the participants' role in the study was completed. Hence the researcher set up a separate e-mail account for each participant using codes that ran from Participant 1 through to Participant 40.
The web log was titled *My Information Journal: ParticipantNumber* and was linked to help pages, information pages, and diary entering guidelines (provided in Appendices VI through XII). The pre-coded behaviours that were provided as categories within the web log function that the participants could use are provided in Chapter 4 along with the findings. In addition to this, participants were free to tag their entries with whatever they thought was appropriate, and were encouraged to do so, even if it was not a category provided in the list. This method of using both predefined categories and participant's own tags was a way to separate the participants' own tags from the researcher's tags (categories) and also provided for their integration later on in the analysis stage, while also making sure the participants did not need to fit their behaviours into pre-defined categories, hence recording a wide range of information behaviours.

### 3.6.5 Data collection

Before the participants began their individual web log diaries, they were encouraged to participate anonymously onto a single sample web log that was set up which also became a place for participants to ask questions of the researcher or clarify their doubts, if any.

The participants were asked to not enter any personal names of other people and instead use pseudonyms if possible but many participants ended up feeling so comfortable with the privacy of the web log that they wrote down their thoughts and feelings in great detail and included some names of other people but much of it was subsequently anonymised during the data analysis stage by the researcher.

The actual diary data collection was not concurrent for all participants and spanned a total of 468 participant days and spanned the period between September 2008 and March 2009, and yielded an aggregate of 2305 separate diary entries of information behaviour, with an
average of 25 lines per entry. The researcher maintained weekly contact with the participants during the period when each participant maintained the diary and also answered participant questions as and when they arose.

### 3.6.6 Data Analysis Methods

The primary method that was used to analyse the data collected through the information journal is Grounded Theory (GT). GT is an approach to qualitative analysis that is an inductive, theory-discovery method that allows the researcher to develop a theoretical account of the general features of a topic [through patterns of association] while simultaneously grounding the account in empirical observations of data [through the coding of categories] (Martin & Turner, 1986). However, after the emergence of a theory, it can be deductively examined alongside existing theories in the literature to find out how compatible or incompatible the emergent theory is with the existing body of literature (Mansourian, 2006). Thus, Grounded Theory, by its very nature, lends itself to performing a triangulation of existing theories. The current study, with its aim of integrating the existing models of information behaviour, is uniquely suited to the Grounded Theory method.

In addition to the Grounded Theory analysis that was done through manual reading, coding, and re-reading in order to elicit meanings, patterns, and categories of information behaviour, an automated content analysis was undertaken through two software tools called ManyEyes, a text-visualisation tool, and Leximancer, a thesaurus-learning based content analysis and theme-discovery tool that maps the concepts arising out of the text itself, along with a map of the concepts specified by the researcher. This process was done only after the manual analysis was complete so it did not preempt, preclude, or precipitate anything in the
researcher’s mind that did not organically arise from the data. Nevertheless, when this automated text analysis was performed, it helped to validate and confirm some of the key findings from the grounded analysis.

This automated content analysis, along with some statistical analysis, provided a cross-reference in the analysis of the diary data, and provided for a methodological triangulation. As Cohen and Manion (1986) point out, triangulation helps map out, or explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint (Cohen & Manion, 1986). The current research study benefits from a threefold triangulation:

- **Data triangulation:** Diary data was collected from 34 different people, from 6 different countries, with 3 different methods – word processor, blog, and paper diary – and at different 14-day time blocks within a 5 month period.

- **Theory triangulation:** Many different existing theories and models of information behaviour arising from the overview of IB research in Chapter 2 were used in the Grounded Theory (GT) analysis.

- **Methodological triangulation:** Three different methods were used in the analysis of the textual data: hand-coding and discerning of patterns with Grounded Theory analysis, a concept analysis with the help of a content and text-analysis software, and a statistical analysis of the main concepts arising from the diaries.

According to Henwood and Pidgeon (2006) this kind of triangulation validates and opens up different facets of a complex phenomena to view, and deepens and widens one's understanding (Henwood & Pidgeon, 2006). Each one of these methods is explained in more detail in the following sections.
3.6.7 **Grounded Theory**

The qualitative method used in the analysis of the text of the diaries is Grounded Theory or GT. This was initially developed and principally used within the field of sociology but has been successfully employed by researchers in a variety of different disciplines including information science (Mansourian, 2006). GT, sometimes also called the *constant-comparison method*, is an inductive method of investigation in which the theory emerges from the dataset inductively (Glaser & Strauss, 1967). According to Case (2007), few Information Science investigators or IB studies stick solely to induction or deduction. Rather, they tend to move back and forth between these modes: collecting information that allows them to state a principle or tendency, then testing that generalisation through further research, in a continuous chain of logic (Case, 2007). According to Powell (1999), studies that seek to inductively and systematically develop taxonomies and theories through intensive analysis and through coding descriptive data use Grounded Theory where the themes emerge through iterative, constant comparison of concepts and categories against data and is said to be grounded in a given naturalistic setting being investigated (Powell, 1999), which, in the case of this study, is the everyday life environment of the participants.

**3.6.7.1 Grounded Theory in Information Science**

In the field of Information Science, Ellis (1993) used the Grounded Theory approach to study academic researchers; Ellis, Cox, & Hall (1993) used this theory to investigate the information behaviours of researchers in the physical and social sciences; and Ellis and Haugan (1997) used it to study the information behaviours of engineers and scientists in industry. Spink et al. (2001) used Grounded Theory in their inquiry into the public searching of the web using very large datasets through transaction-log analysis.
Grounded Theory is particularly suited to such naturalistic inquiries as the approach emphasises a systematic discovery of theory from data using methods of comparison and sampling. The resulting theories or models are grounded in observations of the “real world,” rather than being abstractly generated (Jansen, 2006). This form of naturalistic inquiry identifies the changing patterns of information needs and behaviour throughout all phases of this project. Grounded Theory is an inductive approach to theory or model development rather than the deductive alternative (Jansen, 2006). While much empirical research proposes and verifies a preconceived hypothesis, grounded theories do not begin with a set framework but are developed incrementally from the data. An emerging pattern, concept or proposition is discovered and integrated into the emergent theory. Concepts are re-arranged periodically so that higher-level abstractions eventually emerge over time. As new knowledge arises it is integrated back into the theory. The theory approaches validity as new data stops making any more changes to the theory and fits in with the existing or proposed theory or model (Glaser and Strauss, 1967). Grounded Theory remains intimately related to the reality it accounts for, and therefore, it is ideal for extracting how participants interpret or find meaning in a situation, process or behaviour that is being researched.

### 3.6.7.2 Appropriateness of GT for this study

The Grounded Theory approach is appropriate to this study as Grounded Theory’s naturalistic method of inquiry is particularly suited to studying day-to-day information behaviours without a preconceived hypothesis, and helps the emergence of the generic characteristics of information-behaviour patterns through detailed coding and categorisation. Information behaviour, like all human actions, is integrated and interleaved with our everyday life activities and behaviours on a continual basis and are a part
and parcel of our lives, and do not exist in a vacuum. Therefore, it needs to be examined in its larger day-to-day context in addition to being examined within a given theoretical framework or specific context as many existing models do, for Grounded Theory is about generating concepts that explain people's behaviour regardless of time and place. Most importantly, through the constant-comparison method of Grounded Theory, the newly emergent concepts and theories can be continuously compared with the existing models and theories and this process is helpful when integrating the existing models and theories into a comprehensive and all-inclusive model.

**3.6.7.3 Justification of using GT over other methods**

GT was chosen over other methods of analysing qualitative data for reasons of the advantages that GT offered in terms of finding commonalities in the data. GT was chosen over the other methods of qualitative analysis such as interpretive phenomenological analysis, phenomenography, or Sense-Making methodology for the following reasons. Interpretive phenomenological analysis requires an “idiographic, case study level of analysis, focusing on the particular rather than the universal” (Smith, Harre & Van Langenhove, 1995, p. 51), and is often used in psychological case studies, whereas this study aims to find more universal phenomena. Phenomenography “looks at differences in the ways people perceive, experience, and conceive of a phenomenon [and] is similar to Grounded Theory” (Edwards, 2006, p. 54), but nevertheless, phenomenography “seeks to find the finite sets of ways of experiencing the phenomenon being studied” (Marton, 1986, p.30) whereas this study seeks to examine the whole span of experiences related to information behaviours, and derive the commonalities between them. Other qualitative methods like Discourse Analysis were considered but not adopted for this study as they are more appropriate for research specific to the participants social context, or if all the participants had been chosen to fit a certain
delineated group of people, which is not the case with this study. According to McKechnie, Baker, Greenwood, and Julien (2002), only 1% of Information Behaviour studies use the discourse analysis method, and Case (2007) states that the discourse analysis method tends to produce lengthy descriptions of the participants' “subject positions” rather than any conclusive analysis, which would not have suited the very purpose of this particular research which aims at building a concrete process model of individuals' everyday-life information behaviours using existing theories. Another important concept in information behaviour research, Sense-Making, is an analysis methodology, and is inevitably linked to the sense-making theory which is a generalised communication-based methodology focused on human sense-making (and sense-unmaking). This analysis method is more suitable for a dialogic approach as in interviews and in situations where the researcher has face-to-face contact with the participant (Dervin, 2006) during data collection, as in interviews, and hence the method was considered unsuitable for the current study. Moreover, since this study includes the sense-making theory and its components as part of the conceptual model being studied within the model's template, using the Sense-Making methodology to analyse the data would have privileged it over the other theories, hence defeating the purpose of the study.

3.6.7.4 GT and literature reviews

Although traditional Grounded Theory methodology discourages a literature review or a theoretical framework in advance of the data analysis, both the data collection and data analysis for this research was conducted after an extensive literature review of the existing models. This was not in order to extract a theoretical framework in advance, but instead to become conversant with the existing models and theories. This was particularly important in this integrative research, which is predicated on unifying the
existing information-behaviour models. These separate theories and models were themselves treated as findings that were analysed in tandem with the participant data emerging from the research, which is in perfect accordance with the principles of Grounded Theory. Hence, if an observation derived from the data analysis did not fit in with any of the information-behaviour theories and models mentioned in the literature review in Chapter 2, a new review of the literature was conducted in order to determine if any theories and models from other fields of knowledge were applicable to the observed behaviours. If such a theory or model was found that explained the observed behaviour, it was mentioned in the data analysis and discussion chapters where appropriate (Chapters 4 & 5). If an observed behavioural pattern did not have any precedents in the existing theories or models, it was treated as a new finding of this study, and included in Chapter 4.

### 3.6.7.5 GT Procedures

One of the founders of the GT method, Barney Glaser (2003) discourages the use of any computer software for analysis within the Grounded Theory methodology, as it forces an inimical logic by forcing trust in pre-conceptual frameworks and face sheet data, in contrast to earning relevancy by emergence (Glaser, 2003). According to Glaser, the code-and-retrieve method of computer software merely produces descriptive data of co-occurrence, recurrence, or redundancy. It is the constant comparisons of GT that generate categories that resolve the main concern (Glaser, 2003). One of the ways to sort emergent codes and categories for constant and continuous comparison in Grounded Theory is called memoing—“memos are the theorising write-up of ideas about substantive codes and their theoretically coded relationships as they emerge during coding, collecting and analyzing data, and during memoing” (Glaser 1998). Memoing works as an accumulation of written ideas into a bank of ideas.
about concepts and how they relate to each other (Glaser, 1998). Through memoing, the researcher is encouraged to register ideas about the ongoing study that may eventually pop up in the analysis, thereby not excluding any serendipitous emergence of theoretical connections. Glaser (1992) also provides for a Qualitative Data Analysis (QDA) of the text where “all is data”. The GT procedures allied to this diary study are detailed below, and based on Strauss and Corbin (1990):

- Read the diaries on the web log.
- Looked for indicators of categories in behaviour – named them and coded them on the document (this was made easier through the tagging function available on the web log).
- Compared codes to find consistencies and differences.
- Consistencies between codes (similar meanings or pointing to a basic behaviour) revealed categories.
- Categorised the codes. This was made much easier on account of the web log method used.
- The data from the participants that did not use the web log method (the 3 people who submitted an electronic word-processed diary) was in the form of a Word table and this was converted into an XML file and loaded onto the web log so it could be easily coded also. The one hand-written diary (from the pilot study) was transcribed onto a web log also and similarly analysed.
- The researcher “memoed” or made notes on the comparisons and emerging categories.
- When no new codes emerged from the data, the category was considered saturated.

The GT research plan can also be summed up as in Figure 3-3 and Figure 3-4. In short, data collection and note taking occur in the
beginning. Coding and memoing occur more or less simultaneously. Sorting occurs when all categories are saturated. Writing occurs after sorting. In this process, the explanations emerge gradually. The basic process of analysis may be diagrammed as follows in the figure below. This process will be repeated for every new data set and also for the whole, and additionally, the preexisting theories and models will themselves serve as separate data sets to be examined.

**Figure 3-3:** Grounded theory: a thumbnail sketch 1 (Dick, 2005)
The categories that emerged in the coding (based on the pilot study) are included in section 3.5.8.

3.6.8 **Emergence of two naturally occurring groups of participants and its effect on the analysis**

Although none of the participants were selected to or even required to tag or categorise their information behaviours, all of them were given the option to do so in order that the researcher could get an additional insight into the participants’ own categorisation of their information behaviours. It turned out entirely serendipitously that half of the participants did so, while the others did not. Considering these outcomes, especially since they split evenly in the middle, it was decided that the journals that were tagged by the participants would be compared to the journals that were tagged by the
researcher, to provide an additional layer of analysis. As a result, Group A consists of the participants who self tagged their information behaviours within their journals based on the definitions provided to them as guidance at the beginning of the study, and Group B consists of those participants who wrote their information journals but did not tag or categorise their behaviours in any way. Although all participants were given the option to tag or to categorise their information behaviours in a way that they felt was appropriate to what they were doing, only 17 participants did so.

It must be noted here that only the numerical data (i.e., the count of the categories) were compared between the two groups in order to determine if the information behaviour categories tagged by the researcher was in alignment with the information behaviour categories tagged by the participants themselves. A statistical analysis of these two groups and their tags based on sampling data and aggregate data showed that these two groups could be indeed combined for analysis as described in the the statistical analysis section 4.4.2 of Chapter 4. This data was not used in the Grounded Theory analysis of the diaries which was entirely hand-coded by the researcher based on the overview of the literature and her experiential knowledge, and then coded again using an automated text analysis software.

3.6.9 Post-GT automated text and statistical analysis

After reading and hand-coding all the diary entries and completing the Grounded Theory analysis, the diary data was processed by a text-visualisation program and a content analysis program. This allowed the researcher to interrogate her data at a particular level, and according to Welsh (2002), this can, in turn, improve the rigour of the analysis process by validating (or not) some of the researcher's own impressions of the
This automated content analysis of the information journals was possible partly because of the fact that the majority of the participants had used the web log method with its inherent advantages of attaching tags and categories, while also making the information journals searchable in various ways. It was easy also to integrate the electronic diaries submitted by a few participants into the integrated journals by using blog-specific technology tools to import them into a secure new blog.

Before being processed by the text and content analysis programs, the electronic document was stripped of all the extraneous blog-specific codes and mark-ups through a text-filtering program. The time-stamps were left intact but they were not analysed through the automated tools as the research question did not relate to temporal information.

Mathematically, any given text is a high-dimensional, sparse feature vector where the elements of the vector are the frequencies of specific words and phrases in the document, and geometrically, it is a point in a high-dimensional space, and hence anything one can do with points, one can do with a properly prepared and coded text document. Nevertheless, whether coded manually or by automated methods, text data will contain at least 15% erroneously coded records. Some of this error will be systematic (Popping, 2000)

*Leximancer* is both a data mining and a thesaurus visualisation program that is based on the theoretical foundations of ontological relativity of words, compiling bits of information from natural language text and mapping them to a thesauri to form and assess concepts. Particular words can be merged together to be counted as a single concept and structured relationships between concepts can be identified, so that both key concepts and relationships can be displayed visually via a concept map (constructed in a similar way to a mind map). The circles on the maps indicate themes that have been discovered in the text (Smith *et al.*, 2002).
However, the software is less useful in terms of addressing issues of validity and reliability in the thematic ideas that emerge during the data analysis process, particularly in this study, and this is due to the fluid and creative way in which these themes emerge in the hand-coding (Welsh, 2002), where the researcher was looking for patterns in the information behaviours of the participants and not analysing the content of the participants information needs as such. Lofland & Lofland (1995) found also that qualitative research programs are not all that helpful in the initial stages of the analysis (Lofland & Lofland, 1995) but they can enhance validity and reliability if used post-analysis to confirm certain findings that can then be visualised in a quantitative or diagrammatic way.

The statistical analysis used in this qualitative study might be construed as quasi-statistics in that there is no hypothesis being tested and the statistical analysis mostly involved the counts of categories, a statistical analysis of the pair combinations and their coefficients, a co-occurrence matrix, and the co-occurrence listing of all the categories of information behaviours in the data and how they co-occurred together. Nevertheless, this numerical analysis provided another way of validating the findings from the Grounded Theory analysis.

### 3.7 Research Design: Phase 3

The main goal of this study was to integrate the existing theories and models of information behaviour. This involved the study of several aspects of the data set, including:

- Examining how people construct and coordinate their information behaviours, including information seeking, searching, finding, organising and using behaviours, with a view to relating them to the existing theories and models of IB.
- Investigating the degree to which: (a) people seek information from
other people within social behaviour as opposed to non-interpersonal sources, and (b) how information behaviours are embedded within or support other behaviours and relate them to existing models of IB.

- Investigating the triggers that initiated information behaviours, and examining if there was pattern, and comparing it with the existing theories.
- Investigating to see what kind of information behaviours tended to occur together, how often, and why?
- The findings from the researcher's analysis was compared and analysed along with the findings from the text-analysis software and the statistical analysis in order to arrive at some of the stronger, key findings form this research.
- A new integrated model of information behaviours was designed based on the findings from all of the above, and this process is explained and diagrammed in Chapter 5.

In short, this study looked at all aspects of information behaviours and the different connections and associations that emerged between the various information behaviours in the diary data in order to create an integrated model of information behaviours. This provides a more integrated understanding of peoples' information finding, organising and using behaviour and is an important step forward in IB research.

### 3.8 Establishing the Quality of the Study

A basic requirement for any research is to ensure quality and authenticity in its processes and findings. The researcher strived to improve the quality of this study by incorporating several mechanisms that ensure the same. This study sought to explore the everyday life information behaviours of
people in a naturalistic setting, and hence, techniques of controlling randomisation, most commonly employed in experimental research to measure variables in an “unchanging universe” (Marshall & Rossman, 1995), was not applicable to this study. Instead, naturalistic research should show how the process was stable and its findings grounded in the data in order to establish trustworthiness, “consisting of credibility, transferability, dependability, and confirmability of the research” which are necessities of qualitative research, and somewhat analogous to the concepts of internal validity, reliability, objectivity, and external validity in positivist quantitative research (Guba & Lincoln, 1985). Accordingly the following mechanisms were incorporated to establish the quality and trustworthiness of the study.

### 3.8.1 Credibility

Credibility refers to the isomorphism between the realities of the participants and the reconstructions of these realities developed by the researcher (Lincoln & Guba, 1989) and can be analogous to “internal validity” in experimental terminology, or the “truth” of the data. The researcher employed the following measures from among those suggested by Guba & Lincoln (1989) in order to establish the credibility of the study:

- The participants were ensured of complete privacy and anonymity in the collection and the reporting of the data through several means – making them aware of the privacy implications and the ethical clearance and its constraints, obtaining their consent, and by answering any and all questions they had about the same in a timely manner. This measure was to minimise possible distortion of self-reporting caused by privacy concerns of the participants. Accordingly, the participants were assigned only participant numbers in the information journals online and participants were
encouraged not to use their names with the journals (not even pseudonyms), and additionally, the participants were deliberately assigned a different set of participant numbers (P#) in the reporting of the data.

- As a result of the measures above, it turned out that the participants were so comfortable with the private web log that they started expressing quite detailed and private opinions within its narrative that were related to their information behaviours. Nevertheless, no participant record that reveals a participant identity is used in the journal extracts provided in the analysis section. Wherever the participant had used names of people in their journals, they were deliberately anonymised.

- Participants were contacted after they finished their information journals to ask them for additional comments, if any, and were contacted again post-analysis to check the validity of the researcher’s interpretations.

- Apart from the anonymisation, participants' journals were analysed exactly as they were written and have been maintained electronically for reasons of replication if needed. Both the automated content analysis and the statistical analysis detailed in Chapter 4 proved that the researcher and the participant were in agreement in the way they tagged the participant behaviours for analysis, thus establishing that the realities of the participants and the reconstructions of these realities by the researcher were in alignment with each other.

- Participants were provided with a private and secure practice web log with guidelines and several sample entries so they could always be aware of the guidelines and also have a sample for reference and use the private site to both communicate with the researcher if needed and practice their journals for a while before beginning their
14 day journal. Several participants anonymously made use of this practice journal.

### 3.8.2 Dependability

Dependability refers to the stability of the data over time or the extent to which an external reviewer can examine the process by which the researcher collected and analysed the data (Guba & Lincoln, 1989). This is analogous to the “reliability” of data in experimental research, or the extent to which the measuring instrument would give the same value if used repeatedly. In other words, how can one determine that the findings would be repeated if the inquiry were replicated with the same (or similar) participants in the same (or similar) context. The following measures were used to ensure dependability:

- The three participants from the pilot study were analysed by the researcher first before determining the taxonomy of information behaviour tags that were provided to the participants as a guideline to make the data more streamlined and stable.
- Since half the participants used the tags provided and half the participants did not, the two groups by themselves comprised of several coders, providing the opportunity to test the inter-coder agreement, based on the guidelines provided to the participants, and recommended by Guba & Lincoln (1989). The statistical analysis later proved that the usage of the information behaviour tags were uniform in their variation across both the groups. That is, neither the researcher nor the participants favoured any particular behaviour over another for any given subset of samples. Section 4.4.2 of the statistical analysis described in Chapter 4 provided external validation for this.
- The researcher followed the three-step process of modified constant comparative technique provided by Grounded Theory in
order to maintain the stability of the data analysis in order to produce findings grounded in the data.

- Through the iterative process of data collection and analysis, the researcher kept taking memos in order to keep track of modifications in methodology, schedule and logistics, along with thoughts and insights.
- Incidentally, almost all of the participants have informally expressed their willingness to repeat the study at any time and this provides an opportunity for future research that could indeed test the dependability of this study by repeating it.

### 3.8.3 Confirmability

Confirmability refers to the extent to which the data, interpretations, and outcome of inquiries are rooted in contexts and participants rather than biases held by the researcher (Guba & Lincoln, 1989). This is analogous to the “objectivity” measure used in experimental research or the extent to which different people following the prescribed rules will assign the same value to sets of objects (Kerlinger, 1986).

- The data analysed by the researcher, as described in the Grounded Theory analysis in chapter 4, is well supported with extracts from the data to make the analysis transparent to an external examiner.
- The data (the text of the journals) was examined by the automated content analysis software, whose overarching results about the information behaviour categories (the themes) and their progression in a person’s everyday life was consistent with the researcher’s findings.
- The statistical analysis of the categories of information behaviour (the tag data) provided further confirmation that the researcher was not favouring any one information behaviour over another in her analysis.
3.8.4 Transferability

Transferability is the degree of similarity between the context of the study and the context of the setting to which the study results may apply (Guba & Lincoln, 1989). This is somewhat different from the “external validity” and generalisability that are defined *a priori* in experimental research, as the naturalistic research identifies and defines the context of the study through inductive/deductive loops of data collection and analysis. Hence it is impossible to define the external context to which the study results apply. Fendler (2006) critiques generalisability in the context of qualitative educational research as there are no universal and objective laws to be found. Instead “they reinforce the looping effects of categorising human behaviour, and that since generalisation is part of a reiterative process, generalisability in qualitative research seems more likely to provide us with validation of our preconceived notions and is less likely to contribute anything new for us to learn”. According to Metcalfe & Lynch (2002) such inductive and interpretive research within information systems is more applicable in contexts similar to its own, where “actionable knowledge or critical heuristics are more important” (Metcalf & Lynch, 2002)

The participants in this study were not chosen based on any prerequisites, except that they were all adults over 18, wrote their journals in English, and could participate from anywhere in the world, and did so on a continual basis for any 14 days of their own choosing from within their own individual everyday-life contexts, but due to the constraints of the researcher’s own solicitation, all the participants were from industrialised and urbanised parts of the world, and all of them used some form of computer technology (including mobile phones and PDAs to record their journal except the one participant who maintained a paper-and-pencil journal for purposes of the pilot study. Hence the transferability of this study can be determined *a posteriori* by an external examiner or reader
based on the similarity of the context of these settings as described above. The researcher has, however, fully captured the study context through presenting the relevant details of the participants in Table 4-1 in Chapter 4.

In addition to the above measures of credibility, transferability, dependability, and confirmability, the researcher kept the study flexible to the extent that newly developed ideas and insights could be reflected in subsequent processes. For example, when two groups of participants clearly arose organically from the data, it was decided that they would be analysed both separately and in combination. Also, the researcher kept widening her literature review constantly every time any new data emerged that did not fit neatly into pre-existing theories, in order to make sure that the all of the different variable could be considered carefully before building an integrated model.

3.9 Methodological Limitations

This research inevitably relies on the participants' self-reporting of their perceptions of the phenomena involved. Such self-reporting can have several drawbacks.

- Participants may tend to reconstruct the processes to legitimise their behaviour as rational (Ericsson & Simon, 1984)
- Participants may have difficulty articulating how they “do things in general” (Simon & Burstein, 1985).
- Participants' attention may be selective and pick out only some of the stimuli as important (Petty & Cacioppo, 1986)
- Participants may not report self-negative stimuli to a stranger even when they are important (Bates et al., 1995)
- There may be a bias in retrospection if a person fills in the diary at the end of the day and not when an actual behaviour occurred, and there may be problems of veracity (Breakwell, 2006)
This study attempted to balance these unavoidable limitations caused by self-report data by collecting real-life experience in real-time as they happen in order to minimise possible memory loss, and encouraged participants to be as honest as possible in reporting their information-related activities, thoughts, and feelings. This was done through researcher-participant contact and communication and by ensuring complete participant anonymity and the privacy and security of the data collection method. This participant comfort and privacy was achieved in a much more effective manner on account of the web log method as the web logs were coded by participant numbers and the participants were assured complete anonymity. In fact, many participants later commented that they found the experience very rewarding and also educational and motivational and that it indeed helped them reflect on their information behaviours a lot more. This may be construed negatively as a reactive behaviour caused by the study itself, but nevertheless, based on the literature, this “reactance” or “change in participants’ experience as a result of the study” is not believed to affect the observed phenomenon (Litt et al., 1998), and that “participants do not develop a more elaborate or complex knowledge of the monitored domain” (Thomas & Diener, 1990). Additionally, “the experience of the diary study may entrain their conceptualisation of the domain to fit with those measured in the diary” (Suedfeld & Pennebaker, 1997). However, this has not been proven in the outcomes of any study (Bolger, Davis, Rafaeli, 2003).

Other methodological limitations of this study that need to be acknowledged include:

- **Experimenter's bias**: This can arise as a cognitive bias from the researcher reading up on the field and forming opinions, in the study sample, in the data collection and analysis, in the interpretation, and in the publishing of the results (Rosenthal, 1966).
This limitation exists for all qualitative research and the social sciences have not come up with a solution for the same.

- **Sample selection bias:** This can arise from accidental or instrumental bias in the sampling technique, as against deliberate or unconscious manipulation. In the case of this study, participants were necessarily literate enough to write down their experiences, hence ruling out a large majority of potential everyday life experienced by those who did not fit this category. Nevertheless, within the bounds of this limitation, the sample of participants was unbiased and this was assured through the selection of only a few respondents from every category of solicitation of participants as explained in section 3.6.2.

Regardless of the limitations of this study and the measures taken to minimise them, the approach taken by this study is still exploratory. The purpose of such exploratory research is “to investigate little-understood phenomena, to identify/discover important variables, and to generate hypotheses for future research” (Marshall & Rossman, 1994). The study used existing models and findings, and yet investigated the participants in a naturalistic setting without pre-applying any of the models to design the research. It tried to discover important variables and associations among the models and some of these findings could be used as hypotheses for future study.

The approach taken by this study is also naturalistic and such a naturalistic inquiry involves “studying real world situations as they unfold naturally, non-manipulative, unobtrusive, and non-controlling; openness to whatever emerges – lack of predetermined constraints on outcomes” (Patton, 1990). This study tried to capture naturally occurring real world everyday-life situations in the least obtrusive way without manipulation and controlling the behaviour in any way.
3.10 Chapter Summary

This chapter detailed the assumptions, challenges, and the overall research design along with explaining the techniques involved in the data collection and analysis, as well as the several steps taken in order to improve the overall quality of the study. Being a naturalistic study, it necessarily involves a combination of inductive and deductive processes that inform each other. The researcher has identified and described the major components of this process in order to explain the rationale of the methods used in the study, while also acknowledging the limitations of the available methodology. The study was an initial attempt to obtain insights into people's everyday life information behaviours using existing theories and models in IB and to create an integrated model of IB. The study generated some new hypotheses that could be tested and new research questions could be explored in subsequent research built upon this one.
CHAPTER 4 : RESULTS

'I could tell you my adventures—beginning from this morning,' said Alice a little timid 'but it’s no use going back to yesterday, because I was a different person then.'

– LEWIS CARROLL

This chapter presents the results of the data analysis with extracts from the information journal data where appropriate. Data results show the potentials of being interpreted in several ways, either qualitative or quantitative interpretations, or both. The main thrust of the analysis in this chapter is qualitative. The automated content analysis and the numerical analysis served as complementary methods rather than comprise the focus of this chapter. Diary data was collected over a period of four months from October 2008 to January 2009 – the pilot studies were conducted in September 2007. Thirty-four participants maintained a continuous and highly descriptive daily journal (or web log) of their information-related activities and thoughts, to an aggregate of 2305 separate diary entries of information behaviour, with an average of 25 lines per entry, for 468 participant days over a period of 5 months.

This chapter follows the three steps of data analysis presented in Chapter 3, and respectively reports analysis results of the daily information journal diaries using Grounded Theory analysis, along with the automated content analysis of the aggregated text and its tagged attributes, and some numerical and statistical analysis. A summary of the findings is reported at the end of the chapter.

<table>
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<tr>
<th>Number (NOT Participant No.)</th>
<th>Country where the journal was maintained</th>
<th>Occupation</th>
<th>Age</th>
<th>Gender</th>
<th>Method</th>
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</table>

**Table 4-1:** Socio-demographics of participants
4.1 Socio-Demographics of Participants

The socio-demographic distribution of the participants in this study is shown in Table 4-1. For reasons of privacy and anonymity, the participant numbers are deliberately mixed up in the table so as not match up the identities of the participants with the extracts of their diaries mentioned in various sections. The complete diary data has been saved electronically on three different hard drives and stored privately and will be made available for future research using other methods of analysis if appropriate.

As stated in Chapter 3, a snowball sampling method was used to recruit participants, combined with a maximum variation sampling, but within the bounds and limitations of this study. All participants maintained their diary in English, and are from industrialised and urbanised parts of the world, and although not required to do so, 30 of the 34 participants chose to write their information journals as a private web log. Below is a summary of the participant details:

Total Recruited: 40
Total Completed: 34
Male: 12
Female: 22

Country from where participants maintained the information journal:
USA: 20
Australia: 7
India: 2
China: 2
Jordan: 1
Canada: 2

The research participants are referred to as participants in this
study as they have indeed been active partners and participants in creating the data for this study, and the researcher has maintained their voice by quoting them verbatim where examples were needed to illustrate the analysis, rather than paraphrase them in the text. This is in keeping with the best practices in information behaviour research, as described by McKechnie et al. (2004) who, in their analysis of the terms used by information behaviour researchers to present their participants, say that “Finally, the terms partner and participant may perhaps be regarded as the most inclusive of all as they construct the individual as a member of the research team and an active player in the research process.” (McKechnie et al., 2004).

The units of analysis in this study are the information behaviours and how they interact with each other, and not the participants or their demographics, and so the socio-demographic data was not analysed in any way, but is included in the table just for purposes of record and transparency. This is in keeping with the Grounded Theory method where “the unit of analysis is the incident and not the person or the research subject” (Glaser & Strauss, 1967).

4.2 Information Behaviour Categories

The diaries or information journals provided a descriptive record of the participants' everyday-life information behaviours where some categories of information behaviours were observed more often than others. The fifteen major categories of information behaviours that emerged from the information journals are in Table 4-2.
Table 4-2: The main categories of information behaviour in the information journals

As explained in section 3.6.3.2 in Chapter 3, Group A consists of those people who had self-tagged their information journals while in the process of recording them, and Group B consists of those participants who did not self-tag their information behaviours and whose information journals were tagged by the researcher after they were recorded.

A statistical analysis of the two groups provides statistical validation that the two Groups A & B are strongly correlated and can indeed be combined for purposes of analysis. The coefficient of correlation between Groups A and Group B is 0.98, which is a useful measure to indicate that the tagging of behaviours in the two separate groups was not widely different. This is described in more detail in section 4.4.2.
4.3 Results of Grounded Theory Analysis

This section describes the results of the Grounded Theory analysis of the information journals that was carried out between October 2008, soon after the first participant completed an information journal and August 2009. The information behaviours specified in the tags are organised here in order of their prominence in the diaries, but each one of these behaviours overlap with other behaviours in the information journal and are described as they become relevant.
The participants that used tags to denote their information behaviours also used some additional tags of their own wherever they felt that their entry did not fit into the categories provided. These tags are discussed where appropriate.

### 4.3.1 Sense-making behaviours

Sense-making emerged as one of the most prominent behaviours, and the majority of the participants engaged in this behaviour on a continual basis in their information journals. Sense-making was often exhibited by participants *during* the process of searching for some information rather than at the beginning of an information seeking process. Hence, they were not always seeking information to make sense of something, but were often trying hard to make sense of the information they found *en route* to satisfying a curiosity, or solving a day-to-day problem that involved finding some information, and did not necessarily involve a cognitive or affective gap or uncertainty.

Sense-making, when it surfaced *during* the *information search* process, was handled in several different ways by participants. Some participants wrote that they felt like they were in a wonderland and reported elated feelings of wonder, surprise, and amazement at the information they encountered, while some expressed negative feelings of having fallen in a rabbit hole where nothing made sense and reported feelings of confusion, puzzlement, apprehensiveness, frustration, stress, ambiguity, and fatigue with the information they encountered.

Sense-making also included encounters with other people where the other person represented an information object that they either needed to ignore, engage and interact with, or explore by using participants’ existing information sources like memory or seeking information through several other means, including seeking information from the encountered
person. Sometimes this information was sought just as an end in itself, and at other times, it was used to assess a situation or an environment for various purposes including the inference of safety, comfort levels, and trust. Participants sought for and used information including attire, mannerisms, speech, language, and a host of other factors to create information about the other person in a complex process of abductions from information clues. This kind of abductive sense-making was also observed when participants encountered information resources like information systems, web pages, or media; participants used a complex process of memory, hunches, past experience, or signs from the resource itself to assess its usefulness as a source of information for them. These included all metadata exhibited by the resource, intentionally or unintentionally.

Below are just a few of the shorter entries from the 426 entries in the information journals that corresponded to the sense-making tag:

- “I’m struggling to understand this information” (P4).
- “So much was new to me that I felt like Alice trying to make sense of unfamiliar territory” (P2).
- “It felt like I was falling into a rabbit hole where nothing made sense” (P6).
- “I felt like I was down the rabbit hole and through the looking glass” (P11).
- “I felt lost and confused and tried hard to make sense” (P14).
- “It is hard for me to grasp the meaning of this information” (P12).
- “I’m trying hard to figure out how this [program] works and it is very frustrating” (P26).
- “We began to look for the catalog listings [for songs in a library] and found so many variations that I was baffled by the lack of authority control” (P23).
- “As I began searching I realized the variables that I would be facing. Music carries with it the problems of multiple performances, live versus recorded, variations, remixes, and non-textual information (P40).
• “Went and bought a book by George Soros. In my quest to understand how the world really works, as opposed to the way people of average intelligence tell us it works, Soros seems to have some insights [on the financial crisis] nobody else does” (P6).

• “It’s been a very frustrating experience [figuring out what is wrong with the dishwasher] given we actually had the manual for most of the day, just couldn’t make any sense of it” (P6).

• “I feel unease in asking for information from someone I do not know well, although information seeking is not a shameful event” (P5).

• “I was having trouble making heads or tails of the files [he] had on the shared drive. So I tried going over them again but they were just like something in another language. I think two things are going on--I think [he] has begun writing as much in the jargon or patois of the client as the client has been (problem for new users if you ask me) and also he assumes that his shorthand is intelligible. Not to make it sound like his fault…it isn’t. I haven’t given it enough time lately especially seeing as I have gotten behind due to technical difficulties.” (P10).

• “Spent much of the afternoon grading papers. It’s a ton of information, and finding a rational way to attach numbers to it is weird...It made my head hurt” (P11).

• “Found the moving estimate. Looked at the bill. They’re written entirely differently. My estimate has a discount taken off each line item; the bill has a blanket discount taken off the bottom” (P18).

• “I’m using a process of sense-making to decide that heavy worsted knitting yarn must be the true weight for this blanket as 1) It is a reasonable explanation for my gauge problems, and 2) it’s what the majority of the stores online say. To make sure, I will dig for any yarn (any brand) that is heavy worsted weight in my yarn stash. I can knit a gauge swatch with that, and see if my gauge problems are solved!” (P10).

• “The minute I entered the room, I sensed that I would be uncomfortable in this meeting. I think I was berry-picked because I was the token minority, so to speak.” (P2).

Participants often reported sense-making behaviour when dealing with information technologies such as computers, printers, automated
phone-answering systems, mobiles, or cell phones etc. Participants routinely reported helping others make sense of information technologies in their everyday lives. In fact, some participants added their own tags such as “instruction” “information despair”, “technology failure”, and “techno-stress” in conjunction with the sense-making tag. Here are a few examples:

- “I just spent an hour fighting with our new “improved” printer & I still can’t get it to do what I need it to do” (P24).
- “I’ll put off things for weeks if the answer is to be only found at the end of a phone” (P6).
- “Looked up the newest alleged killer virus on Snopes found out it is real, my mother probably already sent it so it’s likely already eating through my computer.” (P13).
- “Stupid TV didn’t record the last 10 minutes of my program. I checked timewarnercable.com to see if they had a FAQ about the DVR acting up, because this isn’t the first time this has happened lately. But nothing. Just basic information about how the DVR works. Bah. I guess I might have to call them. I hate making phone calls. Hate it forever. I might just put up with it and see if it goes away.” (P21).
- “I installed the WP app on my iPhone to update this blog, and it looks like it might have dropped some posts… I’ve lost track of time [making sense of what happened]” (P10).
- “It was such a pain too because for some reason the Internet was connected but Explorer wouldn’t work so I had to call tech support and spend ages on the phone to them” (P14).
- “Phone service option 1 was “emergency” like “gas leak”. Well, this wasn’t a leak [just no gas at all], so I just needed a service call! So option 2 was “service call” and I felt very justified in my decision. I matched up the options. But I picked the wrong one. The woman I talked to this morning said it “would” have been an emergency & someone would have come out last night! I wouldn’t have had to check into a hotel if the information was clearer.” (P19).
- “I hate making phone calls, in particular, but I’m much more likely to call if it’s a
work issue” (P17).

- “I imagine the average user of this type of site would stop at the first step and if someone approached them later about shoddy work they would then say “well I must just be an idiot because I couldn’t do it” when all along it is really poor site design. That is a real beef I have with a lot of sites on the Internet; poor usability. It makes more sense if the people looking for the information have received some instruction in how to do it, but when the ethos is every man/woman/child for him/herself then people are really stuck sometimes” (P10).

- “I added a new sub-category called “Information despair” to use when I have a perception that it is taking an inordinately long time to sort out basic things” (P34).

- “I just spent six hours removing a multi-pronged Trojan virus from my laptop. Pernicious little *&^%$. Disabled regedit & ability to view hidden folders, where everything had plopped itself. Much online research + three virus scans + figuring out how to get back aforementioned abilities + a brief scare w/a black screen of death & a white cursor ….I think it's fixed. Without having to reinstall XP” (P24).

In Dervin's (1983b) theory of sense-making, it is conceived as a phenomenon that occurs after a person encounters a “gap” in the so-called “time-space continuum” of their lives, wherein they use “information seeking” as a means to bridge the gap. Whilst this phenomenon was certainly observed in the participants’ diaries, it is also true that many of the participants engaged in sense-making during the process of seeking information for purposes unrelated to a cognitive or affective gap in their mental models or any expressed “need.”

Ironically, the information seeking and searching behaviours themselves led to much of the cognitive gap that needed to be filled through seeking a different kind of information than the one the participants were originally engaged in, which often caused psychological or affective gaps of frustration or stress as it interrupted their original information seeking. These kinds of frustrations often ended up with the
participant abandoning the information seeking or adopting other methods of fulfilling their information pursuits. To extend Dervin's sense-making metaphor to explain this phenomenon, it would be analogous to a person, who, while building this metaphorical bridge of meaning to fill a cognitive gap in their space-time continuum, fell into a deeper gap that added an additional affective-gap level of frustration and stress.

Sense-making was also associated with the discerning of meaning in the context of any information that originated from another person's experience, in a process of figuring out what the other person actually meant; in effect, sense-making was an essential part of all communication and of finding a common meaning between two (or more) facets of the information, or of finding the intersubjective meaning. Since information behaviours are, in essence, communicative behaviours both in the narrow and the broad sense, sense-making is entangled with every kind of information behaviour. Dervin (1989) defined communication as a process of information transfer and diffusion, and the participants' journals demonstrate that information transfer and diffusion always involves some kind of information behaviour which in turn involves some form of communication – communication with others and with oneself across space-time – and hence always involves sense-making. Even information organising behaviours exhibited this communication level – participants tried to communicate with their own future selves by organising information for future retrieval, whereas they were communicating with their past selves in order to find the organised information. Since the anticipated information need was always quite different from the actual or encountered information need, information organisation behaviours caused many problems for participants.

Making sense of the information that a participant received from another person (whether in person or otherwise) also activated a process
of trying to discern what that other person meant. This was perceived as
easy if the participant knew the other person well; otherwise the participant
had to guess at the other person's meaning (or mental model), and
understand how it may be different from the participant's own meaning (or
mental model). Sense-making thus was a behaviour that was not just the
realignment of a participant's own mental model through information
seeking, but also a process of guessing at another person's mental model.
This other person may often times be just an unnamed entity who might
have created an information resource (manuals, documents, rules,
websites, phone options, file names, or even just the words themselves
involved in any communication) using his or her own mental model.
Therefore, sense-making was also a process of aligning the mental model
participants held of any given piece of information with the mental model
that another person may have of the same information – it was a process
of finding this intersubjective meaning that would bridge the gap between
the two different models in order to agree upon a common meaning. Of
course, this was not always achieved successfully, and hence the
frustration and the stress experienced by the participants during the
sense-making process.

Participants did not see as much of a dichotomy between thinking
(cognitive responses) and feeling (affective responses) as the information
behaviour theories in the literature seem to suggest, for feelings were a
consequence of thinking, and so were behaviours (what they did) related
to information. Thinking about information can just be as idiosyncratic as
feelings related to information, and consequently information behaviours
were observed to be somewhat idiosyncratic too. Thought, feeling, and
behaviour all involved some sort of sense-making, and since their thinking
and their feelings were both situated within a participant's social-cultural
context, what we think affects how we feel and how we behave, but all of
them are involuntarily mediated by one's socio-cultural and immediate
contexts. This is probably why the sense-making behaviours were the most commonly occurring behaviours observed and also the behaviour that occurred most commonly alongside other behaviours. This expands Dervin's idea of sense-making to beyond just the idea of a bridge across the gap in our space-time continuum and into something that comes into play even with other information behaviours.

4.3.2 Seeking behaviours

The information seeking incidents in the information journals had some recurring patterns. Information seeking was not triggered so much by a need or an uncertainty as much as by the encountering of a direct conflict with a participant’s existing knowledge, beliefs or world-view. Most questions or problems encountered in everyday life by participants were answered using a set number of standard resources that they used on a regular basis in a more-or-less routine manner – another person, a favourite reference resource or website. In most cases, the information resources that they searched were the ones that the participant already trusted and were mostly in line with their existing attitudes, beliefs, and world-view, confirming the *habitus* theory (Bourdieu, 1984; Spink et al. 1997) mentioned in the literature. Many of the participants happened to maintain their information journals during the U. S. Presidential campaign in 2009, and the so-called World Financial Crisis of 2008-2009, and hence they were quite articulate in their information journals about their own political beliefs and the information sources they trusted and consulted concerning the events of that time. This process was entangled with their social, cultural, and personal beliefs and hence they provided a few insights to the researcher about these same issues.

It was when the participants encountered what they considered an anomaly that they could not resolve from within their own world-view that
they initiated an active information seeking in order to resolve the so-called
cognitive dissonance described by Festinger (1957). This cognitive
dissonance was a kind of gap between two contradictory mental models
held simultaneously by a person. Often times, information seeking was just
one of the many ways of resolving this conflict of facts and ideas. Other
times, participants used their own associative memory and experience to
fill this gap. Hence, the problem-solving model of information-seeking
studies and the sense-making concept were both connected but in a way
that involved both internal and external processes.

The information seeking process, just like the sense-making
process, involved also an engagement with another person's cognition (or
mental model) that involved thinking on the lines of “where would so-and-
so have filed the information?”, “who else might have needed this kind of
information before?”, “what might this information have meant to another
person?”, “what do these words mean to the other person who might have
a different conception of it, and hence may have organised it differently?”
This engagement or cognitive coordination process with another cognitive
model was not necessarily of another person even, but was sometimes
with one's own past mental models, as in retrieving from one's own
collection of information sources. Examples include questions like “what
was the context in which I came upon this information before? Where
would I have filed it?” Thus, information seeking was very much entangled
with thinking about information organisation, which was different from
organising information.

Information seeking was one of the most complex of the observed
behaviours as it occurred simultaneously with several other information
behaviours including sense-making, and involved the synchronisation
between the different cognitive models between the person seeking
information and the person(s) providing the information. Below are a few
selected examples from participants’ journals from among 297 entries that illustrate the complexity of information seeking:

• “I guess really the first task I do is to assess the problem in terms of my assumptions of the knowledge of those around me. If I believe I can get the information I want by yelling across the room I’ll take that option before hitting the web. Last on the list is email someone I believe might have the answer. I rarely pick up the phone as for some reason I have an unnatural dislike of using the phone” (P32).

• “Second day back [at work] and my team are still suffering from an inability to accurately convey information [in regard to the problem]. After a little investigation myself trying to look for patterns and determine if they really were seeing something intermittent I discovered that their idea of intermittent actually had nothing to do with the actual meaning of intermittent and that there was actually a pattern to the problem they’d observed. So we are at least now a little closer to correctly defining the problem so maybe tomorrow we may even be a little closer to a solution. Additionally, further questioning of them elicited the information that they actually had a way of making the problem disappear. Why they thought that not passing this little very useful piece of information was a good idea is a mystery to me.” (P30)

• “Monitoring is another way I frequently interact with information at work. The forums that I typically search to find work related answers, I also monitor regularly throughout the day to see if anything interesting comes up, or if someone else has a question that I can answer. I must admit though that I often respond with a reference to the documentation or a curt response suggesting the poster actually searches the forum before posting. It really annoys me when people ask a basic question that has already been answered in previous posts or can easily be found by reading product documentation. The more people that post basic questions or repost questions the less value the forum has as an information source as searches return a greater and greater number of hits and browsing the results to find the right one is becomes more onerous.” (P27)

• “The downside of being home with a new baby though is that the baby is almost my entire world for the moment. This doesn’t mean that my opportunities to interact with information are nil, the baby provides a constant stream of information that is really hard to interpret. So whatever I’m doing I’m constantly
monitoring, keeping one ear open for sounds of distress and keeping one eye open to ensure he is still breathing, he hasn’t kicked his coverings off etc. When he does cry or grumble or complain in some way then it’s a case of seeking and/or sense making, was that an I’m hungry cry? What other information can I use to aid the sense making? Is he sucking on his fingers? Is his nappy heavy? Does he smell? Does he feel cold? Once I’ve got all the information I can I then need to use that information to try and remove the distress. Sometimes it’s easy, he’s wet I change him. Sometimes there doesn’t seem to be any cause for distress, so I just try something random like giving him to his Mum to try and feed him or try and burp him. Then I need to make sure that I’ve learnt something from the exercise so it’s a case of going over what I’ve observed and trying to organise and categorise all the different cues so that next time around I can more quickly determine the cause of distress. It also just occurred to me that we do a lot of browsing. Everyone has an opinion at the moment or a book, or pamphlet, for us so we have a lot of information that we can sort through. It also provides a good opportunity for encountering, although as we did do a fair bit of reading prior to having the baby we’ve had much in the way of information gems fall into our laps in the last two weeks” (P28).

Information seeking behaviours generally had three kinds of component behaviours within it. They were:

1. **Information seeking through directed asking**: Participants sought information from specific people or specific information sources that they considered cognitive authorities. This included people or other sources they knew of who were within their information horizon or their zone of *least effort* and/or *most comfort*, or they sought out a person or resource that was immediately accessible and provided a discreet and personal service (like a librarian or a purpose-built resource like an interactive information booth). This directed asking was done either in person or online (via virtual reference librarians or online chat services offered by companies), or via e-mail, phone, or SMS. Directed asking was
mostly associated with information problems that required immediate attention.

2. **Information seeking through public asking**: Participants often sought information for solving specific information problems by posting questions to several different public spaces like public forums, social networking sites, listservs, physical notice boards, or sought specific information within social gatherings, including meetings, places of worship, and conferences. The majority of this kind of public asking involved non-immediate information problems but non-trivial information problems for which solutions were harder to find from within the participants' own information horizons. They tended also to be non-embarrassing information problems that did not compromise a participant's sense of self. Some of these spaces could be conceived of as *information fields* of *information grounds* mentioned in the literature, except that the information seeking in these public spaces was more purposive than serendipitous.

3. **Information seeking without asking**: When participants were not entirely sure about what information they needed in order to solve their information problem, they *browsed* through repositories of information, or *searched* for resources within which they could find an answer. This was often done in order to formulate their information problem or make it more comprehensible to themselves and to others when they sought information through the first two methods, above. This involved going through binders of procedures at work, looking for guides on the Intranet, or searching through online resources including FAQs, web logs, or sites that had repositories of answers to commonly-asked questions. In a way, this kind of information seeking (without direct or public asking) was part of the process in formulating one's information problem, especially if
it was an ambiguous one, and this involved creating some meaning for oneself first before seeking meaning from others in order to seek, find, and understand the right kind of information. This kind of seeking was often more stressful on the participants, as it involved their sense of self-efficacy and the representation of their own image to others, because they felt that asking the wrong question was worse than getting the wrong answer.

4.3.3 Monitoring behaviours

Monitoring certain selected resources of information on a regular basis concerning news, weather, research, hobbies, special interests, and safety and security formed a significant part of the participants' information behaviours. Examples include the monitoring of certain domains like listservs, groups, web logs, news sites, daily newspapers, radio, television news, and content alerts from search engines. This included so-called "pushing" of information to the participant on a regular basis from flyers, phone, and web services, organisations, both online and through other means such as SMS and mobile-phone based applications. Much of the information encountered while monitoring cannot be considered entirely serendipitous, as they were encountered while intentionally monitoring specific domains of interest that the participant was subscribed to.

Monitoring of information about sick or old friends and relatives in hospitals or nursing homes, either through phone calls or through online sites such as CarePages, also formed a routine part of some participants' daily information behaviours. Often times, this kind of monitoring triggered information seeking about certain medical conditions, health insurance, and investigating others' financial situations.

Almost all participants reported that they regularly monitored information on their own bank accounts and credit cards on a periodical
basis, especially before making purchases or soon after payday. Interestingly, many participants also reported monitoring their own reputation online on a regular basis by searching for their own names on the Web and within certain domains. A few participants had even set up “Google Alerts” to receive an automated e-mail any time their name was indexed by search engines for any reason whatsoever.

Monitoring was one of the tags that was used by participants even where it was not necessarily apparent from their journal entries that they were engaging in information-monitoring behaviour. In the group that did not tag their behaviours, the researcher could discern the monitoring behaviour only when the participant mentioned acting upon something encountered while monitoring a particular domain. Hence, information monitoring was an organic subset of monitoring one’s environment on a regular basis and most participants did not even conceive of it as active information behaviour. Below are some reports of monitoring behaviours from among the 349 in the information journals:

- “Usual all day monitoring of email, facebook, bloglines” (19 participants).

- “11: 23 am: Profiler is running now but the CPU numbers it’s generating aren’t interesting. I’ll wait and see if something exciting comes up. I think I am MONITORING; 1: 31 pm: My monitoring got too boring. So I updated to the latest code and will monitor that instead; 3: 01 pm: Monitoring the performance of the latest code is boring too; 4: 18 pm: Got sick of the monitoring. Maybe it really is OK. Dan has a bug so I’m working on it instead; Optimal foraging: allocating my time so as to maximise my chances of improving the product; 4:56 pm: Set up system for an overnight run – haven’t had any luck with monitoring / profiling today.” (P6)

- Checked my email, clicked through to a NYTimes article about Google and the Millions of Books deal. Read an email from my mother-in-law seeking some shoe sizing information for my kids. I found the information online, wrote her back. Checked Facebook and replied to a friend who wrote on my wall. Monitored the elections-related websites. (P10)
• One of the things I started when grad school got rolling was to create an RSS feed aggregate of blogs pertaining to my discipline in all forms” (P24).

• “We are most likely Internet addicts in a loose sense of the term. We both have, for lack of any better way to put it, comfort sites which we visit. For her, it’s Jezebel or Etsy. For me, it’s Fark, Reddit, ViralVideoChart, Metafilter. It’s akin to browsing the sleazy portions of the newspaper, or bad entertainment magazines. Although Metafilter is occasionally more upscale in its content. I tend to be selective on Fark/Reddit: stick to the showbiz, politics or main page links...I actually learned more about the intricacies of the bailout situation from the people on Metafilter, than from the websites they were linking to. There tend to be some older, reasonably articulate and intelligent individuals on that site. Even on the snarkiest of days, they tend to make for a better read than the rare moments of getting sucked into the talking heads on CNN/Fox et. al., be it at a bar or airport. The endless loop of repeating info-snippets” (P24)

Monitoring usually preceded several other information behaviours. In order to make sense of the information they encountered while monitoring, participants often proceeded to engage in information seeking or searching behaviours.

4.3.4 Information use behaviours

*Information use* behaviour was most often observed in conjunction with information organisation. Participants perceived their behaviour as “using information” when they accessed their own collection of information – books, physical files, desktop files, bookmarks, and online personal repositories, and also when they shared information with others or when they were teaching or instructing others on something. Hence, sharing and teaching emerged as one of the many ways that participants thought of as the using of information. This included also gossip, along with social and professional networking.

Many participants added a tag called “instruction” under the
information use category and added tags called “calendaring” that spanned both the *organisation* and *use* categories. Below are just a few of the 223 entries tagged as information *use*:

- “If there were another category that encompassed “instruction” or the sending of information, I would probably find that useful on more than one occasion. For now I will utilize the category tag “use” for this interaction” (P31).

- “Several members came without their key tag passes, so I searched for them in the database and let them through. A couple of ladies made bookings for the creche, which I filled in on the booking sheet, and one changed her bookings. Some members asked for the new timetable and details of the afternoon classes on Sundays, which I looked up in the timetables and discussed with them” (P34).

- “Friday, when I wrote about trying to catch up on my Google Reader RSS feeds, what I ended up discovering is that I tended to pluck out links which seemed relevant for co-workers & forwarded them on. For D. I sent links to two or three medical databases, & to R. I sent a link for 57 tips on how to best design a website (since the library is in the midst of doing so). I did so without really knowing whether or not the links would be useful, or if they would already be familiar with them. Turns out all of them were useful, or else my co-workers are just being kind. I didn’t find as many links relevant to my own interest, but those which I wanted to explore later I ended up throwing onto Blinklist” (P24).

- “Just stopped by to chat to J, my source of international gossip” (P3).

- “Conferencing all day – work/career related, all information received in person – one on one or presentation to a group. I took written notes and picked up materials for later referencing and to share with coworkers.” (P12).

- “My aunt e-mailed me today, hoping that I could find an out-of-print book for her. As near as I can tell from a quick Amazon search, she’s either got the title wrong or the book doesn’t exist. I’ve found what I think she wants, but I’m waiting for her to confirm, just to be safe” (P31)

- “So, the copier guy told us yesterday that he’s heard if you photocopy money, the copier will shut down until a special “government code” is entered. We’ve been joking about it all day. I just had my intern see what she could dig up on the Internet. Nothing official, Just blog posts and such. Surely there’s a law or regulation about it… may just have to look up counterfeiting statutes to start with,
When participants looked for information for themselves, rather than for others, they did not think so much in terms of information use. It is as if they conceived of information use as an axiomatic truth and as an implicit behaviour, that was the outcome of all their other information behaviours. The participants often sought information on behalf of other people (and not all just work-related) and hence the use tag was applied along with the organisation and seeking tags more often than with any other tag, especially if their information seeking was successful. This indicates that once they found the information, they either used it right away or organised it for later use.

Another aspect to information use was the specific kinds of information use and information sharing behaviours afforded by information technologies, and they are explained in section 4.3.16 on online information technologies.

4.3.5 Searching behaviours

Information searching behaviour was observed most often when the participant did not have a well-defined information problem and was exploring within a set of resources through browsing or several resources online through surfing. While information seeking behaviour was related to information problems that were generally goal-directed, time-bound, concrete, and externally imposed, information searching behaviour was often related to information problems that were ambiguous, spread over time, abstract, and were often intrinsically motivated based on the participants’ interests.

Participants provided very long and highly descriptive accounts of their information searching behaviours and some even provided screen-
shots of their online searching, along with web links, and the keywords they had formulated and reformulated. One participant even included a video recording of his web-searches to demonstrate how he searched for information on the Web. Some of the shorter text descriptions from the 199 such experiences are extracted below:

- “I searched all over [for an information manual] to figure out how to re-thread the straps in the babies’ car seats. What an ordeal. E puked in the car all over his seat and H’s seat so I had to completely take both car seats apart and wash them but I forgot how to thread all that nylon webbing back through under and around and hook this and that and yeesh, and since I took both apart I had no guidelines. Thank God for Amazon! They are the only site that actually had good pictures of our seats and I could use those pictures to figure it all out, well now I am an expert on Cosco and Evenflow car seat straps!” (P13)

- “I did a search on a relatively simple search term: vocal cord pain. Google returned about 183,000 options, and an additional 70,000 images. Since I have never had vocal cord pain or hoarseness with my ear problems, I did tend to worry over it as it has been occurring off and on since August. But never any worse than before, and transient. So in the pre-dawn of ear surgery day, I learned new words like “granuloma” and “dysphonia.” And about 10 different kinds of cancer that can hit the vocal cords. Much to my relief, the doctor said that my recurrent vocal cord/voice issues were probably due to a combination of talking a lot for my job, and recurrent acid reflux. Not cancer. This is probably just desserts for not hurrying to the doctor sooner when the issue recurred” (P32).

- “Located several free forums that had some hints, but there was still nothing definite. I suppose the information need is somewhat ambiguous, as all systems are generally different from one another. I was disappointed that there isn’t an easily findable guide to cleaning up a standard PC, but then again maybe I wasn’t looking in the right place” (P24)

- “One issue I encountered while searching was the confusion in search terms. The term graph can also be substituted for chart, table, diagram, or
visualization. Therefore, it became paramount that I narrowed my scope to terms that truly fit my need. Though I didn't find the perfect solution, I feel well prepared for the time in which we approach a more stable design phase. This problem contains a similar problem to another of my searches, in that much of the published advice is contained in forums or is featured in a section of a larger discussion on programming languages and displays. (P32)

• “During work time most often I’d say I seek, browse and monitor. If I have a problem that I don’t know the answer to I’ll generally jump onto a couple forums and do a quick search having attempted to reduce the problem to a couple keywords to ensure the search is sufficiently narrow. I rarely get a single hit so then it’s a matter of browsing the results to see if anything useful comes up. If the forums turn up nothing I’ll expand my search to the rest of the web. If I’m still unlucky, shock horror, I might have to actually talk to someone! Actually sometimes depending on the nature of the problem I may just try communicating with a real live human being first” (P28)

Interestingly, among the participants who self-tagged their information behaviours, they often tagged their information behaviour as information searching when their search was ongoing and not yet fruitful, whereas they tagged it as information seeking when their search yielded results. This indicates that the process was perceived as potentially unbounded when they started searching for information, but when the participant found the information, their perception of the process changed so they saw it as a successful and finite information seeking episode.

4.3.6 Encountering information

One of the main triggers of information seeking in everyday life was the encountering of some fact or information that was either a surprise to the participant or raised a question that wasn’t answered from within a participant's own knowledge system.
Information encountering often followed monitoring and preceded sense-making and seeking. Sometimes, participants deliberately put themselves in situations where they would encounter new information, and sometimes they acted upon information they came across in a serendipitous way. Apart from information encountered while deliberately monitoring certain domains of interest, participants also encountered information within various information grounds, both physical and online – coffee shops, bus stops, city buses and commuter trains, office kitchens, conferences, radio and television programs, online forums, and social networking sites. Below are a few descriptions of encountering information from among the 196 in the participant journals:

• “I am listening to a podcast where a book was named. I want to do more research on the book and see if it’s something I’d like to read” (P 24).

• “I added a potential web site to the list I maintain in my head as a possible initial source of information to avoid a google search. Google is good but not fool proof so it’s always handy to have a list of sites to hit first rather than go straight to Google. Found it on the side of the nappy box. It was the Huggies site. Apparently as well as having a bunch of product information they also have a sleep specialist and midwife you can ask questions of (assuming you don’t need the answer in a hurry) as well as a bunch of parenting guides” (P28).

• “Yesterday was interesting. A wander & see-what-happens day. After class, ...just sort of wandered into a diversity group meeting, where they were screening On the Edge: The Femicide in Ciudad Juarez, an incredibly depressing, bleak documentary about the murder of at least 400 women in a border town. NAFTA, the drug trade, police corruption, poverty – all were implicated...Eavesdropping on the bus was fun, too. Listening to the various conversations about where people were, what they were doing on election night. A very “where were you?” sort of moment” (P24).

• “This evening at home, I noted “encountering” behaviour – a lead story on AOL about a politician’s sexist verbal “mistake” lead me to a page that contained a link to information about the current state of the US “Big Three” Automakers and the narrow chances they have of getting an easy bailout from Congress, and from
there to a political poll (where the questions were badly constructed). *Information snacking* would be an appropriate term as well, because my information access was totally guided by whim, what caught my eye and what ‘tasted’ interesting at the moment” (P15)

- “Serendipitously, I was browsing through a *Parents* magazine that came in the mail yesterday and read an article on Celiac disease. I don’t have it, and honestly I don’t know anyone that does, but that didn’t stop me from being convinced that my daughter must have it. I decided to call my mom and ask her if anyone in the family has celiac disease. One may think that if there was someone I would already know about it, but I went undiagnosed with my thyroid condition 2 years because no one bothered to tell me that two aunts, several cousins and a grandmother all have the same disorder. Turns out my cousin has celiac. So my information behaviors for today involved a roundabout encounter with the idea of celiac disease followed by some pointed questions to two or three of my relatives – phone calls to my mom and aunt and an email to my cousin, and doctor’s appointments for my daughter” (P21).

Encountering information was often also the result of *curiosity*, as in the case of participants eavesdropping on others’ conversations at cafés (as noted by five participants) and on public transportation, as noted by three participants. Information seeking behaviour that followed from encountering information was not necessarily perceived by the participants as a *need* or as an *uncertainty* to be resolved, but was often times perceived just as an adventure to be pursued for fun or for the sake of the information itself. Many participants reported what may be conceived of as a state of *Flow* (Csikszentmihalyi, 1990) while following up on encountered information that interested them. On the negative side, *encountering information* also provided a distraction from participants’ current information seeking or searching tasks, and resulted in participants reporting that they spent more time than they intended to on some information-exploring whim which later caused them time-management problems.
4.3.7 Organising behaviours

The majority of the descriptions within the information journals related to organising information also expressed the frustrations participants experienced due to the lack of information organisation. The more information sources and channels that a participant had to deal with in their everyday lives, the more frustration they reported which was related to the deficiencies of the various methods for organising information that was used by them or by someone else.

Participants' information-searching behaviours often began with retrieving from their own personal collection of information resources – memory, bookshelves, file cabinets, piles of papers, letters, receipts and bills, e-mail folders, browser bookmarks, browser histories, flash drives, or hard drives – their own personal subset of their information fields that they lived with. This kind of searching through one's own information collection was found to be either very successful or frustrating depending on one's memory and one's state of mind when the information was initially acquired and organised (or not) for future use, and one's state of mind or time-constraints when looking for it again. Thus, information searching, and hence the retrieval of information from one's own collection of information in everyday life involved a cognitive and affective coordination with one's own past selves in a sort of time travel, just as organising information is a form of anticipatory coordination with one's future information needs.

In the literature, much of the organising information studies are either under the discipline of cataloguing and classification (as in Library Studies) or under a newly emerging information science sub-discipline called Personal Anticipated Information Management. Many of these personal information management studies like Bruce (2005) take principles from library studies and apply them to individuals, but individuals
in daily life seem to think about information organisation (or the lack of it) only when they need to retrieve and use the information and encounter problems.

These problems often also relate to the differences between the intended use of the information and its actual use at a future date. Encountered information was often filed away (mentally or otherwise) by the participants in a sort of investment into one's anticipated future need for information, often ambiguous, and hence the place of the newly encountered information in their repertoire was not very well defined.

Several participants used e-mail to send themselves e-mails with information that they had encountered (often web links) which they wanted to access for later use, in a sort of reminder to themselves to file it away. But often, they had trouble accessing it later as the information was not necessarily tagged with any relevant keywords that they could search for within their own e-mail. Others used online personal portals to electronically “park” information for later use. This way of organising information was once again an act of communicating with oneself for an anticipated future information need, but often caused problems because of memory issues.

Many participants found the organisation of their e-mails, folders, files, bookmarks, online passwords, and their online personal spaces quite daunting and challenging and leading to some confusion and frustration, as the more information they collected, the more it needed tending to – this is referred to as information farming in the literature (Bates, 2002). Some participants mentioned that they did a lot less “information hoarding” as they termed it, for they now had more access to more current information online. Below are some descriptions relating to information organisation from among the 179 in the participants’ journals:

- “I added a new sub-category called “Information despair” to use when I have a
perception that it is taking an inordinately long time to sort out basic things. As this is not very cheerful, I am working on a more cheerful one to add, as well” (P34).

- “Sending e-mail to oneself, storing folders with passwords, RSS feeds, parking the breadcrumbs of information” (P16)

- “I had to explain my new filing system to my colleague. She said it makes intuitive sense to her (more than the old one did), but I felt bad for not having mentioned it when I changed it. Oops!” (P10)

- “After clearing out some system filing cards yesterday, I looked at a business card file that I have with a view to transferring the information to an electronic contacts list and clearing out the cards. I have lots of scraps of paper with product codes for software, mobile phone data and the like which also need to be transferred (Note to Researcher: Perhaps you need to add a category called information despair” (P10).

- “I do have a half thought out system for organising email in that I move emails into folders and sub-folders depending on the content of the email. I’m not very consistent though so I still have hundreds of emails in my in-box. I also regularly just dump a couple months of email in a folder called unsorted. What I really should do is sit down and have a think about how I want my emails to be organised and set up a bunch of filters to automatically route my email to the appropriate folder”(P28).

- “I also added “Information auditing” as I spent a lot of time today going through system cards and ripping up old ones. [Note to researcher: a new category, information despair, could perhaps be useful here]. (P34)

- “E-mail woes: I know I am not the only one that can often get lost in a sea of emails. I have tried in the past to organize folders in which to place relevant emails, only to find myself puzzled that the search feature doesn’t look in places that aren’t generally indexed. Hence, I can’t find an email that I placed in a location which I had deemed to be “put there so that I won’t forget where I put it.” Having to use Outlook 2003 for my professional position, I constantly find myself frustrated with the location devices, or lack thereof, featured in this release. Viewing a message thread takes far too many clicks to be useful. If I try to search for a common name, I have to wrestle the system to find some way to eliminate some of the search noise. Gmail does things slightly better, but even
that can wind up being a chore to find things in a semantic fashion. I have seen a
demo of an email client that does more with time-lines and tagging. To me those
additions would help solve many information seeking problems with message-
based systems. Even forums could benefit from this style of interface. Trudging
through emails in search of one item is like looking through a box of old photos.
If you only sort them by date taken, at least you have some semblance of order,
but you are still left relying on personal memory of the contextual information.
Providing message tagging, either system generated and search able or user
initiated, would help to provide greater inroads into ones own collective message
stream” (P 33).

• “I find the notion of “information hoarding” no longer relevant these days. I used
to be a hoarder of information, with folders of information, and text books
cluttering my desk. These days I maintain a clean desk and just source the
information I need as I need it. It also means I’m always using the most current
information” (P7).

• “There really is much less of a need to hoard information these days.
Unfortunately, with electronic access and storage I’ve found myself getting
worse, especially as data storage media is so plentiful and cheap now. At least
with books borrowed from the library there was a mandatory requirement to
return the resource. Many really hard-core people would photo-copy the whole
resource to keep but I never had the patience for that...Now I’ve got lots of stored
information from various searches for differing reasons- just from my study alone
I’ve amassed a huge array of electronic copies of journal articles, etc. The
amount of electronically-stored information I have is now phenomenal- a
veritable library in itself. I keep saying to myself “it may come in handy again one
day” and due to the transient nature of many websites (and transient ability to
access some sites and journal databases) I’ve learned that sometimes it's best to
keep a copy of certain information that I may just need again. I am always in
envy of people who do not suffer from this affliction (P9).

• “A new kind of organising method came intuitively to me when I've hit a critical
mass of information storage that needs to be organised in a way that specific
information can be easily retrieved when needed. Conventional electronic folder
storage lends itself to hierarchical classifications but I try to organise my
information objects by their "attributes" that can later be used as a basis for
retrieval purposes” (P8).
In the last extract, the participant mentions organising by “attributes” which is very similar to the faceted classification mentioned in the literature by Sonnenwald & livonnen (1999), and it is interesting to note that some participants do organise information in terms of its attributes. One participant, although a librarian, reported some feeling of guilt as she did not organise her own books based on any established classification system, but instead, mapped them spatially to the countries on a world map on her home library's wall, based on a book's subject, language, or country of origin. This is an example of how concepts related to information behaviour (e.g., information organisation) can be mapped to other concepts in a person's mind, whether they be spatial and visual concepts based on geography or other historical and linguistic concepts.

Some other tags added by participants under information organising were terms such as calendaring and scheduling. In such cases, although they were not really organising information in the traditional sense, they were organising the future use of their time, and keeping themselves and others informed of the same, so they could monitor it later on a regular basis or search for and retrieve the information at a future date.

Cognitive coordination with other mental models was a coordination of meaning between oneself and others (intersubjectivity), whereas a cognitive coordination between one's own past and present selves (intrasubjectivity) was a coordination of meaning inside oneself, which is wrought with even more problems, for the longer the time between the two, the more changes are likely to have happened within oneself. In a way, encountering new information was just a matter of coordinating one's present mental model with the new information pattern, whereas organising, and searching through an organised or disorganised collection of one's own previously found information (that have presumably altered one's mental model to some extent already) is fraught with problems as it
involves facing one's past in some manner, and one's anticipated future, for we organise so we can retrieve.

All of these processes were also in essence, acts of communication, often uni-directional at any given moment, and were communications within a rhetorical situation, and hence the predominance of sense-making across all behaviours. Documents are information carriers, just like people, and can talk to us, but cannot tell us what they mean. This meaning is created within ourselves.

4.3.8 Information foraging

Information foraging behaviours reported by participants were often active searches for information wherein the information was elusive or was not waiting to be found, and participants often expressed doubts if the information existed at all. Foraging for information was often also associated with concepts that resembled the use of some tactics, skills and relevance judgements on the part of the participant, more like hunting tactics. This was often observed during the search for information on the Web rather than searching within organised search systems, for search systems often took the guesswork out of a search, one way or another; one cannot often “browse” an online database with ease.

Encountered information that was saved for later use was also tagged as information foraging by many participants. This may be due to the association of foraging with hunting & gathering and hence gathering information for later use was semantically associated with foraging in their minds – another case of inter-subjective meaning creation. Behaviours like footnote chasing and following up on information leads or information scents (solicited or unsolicited) based on one's intuition was often tagged as information foraging. This was analogous to the information scent concept described in the literature that is a component of information
foraging, described by Sandstrom (1994). Below are a few examples of
behaviours that the participants had tagged under this category from
among the 195 such reports:

- “Attempted organizing, sense-making, sometimes fruitless information foraging by
using probing questions and the like. Much of the information received was
partially complete at best...Preparing for meetings is something I wish my co-
workers would focus upon” (P32).

- “I never thought I would have so much trouble finding a place to buy an instrument
in America, but short of buying online, I have been struggling to find a location
that may actually carry the instrument I am looking for...The problem with this
type of search is that the information I am searching for isn’t something that has
a wide audience. Yes, the concept of finding a desired item class within a group
of results is desirable to almost all information seekers, but much of search
system design is centered around making items with the most relevance be the
most easiest to find. But to me, that is the exact opposite of why we need search
systems. We need to make finding the needle in the haystack easier than
pointing to the ocean” (P 31).

- “In doing research for the bibliographic essay, I finally stumbled across the most
obvious method of ferreting out other resources. Look at the bibliography of the
articles I’m reading. it often becomes a nested trail of articles all referring back to
each other, which reaffirms the potential worth of an article, if it’s increasingly
cited by other articles. Using this method, I nearly tripled my intake of articles to
read for the paper & in this manner, also discovered new search terms,
depending on the subject source of the article” (P24)

- “I attended a meeting with upper management and received information on a
conference attended. I asked questions about status of organization-wide
project, and received information in return, not all of it complete by necessity.
(Categories: Information foraging, information scent.)” (P39).

- “The simplicity of a site like google is that you can type in whatever key words you
like to retrieve your results. You don’t have to think about whether you are doing
a subject search or an author search or whether your information is in a footnote
or a citation or anything else. It does a complete search for your search terms.
Once your initial search is done, you can follow the browsing and berry-picking route to gain the desired result/s. It is almost like trawling the information sea with your search net and then picking through the catch.” (P13)

- “I actually find that online academic databases and their like are the hardest of any to search. Certainly they contain a vast amount of data, however I think part of the problem is that they have tried to incorporate too many complex search techniques. Sometimes I think they would be better served by using a simpler google-style search and browse approach” (P2).

- I think that that browsing rather than searching is a more popular form of information seeking for me due to the fact that unless I am looking for a very specific item or paper, I want a range of sources and my search terms will become increasingly specific and well-defined as I come across more and more information sources and realise what I specifically need as my search term” (P25).

4.3.9 Browsing

Browsing and searching often went together in participants' reports. Participants engaged in browsing when they had difficulty defining their information needs, or when the database structure and query requirements of a search system was unknown to them. Moreover, for most participants, looking was more interesting and easier on their cognitive functions than formulating. Although the participants engaged in browsing when they were not able to express their needs in a query, they knew enough to snap up the information they wanted when they landed upon it.

Browsing gave them a satisfaction of having engaged in some fun on the side while they looked for information. More than one participant noted that this was like window shopping which was sometimes far more rewarding than executing a shopping list, and many participants seemed to prefer browsing which seemed to give them a sense of instant gratification by acting immediately on their search task and keeping themselves open
to encountering, rather than formulate a search strategy beforehand. Whenever possible, participants generally preferred the behaviour that required the least effort, and in this case, it was the method that required the least cognitive effort, for browsing required less cognitive effort than searching. Below are some descriptions of browsing in participants' own words from among the 157 such descriptions:

- “If I knew exactly what I was looking for and where to find it then I would just go and get it! I think the fact is that browsing is actually more of a way to scan sources in narrowing down exactly what we are looking for and the specific terms of the "query" that is required to locate it”. (P6)
- “I like hiking and it is always so tempting to take that little side path so long as you don't get too lost for too long. When browsing on the net you can always return to formal search methods at any time to start again.” (P12)
- “I find that after years of almost daily browsing on the Internet, it was very difficult to train myself for a specific search using the library databases. I used all the correct syntax, tried different terms and databases, and still did not find much that I thought was relevant. Through my research for assignments I've gotten a lot better, but I still prefer to just slip back into browsing mode, especially when I know Google Scholar is so readily available”(P1)
- “I like browsing the Internet as it is not just a single medium, it doesn't just contain fiction or reference like a library or shoes or services like a shopping centre or friends and fun like a social event but it has everything and you don’t have to go anywhere. Just start browsing and see what you find. It’s so easy!”(P21)
- “I was struck by how much footnote chasing has in common with web browsing. You start with a website that covers the topic you are interested in then you explore the links on that page, the links that are on the linked pages and so on. Sometimes you go down a dead end, and then you click back a few times and start "chasing" a new path through the links.”(P28)
- “I watch many students from 10 to 18 get 'lost in the web' because they browse and do not have enough computer or information literacy to find meaningful information from a specific search. Google provides very quick results for them and near enough is good enough as they have not had the benefits of a rigorous
academic education. What the browser or searcher (as in the human) brings to the search really affects the search” (P26)

- “I usually think if I just use searches I could be missing something, so I will make sure to browse as well (it’s also a good way to get feedback about how appropriate your search terms are for your purpose, and to improve your searching ability in general I guess)” (P8)

- “I often prefer to browse before searching not because I don’t know enough about what I’m looking for (although this may also be true), but because I just like to see ‘what’s out there’...I find that with browsing you can know where the part that you’re looking at fits into the bigger picture, which can really help when you’re dealing with a lot of information – I use it as a way of keeping things in perspective”. (P10)

While many participants closely associated information searching with information browsing and did not necessarily see them as separate behaviours, other participants described their search for information as starting off with browsing until the participant had a better understanding of exactly they were looking for. Participants generally exhibited less browsing and more searching with specific terms when the information they were searching for was within their area of expertise or domain. Browsing emerged as an inherent and natural process that the participants undertook when searching for information in order to solidify their information needs – it was also an act of cognitive coordination between available information and useful information. In many ways, browsing was associated also with the Principle of Least Effort as described by Zipf (1949) and discussed in the literature.

4.3.10 Multitasking behaviours and Flow

Much of the information behaviours of the participants was spread out over time and space and was constantly prioritised and re-prioritised depending on both internal and external factors that involved disruptions caused either by interruptions, boredom, frustration, gratifications, or the
exhaustion of resources. Many participants often switched between information problems depending on the demands on their time, but did not provide much description in their journals that was specifically related to multitasking, even in the instances where the participants had tagged their behaviour specifically as multitasking. This is possibly due to the sequential nature of the diary reporting as opposed to the parallel and distributed nature of multitasking. The 94 descriptions of multitasking were similar to the ones below:

- “Came into work. Logged on to the library catalog, Intranet, and my work gmail account. Read, filed, deleted emails. Got an email from a colleague about a new link to the APA content concerning electronic resources and visited the site to see how the link worked, then bookmarked it to my work links. Checked email and VRL again later. Saw an article on the front page of Yahoo! about jobs with best benefits and clicked through to it, looked at the first two or three jobs and then clicked out of it. Saw another article on Sarah Palin when I returned to the Yahoo! homepage and was intrigued but didn’t want to do the work to get to it and read it. Checked facebook, went to look at the flair my friends gave me, browsed flair to send back. Looked through everyone’s updates, commented on a picture my cousin posted. Checked out the front page of Yahoo! Looked at CNN.com, read a story on Jennifer Hudson’s slain family, another on debt sending grads overseas, emailed that article to M, read “Woman arrested for killing virtual reality husband” and emailed that to M, too; read “Depression during pregnancy doubles the risk of pre-term birth” and sent that to M; played some Packrat [a facebook game application]...” (P10).

- “Checked my Twitter account throughout the day while doing other things. I would say I checked during breakfast, during breaks between some work, lunch, during break during teaching session, during supper, and after I finish blogging here. Usually only a couple minutes each. Sometimes I reply, others just see what’s happening and what my friends are saying. I like to read; it cheers me up” (P14).

- “At the peak of my flurried [travel planning] activity, I was running OpenOffice Writer, Google Earth, 4 Firefox Web Browser tabs, a Calculator (to do km->mile conversions marginally quicker than I can do it in my head!), and a calendar, as
well as several textfile notes in Editpad that I had made on a previous trip along the Great Southern Loop. In addition, I was flicking through a copy of the Rough Guide to Australia for various ideas relating to excursions slightly off the main direction of travel” (P25).

Multitasking was reported often in conjunction with technology-related information behaviours such as having multiple windows and tabs open on one’s desktop and switching between them, or using text-messaging and e-mail via mobile telecommunication devices like mobile phones and PDAs. In a way, the technological tools were affordances to multitasking behaviours, but the information behaviours that were afforded through these technologies helped participants interleave their work, personal, and social worlds. One of the other tags that most often co-occurred with the multitasking tag was the social networking tag that was added by several participants as a sub-category under the information sharing and use tags. Many participants just added it once at the beginning of their journals (either under monitoring, sharing, or use) with a note to the researcher that it was something they did on a daily basis so they may forget to mention it every time, but that the researcher should assume that they did this on a continual basis.

On the opposite end of the spectrum to multitasking was the phenomenon of Flow, observed in a few instances based on participants’ descriptions of how they were absorbed so completely and deeply in an information problem that interested and engaged them that they lost track of time and were not distracted at all by any interruptions. It was a state where an information problem keeps the participant engaged for long periods of time when they felt a sense of engagement and happiness at their accomplishment when they were finished. It was often observed during creative information tasks like gathering information for research or recreational writing, creating art, solving puzzles, playing games, or during
problem-solving activities like writing software programs, and surprisingly, even while indexing or creating annotated bibliographies.

4.3.11 Social networking

Social networking was very much a part of the participants' information behaviours and triggered other information behaviours like sense-making, searching, seeking, and browsing, often when new information was encountered. Hence, one of the biggest triggers of information behaviours was the encountering of new information, often through the monitoring of social networks.

Many journal entries reported participating in and propagating so-called Internet memes within their social networks, either through forwarding things to their different networks or through posting them within their own online spaces, and commenting on others' memes. Sharing was also a component of social networking and many participants engaged in what Abrahamson & Fisher (2007) term as lay information mediary behaviour (or LIMB) where they passed on information they found to specific people in their networks that they thought might have an interest in it. Many student participants e-mailed links and citations to other students that was in the other student's area of research or study. This is termed in the literature as serendipitous altruism (Twidale et al., 1997).

Social networking was also a big component of multitasking behaviours as participants monitored social networks in a habituated manner, periodically or continually, in between their everyday life information activities. Some of the 64 diary entries concerning participants' social networking are extracted below, and this was a theme that was interspersed throughout the information journals:

- “Thank god for facebook, I am able to remember people's birthday – even my own.” (P 10).
• “What did we ever do before this kind of information access?” (P 7)

• “Socialising online is the most effective to stay in touch when I am strapped for time” (P 12).

• “My friends and colleagues live in different online spaces or electronic environments or “different venues” and I do a lot of public socialising or bulk e-socialising” (P 11).

• “I keep my friends on Facebook, my family on Yahoo! Groups, my professional contacts on LinkedIn, maintain a blog, Twitter on a regular basis with my colleagues, and I am quite aware of my privacy settings and keep a strict control on what is visible to who. A lot of the information I absorb and impart on a daily basis is now mainly through these protected online social networks, and to think that I only ever touched a computer after I turned 35!” (P 1).

• “Chatting online with old classmates. I feel connected again” (P16).

• “Online social networking provides me with an opportunity for recreational writing and serves to maintain interactions with people that would otherwise be more formal, time consuming, and sometimes even sound suspicious; it is easier to interact with some of my ex colleagues and classmates from long ago as part of a group online rather than send them an e-mail out of the blue” (P3).

• “I often ask for input or opinion or information from people on my social network to help me make decisions about certain things. For example, I just posted soliciting input from Twitter uses about what restaurant to go to in the area where I have a meeting this afternoon” (P 32).

• “Online social networks provide me a way to have others monitor the news for me, so I don't have to. I spend a lot of time interacting with my friends on MSN messenger chat. We share links, thoughts and ideas and check on each other on a regular basis via chatting” (P 14).

• “I think facebook is very intrusive into your life and I am seriously considering deactivating my account; but let's face it I am way too nosey for that to happen” (P 18).

• “I feel the peer pressure to know more information on what everyone is talking about [on my social networks] re. Fashion etc.” (P 8)

• “Viral meets real life: Last night I attended a local Tweet-up, a social event
attended by about 200 people in the area that use Twitter. One of our group involved in creating a Twitter stream with video stream which went out live from event. People at event could see each other’s messages on screen etc. Food & Drink. many photos; I’ll add link later. Too hard to do by phone. Surprisingly a number of us up early this am and tweeting already” (P 12).

- “Social networks provide me with my own personalised Intranet relevant to my needs and within the vast and ever-increasing and increasingly irrelevant information on the Internet” (P3).

Social networks provided a space for participants to share informal information that was relevant to their immediate situations and everyday lives as opposed to the impersonal and often formal information from information providers. The former kind of information was often more valued and privileged over the latter kind of information. This relates to many of the social and contextual theories of information behaviours where people have preferences for information from certain cognitive authorities within their own small-worlds or information fields. In many ways, the social networks were information grounds that facilitated the dissemination and exchange of information wherein the participants did not even need to be present simultaneously in order to exchange information. Moreover, the messages that participants posted to these networks functioned not just as an expression of their personality, but also as a message to other members, sometimes within a rhetorical context. At least three participants reported going out and doing something in real life just so they could update their Facebook status with an interesting message, and one participant jokingly referred to thinking about her everyday activities in terms of short Twitter updates. In effect, the social networking sites provided a space for broadcasting information for those who felt such a need.

Many participants reported having connected with long-lost friends
through social networks only to find they did not have much information to share in common any more. Some participants found also that brief acquaintances who were on their social networks suddenly became their close friends that they had a lot in common with, because they now knew a lot more about this acquaintance through the network. This kind of friendship based solely on long-distance information sharing was analogous to the days before e-mail when people often had so-called pen friends from far off countries. Four participants reported having met their spouses through this kind of online interaction on websites and web logs.

Some participants attached screen shots of their social network activity along with snapshots of their conversations and updates and some even included their daily instant-message conversations within their information journal. Although these were tedious and time-consuming to analyse, it was evident from them that although people's networks reportedly consisted of scores and sometimes hundreds of people they had known over the years, their main interactions were with a selected few people on a continual basis. Examples included spouses exchanging information through the day over these networks from different work locations, students and expatriates communicating on a regular basis with friends and family from their home countries, and parents checking up on information about their children through a combination of methods that included school websites, social networks, and mobile phones.

The people within a participant's personal or social world were the ones that the participants approached first when they needed information that was not easily accessible within formal information resources or was difficult or time-consuming to understand. For example, a participant consulted with an amateur photographer friend in her online social network about buying lenses for a new camera as she considered him the *cognitive authority* on that subject within her *information field*, despite
having looked for the information in detail on some retail and professional photography websites. In fact, what started out as a simple search for lenses for a particular camera turned into an hours-long searching and browsing experience that only helped confuse and confound the participant with too many choices. In a way, this participant (and others) exhibited behaviour that was once again in line with the *Principle of Least Effort*, wherein she simply passed on the effort involved in some information-related decisions to another person who she thought may have to put in less effort on account of his previous experience. This may in itself be considered an *information searching* behaviour for she had to search from within her friends' circle to identify and locate the right person to ask. This can be categorised also as a kind of information seeking by directed asking that is one of the three kinds of information seeking behaviours as described in section 4.3.1.

There was strong evidence from the participants' information journals that social media technologies provided a major *information ground* that was integrated within their existing lives and with their existing technological, cognitive, affective, and socio-culturally grounded experiences. Participants expended considerable time and effort with these so-called social media technologies not just because they were new or novel, but also because they provided a convenient and usable way to expand ones social capital, and by extension, their information capital. Since many of these social media technologies are built upon existing technologies that the participants were already accustomed to in recent years, the participants found them easier to use and easier to integrate into their lives in order to facilitate information sharing within their own personal networks. These technologies also provided opportunities for people to interact in certain concerted ways to meet other like-minded people in order to receive and exchange information in their work, everyday, and social lives, and collaborate on projects both personal and
professional. In many ways, these technologies helped participants to go beyond being consumers of information and become creators and disseminators of information to their immediate communities and beyond.

4.3.12 Berry-picking behaviours

When participants searched for information on the Web, an original search existed, but after results were returned with the first search, they picked a few websites to explore or save, and then something was triggered that led them to modify or reformulate their search and sometimes this was iterated many times – this was evident both from some participants’ detailed descriptions of their Web search and also from the one screen-capture video that a participant embedded in his web log. This follows the berry-picking model of an evolving search as described by Bates (1989) and the reformulation strategies studied by Jansen, Spink & Narayan (2007). Even when they knew exactly what they were looking for, some participants found it hard to formulate an exact query.

Another reason for berry-picking was that not all the information a participant needed was found within one source, or even in one format, and hence participants collected bits and pieces from different sources before they were satisfied. The participants who identified their behaviours as berry-picking based on the definition provided to them, also recorded some very articulate comments in their information journals by saying that although they had not heard of or used this term before in regard to information, they strongly identified with this sort of information behaviour, especially in their online searches for information. Some even wrote that they had looked it up online and read Bates’ 1989 article. Below are a few descriptions from participants’ 89 descriptions of berry-picking behaviours:

- “I am slightly amused that there is a term (berrypicking) for the method of searching that I thought was simply natural to me” (P 26)
• “Berrypicking (if that's what we want to call it) is very relevant to the way I conduct searches. The modern GUIs allow multiple simultaneous searches to be displayed and it is not unusual for me to have 8 or 10 google searches showing on my system at any one time. Humans like to have choice and the current online environment offers plenty of that” (P20).

• “More often than not, reading updates on AOL will take me to a search for details on urgent stories, and often to sites like ABC News and online versions of local news publications. I read these like I would the newspaper, in a scanning mode, looking for snippets that answer the questions I have—which I believe qualifies as a combination of browsing and berrypicking.” (P21)

• “After reading the definition, I realized that the way I “Google search” is identical to the “Berrypicking” definition on the guide sheet. Each time I decide to search for information I start with a few broad terms before gradually refining the search as I learn where I want the search to go. I never find the information I seek on the first search; each consecutive search is “improved” until I obtain the desired end result” (P14)

• “Searching can be likened to shopping from a list, which is fine if you know what you are looking for and have little time to find it, but “window shopping” or browsing can be just as rewarding, if not more so as I find relevant information that I was not initially looking for” (P3).

• “To Berrypick or to Browse, now that is the question. I am a true believer in both techniques. I start berrypicking while not quite sure what exactly I’m looking for, but once I learn what I want, I am querying for exact terms. I am after a TV today and I start with a berrypicking. I read about the different standards on the market such as are LCD, plasma, projectors, rear projectors and CTR’s. I also learned of the different brands available, but once I decided that I am after a certain famous brand in a HD LCD 42” my search was narrowed down to an exact term. Now I didn’t want to learn any more about the TV’s, as I’ve already spent a whole day researching them. Now I want the cheapest price possible for precisely the model and make I’ve chosen. To achieve that now I am going to use a precise query and then browse through the results, and not berry pick any more” (P4).

• “I use berrypicking for both online information and for shopping! When I walk into a store, I look at a piece of clothing (information or document) and then from that information, my search query or focus might be altered (to a different colour, cut
or design” (P1).

• “I find one document that is relevant, I go to the physical section in the library, and often I find a dozen more relevant books which were not produced by my original catalogue search. This is something I have always found puzzling, considering my search terms are usually broad enough to include these extra books. But it is now a search method I use and recommend to many” (P2).

• “I think that due to the huge amounts of information available when searching on the Web, it doesn't matter if I know what I am searching for or if I am just browsing, it is almost inevitable that I will need to refine my searches based on the results returned from prior searches. This is not only because of the volume of information available but also because of the number of words that can have similar meanings” (P 13).

• “Something I did find interesting searching through all the databases, though, was that despite the vast number of documents available, the same search in different databases or different websites can return some of the same documents. I also think it's interesting that a precise search returns more irrelevant documents than relevant ones. At least that was the case for me. But I'm a self-confessed berry-picker, and I don't especially like berries. I may pick from dozens of bushes, but it can take a long time before I feel like I've gathered enough berries to fill my information bucket” (P 29).

• “I'm not a person who normally has multiple searches going at one time. I usually choose a certain search phrase and then see what results it gets me. If the results aren't what I was looking for I go back and edit my initial search phrase and search again. Usually I continue doing this until I find the results I was looking for in the first place. So in effect my search could be seen as "evolving?” (P17)

• “Berrypicking jamboree; information snacking; aggressive berrypicking” (Tags used by P7).

It emerges that the reason why several participants engaged in berry-picking behaviours to seek information, especially in an online environment, was because it allowed them to pick keywords by browsing from among the results of their original search and use them to narrow or
widen their search or reformulate their query – this is better described as an *evolving search*. Generally participant wanted a sub-set of their results through browse through but most search facilities did not provide them with a function where they could “search within results.” Participants applied berry picking behaviour in conjunction with searching and browsing, and it can indeed be considered a type of searching or browsing.

The more information there was on any given subject, the more semi-structured and unstructured it seemed to the participants, and hence the search techniques used were also semi-structured and unstructured. This constant adjusting and refining of the search terms was perhaps a response to the kind of information available to all participants via the Internet and the search engines, as opposed to all the information that is actually out there in the real world. So berry-picking in these participants can be seen as a way of compensating for the limitations of the search tools available and the structure (or the lack thereof) of the information available online.

4.3.13 Surfing

Participants described their web surfing behaviours variously as “hypertext travelling” “information snacking” or just as “time-wasting” “time-pass” or “pointless clicking.” Surfing was a form of “wandering” in the hope of finding some interesting information, or a kind of “walkabout,” and often, participants who followed a few hyper-links that seemed interesting got lost along the way and some had trouble backtracking to their original information task. Below are a few typical examples from among the 64 documented in the journal:

- “Unintentional aimless surfing: Was seeking some information online about an author (David Mead), having taken a book of his out of the library (Guitar Workout for the Interminably Busy). Popped to google, as ever, and after a false-
positive result (a singer-songwriter by the same name in Canada), I located the author’s website. Before I knew it, I was on another (collaborating) guitarist’s website (having linked through from David Mead’s site), because I recognise the name but couldn’t remember where from. From there, I ended up on Wikipedia, then Amazon, and from there, to a bunch of other, vaguely unrelated sites. So, I am sitting here feeling somewhat unsatisfied with the fact that I have, chewed a chunk of my bandwidth allowance for the month and spent a not-inconsiderable period of time, to gain the information I was seeking, plus a range of other (at the time, interesting) tidbits, which I have already (for the most part) forgotten, and which were completely unrelated to the original search. I seem to do this a lot, and it is often very frustrating” (P25).

• “Every item or event in wikipedia can lead me on a journey of discovery also. Finding information leads me to more information which in turn can give me a better understanding of the original information I was looking for” (P5)

Participants did not report surfing as a method they used to find information in any purposeful manner, but sometimes engaged in surfing behaviour out of boredom, or along the way-finding process of looking for something elusive. Surfing behaviours were connected also to a website’s design and information architecture and participants found some websites easier to navigate than others. When they encountered something interesting during information surfing, they often just book marked it on their browsers (or other online book-marking tools) for potential future reference or sent it to someone they thought might appreciate it, or posted it on their online social networking spaces. A few participants reported having remembered to save something that they had encountered in this manner whilst purposefully looking for some other information, but even then, they had a problem finding it again later as it was often lost within their other bookmarks.
4.3.14 Verifying

Many participants used more than one source of information to ensure the veracity and quality of the information they had found. The more important an information was perceived, the more the participants verified with trusted sources or people they perceived as cognitive authorities. There were a few anomalies concerning health-related information where participants did not necessarily seek out to verify information that they found or heard about, and engaged instead in imagining some nightmare scenarios based on a few scary reports. Verifying often was undertaken for work-related information problems or information seeking related to one’s property or family, where participants sought information from governmental and organisational websites after hearing about something in the popular media that worried them.

Below is one instance where information quality and lack of information verification by others caused problems and frustrations for the participant. There are about 54 other similarly descriptive diary entries that illustrate how information quality and verifying was an important issue for participants.

“I was also reminded yesterday of the importance of ensuring quality in the information used for problem solving. We have an issue at work with a piece of software not behaving as it should and have enlisted the help of the tool administrator to sort out the problem. However, when questioning several members of the team it became clear that the team had provided the wrong information to the tool administrator and couldn’t even give me a consistent description of the problem yet they were complaining they hadn’t gotten a prompt resolution to the problem. What is a little frightening is I’m not sure if I managed to get the point across to them that they couldn’t expect a prompt resolution to the problem if they couldn’t correctly describe the problem. Further they hadn’t made any attempt to [verify] if anyone else had encountered the same problem and had a resolution for it. The problem was a significant one and yet they...
hadn’t thought to use all avenues open to them. More than a little frustrating! I’m feeling a little old fashioned. Writing this blog makes me think much more about information, it’s sources and quality more than I would otherwise. Not that I don’t consider both those quite a bit, I am constantly disappointed with information quality these days. What I’ve begun to realise is that while the Internet is very convenient I still like print media” (P 28).

Verifying information was often perceived as information seeking by the participants, although it was a reframing of their information seeking in order to confirm their doubts about the veracity of the information. Some participants used their social networks to seek verification of certain kinds of information, most often related to politics or travel. They did this through posing questions or asking for suggestions.

4.3.15 **Satisficing, Gratification, & Procrastination**

In their information journals, participants described many thoughts, feelings, emotions, and psychological conditions that affected their behaviours in general, and tagged some of the few main ones that influenced their information behaviours in particular. *Satisficing* and *procrastination* behaviours were often noticed in conjunction with each other and in conjunction with *instant* and *delayed gratification*. In general, participants tended to perform a triage of their information needs or tasks and dealt with them accordingly, but there were some interesting anomalies.

Externally imposed information tasks were generally more prone to both *satisficing* and procrastination, which in turn were associated with each other. The more an information task was procrastinated, the more a participant tended to *satisfice* in response to the resulting time constraints. *Satisficing* and procrastination were also associated with information gaps
that were ambiguous or abstract, as opposed to well-defined and concrete information problems. Externally imposed information problems often required formal information sources, which was one of the reasons for the procrastination. Externally imposed information problems were often related to a participant's professional or academic spheres and hence participants felt compelled to also work harder on them or perform better in general.

Internally-motivated information needs or tasks (especially those that were the result of encountering something interesting) were manipulated by participants to help them in their various gratifications, both immediate and delayed gratifications. When a participant had a series of information tasks or problems to process on any given day, certain information tasks and problems that were pleasurable (but not necessarily easy or quick to achieve) were dealt with right away to obtain immediate gratification, and often included directed information seeking. Other information tasks that were pleasurable to the participant (and also easy to achieve) were intentionally postponed by the participants in order to make sure that they finished their series of information tasks or problems with some assured success (or feelings of accomplishment) in their information searching – a case of delayed gratification. Both instant gratification and delayed gratification behaviours tended to involve concrete information problems.

Below is a selected set of participants' reports on these related information behaviours:

- “I often intend to look things up and in theory having broadband should allow for immediate gratification, but the walk from the couch to the computer is often too much at the time and I intend to do it later, but then rarely do. However, the thing about writing this blog is that I do actually eventually remember. Earlier today I had the intention of checking out who the people on the $50 note were as I’d never heard of either and now thanks to the magic of wikipedia I now have”
• “So much information and interaction available on my social networks; electronic gratification makes me avoid telephones” (P 7)

• “My need for perfectionism doesn’t allow me to think that this report is ready to be submitted to my boss yet, but I need to stop fiddling with it and submit soon” (P8).

• “I have so much information from both sides for and against vaccinations that I feel that I cannot make a decision at all” (P2).

• “I did some deliberate procrastination – I did it in response to roadblock of other information topic I didn’t finish - I needed a success” (P 11)

• “I discussed with one of my classmates to make sure that I covered the key points to ensure that I passed. No further change [on my essay] was made after the discussion; I thought I had tried my best already, that’s enough” (P 7).

• “I can be more careful, but it seems that I have run out of patience on this assignment; at last I just let it go, and had it printed” (P 1).

From participants reports, it was evident that electronic and online tools and resources often aided their gratification behaviours, and behaviours like surfing and browsing often aided procrastination.

4.3.16 **Online and wireless information technologies**

Participants used a significant amount of online and wireless technologies in their work and everyday lives and often in ways that were creative. One participant, an expatriate student, reported using the free Skype video conferencing on a daily basis to sit down with her family in her home country over dinner and make dinner conversation over the Internet. It was an almost-daily information behaviour where they exchanged family news and gossip. She opined that it was better than watching the television news during her suppertime. Participants reported using these digital technologies to create and maintain a sense of intimacy and family
relationships not just across continents but also across town or across different work schedules to monitor other members of their family and to coordinate daily activities. For example, at least seven participants reported being new parents who took turns at work and at home watching the baby, and kept up a constant stream of information exchange with their partner or spouse through online and wireless information technology tools.

Several participants reported using social networks to find classmates from high school and college that they would never have otherwise been able to find. In a sense, the available tools were facilitating or providing affordances to certain information seeking behaviours. Two participants mentioned using a blog to directly record their notes in a classroom, thus broadcasting them instantly to their classmates, and creating a space where they could exchange information on the subject outside of their university’s network. Four participants used temporary web logs to share information with their colleagues from conference venues. Four participants created and edited wikis on Wikipedia.com on subjects of interest to them.

24 out of the 34 participants mentioned in their information journals that they maintained a long-running personal web log about some subject or the other. Many maintained more than one web log for the different spheres of their interests – some were to keep in touch with family, some were travel journals, some supported their hobbies, and several maintained a web log in their professional areas of interest. They were also regular readers of other web logs in their areas of interest through RSS feed services. In many ways, these participants did not see themselves as just consumers of information, but also producers of information that would not have been possible without the digital tools. Bruns (2008) terms this kind of combined creator and consumer of information as a “prosumer” or
“prouser” (Bruns, 2008).

Participants used online and mobile technologies to broadcast breaking news to their friends and family, to coordinate social events, and to broadcast road and weather conditions and restaurant reviews to everyone on the Internet, and sometimes simply for everyday entertainment through music, videos and news. At least 12 participants used Twitter as a search engine to locate posts of interests on places they were travelling to and to seek out reviews of events and conditions at places they were planning to go to, and some even contacted strangers (and even public personalities) for their opinions about matters of interest to them. Below are a few descriptions:

- “I go by the handle GH and have vast amounts of on line entries. I also have a blog that is hated and loved by reasonable numbers and I blog for Intellectual Conservative, MensNewsDaily and BlogCritics as well. I take pride in having a real online presence and even have an entry on Wikipedia that refers to me. I have never written anything for Wikipedia though. The Internet is a place where I feel intellectual honesty is possible since all variety of lunacy is trafficked, mine included. I also believe it is possible to have a greater impact on politics by writing responses to articles from major publications than by doing much else. People actually read and often even actually hate or love what you write. Search me I am not bashful about what I write” (P13)

- “I was at a Broadway show with a friend. An ex President was in the audience. At the end of the play, there had been no announcement made about his presence but there was a crowd outside the theater. A group of protesters on one side, and a group of supporters wanting autographs on the other, all thanks to texting and twittering by several of us in the audience” (P2).

- Google was used for spell-check (P7, P24, P25, P12).

- “I used amazon search inside the book to find references and citations” (P10, P3)

- “I am annoyed that some results that show up in my search are relevant but lock you out if you are not subscribed to a service” (P8)

- “The Internet is more than Fact, Fiction or Communication. I spend hours on
YouTube clicking from one video to another. A feature of its interface is to offer items of similar description, topic or author. A profile of the theme I have adopted is generated and responsible for the feeding of related choices. What this means to me is that I can follow my "train of thought" and choose the tracks that it will follow. This is leading me on a journey which is easier than thinking and choosing what to do and where to go next” (P5).

- This process reminded me of the problems many library users encounter when they try to access full text articles that they find using our federated search systems. They can easily find the citation but are put off when they encounter a screen that asks for their payment. The barrier between subscribed titles and indexed abstracts only serves to confuse most patrons. True, we make services available for those looking for the non-subscribed items, but how many do we lose? (P24)

- “The Internet is an amazing thing since now it really is possible to know just about anything that crosses your mind from what makes a CDO a debt to why leverage a buyout to just about anything else. I also searched Google scholar for some excerpts of books I have on my shelf that I just didn’t feel like getting up out of the chair to find” (P14).

- “Who needs those phone books any more! I do keep one in case the electricity is out. I was searching for my professor's phone number on the Internet through searching for his name which always lands me on his home page as the first result. He lives in another continent but we are always in touch via email. He writes me the recommendations I need for my applications to graduate school but I hadn't been in touch with him for about 4 months, but landed instead on an obituary notice posted for him in the local papers just hours before. I was both shocked and dismayed and also thankful for the Internet as I could immediately contact his family who were indeed wondering how they could get in touch with me. Needless to say, all my information activities today revolved around finding classmates and alumna on the Internet that I could pass on the news of the funeral to.” (P1).

More than half of the participants had an instant-messaging window (MSN, Yahoo Messenger, Google Talk, or Facebook Chat) open on their computers while they went about their daily routine at work or at home and were often interrupted by messages from their friends, colleagues, or...
family that they welcomed and responded to. Some participants even attached screen-shots of such messages within their information journal web logs. These participants reported carefully managing these services in such a way that only certain people could access them in this manner.

Almost all of the participants also used mobile Internet technologies while they were commuting or travelling – catching up on news, gossip, and monitoring their family, connecting with friends, or coordinating their work tasks. This often triggered some information behaviours like information seeking and information searching, sometimes on behalf of others' information needs.

Often times, the people the participants were helping through these technologies were the people who presumably did not have access to these technologies – many participants performed searches and information tasks on behalf of others like older relatives or friends who called them on the phone or approached them in person – an act of altruistic searching. In addition, many participants noted that they regularly and voluntarily instructed their peers on the use of some technology or interface, which they tagged under “instruction” and “sharing,” while also seeking help from their peers every now and then on the use of some technology or interface, which they tagged as “information seeking” or “information use.”

Therefore, in any given information-sharing interaction, one person was information seeking or just involuntarily encountering new information while the other person was information sharing or voluntarily using information that they had already found.

### 4.3.17 Information avoidance

Participants’ information journals revealed that although they were generally looking for more rather than less information on topics that
interested them in their everyday lives, there were certain areas where they actively avoided information. These were specific issues with which the participants either had some previous experience or knowledge or wanted to avoid any new information that might interfere with their decisions or current way of thinking. It was a way of maintaining the status quo or not rocking the boat. This was noticed mainly in the following areas: financial affairs, certain medical issues, religious issues, and certain political issues. One participant actively avoided any form of bad news because it made her sad and depressed. At least three participants avoided finding out more about their current financial status as they feared the worst and preferred to avoid bad news. One very religious participant avoided any information that would force her to question her faith. Two participants avoided seeking medical diagnosis for something they only vaguely suspected may be serious enough to drastically change their current way of life. Five participants avoided certain kinds of information exchange with some specific people, not because they wanted to hide something, but because they felt the information would hurt or cause distress to the other person. This can be described as a kind of information gatekeeping behaviour as described by Spink et al. (1989) in the literature. Many of the examples are too emotionally affected to extract here, but below are some brief ones:

- “My online banking statement from last month is ready. I should download that, but I’m feeling tired and lazy. I’ll do it tomorrow, I guess. Maybe this is a good opportunity to play with the mailbox feature on the new printer you can send a print job to, but not actually have it print until you’re standing at the printer to pick it up. No more running to the printer to grab the embarrassing thing before anyone else sees it!” (P24).

- “I am very upset and it’s partly an information issue [and lack of timely communication by my boss about my moving bills], but I’m so upset right now I don’t want to open the mover’s bill. I’m always emotional about money anyway, so uncertainty about money and bills is a real sore spot for me. I know the
emotions are making this much much worse.” (P 17)

- “I’m sick of new information and just want to drink beer and sleep!” (P27)

- “I have always avoided financial information as it makes my eyes glaze over. But it’s too late now. I could have pulled money out of the money market account when it became obvious the market was tanking, rather than, you know, NOW” (P2).

- “My friend is not a believer like me but we are friends so I avoid discussing the subject with her” (P3).

- “My therapist asks several questions of me and my relationship with A. It’s hard to confront all the possibilities of exploration and I shut down many of my verbal responses. I evade the answer and try to create responses to divert the question” (P33).

The participants' information avoidance behaviours were in line with much of the information avoidance theories mentioned in the literature including Case et al. (2005) and Johnson (2009) that most people seek out information which agrees with their current world-view and cognitive skill levels rather than acknowledge or seek new information that causes an uncomfortable conflict in their minds. One new finding was that information avoidance behaviour had two aspects to it – passive information avoidance and active information avoidance. Passive avoidance was the long-term avoidance of abstract information relating to one's long-held and deeply-held beliefs of self and identity that had to be processed cognitively, and which the participant knew would cause cognitive dissonance and hence pre-empted it by avoiding the information altogether. Since one cannot completely avoid encountering this kind of information, it is more like a refusal to process encountered information rather than a refusal to seek information. On the other hand, active avoidance was a short-term rejection of information that was more of a stress-coping mechanism in response to some concrete information that was already processed
affectively, blocking any further information seeking for a short time.

4.3.18 Concurrent information behaviours

As is evident from many of the examples provided under the various information behaviours in the previous sections, participants' information behaviours were not confined to any one type of information behaviour at any given time, but encompassed the whole range of information behaviours, often simultaneously, and never in a linear fashion, although there was some progression from certain behaviours to others on a regular basis. Many information behaviours occurred concurrently with each other – monitoring and sense-making often ran parallel – while some information behaviours were often nested inside other information behaviours. For example, information encountering was often observed within information monitoring and information browsing behaviours, while Information searching, information browsing and berrypicking went hand in hand most of the time, while almost all of them were located within sense-making at several points in time.

Participants engaged in many of the information behaviours in a parallel, distributed, and concurrent fashion – many information behaviours for one information problem, one information behaviour across many information problems, and many information behaviours concurrently across many information problems. All information behaviour processes were situated within the context of a person's socio-cultural world that exerted its influence on how people engaged in these information behaviours in their everyday lives.

The information journals demonstrated that the participants' feelings, ideas, beliefs, memories, actions and reactions were linked together associatively in an cognitive-affective network that was framed within their social and cultural contexts. The activation of any one of these
components through information curiosity or an information need often activated the other components in this network. These different component information behaviours were inter-twined and interleaved together and there was no clear delineation between them. Hence, an integrated model of these behaviours is indeed possible and would be in line with how participants interacted with information in their everyday lives.

4.4 Results of Post-GT Analysis

As described in chapter 3, two different text and content analysis tools were used to perform the automated content and text analysis of the information journals – one is called *ManyEyes*, a text-visualisation tool, and the other is *Leximancer*, a thesaurus-learning-based content analysis tool used to discover “themes” in a text. These analyses were performed long after the Grounded Theory analysis was complete. Therefore, when the researcher re-approached the information journals with these automated tools, it provided some confirmation to find that several of the connections that had emerged from the Grounded Theory analysis were indeed validated through these automated methods, but all the same, they also missed several other associative threads and themes that emerged from the Grounded Theory analysis.

4.4.1 Automated text and content analysis

Text analysis or content analysis is a general term that describes “any methodical measurement applied to a text (or other symbolic material) for social science purposes” (Shapiro & Markoff, 1998). Extracting and representing the networks of ties between concepts in a set of texts creates a visual map of each text. Map analysis allows the researcher to compare the networks of ties between concepts in these texts by
systematically reducing their content. Research has shown that automated analysis of texts can provide information broadly consistent with the results of human coding, and that the information about the concept networks in the texts can allow a researcher to make meaningful conclusions about the themes in the data (Popping, 2000).

Two types of text and content analysis were performed on the diary data. The first was the ManyEyes software that was used to analyse both the tags and category counts and also the words in the integrated text comprising of all 34 journals in one single document – this comprised of about 120,000 words after the text filters were applied. The second was the Leximancer software that was used to semantically map the text of the information journals. This system goes beyond keyword and phrase searching and coding by discovering and extracting thesaurus-based concepts from the text data with no requirement for a prior dictionary, although one can be used if desired. These concepts are then coded into the text, using the thesaurus as a classifier. The resulting asymmetric concept co-occurrence information is then used to generate a concept map. When large amounts of texts are processed, Leximancer can serve as a data-mining tool. Particular words can be merged together to be counted as a single concept and structured relationships between concepts can be identified, so that both key concepts and relationships can be displayed visually via a concept map. This feature was useful as many of the concepts this study was interested in were sets of phrases like “information searching”, “Information seeking”, “information foraging”, and “sense making.” These capabilities made Leximancer a useful tool for accessing and assessing the information in the 34 information journals, with its ability to map its findings particularly helpful. Essentially, the map provides a holistic overview by illustrating the main concepts contained in the text and how they are related. Closeness in the map refers to the extent to which two or more concepts appear frequently in similar contexts.
The centrality of a concept within a map reflects the extent to which it co-occurs with many of the other prominent concepts. That is, a concept will be centrally located on a map if it appears in contexts surrounded by many other Leximancer-extracted concepts. According to the Leximancer manual, the program can analyse information without previous knowledge of the topic under investigation, thus providing unbiased results. However, although argued as a strength of the program, this was actually found to be a limitation as the program was less able to identify abstract concepts like sense-making without specific tags in the web log text and the “seeding” of certain concepts relevant to this study, and the “killing” of certain other concepts. For example, without any such “seeding” and “killing” of certain concepts, the overarching “theme” in the data emerged as PERIODICAL. This was because the text of the integrated journal had hundreds of entries that referred to periodical and temporal concepts like “morning” “today” “afternoon” “evening” “week” “month” etc. along with the names for weekdays, which were embedded in the text (and not in the metadata) but would have compromised the meaning of the text by breaking up sentences if they were removed completely.

Figures 4-2 and 4-3 represent a visualisation and comparison of two text documents: the content of Overview of IB Research (Chapter 3 in its entirety) and the integrated information journal of all the participants. The size of the word represents its prominence in the text. Not surprisingly, the language of the research on information behaviours is very different from the language of the participants’ descriptions of information behaviour, but they provide a good side-by-side comparison of the important concepts that emerge from both texts. Not surprisingly, terms such as cognitive, foraging, uncertainty, and use stand out in the literature, whereas the participants’ journals reveal a lot more about their everyday life information behaviours which are dominated by words like monitoring,
searching, get, find, look, asked, checked, work, home, and other such everyday terms.

Figures 4-4, 4-5, 4-6, and 4-7 represent a map of the most commonly found phrase combinations in the participants' combined information journals, which afford us a small window into how everyday-life information behaviours are conceived of, and expressed by the participants. Once again, “looking for” and “finding” information seem to be the most common themes, and they are inter-connected with both the technologies of everyday life and the social networks of the participants.

Figures 4-8 and 4-9 both show the dominance of the word “looking” in participants' information journals with respect to looking for information. This is how the participants conceive of all the processes of searching, seeking, foraging and so on in their everyday lives, which is very different from how the information behaviour literature conceives it.

Figures 4-10, 4-11 and 4-12 represent the data as seen by the Leximancer program. In Figure 4-10, the map's central concept is “Information,” as was expected, which is connected to the other major concepts discovered. The interesting information from this map is that although all the various categories of information behaviour are generally spread out with some intersections (with some connections between them represented by the straight lines), almost all the behaviours co-occur quite a bit within the sense-making behaviour. Hence, the detail of this part of the map is provided in Figure 4-10, which shows sense-making linked to monitoring, multitasking, searching, surfing, information, information foraging, work, organising, use, browsing, and encountering. The “day” concept is perhaps due to the mention of words like “today” and the names of days of the week within the text itself, even though the time-stamps were stripped from the data in pre-processing.

Figure 4-12 provides a further detail of the concept pathway that
Leximancer deduced from the data: from “time” <to> email <to> social <to> organising <to> browsing <to> surfing with some tangents along the way that indicate some sharing, verifying, seeking, searching, looking & looked, checking (which can be construed as either monitoring (as in checking e-mail), or verifying (as in checking information). Hence, Figure 4-12 describes the majority of the participants' journals quite accurately – participants always started the day by checking their email, and then replied, shared, organised information for the day at work or at home – and performed the rest of the information behaviours throughout the day, and all of these activities involved some sense-making.

Although this kind of concept maps give a fairly good sense of the information activities engaged in by the participants in their everyday lives, it cannot help us understand them in the way the Grounded Theory analysis does. The metaphorical or idiomatic expressions by the participants are lost in the conversion of the text to data, along with losing the discovery of contextual and social meanings that a trained researcher can bring to the data. It also has problems with disambiguation and complex sentences, as with any text-analysis software.
Figure 4-2: Wordle Map of the text of Chapter 3: The theme words in the Overview of IB Research: the size of the word in the figure represents the frequency of the word in the overview of IB research in Chapter 3 (common words like “an” “the” “and” etc. and name-like words have been removed.
Figure 4-3: Wordle Map of the integrated text of the journals: the size of the word in the figure represents the frequency of the word in the information journal (common words like “an” “the” “and” etc. and name-like words have been removed).
Figure 4-4: PhraseNet diagram of the top 50 words in the integrated journal text connected with an “a” - Notice that the major hubs relate to “find” and “found” and in regard to an information source like a book, blog, link, message, or video.
Figure 4-5: PhraseNet diagram of the top 50 words in the integrated journal text connected by proximity to each other - notice the hub of the net revolves around the word “found.”
Figure 4-6: PhraseNet diagram of the top 50 words in the integrated journal connected with “the” - the hubs of this net converge on “find”.
Figure 4-7: PhraseNet diagram of the top 50 words in the integrated journal text connected with “and” - the major hub is “found.”
Figure 4-8: PhraseNet Analysis of all the word combinations beginning with “Looking” in the text of the information journals.
Figure 4-9: ManyEyes Phrasenet Analysis of all the word combinations ending with “Looking” in the text of the information journals.
Figures 4-10: Leximancer network map of concepts found in the journal text: notice that sense-making and use are major hubs.
Figure 4-11: A detail of Figure-4-10 with a closer look at the information behaviours related to sense-making.
Figure 4-12: A further detail Figure 4-10 showing the relationship trees within sense-making.
4.4.2 Statistical analysis

Four different kinds of statistical analyses were performed on the counts of information behaviours observed in the information journals presented in Table 4-2 at the beginning of this chapter, which represent the raw counts of the behaviours found in the information journals:

1) The coding patterns in Group A (participant-tagged) and Group B (researcher-tagged) were compared to answer the question: Was the researcher tagging the same as the participants? It is impossible to answer that by any means, but we can tell whether the researcher or the participants tended to favour different terms. Therefore, for each type of information behaviour, the count of the number of times that the researcher and the subject tagged a sample with that behaviour was performed. It was then correlated to the counts presented in Table 4-2 to see whether the totals were the same. Not surprisingly, Group A and the Combined group correlated with a .99 and Group B and the Combined group correlated with a 1, which is expected and not very useful information because they are both subsets of the combined group. But interestingly, Group A and Group B had a .98 correlation with each other and that is a more useful measure for the purposes of this study. It means that the researcher’s frequency of using a particular tag (i.e. describing an experience as that behaviour) had a 98% correlation with the participants’ frequency of using a particular tag. That is not to say that the researcher and the participants meant the same thing when they used a tag, just that they used them just as often. Nevertheless, this correlation helps to validate that it made sense to combine the two groups A and B for purposes of analysis.

2) A co-occurrence matrix of the information behaviours was created
with the combined data from the participants' information journals, using the top 20 information behaviour pairs that emerged from the data. Co-occurrence matrices, such as co-citation, co-word, and co-link matrices have been used widely in the bibliometric field within information science for citation analysis and journal and author impact factors. They provide us with useful data for mapping and understanding the structures in the underlying document sets (Leydesdorff & Vaughn, 2006). In this analysis, the information behaviours were extracted from the data in such a way that they constituted a number of samples, each of which was a set of behaviours. For each pair of behaviours \((a, b)\) it was counted as to how many times \(a\) and \(b\) occurred in the same set. As this is a symmetrical relationship – \(a\) and \(b\) occur together exactly as many times as \(b\) and \(a\) occur together – the co-occurrence matrix (Figure 4-13) is symmetrical. In this co-occurrence matrix graph that displays what pairs of behaviours occur together, the strength of the relationship between the behaviours is indicated in terms of the thickness of the lines – the thicker and darker the line, the greater the co-occurrence. Notice that in the co-occurrence matrix graph, sense-making has a strong co-occurrence with monitoring, encountering, seeking, searching, organising, and use, which means that these six information behaviours co-occur with sense-making more often than with any other information behaviour, and also co-occur with each other more often than with the rest of the information behaviours. This confirms the overarching finding of the Grounded Theory analysis about the importance of sense-making in human information behaviours.

3) Then, in a separate analysis, for ALL subsets of behaviours (not just the subsets of size 2, as above), a count was performed of how many samples contained that subset. This gave the list of numbers
with the various combinations of the information behaviours and their exact counts of co-occurrence. This list of numbers contained all of the numbers from the previous analysis, but as the subsets are not of size 2 the numbers cannot be presented in a matrix. A matrix to display those numbers would be 12-dimensional, and the numbers would relate to n-dimensional slices through it. The first 50 combinations of the groups of information behaviours that co-occurred most often are presented in Table 4-3. The complete list contains 1271 different combinations and is presented in Appendix XIII. From this table, it is evident that sense-making co-occurs most often with monitoring, seeking, and encountering, while organising and use occur together most often, and several of the insights from the Grounded Theory analysis can be confirmed by examining the combinations.

4) Finally, it was examined how the appearances of the behaviours matched each other. Therefore, for each kind of behaviour the researcher went through all the samples and recorded a 1 if the sample contained that behaviour and a 0 if it did not. This provided a very long list of 1s and 0s for each kind of information behaviour. This was then correlated with the list (Table 4-3) where the information behaviours occurred with each other for each different pair of samples. This data is presented in Table 4-4. A higher number means "more likely to occur together". Some of the stronger correlations occurring in this table are as follows:

- Organising and use have a + 0.42 correlation as participants often engaged in these two behaviours concurrently in that when they “saved” information, they were organising it for later use, and considered it a form of use, whether or not they were able to
successfully retrieve this saved information when they needed it. The other correlations for use was with seeking (+0.14) and sense-making (+0.18) – with a subset correlation of + 0.08 between seeking and use. This was because participants often had trouble seeking for and using the information that they had saved or organised.

- Another notable correlation was between multitasking and social networking (+0.23) and social networking and sharing (+0.18). This is because participants often engaged in social networking between other information behaviours to share information with friends, family, colleagues and others.

- Searching, browsing, surfing, and foraging all had significant correlations with each other, as participants often engaged in these during online information searches.

In summary, the statistical analysis confirmed many of the findings from the Grounded Theory analysis, but once again, it cannot provide the level of detail and insights obtained from qualitative analysis.
Figure 4-13: Co-occurrence Matrix of the category tags in the information journals. The thicker the line, the greater the co-occurrence of these behaviours.
128 organising / use
117 sense-making / use
117 seeking / searching
110 seeking / use
108 sense-making / searching
99 sense-making / organising
92 seeking / monitoring
92 seeking / encountering
90 monitoring / searching
88 seeking / organising
85 monitoring / use
83 monitoring / encountering
78 sense-making / encountering
75 searching / use
75 organising / monitoring
65 use / encountering
65 organising / searching
62 sense-making / organising / use
60 sense-making / seeking / searching
60 sense-making / foraging
60 foraging / searching
57 sense-making / seeking / use
57 sense-making / monitoring / searching
57 seeking / organising / use
55 organising / encountering
54 monitoring / foraging
51 seeking / foraging
51 searching / encountering
50 sense-making / monitoring / use
50 organising / foraging
50 foraging / use
47 sense-making / seeking / monitoring
45 sense-making / seeking / organising
45 sense-making / searching / use
45 sense-making / organising / monitoring
45 organising / monitoring / use
43 seeking / monitoring / encountering
43 foraging / encountering
42 seeking / searching / use

**Table 4-3:** Frequencies of the groups of different information behaviours occurring together. The complete lists contains 1271 combinations and is presented in Appendix XIII
Table 4-4: Correlation Coefficients between individual information behaviour categories in the combined journals.

<table>
<thead>
<tr>
<th>Sense-making</th>
<th>Monitoring</th>
<th>Seeking</th>
<th>Use</th>
<th>Searching</th>
<th>Encountering</th>
<th>Foraging</th>
<th>Organising</th>
<th>Browsing</th>
<th>Sharing</th>
<th>Multitasking</th>
<th>Berry-picking</th>
<th>Social-networking</th>
<th>Surfing</th>
<th>Writing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sense-making</td>
<td>1</td>
<td>0.16</td>
<td>0.08</td>
<td>0.18</td>
<td>0.12</td>
<td>0.12</td>
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<td>0.02</td>
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<td>0.06</td>
<td>0.07</td>
<td>0.1</td>
<td>0.06</td>
<td>-0.07</td>
<td>0.27</td>
<td>-0.03</td>
<td>0.06</td>
<td>0.09</td>
<td>-0.01</td>
</tr>
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<td>Seeking</td>
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<td>-0.04</td>
<td>1</td>
<td>0.14</td>
<td>0.15</td>
<td>0.08</td>
<td>0.05</td>
<td>0.09</td>
<td>0.08</td>
<td>-0.05</td>
<td>0.02</td>
<td>-0.03</td>
<td>0.07</td>
<td>0.13</td>
</tr>
<tr>
<td>Use</td>
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<td>0.05</td>
<td>0.13</td>
<td>0.42</td>
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<td>0.08</td>
<td>-0.02</td>
<td>0.03</td>
<td>-0.03</td>
</tr>
<tr>
<td>Searching</td>
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<td>0.15</td>
<td>0.07</td>
<td>1</td>
<td>-0.03</td>
<td>0.19</td>
<td>0.06</td>
<td>0.14</td>
<td>-0.08</td>
<td>0.16</td>
<td>0.03</td>
<td>0.06</td>
<td>0.11</td>
</tr>
<tr>
<td>Encountering</td>
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<td>0.08</td>
<td>0.05</td>
<td>-0.03</td>
<td>1</td>
<td>0.1</td>
<td>0.04</td>
<td>0.15</td>
<td>0</td>
<td>0.1</td>
<td>0.03</td>
<td>-0.05</td>
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<td>Foraging</td>
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<td>0.1</td>
<td>1</td>
<td>0.17</td>
<td>0.24</td>
<td>-0.09</td>
<td>0.27</td>
<td>0.05</td>
<td>-0.02</td>
<td>0.11</td>
</tr>
<tr>
<td>Organising</td>
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<td>0.06</td>
<td>0.09</td>
<td>0.42</td>
<td>0.06</td>
<td>0.04</td>
<td>0.17</td>
<td>1</td>
<td>0.06</td>
<td>0.01</td>
<td>0.2</td>
<td>-0.02</td>
<td>0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>Browsing</td>
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<td>0.08</td>
<td>0.02</td>
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<td>0.15</td>
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<td>0.06</td>
<td>1</td>
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<td>-0.02</td>
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<tr>
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<td>-0.07</td>
<td>-0.05</td>
<td>0.03</td>
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<td>-0.09</td>
<td>0.01</td>
<td>-0.04</td>
<td>1</td>
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<td>-0.01</td>
<td>0.18</td>
<td>-0.02</td>
</tr>
<tr>
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<td>0.02</td>
<td>0.08</td>
<td>0.16</td>
<td>0.1</td>
<td>0.27</td>
<td>0.2</td>
<td>0.2</td>
<td>-0.05</td>
<td>1</td>
<td>-0.01</td>
<td>0.23</td>
<td>0.15</td>
</tr>
<tr>
<td>Berry-picking</td>
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<td>-0.03</td>
<td>0.02</td>
<td>0.03</td>
<td>0.03</td>
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<td>-0.02</td>
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<td>1</td>
<td>-0.01</td>
<td>0.08</td>
<td>-0.01</td>
</tr>
<tr>
<td>Social-networking</td>
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<td>-0.07</td>
<td>0.04</td>
<td>0.06</td>
<td>-0.05</td>
<td>-0.02</td>
<td>-0.05</td>
<td>-0.02</td>
<td>0.23</td>
<td>-0.01</td>
<td>1</td>
<td>-0.06</td>
<td>-0.04</td>
</tr>
<tr>
<td>Surfing</td>
<td>0.02</td>
<td>0.09</td>
<td>0.13</td>
<td>0.03</td>
<td>0.11</td>
<td>0.1</td>
<td>0.11</td>
<td>0.05</td>
<td>0.22</td>
<td>-0.02</td>
<td>0.15</td>
<td>0.08</td>
<td>-0.06</td>
<td>1</td>
</tr>
<tr>
<td>Writing</td>
<td>-0.03</td>
<td>-0.01</td>
<td>-0.02</td>
<td>0.03</td>
<td>-0.04</td>
<td>-0.08</td>
<td>-0.05</td>
<td>-0.01</td>
<td>-0.06</td>
<td>0.12</td>
<td>-0.05</td>
<td>-0.01</td>
<td>-0.04</td>
<td>-0.04</td>
</tr>
</tbody>
</table>
4.5 Key Findings

Participants engaged in many of the observable or recordable information behaviours described by the various IB models, but in some more often than in others, and there were some notable patterns with co-occurrences of certain information behaviours. The key findings and themes that arise from the grounded theory analysis and confirmed by automated content analysis and statistical analysis of the information journal data are:

1) **All information behaviours are entangled with each other:** The participants engaged in the many information behaviours concurrently and these different behaviours were naturally and organically coordinated in a seamless way and integrated within participants' everyday life information behaviours, and hence the question of whether these different models can be integrated has been answered in the positive. Participants conceived of information behaviours in terms of “Looking” “Checking” “Finding” “Using” and “Sharing” rather than as seeking, searching, browsing, foraging, surfing, berrypicking etc. as described in the literature, and they all involved various levels of affect or sense-making. Chapter 5 lays out an integrated model based on these findings.

2) **Monitoring leads to encountering and to sense-making:** One of the main triggers for several information behaviours is the encountering of some new information during the process of monitoring one's information environment or a domain of interest which leads to a conflict in one's mind between one's internal perceptions and apparent external realities. Monitoring and sense-making behaviours were observed to occur more frequently, and also co-occur quite often, while both were also closely related to
socialising online and to seeking information through social networks, which were observed to serve as the information grounds for the majority of the participants, and were part of their information horizons. Often times, information seeking is seen as the only way of resolving this conflict between facts and ideas, or the perceived gap between internal mental state (including knowledge) and external information. Nevertheless, if access to the information needed to bridge this cognitive gap was hindered by the lack of certain cognitive coping skills in a participant, it led to a deeper but different gap which can be conceived of as an affective gap that causes information distress – the participant needed and wanted the information, but lacked the skills to either access it or understand it. Although the word encountering may imply accidental or serendipitous encounters in most contexts, in the context of information behaviour, it is situated within, and arises out of monitoring a domain rather than monitoring a specific piece of information anticipated by the participant. This monitoring of a domain or even the monitoring of a person's immediate environment for reasons other than direct information seeking can lead to encountering totally unexpected information that the person may want to act on or pursue further.

3) **The role of sense-making:** Sense-making played a major part in participants' information behaviours, but it was noticed that it was more dominant during the course of the information seeking or information searching process rather than at the beginning of these processes or as a trigger for information behaviours as assumed in the literature. Participants almost always used words and phrases like puzzled, frustrated, confused, struggling, hard to grasp, figuring-out, trying hard, cannot understand, baffled, stressed, unease, and
ambiguous when describing their feelings during the process of information seeking or information searching and several of these affective sense-making behaviours actually led the participants to stop their information search in despair. This could of course be interpreted as the so-called continuous/ discontinuous process described by Dervin in her sense-making metaphor where she describes them as gaps or “sense-unmaking.” Nevertheless, at the other end of the spectrum, participants perceived sense-making as an adventure that motivated and challenged them in a positive way to solve problems or create new sense (and hence new information) without necessarily experiencing uncertainty or stress. Hence, the problem-solving model of information-seeking studies and the sense-making concept are both interleaved, but even together, they do not explain all of participants' information behaviours, and depending upon the participants' own internal states, they perceived an information gap as a positive cognitive challenge that led to a happy and productive information interaction (and sometimes Flow experience) or a negative affective confrontation that led to either information distress or information avoidance.

4) **Uses and gratifications:** When an information need was inchoate or abstract and required some creative and analytic input, participants often procrastinated, whereas task-based information problems like fact-finding, along with other clearly defined and non-abstract information problems got attended to right away. This procrastination was not the same as avoiding information, for they were continually thinking about the information problem without acting on it. This concept is closely related to both instant and delayed gratification behaviours and related to both information seeking and information searching. Most externally imposed
information behaviours were time bound and information found for these purposes was generally forgotten and not processed beyond its deadline, whereas most internally-generated information behaviours based on curiosity and innate interest was ongoing and the results were filed for future use or for building upon existing knowledge. Sometimes it lasted a very long time or provided “food for thought” as one participant put it, and led to long-term interest and engagement with the subject.

5) **Information Avoidance behaviours**: One anomaly again is an active *information avoidance* behaviour, which occurs when participants seem to instinctively already know the answer to a question in their mind, or think they know the answer, but do not want it confirmed through a simple but active *information seeking*. Examples include not just health-related behaviour, but also information behaviour related to one’s finances, one’s religious or other beliefs, or anything else that may confirm one’s immediate insecurities or fears, or force them to take an action that they are not willing to take. In that sense, information avoidance behaviour had two aspects to it – *passive information avoidance* and *active information avoidance*. Passive avoidance involved avoiding abstract information relating to one’s long-held and deeply-held beliefs of self and identity that had to be processed cognitively, whereas active avoidance was a short-term coping mechanism in response to some concrete information that was processed affectively.

6) **Kinds of information seeking**: Three kinds of information seeking behaviours were observed: information seeking through direct asking, information seeking through public asking, and information seeking without asking by consulting public repositories of
frequently asked questions, so one can either find an answer or formulate a better question.

7) The key role of information use: Information use is an inseparable part of information behaviours and is connected not only to every aspect and stage of the process of looking for information, but also to every aspect of everyday life. Information is used not only to reduce uncertainty or to fill a cognitive gap in one's mental model, but was used to achieve several other goals in participants' everyday lives. Besides, during any process that involved looking for information, information use was constantly at play, for one could only understand and make sense of the constant input of information by constantly reorganising and reusing previously found or experienced information.

8) The complex role of organising information: All behaviours involving the acquisition, organisation, and use of information involve the process of making meaning through complex acts of coordination including organisation, reorganisation, prioritising, and use. Cognitive coordination with other mental models was a coordination of meaning between oneself and others (intersubjectivity), whereas a cognitive coordination between one's own past and present selves (intrasubjectivity) was a coordination of meaning within one's own mind, which is wrought with even more problems, for the longer the time between the two, more changes are likely to have happened within one's mind. In a way, understanding newly encountered information was just a matter of coordinating one's present mental model with the new information, whereas organising, and searching through an organised or disorganised collection of one's own previously found information (that have presumably altered one's mental model to some extent...
already) is fraught with problems as it involves facing one's past in some manner, and one's anticipated future, for we organise so we can retrieve, and the longer the time between the two, the more changes are likely to have happened within oneself. All of these processes were also in essence, acts of communication, often unidirectional at any given moment, and were communications within a rhetorical situation, and hence the predominance of sense-making across all behaviours, and notably alongside organising behaviours. Documents are information carriers, just like people, and can talk to us, but cannot tell us what they mean. This meaning is created within ourselves, and hence the process of organising information was one of the most problematic for many participants.

9) **No dichotomy between cognitive and affective, and between cognitive-affective and social contexts:** Participants did not see as much of a dichotomy between thinking (cognitive responses) and feeling (affective responses) as the information behaviour theories in the literature seem to suggest, for feelings were a consequence of thinking, and so were behaviours (their actions) related to information. Thinking about information can just be as idiosyncratic as feelings related to information, and consequently information behaviours were observed to be somewhat idiosyncratic too. Thought, feeling, and behaviour all involved some sort of sense-making, and since their thinking and their feelings were both situated within a participant's social-cultural context, what they thought affected how they felt and how they behaved, but all of them were involuntarily mediated by their socio-cultural and immediate contexts. This is probably why the sense-making behaviours were the most commonly occurring behaviours observed and also the behaviour that occurred most commonly alongside other behaviours.
In summary, participants went about their daily lives engaging in several information behaviours through the day. They generally monitored certain information fields or information grounds within their information horizon – at home, work, and online – on a daily basis, along with performing other tasks related to their work, personal, and social lives. When they encountered new information (in the form of a person, an object, a document, or a communication – serendipitously, intentionally, or as part of their work or other responsibilities – that created a mental or emotional conflict, or created too big a gap between their current mental model and the external world, they sometimes (but not always) saw it as an information problem, and sought to resolve it through looking for some information to fill that gap.

This act of looking for information often involved different strategies – seeking, searching, browsing, surfing, berrypicking, foraging, hunting and gathering – each of which had discrete components but were often interleaved together and ran parallel. Sometimes, when participants were looking for many different kinds of information to solve one information need or problem, or were looking for one piece of information for solve many different gaps or problems, they were often handled together simultaneously, along with other non-information tasks, through multitasking. When the participants found the information they were looking for, they were either satisfied and used it right away, organised it, or just put it away for later use. They often found other information along the way that they were not necessarily looking for. This either caused a new gap that needed to be filled, or else they shared this new information with someone they identified as a person who might need that information. Presumably, this other person will encounter this new information now and will either begin a process of ignoring, avoiding, or engaging in some information behaviours. In the meanwhile, if the participant did not find the
information s/he needed to resolve all of the various different information problems s/he was engaged in, they coped with it in various ways – some information problems were terminated, some were postponed, some were managed carefully, and others either caused happiness, frustration, exhaustion, or new information needs. Many were resolved and some found information was used right away while some information was saved in anticipation of future use.

The participants used various information management strategies in everyday life and some included prioritising, multitasking, delegating, procrastinating, and avoiding, all of which in turn had several discrete components within. Hence, at any given time, any given participant was engaged in several information problems continually and concurrently in both a parallel and a distributed manner, and many of these different information problems intersected with each other often, either in content, strategies, organisation, or in their use. In participants’ own words though, they were either thinking about, looking for, finding, sharing, organising, or avoiding information, without being consciously aware of engaging in any specific information behaviours.

4.6 Chapter Conclusion

The research question for this study was: Is it possible to derive a unified model of information behaviour that integrates the insights from the existing IB models and allied theories by using them as a template to analyse observed and recorded everyday information behaviours?

The analysis of the information journals presented in this chapter indicates that it is indeed possible to integrate the information behaviour models and unify them into one macro model, for participants engaged in many of these behaviours concurrently, and some of them in sequence, and all of them on a regular basis in their everyday lives. This integrated
model is presented in Chapter 5.
CHAPTER 5 : DISCUSSION

“A model which took account of all the variegation of reality would be of no more use than a map at the scale of one to one.”

JOAN VIOLET ROBINSON⁵

This chapter presents a theoretical discussion of the various aspects of human information behaviours based both on the results of this study, presented in Chapter 4, and how some of these results relate to the IB theories and models presented in Chapter 2, along with insights from other disciplines that throw some light on the results. Two new models of information behaviour are presented; the first one is a unified conceptual model based on all of the discrete components of information behaviours from the study results and the literature, and the second one an Integrated Model of Everyday Life Human Information Behaviours, a more theoretical and abstract model based solely on this study. The models are described, and the theoretical and methodological implications of this study are stated.

5.1 Introduction

To begin with, let us consider the definition of information that was provided to the study participants: “Information is any difference that makes a difference to a conscious, human mind. It is whatever appears significant to [you], whether originating from [your] external environment or [your] internal world.”

The definition above is an explicated version of the definition by Gregory Bateson, a linguist and anthropologist, who considered

information as an abstraction derived *from* something, or a *reaction* to it, but was not the thing itself (Bateson, 1972). He further explained that “All receipt of information is news of difference and all perception of difference is thus limited by threshold” (Bateson, 1972, p. 29) which puts it in perspective of our neurocognitive abilities and “bounded rationality” (Simon, 1957), where human rationality is limited by the information we have, the cognitive limitations of our minds, and the finite amount of time we have to make decisions.

Although there has been much discussion in Information Science and in other disciplines about the definition of information, which run from the highly specific to the very general, Case (2007) argues that no definition of information is needed in order to research information seeking or information behaviours in general, and that although scholars need not share a single or universal definition of information, each scholar still needs their own definition. Indeed, it was necessary to provide the participants with some guidelines and the researcher’s definition of information, and hence a definition that had the broadest possible scope for interpretation was used in this study, so as not exclude any narrow definition that a participant may have conceived of before. For example, many potential participants, upon first look, always assumed that the study was about finding information on the Internet, and hence, they required a broader explanation of information to include all information-related thoughts and activities in everyday life. IB studies in the past have often been grounded in the most rational of all contexts, libraries and IR systems, which have their own inherent logic, and where users go to with defined information problems, whereas studies of people in everyday life often run into quite anomalous findings. For example, findings related to everyday life point to the seeming irrationality of human information behaviour (Spink & Cole, 2001a) as this study has found.
The participants, through their information journals, detailed many of the different ways they conceived of information, and not all of them involved retrieving or using information from their immediate external information environment. Many of these different conceptions of information will be discussed in this chapter also, along with the information behaviour processes.

### 5.2 Everyday Life Information Contexts

Several different routines in the everyday life of participants were composed of a series of information behaviours comprising of organising, monitoring, encountering, reorganising, and use, often in that order, and was in keeping with the concept of *habitus* described by Spink et al. (1989). There was often a neat progression of behaviours on a periodical basis but these behaviours mostly framed a person’s workday or work tasks, whether at home or in the office. In a way, the participants were consciously organising their very information behaviours and not just organising information. This often also consisted of coordinating with other people, which was an act of mutual exchange of information. These kinds of daily information behaviour routines were also observed in non-work related contexts.

In the interval between these periodical behaviours, the information behaviour tasks were non-linear and somewhat serendipitous as described by Foster (2004) and often interleaved with looking for various different kinds of information through the techniques of seeking (including asking other people), searching, browsing, surfing, and berry picking. Many of these information behaviours were purposeful and even reflective in nature, while others were reactive or reflexive interactions with their environment (physical or online) or with information systems. In fact, much of the information behaviours that occupied a large, and often reported as
frustrating part of participants’ everyday lives was related not directly to information needs for their personal or work interests at all, but to solving so-called technical difficulties that they stumbled upon during the process of searching or seeking information, which they had to solve first before they could go back to their routine or other information behaviours. Many participants seemed resigned to these problems (often related to technology like networks, printers, and hard drives) while a few participants were distressed enough to seek information through calling help desks which ended up causing them even more distress due to a failed intersubjectivity between the different conceptions of the problem by the participant and the help desk.

Outside of the daily routines that were similar across the majority of participants, they also exhibited a range of information behaviours as expected, and a variety of conceptions of information, and different ways of approaching the different streams of information in their lives. Although these information behaviours in no way followed a linear pattern, the very nature of written communication makes it difficult to accurately convey this non-linear pattern, both for the participants in their diaries and for the researcher in this study.

5.2.1 From Context to Information Gap

According to the literature, the individual cognitive context within which the information-seeking initiation process occurs (as opposed to the individual's physical, affective, or other environmental contexts) is described variously as an “information gap,” “anomaly,” (Belkin, 1980) or a “problem to be solved” (Marchionini, 1995) and fraught with feelings of “uncertainty, confusions, anxiety, and even threat.” (Kuhlthau, 2004).

All of us have gaps in our knowledge, but we do not always feel the need to fill that gap, even when we are aware of it. “Isn’t more information always better?” asks cognitive psychologist Gerd Gigerenzer (1999). He
proceeds to explain:

Why else would best-sellers on how to make good decisions tell us to consider all pieces of information, weigh them carefully, and compute the optimal choice, preferably with the aid of a fancy statistical software package? In economics, Nobel prizes are regularly awarded for work that assumes that people make decisions as if they had perfect information and could compute the optimal solution for the problem at hand. But how do real people make good decisions under the usual conditions of little time and scarce information? Consider how players catch a ball—in baseball, cricket, or soccer. It may seem that they would have to solve complex differential equations in their heads to predict the trajectory of the ball. In fact, players use a simple heuristic. When a ball comes in high, the player fixates the ball and starts running. The heuristic is to adjust the running speed so that the angle of gaze remains constant—that is, the angle between the eye and the ball. The player can ignore all the information necessary to compute the trajectory, such as the ball’s initial velocity, distance, and angle, and just focus on one piece of information, the angle of gaze. (Gigerenzer, 1999)

We all have internally and intuitively stored information hard-wired into our minds through experience or training, and therefore, all our perceived information gaps (or uncertainty) do not always turn into an information need. Gigerenzer calls this *smart heuristics* and extends it to the way we operate with less rather than more information in our lives by optimising our cognitive capabilities, especially when it comes to making important decisions in our lives (Gigerenzer, 1999). In order to make good decisions, or just to maintain the *status quo* as most people often like to do if they are comfortable with their situations, one sometimes has to ignore information, as was observed with many participants in this study. On the other hand, sometimes a very trivial uncertainty or plain curiosity about something that apparently has no implications on our lives motivates us to look for information, often even if it seems like a wild goose chase.
Case et al. (2005) noted that sometimes people *avoid* information, if paying attention to it will cause mental discomfort or dissonance, and found that cancer information in general and genetic screening for cancer in particular have this behaviour associated with patients and at-risk population (Case et al., 2005). This study found some additional areas where people avoided or deliberately ignored information – religion, finances, relationships, and family. In an abstract sense, we all live in daily uncertainty about the larger questions of life and the universe, and our very lives. Religion, money, relationships, and family are important aspects of most people's lives that provide them with a concrete sense of stability and continuity through a denial of uncertainty and a sense of determinism. Consequently, these were the most problematic areas where participants had to use mechanisms like “blunting and coping” (Case, 2005) with respect to any information that created uncertainty. Since politics is an area that is closely connected to one's world-view and values, it was an area where the study participants selectively chose or rejected from available information, more so than with any other kind of information they were looking for. In a sense, many of the participants were highly conscious of what they did not need to, or did not want to know, and one instance where they did not feel the need to check the validity of the information or the belief that they already had. One witnesses this behaviour in various ways when people consciously avoid certain information that might cause them distress or a cognitive overload or a cognitive dissonance. This can include not just information related to the personal areas of life as described above, but also to public information, as with a the few participants who consciously avoided the mainstream public media for fear of bad news that would cause depression-like feelings in them.

This study found that there were two main types of information avoidance behaviours:
• **Passive information avoidance** is a long-term behaviour that is exhibited when a person avoids certain kinds of information that they encounter in their everyday lives from being processed cognitively for so long that it becomes a passive and involuntary behaviour in them and mostly includes information related to religious and political beliefs and world-view. The person is aware of a gap in the two mental models and yet does not acknowledge a need for any further information to bridge that gap.

• **Active information avoidance** is a short-term behaviour exhibited when a person avoids certain kinds of information that is thrust upon them occasionally under non-trivial circumstances and mostly includes information related to serious illness, or very personal matters like relationships or finances. This kind of bad news activates their affective mechanisms in such a manner that the only way they can manage it is by consciously avoiding any further information seeking that might cause distress. In a way, it is a kind of coping mechanism, or “a momentary stay against confusion” as Robert Frost said of poetry.

On the other hand, the majority of the participants seemed to have an indefatigable desire for information and had a self-motivated natural curiosity to obtain the maximum possible information about everything, often leaving some with a sense of lost time and “infostress” as one participant put it. This is perhaps also on account of the natural human compulsion that propels all of us towards information, something that Tom Wolfe (2000) terms as “Information Compulsion,” which he claims is the greatest ally for a non-fiction writer like him:

“Most people have what I call information compulsion. For example, and I think all of us feel it, if you’re walking down the street, and somebody drives up and says, ‘Excuse me, could you tell me the way to Chestnut Lane?’ If you know the way, you can’t talk enough. You say, ‘Turn around
down here and go back two lights 'til you see a big church. You'll run into a big church, take a right.' You can't tell them enough because you have information compulsion; you're gaining a few minor status points by knowing something they don't know and imparting that information. If on the other hand you don't know how to get there, you go away muttering, 'What the hell did they stop me for? What do they think I am, some local mission girl? The nerve!' This is information compulsion. (Wolfe, 2000)"

This compulsion can also play a part in information seeking, when one browses or monitors information without a specifically articulated need, or when one has an obsessive-compulsive need for information, as with many participants. The psychologist George Miller coined the term "informavore" for human beings, for we exhibit a type of natural human need for information, and he posited that all human beings are informavores: “Just as the body survives by ingesting negative entropy, so the mind survives by ingesting information. In a very general sense, all higher organisms are informavores” (Miller, 1983). Daniel Dennet (1997) and Stephen Pinker (1997) have also propagated this idea in their writings on cognitive and evolutionary psychology. In one of his letters, Charles Darwin described himself as a person “greedy for facts” (Currier, 2007), and gathered data from 2,000 people on various continents via some 14,500 letters through ship, train, and post. Currier, an Information Scientist who studied Darwin’s private library, found that Darwin had devised his own methods to color code, annotate, and numerically classify his data at a time that predated modern libraries; the Dewey decimal system wasn’t developed until 1876.

As observed with the participants in this study, this hunger for information has found an abundant information source within online digital environments like the social networking sites that also provide a rich information foraging ground for those who are greedier for information than others, but don't have to go through the extraordinary efforts that Charles
Darwin went through to create a global network. Simultaneously, the mobile technologies provide also a convenient affordance to this rich but non-linear information environment that participants take advantage of through multitasking. Once again, the word affordance has connections with an anthropological perspective as originally coined by James Gibson:

“The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill. The verb to afford is found in the dictionary, but the noun affordance is not. I have made it up. I mean by it something that refers both to the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment” (Gibson, 1979).

Nevertheless, participants reported that although multitasking helped them to simultaneously monitor several of their interests or domains, it also caused them some stress. The study found also that there was a connection between multitasking and monitoring and information seeking, as participants had to sometimes seek further information to make sense of some information they had encountered while monitoring, which was one of the main behaviours afforded through multitasking. This sometimes interrupted their original information-related activity in a such a way that they often got lost, had to backtrack, or ran out of time.

5.2.2 From Information Gap to Information Need

So when does an information gap in any given context become conscious information “need” as described by Dervin & Nilan (1986) presumably to be filled with information? Do we all seek to fill every gap in our information store or knowledge? We have already established that this is not true, as we sometimes consciously decide not to fill some information gaps, or refuse to recognise it as such. However, what kind of gaps do we decide to
fill by looking for more information? One may not be consciously avoiding or rejecting some kinds of information, but we may still have to ignore it, especially if it is not relevant to our everyday lives. This *information relevance* plays a key role in our recognition of an information need, so that only some kinds of gaps motivate us enough to actively look for information. This relevance is closely linked to a person's current state of knowledge rather than all potential states of knowledge. We can understand this through the concept that “Information is surprises” explained by Roger Schank, below:

> We all expect the world to work out in certain ways, but when it does, we're bored. What makes something worth knowing is organised around the concept of *expectation failure*...When the waiter doesn't come over with the food, you have to figure out why; when the food is bad or the food is extraordinarily good, you want to figure out why. You learn something when things don't turn out the way you expected. The most important thing to understand about the mind is that it's a learning device. We're constantly trying to learn things. When people say they're bored, what they mean is that there's nothing to learn. They get unbored fast when there's something to learn. The important thing about learning is that you can learn only at a level slightly above where you are. You have to be prepared" (Schank, 1995).

This concept of “learning at a level slightly above where one is” is crucial to understanding the information behaviour of anyone, especially their perception of information need. This concept of constantly pushing our mental capabilities through acquiring new information was often termed as just plain curiosity or an *information adventure* by the participants. One might be bored because there’s nothing new to learn, while one might also be bored when there’s too much to learn or the information might be presented at a level much above where one is, thus one is not prepared to process the new information. This phenomenon is
variously described in the literature as “Information overload” (Toffler, 1970) 
“information anxiety” (Wurman, 1990) and “information fatigue” (Lewis, 1996). In the field of education, it is explained in terms of Vygotsky’s (1978) 
theory of the Zone of Proximal Development mentioned in Chapter 2, 
where learning can only happen in stages, with the proper scaffolding 
provided by the educators for the various stages. In the everyday-life 
information behaviours of the participant in this study, though, there is no 
educator providing this scaffolding, and each person had to determine for 
themselves their level of cognitive comfort and their ability to take on the 
next level of cognitive challenge through recognising the need for more 
information. Therefore, information behaviour cannot be explained through 
a process model that depicts external observable information behaviours 
alone, as often is the focus of many information-seeking models, without 
considering the internal cognitive and affective states of the person.

This study found that those who did not always describe their 
information needs as a “need” or an “uncertainty” or a “problem to be 
solved” described it instead as an exploration of their inherent curiosities or 
interests. Many participants had information needs related to several 
hobbies or special interests completely unrelated to their work or 
profession ranging from knitting, board games, hunting, trekking, anime, 
role playing games, arcana, Americana, and martial arts to mediaeval 
sports, to which they devoted a major chunk of their time searching for or 
seeking information. Consequently, most of the information they looked for 
in the day-to-day pursuit of their interests was located within special 
information networks or social networks outside of formal resources where 
they created and shared information that were analogous to some of the 
concepts of information fields as described in the literature by Cool (2001).

One of the other information behaviours observed is that of 
“information seeking for information's sake” or information as an end in
itself. This was often described as an information adventure by the participants, but this could also be construed as a need—a need for more information in general or a perception that more information would somehow make a person more knowledgeable or more popular with their peers. Often participants reported “collecting and saving” or “hoarding” information that they came across along the way of seeking other information, which they put away for later use for themselves or others, or immediately passed it on to someone they thought might have some use for it, in an act of “serendipitous altruism,” as described by Twidale et al. (1997). The participants seemed to consider it as a form of information investment or even a way of using the information to reach out to someone in an act of friendship or rekindling a relationship.

Sometimes an information need can be something related to the aspirational needs of a person, like a form of armchair travelling or armchair adventure, a term associated with travelogues and travel books. These were the staple of two participants at least, and the constant researching of online travel information was termed by one participant as “hypertext travelling” for she constantly made and unmade plans for where she wanted to travel next. This kind of inchoate information need could also be seen as an anticipated information need, or plain “daydreaming” as one participant put it, depending on the situation. On the subject of dreams, one participant reported always keeping a notebook and pen by her bedside so that when she had interesting dreams or nightmares, she could write them down before she forgot them, and use them in her creative writing projects. Unorthodox information seeking indeed but still valid information seeking from one’s own unconscious and involuntary states of mind, or perhaps a form of information capture, like taking a photo or snapshot of one’s mental state.
5.2.3 From Information Need to Looking for Information

Many of the IB models from the Overview of Literature in Chapter 2 proceed from the assumption that there is a causative relationship between the activating triggers (stress, perception of risk, hope for reward, perceived self-efficacy) and the intervening variables (physiological, demographic, interpersonal, role-related, environmental), but most often the intervening variables can just act as catalysts in the phenomenon rather than as directly interacting elements, or act as barriers. Some information needs are stronger than others, and can overcome any intervening phenomena. Besides, we all have several concurrent information needs (internal or external) at various levels of importance at any given time that may or may not be related to each other, and we mentally perform a triage of these needs on a continual basis in an act of mental coordination. Since we can only handle a very limited number of information problems simultaneously, we prioritise our information needs to either maximise or optimise the outcome. Hence, a person’s information behaviour cannot be broken up into neat little chunks to follow a theoretical model, nor can each element be delineated in its own time-space, for it is within a continuum where one is processing not just one task at a time, but processing various information problems at different stages of execution, with a few outside catalysts thrown in that change the outcome of these tasks one way or another. These catalysts can be in the form of mediators, gatekeepers, cognitive authorities, or affordances, as described in the literature.

Since many information problems can be potentially endless, people voluntarily or involuntarily use “satisficing” (Simon, 1957) – a term between satisfying and sufficing – which was observed with some participants; this was especially applied to information behaviour related to
decision-making that was perceived as a temporary settling or compromising, that can put a stop to any particular search for information. That does not necessarily mean that the person would not come back to the same search later. This is analogous also to notions of how humans are both cognitive optimisers and cognitive misers (Gigerenzer, 1999), carefully managing both their mental abilities and their time. Thus, a search can remain suspended temporarily or permanently, depending on the outcome of the decision to stop seeking: a good outcome will put an end to the searching, and a bad outcome may force one to resume the search again later, or adopt a different strategy.

5.2.4 From Looking for Information to Finding Information

Faced with an information need or information problem, a person gathers information through the various techniques of either looking through one's previously found information, asking, seeking, searching, browsing, berry-picking, and surfing (all discussed in detail in Chapter 4), identifies the possible solutions, and chooses the best one. Sounds simple. However, participants did not always exhibit this neat progression or a definite closure with respect to information seeking or searching. Nevertheless, no IB model deals with how people evaluate and analyse the information they have found. According to Belkin (1978), information has behavioural requirements “for different users respond to (and learn from) the same set of data differently at different times; and that the nature of a user’s response depends to some extent upon the presentation of the data” (Belkin, 1978). Thus, what is information to one person may be gibberish to another, even though the information might actually be relevant to both their searches, which explains why Dervin and Nilan (1986) posit that “information is something constructed by human beings” (Dervin & Nilan, 1986).
If the searcher ends up with information that s/he was already aware of, do we consider the search successful, even though the searcher did not learn anything new, instead just receiving reinforcement or unsolicited verification of the knowledge s/he already has? On the other hand, if the searcher goes down an information trail and does not find what s/he was looking for, and has to go back to square one, do we consider it a feedback loop that takes the searcher back to the beginning or to a new place, for, after all, the searcher has learned at least one new piece of information—not to go down that same information path once again? Isn’t elimination of possible choices a form of valuable information too?

More often than not, a person is not looking for any one piece of information to fill their information gap or solve their information problem, but constructs that information bridge by using several pieces of information in a process of inference, not unlike how a researcher does research, but without a conscious method – this inference can be deductive, inductive, or abductive. Much of this process is done in everyday lives by individuals in their daily lives but they do not use any of the algorithmic models of information behaviour with finite sequences like in a flowchart, but use instead a high level of thinking or a deep understanding of the details of the information problem in order to solve them, or through a series of conjectures and consequences, or trials and errors.

Affective factors such as a person’s emotions upon finding some unsolicited or unrelated, but upsetting information along the way can influence the process in a big way also, as was observed with several participants where they either interrupted or terminated a search in order to resolve some affective feelings triggered as a result of such an encounter with new information during the search.
5.2.5 From Finding Information to Using Information

Once we have the best possible information at hand, now what? Have we fulfilled our “gap,” our “need,” our “uncertainty,” for according to Hartley (1928), “Information is the eliminated uncertainty”? On the other hand, according to Wilson, “In the real world...we frequently receive communications of facts, data, news, or whatever which leave us more confused than ever. Under the formal definitions, these communications contain no information” (Wilson, 1993). Thus, not all information can eliminate the uncertainty, even if it is relevant information. According to Rochester, “Information is an organised collection of facts and data” (Rochester, 1996). Nevertheless, an organised collection of data and facts in German is still not “information” to a person who does not understand German. Or if the only information to be found is in the language of Mathematics or Statistics that the searcher does not understand, and all that the searcher is looking for is some help with making a medical decision, they are still not able to make a decision based on that information. Therefore, the value of the information received is in the intersection between a person’s own cognitive abilities and the information representation. On the other hand, if the person is able to find another person (or a program) to translate the document from German to English and/or explain the implications of the Mathematics, then the documents found could be turned into information the person can use. Furthermore, the information will mean different things to different people depending on the person’s own innate preferences, biases, and perspective. As Brenda Dervin (1967) says: “Meanings are in people...Messages sent do not equal those received. The same person is different across time and space.” Therefore, it is important to consider a person’s socio-cultural and cognitive-affective context within the information behaviour model, for it
comes into play at every stage of information seeking, and more importantly in information analysis and use.

Information use was also one of the hardest information behaviours to discern and delineate, both for the participants and the researcher, as it is entangled in the inherent axiomatic assumption that we seek information in order to use it – to fulfil a need, to fill a gap, to solve a problem, or as part of fulfilling our routine and other responsibilities. In the literature, finding the information is perceived to be the end of the information behaviour process, although it isn't always the case.

While constructing this so-called information bridge across this gap in our cognitive-affective models, we use all sorts of information and not just the one we are looking for; we use our own and others’ experience, our knowledge base or information store, information we found in the past, information that was thrust upon us and didn’t make any sense until we associated it with the new information and so on. Many participants also reported the very common perception that once they learnt a new word, they heard it or read it everywhere. They reported many so-called a-ha moments when different pieces of information from different moments across space and time suddenly fell into place in a sort of epiphany of understanding. This is just one example of how our cognitive context plays a part in what we recognise, accept and use as information.

A lot of the information we find is used and incorporated back into communicative acts (of sharing or teaching or otherwise) that involved the use of metaphors. Metaphors are something we humans are naturally attuned to, for through them we make use of patterns and relationships that are obtained in our physical and mental experience in order to organise our most abstract understanding and to transfer these patterns to others through communication. Nevertheless, metaphor remains a tool to understand the experience of one thing in terms of another. For example,
the very words commonly used in information behaviour research, like gap, bridge, sense-making, seeking, foraging, berry-picking, searching, and use are themselves metaphors for something else and each person can understand it through their own experiences only.

Nevertheless, one kind of behaviour that many participants agreed upon as an information use behaviour was when they shared found information with others who thought might use the information. They also conceived of it as information use when they were helping others understand information, or when they were providing instruction to someone about how to find information or use technological resources, when they were teaching, or when they were in an otherwise educational setting where they were “informing others.” In a way, many of the information literacy and learning-related theories mentioned in the literature fit in with participants' notions of “information use,” but then, on the other side of this kind of information use there is presumably an “information user” or student or learner.

5.2.6 From Using Information to Keeping Found Information Found

Organising information or the “need” to organise information was a recurrent theme in the participants' information journals as discussed in Chapter 4. In many ways, organising information (and subsequently the retrieving of information from one's personal information collection) was cognitively the most challenging of all information behaviours for the participants. Although new technologies have provided many easy ways of retrieving information from public repositories, there is no easy, standardised, or structured way for searchers and finders to organise their personal repository of information. This is true of not just information found online, but also several other electronic and non-electronic information
sources they had collected. These included Internet bookmarks, web log subscriptions, electronic documents in a variety of formats, printed documents and books, media files, and several other information resources including hard drives and back ups. Many participants used online repositories for their electronic information, using so-called folksonomy tags of their own making, but retrieving information from them proved problematic mainly on account of problems related to memory or categorisation – how can one retrieve specific items from hundreds of photos in folders named “summer vacation” or “stuff from camera” without spending hours looking through them? Or retrieve other text documents from one’s own collection without remembering the one unique attribute that makes them different from all the other documents they had? Most participants complained about their own file-naming conventions or the lack thereof, and even if they did have one, they forgot to follow it or changed it at whim, revealing the vagaries of the human mind.

These problems often also relate to the differences between the intended use of the information and its actual use at a future date. Encountered information was often filed away (mentally or otherwise) by the participants in a sort of investment into one’s anticipated future need for information, often ambiguous and inchoate, and hence the place of the newly encountered information in their existing repertoire was not very well defined. Additionally, after all the seeking and the searching, the participants’ mental state shifted from one information problem to another and the information found was often used right way to feed into a new information problem. Therefore the information was re-incorporated into the knowledge base right away (information use) to tackle a new information gap or problem, and a lot of the other information encountered and considered relevant for future use but not used right away was often hastily set aside and got buried under more newly found information.
In the literature, much of the studies related to information organisation are either under the discipline of cataloguing and classification (as in Library Studies) or under a newly emerging information science sub-discipline called Personal Anticipated Information Management. Many of these personal information management studies like Bruce (2005) take principles from library studies and apply them to individuals, but individuals in daily life generally think about information organisation (or the lack of it) only when they need to retrieve and use the information, and encounter problems instead. Additionally, they do not have the training or skills that librarians have.

This brings to mind some of the creative ways that participants used to organise their bookshelves and their files as described in Chapter 4, especially the participant who organised her bookshelf based on the countries on a wall map and the participant who organised his files based on their “attributes” in a self-discovered faceted classification system. Whether it was a simple document like a tax form, a birth certificate, or a car insurance policy, many participants had trouble finding not just what other family members had filed in their home filing systems (often just boxes of “stuff”), but what they themselves had filed. This included electronic documents too. Not all participants were happy with their own file naming conventions, and despite utilising desktop search tools, many had trouble locating information they remembered having found and stored for future use. E-mails proved to be a particularly sore point for many participants as was evident from some of the journal extracts in Chapter 4.

Information organisation problems were found to be unique problems of coordination and communication in many ways as they had several layers of complexity, not the least of which included the many ways in which people conceived of information and the usefulness of information. A lot of these information organisation problems related to
problems with language and communication, and inter-subjective meanings not just between two or more people, but even between the two mental states of the same person – from between when the person found the information and organised it, and when s/he was trying to retrieve it in order to use it for different purpose. Patrick de Gramont in his book *Language and the Distortion of Meaning* (1990) explained the workings of language on the human mind as very similar to a filing system and it helps us understand the problems of filing or organising information to some extent:

Filing systems have two distinguishing characteristics which enable one to compare them to the way language works. First, they operate on the basis of the fact that the information to be filed has meaning before it is filed. Second, the system under which the information is filed is geared, not to the information per se, but to an ulterior purpose. For example, if I file my correspondence alphabetically, the classification I use has nothing to do with the correspondence in itself; rather it is a function of wanting to retrieve letters easily and efficiently. (Gramont, 1990, p. 65).

This illustrates the problem associated with the assignation of meaning or “aboutness” to any information in everyday life without any formal rules of authority control as used by librarians, for this meaning changes not just across different people but also just within the same person, as it can be altered over time, independent of context and content. Combine this with the fact that a document carries both some form of language (or communication) within its content, along with some form of assigned meaning ascribed to it by the person (its meta data), and one can understand how it can be prone to a double distortion of meaning that would make it hard for the person to retrieve the document at a later time. Add to it the layer of anticipated meaning which is what organising information is about, and it can compound the problem even more.

Many participants tried to control this process of meaning creation
within any information experience through maintaining surrogate records of their experiences in the form of lists. Several participants engaged in some very impressive list-keeping behaviours in their everyday lives that can only be termed as information organising behaviours – maintaining an annotated list or personal review of every book they read, every movie they saw, every game they played, and pretty much every other activity that they deemed important enough to record for their own reference or to communicate to others, sometimes through a web log or website. Through this process, they created new information on a continual basis and recorded it, just as we all do in our minds every time we encounter some information that is meaningful to us or with which we can create new meaning (and hence new information), whether we record it on a daily basis or not.

5.3 Creating New Information

In Nature, pattern is the presence of information, and “if the world were a completely chaotic, unpredictable affair, there would be no information to process” (Barwise & Seligman, 1997). Human beings, by nature, are “pattern-detecting, pattern-producing, pattern-consuming, and pattern-dependent organisms,” (Furman & Gallo, 2000). If human beings are informavores as described in section 5.2.1, we can be considered so not just because we ingest information, but also because we are constantly “counterbalancing the tendency toward entropy by consuming or incorporating order, pattern, and information available within the environment” (Schrodinger, 1944). In fact, in their investigations into brainwashing, thought reform, cults, and torture methods, Conway & Siegelman (1978) established that an absence or excess of perceptible information patterns presented to human beings could drastically alter their neurocognitive functions and sense of reality.
Information itself has no meaning to human beings without this assignation of patterns, irrespective of whether they are done deductively, inductively, or abductively, or more often than not, naturally and involuntarily in everyday life. Hence, it is inevitable that we constantly create new information and new meanings with our skills of association every time we come in contact with information, just as this researcher and every searcher attempts to create new information by deliberately observing patterns in the information gathered during research. Accordingly, the next section presents a new unified conceptual model of human information behaviours and a new integrated model of human information behaviours based on this study.

### 5.4 Presenting an Integrated Model of Information Behaviour

This section presents a new unified conceptual model of human information behaviours (Figure 5-1) and a new integrated model of human information behaviours (Figure 5-2) in everyday life, both based on the results of the study and the patterns detected in the participants’ information behaviours and the analysis of the same, with insights from the overview of the IB literature and the discussions preceding this section. Figure 5-1 takes an all-inclusive approach that includes every information behaviour and every element and variable mentioned in the literature, including those that are unobservable in this study, whereas Figure 5-2 abstracts these behaviours in terms of how participants perceived their own behaviours.

Figure 5-1 recognises the importance of a person’s cognitive-affective state and socio-cultural context by placing it in the centre of an information behaviour model through which all information behaviours are negotiated and through which the different information processes can take
short-cuts between the stages, backtrack, bypass some stages, or abandon information seeking, depending on the person's cognitive and affective load, along with the person's environment, including mediators and affordances. It depicts and denotes all the processes, both internal and external, that a person can potentially engage in within their everyday-life contexts between *looking for* and *finding* the information they need or want, or just find more information to supplement the information they encounter along the way. It is not a linear process and one behaviour does not always necessarily lead into the other. Instead, it is a complex network of behaviours that are inter-dependent on each other depending on the person and the context.

Figure 5-2 simplifies and abstracts from Figure 5-1 and presents the overarching themes that emerged from participants' information journals in the context of their everyday life information behaviours. Although the following processes are self-explanatory and based on the previous observations in this document, it is recapped in a systematic process below:

- **The TENSION BETWEEN STREAMS OF EXPERIENCE and STREAMS OF INFORMATION:** At any given time, a person has a lived experience behind them which serves as their own personal information store, along with their awareness of themselves. This is based on a complex combination of memory, experience, aspirations, socio-cognitive and sensorimotor abilities. Simultaneously, they are also aware of their environment (in the broadest sense of the word) and encounter a constant stream of information, whether it be new patterns created in their own mind (voluntarily or involuntarily) or information and information tasks emerging from the world around them from their daily lives. Most of this information is ignored, but some are not, or cannot be ignored.
Figure 5-1
Conceptual Unified Process Model of Human Information Behaviours
© Bhuva Narayan
Figure 5-2: Integrated Model of Everyday Life Human Information Behaviours
MONITORING: ENCOUNTERING: At any given time, when the two streams – past experience and new information – meet in such a way (either through monitoring information or simply encountering information in our everyday information grounds) they instantiate (either through metaphor or derivation) or create new patterns of association, and we are motivated to continue or complete that pattern through looking for more information. This is a form of instinctive curiosity and does not cause many affective feelings at the beginning although it does involve sense making.

- PERCEIVE: If there are no detectable patterns of association or if this tension between experience and information breaks a pattern we have already formed in our minds, we try to make sense of it by either seeking to restore the pattern with new information (by recognising a need or gap) or avoid the new information (by ignoring or rejecting the information). Both of these processes can cause our stress and coping mechanisms to be activated depending on the person and is a form of sense making.

- LOOK: Once the need or gap is recognised, we proceed to either fill the need or build a bridge over the gap with information. We do this through various techniques – look in our memory store or physical information store, ask someone, seek, search, browse, berry-pick, and forage for information. During this process, if we stumble upon any new needs or gaps related to our cognitive, affective, or physical skills,
self-efficacy or access issues (related to the mediators, affordances, cognitive authorities and gatekeepers between the searcher and the information), we go back to the previous stage and perceive it as either something we want to pursue or something we want to abandon or procrastinate about. If we decide to pursue, we may keep looking but now the looking is a lot more complex so we employ various strategies like immediate and delayed gratifications, satisficing, coordination, organising, prioritising, using, feedback loops, organising and so on.

- **FIND**: If we succeed in finding what we are looking for, or find something else along the way that helps fill the gap or build a bridge, we still have to select specific aspects from the information we find that are relevant to our current experience, associate it with our previous stores of information, coordinate with others to make meaning of the information, or just put it away to deal with it later. If we choose to, then we go on to the next level. By this time, we have already incorporated the found information and other information encountered along the way into our streams of experience, and have already used the information to some extent.

- **CHECK**: We check the information for internal consistencies and patterns within itself and with our previously held information store and if there are doubts or issues of representation or translation (could
be linguistic, social, cultural or epistemic translation), we verify the information through various means of validation (that can take us back to the previous stages again).

- **USE:** If satisfied we proceed to incorporate the information in a more concrete manner into our streams of experience or use it in other ways dictated by circumstances that created the need or gap – perhaps within our work or personal responsibilities. This may include organising it to make new meaning, creating or producing new information, and sharing – including teaching and helping others.

- **SAVE:** We may or may not decide to save the information or organise it in any way outside of incorporating it into our streams of experience, but if we do, then we may use various strategies like filing, storing, or pile it up in a physical or metaphorical corner of our lives in some ambiguous or concrete anticipation of future need.

- **SIFT:** When we perceive a need or gap once again, we look through our personal information store from above and retrieve information before we save it again, dispose of it, or reorganise it. As we have seen with the participants, it is not as easy as it sounds and is fraught with frustration.

**AFFORDANCES, GATEKEEPERS, MEDIATORS, and AUTHORITY:** All of the behaviours, above, can be effected and affected by various affordances or hindrances in the form of *people* (mediators, gatekeepers, cognitive authorities), and
also one's own self worth, confidence, self-efficacy etc. These affordances could also be a *space* (information grounds, information fields etc.) or just an opportune *time* in a form of encountered need, when a person realises and recognises an information need after encountering the information). They could be technologies and its allied gatekeepers, mediators, and authorities, including pay-walls, support, access etc.

➤ **MOVE FROM UNCERTAINTY TO ELIMINATED UNCERTAINTY:**

Throughout all of the processes above we constantly move back and forth between them for we may be engaging in several information activities at once. Simultaneously, we also move back and forth between uncertainty and the eliminated uncertainty for that particular information activity. Presumably, we can only eliminate uncertainties on a continual basis through the information activities, but we cannot approach a sense of total certainty so long as we want to explore new information encountered that will force us to reformulate our assumptions and beliefs on a continual basis. Unless we avoid information.

In summary, participants engaged in many of the information behaviours in a parallel, distributed, and concurrent fashion – many information behaviours for one information problem, one information behaviour across many information problems, and many information behaviours concurrently across many information problems.

### 5.5 Theoretical Implications

In this section the study findings are first compared to a framework of relevant models in IB. Then they are discussed within the larger theoretical frameworks of human behaviour. Lastly the integrated model and its
implications for the connections and relationships between the various information behaviours is explored.

5.5.1 Implications for Existing Theories and Models

Although the study results in Chapter 4 encompass all of the theories and models described in Chapter 2 in IB in various degrees, the key findings might have specific implications for some existing models and findings in IB and allied research. This section discusses implications for (1) the sense-making theory and model, (2) the information avoidance theory, (3) information organising theories, and (4) information use theories.

- **The role of sense-making in information behaviours:** The sense-making aspect was dominant in the information journals of participants, and co-occurred with almost every other information behaviour. Nevertheless, it was noticed that it was more dominant during the course of the *information seeking, information searching*, and other processes rather than as an initial trigger for the initiation of information behaviours which the sense-making metaphor (Dervin, 1977, 1983, 1989, 1992 & 1994) chiefly implies. Moreover, sense-making had two aspects to it, one positive and one negative. Sense-making was perceived as positive when a person was so involved in an information activity that everything fell into place and everything made sense in a linear and sequential manner and the person was in a state of intense excitement and happiness or a state of *Flow* when nothing could distract them from this information activity. Participants reported positive feelings of wonder, surprise, and amazement when they were engaged in this kind of sense-making. The negative aspect of *sense-making* involved obstructions that prevented the participant from accessing, understanding, or
processing information. Participants reported negative feelings of having fallen in a rabbit hole where nothing made sense and reported feelings of confusion, puzzlement, apprehensiveness, frustration, stress, ambiguity, and fatigue with the information they encountered. These two aspects of sense-making behaviour were entangled with every aspect of information behaviour from receiving information to searching and seeking to organisation and use. The results of this study call for more research into a more inclusive range of sense-making behaviours within human information behaviours, and in the context of other information behaviours and not just in the context of social or cultural settings.

- Aspects of information avoidance behaviours: Information avoidance behaviour was mainly observed when a person knew that paying attention to some information will cause a conflict or dissonance in their minds. Examples included information related to medical, money, and relationship matters, and one's religious and political beliefs, or anything else that conflicted with one's previously-held beliefs, or confirmed one's insecurities or fears, or forced them to take an action that they were not willing to take. Two kinds of avoidance behaviour were observed: active and passive, as described in section 5.2.1. Although Johnson (1997), Case et al. (2005), Johnson et al. (2001) and Johnson (2009) have documented information avoidance behaviour, and stated that most people seek out information which agrees with their current worldview rather than acknowledge or seek new information that causes an uncomfortable conflict in their minds, they have done so mainly within the context of medical information seeking by patients with terminal illness or concerning genetic diagnosis of incurable or otherwise serious illnesses. The results of this study call for more research directed towards this kind of interaction with information in
everyday life wherein a person ignores, blunts, rejects, and avoids information, for these avoidance behaviours are complex and have different roots.

• **The need for an IB perspective of information organising:** This study found that *information organising* behaviours were part of every stage of looking for information and not just at the stage when one finds and uses some information and then wants to store it for future use. Participants organised information mentally into various patterns in an *ad hoc* manner even as they were searching for information in order to make decisions about what was relevant information. This relevance was a dynamic process of cognitive coordination that depended not just on the participants' decisions of what was relevant, but also on what the participants' perception of what others thought was relevant in an effort to discern the other person's meaning. Organising information after it was found was also fraught with many problems including relevance, for the participant was organising the information for future retrieval without necessarily knowing how this information might be relevant in the future. *Information organising* has always been considered the domain of information providers like libraries and retrieval systems and mainly in organisational contexts. Some studies like Bruce (2005) and Jones, Dumais & Bruce (2002) have called for more research on *personal anticipated information need* and *personal information organisation* but not much research has been done in this area with respect to people's information behaviours related to organising information in everyday life and the cognitive-affective processes related to the same. Cole and Leide (2005) discussed the role of metaphors in human information organising behaviour or HIOB, and describe metaphor instantiation as an information-need-structuring device, which can also be described as an information
organising device (Cole & Leide, 2005). This study found that information structuring, and not just the structuring or prioritising of information need, was an integral part of all information behaviours and not just at the initiation process of prioritising one's information needs. It was present at every stage of looking for information, including searching, seeking, berrypicking, foraging, browsing etc., and also at the finding information stage and using information stage. The results of this study call for more informed research of all aspects of information behaviour beyond the traditional user studies of the techniques of searching, seeking, retrieval and the like.

• **The need for an IB approach to information use:** The study results show that information use is an inseparable part of information behaviours and is connected not only to every aspect and stage of the process of looking for information, but also to every aspect of everyday life. Information is used not only to reduce uncertainty or to fill a cognitive gap in one's mental model, but was used to achieve several other goals in participants’ everyday lives. Nevertheless, because information use is taken as a basic assumption for why people look for information, there is not much research on how we humans actually utilise information, and how we constantly absorb, evaluate, incorporate, share, manipulate, shape, and even discard information, both deliberately and involuntarily. This is a process that happens continually and includes interactions not just with others but also with oneself – one's past and future selves. Besides, during any process that involved looking for information, information use was constantly at play, for one could only understand and make sense of the constant input of information by constantly reorganising and reusing previously found or experienced information. The information use
studies within Information Science are generally about the use of information services or sources and channels of information, as observed by Tuominen & Savolainen (1997), but their proposed social constructionist approach to information use does not take into account how individuals use information in their everyday lives and how this process is an integral part of all information behaviours. Hence, there is still a need for more extensive studies of information use outside of an organisational or social contextual perspective. Information use cannot be studied without taking into account other information behaviours, and the other information behaviours cannot be studied without taking into account information use. Before studying information use in a social contextual perspective, it needs to be studied in context with other information behaviours first in order to understand it better.

5.5.2 Implications of the Integrated Model

Despite the tension in the literature between cognitive, affective, ad social contextual perspectives of information behaviours, participants did not see much of a dichotomy between thinking (cognitive responses) and feeling (affective responses), for feelings were a consequence of thinking, and so were the resulting behaviours (their actions) related to information. Nevertheless, many information behaviour studies operate within silos of either cognitive, affective, or social contextual paradigms.

Thinking about information can be just as idiosyncratic as feelings related to information, and consequently information behaviours were observed to be somewhat idiosyncratic too. Thought, feeling, and behaviour all involved some sort of sense-making, and since their thinking and their feelings were both situated within a participant’s social-cultural context, what they thought affected how they felt and how they behaved,
but all of these were involuntarily mediated by one's socio-cultural and immediate contexts. This is probably why the sense-making behaviours were the most commonly occurring behaviours observed and also the behaviour that occurred most commonly alongside other behaviours.

In summary, the participants used various information behaviours in everyday life that included formulating, prioritising, multitasking, coordinating, reformulating, delegating, using, procrastinating, organising, and avoiding, all of which in turn had several discrete components within. Hence, at any given time, any given participant was engaged in several information problems continually and concurrently in both a parallel and a distributed manner, and many of these different information problems intersected with each other often, either in content, strategies, organisation, or in their use. In participants’ own words though, they were either thinking about, looking for, finding, sharing, organising, or avoiding information, without being consciously aware of engaging in any specific information behaviours unless they were tasked to think about it in the form of writing an information journal.

The new integrated model of information behaviour is an exploratory attempt to model the connections between all the various information behaviour processes involved in everyday life and can serve as a template for future research with an integrated perspective to information behaviours.

5.6 Participants' conception of Information

So how did participants conceive of information? The answer is that the participants conceived of information as something that both resides within documents and outside of it, in human minds, patterns in Nature, and as patterns in their relationships, and in their environment. Their own experience was the most valuable information they had, while every lived
experience was incorporated as information back in their minds. Documents were carriers that were representations of information without the context of reality, and sometimes they were evidence for the reality. For example, all the streams of travel-related information – photos, maps, and travelogues of foreign places – that one participant constantly sought and found were definitely perceived as valuable informational documents by her, and yet they were not the real thing, and so she still had aspirations to incorporate the real place situated within the contexts of the countries and places she had on her list into her streams of experience by traveling to those places. Thus, she could convert information into experience while she was travelling, but once she had lived experience of the travel, it would become incorporated as new information in her mind. Similarly, the models presented in this chapter are documents that represent maps of the everyday information lives of the participants, but the map is not the territory.

5.7 Methodological Implications and Limitations

The study's results raised some methodological issues concerning (1) the naturalistic approach employed, and (2) the research design.

5.7.1 Implications of the Naturalistic Approach Taken by the Study

This study took an exploratory approach and employed a naturalistic method in order to investigate information behaviours in everyday life and used the results to integrate the several theories and models of information behaviours existing in IB and allied disciplines. As a result, the following features of the study approach might have implications for the study's
findings:

- **Focused on dynamic factors**: Data collection was intentionally focused on participants' own situational variables in order to elicit a descriptive narrative record of everyday life information behaviours with a wide range of participants through maximum variation sampling. Although some static variables such as age, gender, occupation, and country were collected, this study did not account for these static variables of the participants (e.g., cognitive styles, personality types, psychological variables, income, or social status).

- **Focused on participants' perspective**: The tools used in the study might reflect the information researchers' perspective, since data collection instruments were designed based on models and findings representing the information researcher's points of view, and data analysis was informed by the researcher's viewpoint by employing frameworks based on researcher's perspective. Nevertheless, the situational factors captured are concentrated on those that were notable and important within the everyday lived experience of the participants, and associations among these factors identified by the study were drawn mainly from participants' higher-level cognitive processes of reasoning, although many participants recorded their feelings with no inhibition on account of the privacy of the diary method. All the same, the study made no attempts to collect specific data about other factors involved in participants' everyday lives apart from their own reports. In that sense, this study might still represent a one-sided picture of everyday life information behaviours.

### 5.7.2 Limitations of the Research Design

The sole method of data collection for this study was the daily diaries or
information journals. This method, along with the actual physical method of collecting the diary data, the timing of the collection, as well as participant sampling and data analysis methods might all have implications for the study's findings. These issues are discussed below:

4. **Diary Method:** This study relied completely on the participants' self-reporting of their perception in regard to their information-related activities throughout the day. Self-reporting of such internal processes are known for several drawbacks or biases including but not limited to rationalisation, selective reporting, lack of articulation, memory bias, reconstruction and retrospection errors. The study attempted to balance these unavoidable limitations through researcher-participant contact and communication and by ensuring complete participant anonymity and the privacy and security of the data collection method, and also by giving the choice of diary format to the participants depending on their comfort.

5. **Participant sampling:** The study chose a maximum variation sampling method to recruit participants. This is a purposefully selected sample of persons or settings that represents a wide range of experience related to the phenomena of interest in order to represent the range of experiences related to what one is studying, but the results are not generalisable. Since diary data was collected from 34 different people, from 6 different countries, with 3 different methods, the results are indeed transferable to other similar settings where all the participants are from urbanised and industrialised parts of the world and were all able read and write in English, although they were not all from the same socio-demographics.

6. **Timing and time-period of study:** It can be argued that a 14-day time period is too short to capture the range of information behaviours, as it may not necessarily include important and
momentous occasions in a participants' life, but since this study was mainly interested in everyday life, this time period was sufficient to provide several glimpses into the same. The time period was set to 14 days rather than 7 days (as suggested in the literature) in order to include periodical events related to a person's fortnightly pay cycle when most people exhibited information behaviours related to their finances. A longer period on the other hand would have caused participant fatigue which would not have helped much. It is assumed that there was enough of a range of information behaviours, irrespective of time, place, or personal variables, especially as the journals were maintained during different 14-day periods within a 5-month period, so that any single large global event would not have affected the information behaviours of the participants in a somewhat artificially uniform manner outside of their everyday lives.

7. **Data Analysis:** This study, with its aim of integrating the participants own thoughts, feelings, and actions that are self-reported by the participants themselves, is inherently textual and qualitative in nature and hence was analysed with qualitative methods that are flexible and adaptive to surprise and discovery. This could be considered a subjective analysis by some although it used the Grounded Theory method in a systematic and meticulous manner. Moreover, the data analysis section provided relevant extracts from the journals themselves to support the analysis. Additionally, since the codes assigned to the themes and the information behaviours were based on some selected conceptual principles and add up to a numerical quantity, the study used a multi-method approach to analysis that consists of both inductive and deductive, and qualitative and quantitative methods. This helped with the internal validation of some of the overarching
findings and also provided some new insights in the form of a quantitative and visual representation of information behaviours.

5.7.3 Challenges faced in this study

Hargittai (2009), in the book Research Confidential suggests that beginning scholars in the Social Sciences and Information Science may be unaware of problems they face, in part because scholars do not share stories of what didn't work on their projects, and how to deal with particular challenges, especially in empirical research projects. In answer to that call, this section will detail some of the challenges faced in this research.

There is a general consensus that the diary or journal instrument, although providing rich data, is harder to use than traditional methods like surveys and interviews on account of the time and effort involved on the part of both participants and researcher. This proved to be true in the case of this study, but not so much at the stage of actual diary recording than at the stage of recruitment.

It took about a year of soliciting and meeting with and talking to potential participants before 40 participants were found. Even then, only 34 participants actually finished the diary, while 6 participants dropped out less than half way. Their journals could not be used as they did not return the participant consent form and were not paid a honorarium in line with decisions made during the participant recruitment process.

Since this study used a freely available public web log tool that fulfilled all the criteria of privacy, security, and password-protected settings, each one of the participants had to be set up with a separate web log. Since each one of these had to have guidelines, sample pages, definitions, and other materials like tags and categories, and most importantly, the privacy settings added to them, this process was quite labour intensive and could only be done at the rate of two a day or so.
Each web log had to be associated with a newly set-up e-mail account for each participant so that the researcher would have full control of them once the participants had finished their journals. The participants could not read each others web logs nor did they know who other participants in the study were. Additionally, the researcher backed up the web logs by mirroring each one of them separately on her hard drive so that any unforeseen problems with the website would not affect the data that had already been recorded. As it happened, the Wordpress web log service indeed had a world-wide problem with their servers being attacked by a virus in late 2009, although thankfully, this study's web logs were not affected.

Once all the journals were recorded, they were analysed separately in sequence and also integrated into two separate groups (the self-tagged Group A and the researcher-tagged Group B) and then into one unified journal for purposes of the automated content analysis and statistical analysis. The tagging and the manual Grounded Theory analysis were both time intensive and had to be paced well, for reading the diaries was itself an act of cognitive shifting for the researcher, for she had to place herself in the mind of every participant in order to discern their meaning and analyse them with respect to the literature.

Additionally, negotiating between the various electronic formats that these separate methods of analysis required while also making sure than no data was lost during the transformation was no mean feat. In addition to the pre-determined categories, the participants were allowed to add their own tags that they thought was relevant to their behaviours. While this method elicited some concepts in participants' own words like “instruction” “technology failure” “information fatigue” “technostress” “calendaring” and “hypertext traveling” it also elicited a lot of irrelevant tags like place names and proper names that had to be manually removed before analysis.
On account of all the privacy, confidentiality, and anonymity provided to the participants, some participants were so comfortable with the private web log that they started expressing quite detailed and private opinions within its narrative that were related to their information behaviours. Nevertheless, no participant record that reveals a participant identity is used in the journal extracts provided in the analysis section. Wherever the participant had used names of people in their journals, they were deliberately anonymised, but this process was once again labour-intensive.

Nevertheless, the advantages of the web log method of diary data collection over-weighed the disadvantages, for in the end, this method provided for an easier way to track entries by information behaviour categories and search for keywords etc., without having to transcribe everything manually first, as was done in the case of the one pen-and-paper diary.

5.8 Chapter Conclusion

This chapter began with an exploration of the nature of information and explained how humans need, seek, or avoid it based on the participants’ information journals. A model was constructed to explain the processes that participants went through in their everyday lives with respect to their interactions with information. The theoretical implications of the key findings of this study to the existing theories and models was discussed, along with the implications of the integrated model. Lastly, the methodological implications, limitations, and challenges were discussed.
CHAPTER 6 : CONCLUSION

“The hardest thing to understand is why we can understand anything at all.”

ALBERT EINSTEIN

This chapter presents an overview of this study and its significance. The chapter concludes with a discussion of the scope for future research and presents suggestions for future research questions generated by the study's findings.

6.1 Overview

The focus of this research was in the area of human information behaviours and how the various different approaches, theories, and models could be integrated within one unified model based on a study of everyday life information behaviours. This was achieved based on a study of the information journals maintained by 34 participants across six countries wherein each participant maintained a 14-day-long information journal or daily diary recording their thoughts, feelings, and actions related to information behaviours to an aggregate of 2305 separate diary entries of information behaviour, with an average of 25 lines per entry, for a total of 468 participant days over 5 months.

The information journals were analysed using a multi-method qualitative-quantitative analysis in a serial mode of inquiry beginning with Grounded Theory, two kinds of automated text analysis, and a statistical analysis of the categories of information behaviours generated from the journals.
The study's findings captured the complexity and dynamics of the participants' interactions with information in their everyday lives. The participants engage in the many information behaviours concurrently and these different behaviours were naturally and organically coordinated in a seamless way and integrated within participants’ everyday life information behaviours, and hence the question of whether these different models can be integrated was answered in the positive. Chapter 5 laid out an integrated model based on these findings.

Participants did not see as much of a dichotomy between thinking (cognitive responses) and feeling (affective responses) as the information behaviour theories in the literature seem to suggest, for feelings were a consequence of thinking, and so were behaviours (their actions) related to information. Thinking about information can just be as idiosyncratic as feelings related to information, and consequently information behaviours were observed to be somewhat idiosyncratic too. Thought, feeling, and behaviour all involved some sort of sense-making, thinking and feelings were both situated within a participant's social-cultural context. What we think affects how we feel and how we behave, but this process is involuntarily mediated by one's socio-cultural and immediate contexts. This is probably why the sense-making behaviours were the most commonly occurring behaviours observed and also the behaviour that occurred most commonly alongside other behaviours.

In summary, participants went about their daily lives engaging in several information behaviours through the day. They generally monitored certain information fields or information grounds within their information horizon – at home, work, and online – on a daily basis, along with performing other tasks related to their work, personal, and social lives. When they encountered new information in the form of a person, an object, a document, or a communication – serendipitously, intentionally, or as part
of their work or other responsibilities – that created a mental or emotional conflict, or created too big a gap with their current mental model and the external world, they sometimes (but not always) saw it as an information problem, and sought to resolve it through looking for some information to fill that gap.

This looking for information often involved different strategies – seeking, searching, browsing, surfing, berrypicking, foraging, hunting and gathering – each of which had discrete components but were often interleaved together and ran parallel. Sometimes, when participants were looking for many different kinds of information to solve one information need or problem, or were looking for one piece of information for solve many different gaps or problems, they were often handled together simultaneously, along with other non-information tasks through multitasking. When the participants found the information they were looking for, they were either satisfied and used it right away, or organised (or just put it away) for later use. They often found other information along the way that they were not necessarily looking for. This either caused a new gap that needed to be filled, or else they shared this new information with someone they identified as a person who might need that information. Presumably, this other person will encounter this new information now and will either begin a process of ignoring, avoiding, or engaging in other information behaviours. In the meanwhile, if the participant did not find the information s/he needed to resolve all of the various different information problems s/he was engaged in, they coped with it in various ways – some information problems were terminated, some were postponed, some were managed carefully, and others either caused happiness, frustration, exhaustion, or new information needs. Many were resolved and some information was used while some information was saved in anticipation of future use.
The participants used various information management strategies in everyday life and some included prioritising, multitasking, delegating, procrastinating, and avoiding, all of which in turn had several discrete components within. Hence, at any given time, any given participant was engaged in several information problems continually and concurrently in both a parallel and a distributed manner, and many of these different information problems intersected with each other often, either in content, strategies, organisation, or in their use. In participants’ own words though, they were either thinking about, looking for, finding, sharing, organising, or avoiding information, without being consciously aware of engaging in any specific information behaviours.

In the meanwhile, if the participant did not find the information s/he needed to resolve the various different information problems s/he was engaged in, they coped with it in various ways – some information problems were terminated, some were postponed, some were managed carefully, and others either caused happiness, frustration, exhaustion, or new information needs. Many were resolved and some information was used while some information was saved in anticipation of future use through organising them in some manner.

Using and organising information both involved complex acts of coordination. While encountering new information was just a matter of coordinating one's present mental model with the new information pattern, organising, and searching through an organised or disorganised collection of one's own previously found information (that have presumably altered one's mental model to some extent already) is fraught with problems of coordination with one’s own past or future mental models, and often resulted in a failure of intersubjective meaning, as it involved facing one’s past in some manner, and one’s anticipated future, for we organise so we can retrieve, and the longer the time between the two, the more problems
with retrieval. All of these processes were also in essence, acts of communication, often uni-directional at any given moment, and were communications within a rhetorical situation, and hence there was a predominance of sense-making across all behaviours. Documents are information carriers, just like people, and talk to us, but cannot tell us what they mean. This meaning is created within ourselves.

6.2 Implications for IB Research

The results have implications for understanding human interaction with information and consequently for anyone interested in information services. Although IB research in general is about the behaviours involved in the process of looking for information, they have nevertheless been concentrated around studying the techniques of searching, seeking, foraging, browsing, berrypicking, surfing, and information retrieval. This study shows that other important factors in looking for information include information use and information organising, both of which have been researched very little within IB.

Sense-making is one of the dominant cognitive-affective-social approaches within IB, and yet it has most often been used as a methodology for studying information interactions, rather as a key process that is entangled in every step of looking for information, and not just in the initial stages. Moreover, sense-making is not always a one-way process or a process that causes uncertainty and feelings of stress. Sense-making is a process of making meaning across mental models with others as well as with oneself, and can also be a non-stressful positive experience for many.

Another area of information behaviours that needs more attention from IB research is information avoidance behaviours that are associated with many areas of information needs where people's information needs and information processing are inherently biased by their personal,
This study also highlighted the importance of addressing both external (social and environmental) and internal (cognitive and affective) factors in IB research.

In addition to the large number of findings concerning associations and connections among the various information behaviours, the study developed an integrated model of information behaviours that provides a starting point for further research in IB.

### 6.3 Implications for Practice

Although this is a theoretical research study, some of the findings can be used to understand user behaviour within organised information systems to support users better in the area of organising and using found information, for this study found that rather than needing help with searching, seeking, or retrieving information, people needed help with organising and using information they had already found. Some of the concepts that can be easily implemented by systems (including online retrieval systems) include e-mail tagging, better online folder management, searching within results, and better and more intuitive folder management and tagging systems on desktops and mobile electronics. There are some excellent proof-of-concepts in the research community, but they are not accessible to people in their everyday lives, either for lack of information literacy, resources, or time.

### 6.4 Significance of the Study

No other study has integrated the various models of IB through empirically examining information behaviours in people’s day-to-day lives through daily diary studies. The new model that integrates the existing models of
information behaviour is not only very useful in and of itself, it also helps reinforce the validity, credibility, integrity, and importance of the existing models as it explains and elicits their relationships with each other. Additionally, the inter-relationships between the existing models provide new insights into information behaviour, by parsing the language of the existing theories and models and classifying and categorising them within the structure of an overarching and integrated model.

In addition to the theoretical contribution to the field of IB, the current study also makes a significant contribution in the methodological area of IB through the research instruments used for data collection. There are several studies of the Internet and the so-called social media that seem to follow a trend rather than set a trend, and there are not many studies that work with these technologies and use these technologies in their empirical research in ways that make way for new methods of data collection and set a trend for information scientists to facilitate data collection from all over the world.

This study is significant within IB research also on account of its use of a multi-method qualitative-quantitative approach to analyse textual data that combined a qualitative Grounded Theory analysis with an automated content analysis and data-mining tool along with statistical analysis methods.

6.5 Future Research

The study explored the phenomenon of human information behaviours from the perspective of everyday life. The researcher recognised some of the limitations of the existing research and models of information behaviour, and intentionally designed this study to integrate the existing models. In the process, several study findings emerged that could be considered as hypotheses concerning relationships among potentially
Two different approaches are suggested for the purpose of extending transferability of this study's findings and improving our understanding of human information behaviours:

➤ Take a similar exploratory approach employing naturalistic research design using a more refined and structured version of the data collection instruments, and using taxonomies and the integrated model as the initial framework for data analysis to study different information behaviours in different environments. Participant samples could come from:

- Users of specific domains, organisations or services like private and public organisations, educational institutions, and libraries.
- Users of human intermediation at any of the above entities.

➤ Purposefully sample users from two different domains and compare their information behaviours using a more discrete analysis of their behaviours. Participant samples could come from:

- Two different groups within any given context.
- Two different collaborative groups within any given context in order to study collaborative information behaviours.

The research instrument of the web log information journal is also well suited to a study of collaborative and group information behaviours as it provides for the cooperation and collaboration of several participants within one space.

Some of the questions for future research generated by this study are:

- How and why do people avoid information and how is this
phenomenon connected to their current beliefs and world view? How does this affect them in their everyday lives? For example, in their family relationships or finances or health?

- Are there ways of representing information that are more conducive to understanding and acceptance by a specific population? For example, can a doctor explain the statistical odds of a patient’s chances of recovery in a better manner in order to help the patient make more informed decisions about his or her own health and treatment?

- How do people (in everyday life or otherwise) organise information (or not) and how do they find information from their own information store? What mental schemas or document attributes do they use?

- What mental strategies do people use in the sense-making processes involved during the various information behaviour processes? How do they incorporate new information into their existing information store? How do they align and realign their existing mental models with those of others including their own past models? What are the affective and social implications for such a constant realignment of one’s mental model?

The rich data set resulting from this study also has huge potential for future research using other analysis methods from macro to micro analysis, while the research findings can be used to generate hypotheses for future research. The methods of data collection (private web logs) and data analysis (multi-method triangulation) used in this study can set an example for future research in IB.
6.6 Chapter Summary

This chapter presented an overview of this study and its significance. The chapter also discussed the scope for future research and presented some suggestions for future research questions generated by the study's findings.
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Appendix I

University Human Research Ethics Committee
HUMAN ETHICS APPROVAL CERTIFICATE
NHMRC Registered Committee Number EC00171

Date of Issue: 3/2/10 (supersedes all previously issued certificates)

Dear Ms Bhuvaneswari Lakshminarayanan,

A UHREC should clearly communicate its decisions about a research proposal to the researcher and the final decision to approve or reject a proposal should be communicated to the researcher in writing. This Approval Certificate serves as your written notice that the proposal has met the requirements of the National Statement on Research Involving Human Participation and has been approved on that basis. You are therefore authorised to commence activities as outlined in your proposal application, subject to any specific and standard conditions detailed in this document.

Within this Approval Certificate are:

- Project Details
- Participant Details
- Conditions of Approval (Specific and Standard)

Researchers should report to the UHREC, via the Research Ethics Coordinator, events that might affect continued ethical acceptability of the project, including, but not limited to:

(a) serious or unexpected adverse effects on participants; and
(b) proposed significant changes in the conduct, the participant profile or the risks of the proposed research.

Further information regarding your ongoing obligations regarding human based research can be found via the Research Ethics website [http://www.research.qut.edu.au/ethics/](http://www.research.qut.edu.au/ethics/) or by contacting the Research Ethics Coordinator on 07 3138 2091 or ethicscontact@qut.edu.au

If any details within this Approval Certificate are incorrect please advise the Research Ethics Unit within 10 days of receipt of this certificate.

### Project Details

**Category of Approval:** Human non-HREC

**Approved From:** 22/11/2007  
**Approved Until:** 22/11/2010 (subject to annual reports)

**Approval Number:** 0700000936

**Project Title:** Towards developing a holistic and integrated model of information behaviours

**Chief Investigator:** Ms Bhuvaneswari Lakshminarayanan

**Other Staff/Students:** Prof Amanda Spink

**Experiment Summary:**

Study various aspects of human information behaviour in a holistic manner, with the aim of building a theoretical model that will represent the results of the study and will work as a template of information behaviour across people’s everyday, learning, and working environments.

### Participant Details

**Participants:**

Staff and students

**Location/s of the Work:**

QUT

### Conditions of Approval

**Specific Conditions of Approval:**
University Human Research Ethics Committee

HUMAN ETHICS APPROVAL CERTIFICATE

NHMRC Registered Committee Number EC00171

Date of Issue: 9/2/10 (supersedes all previously issued certificates)

No special conditions placed on approval by the UHREC. Standard conditions apply.

**Standard Conditions of Approval:**

The University's standard conditions of approval require the research team to:

1. Conduct the project in accordance with University policy, NHMRC / AVCC guidelines and regulations, and the provisions of any relevant State / Territory or Commonwealth regulations or legislation.

2. Respond to the requests and instructions of the University Human Research Ethics Committee (UHREC);

3. Advise the Research Ethics Coordinator immediately if any complaints are made, or expressions of concern are raised, in relation to the project;

4. Suspend or modify the project if the risks to participants are found to be disproportionate to the benefits, and immediately advise the Research Ethics Coordinator of this action;

5. Stop any involvement of any participant if continuation of the research may be harmful to that person, and immediately advise the Research Ethics Coordinator of this action;

6. Advise the Research Ethics Coordinator of any unforeseen development or events that might affect the continued ethical acceptability of the project;

7. Report on the progress of the approved project at least annually, or at intervals determined by the Committee;

8. (Where the research is publicly or privately funded) publish the results of the project in such a way to permit scrutiny and contribute to public knowledge; and

9. Ensure that the results of the research are made available to the participants.

**Modifying your Ethical Clearance:**

Requests for variations must be made via submission of a Request for Variation to Existing Clearance Form (http://www.research.qut.edu.au/ethics/forms/humvar/var.jsp) to the Research Ethics Coordinator. Minor changes will be assessed on a case by case basis.

It generally takes 7-14 days to process and notify the Chief Investigator of the outcome of a request for a variation.

Major changes, depending upon the nature of your request, may require submission of a new application.

**Audits:**

All active ethical clearances are subject to random audit by the UHREC, which will include the review of the signed consent forms for participants, whether any modifications / variations to the project have been approved, and the data storage arrangements.

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End of Document
Appendix II

We are looking for research participants who are willing to maintain an Information Journal for a period of two weeks—a journal where you write down all the ways and means and resources you employed to find, organize, and use information in your daily life.

You are welcome to participate in your own time and place, and in your own choice of formats—a written journal, an electronic journal, or a secure weblog.

As an appreciation of your time and effort, an honorarium will be presented to every participant in the form of a gift voucher worth AUD 100.

If you are interested in participating or just curious to learn more, please do not hesitate to contact us.

To participate, contact:

Bhuvn Narayan
PhD Candidate
bhuvn.narayan@qut.edu.au

or Bhuvn.Narayan@gmail.com

Faculty of Information Technology
Queensland University of Technology
126, Margaret Street, Level 3
Brisbane, QLD 4001
Australia
Phone: +61 7 3353 9248
Mobile: +61 4 2294 8123

Name of Research Project
Towards Developing an Integrated Model of Information Behaviour

Name of Advisor:
Professor Amanda Spink

QUT

Downloaded University of Technology

Ethics clearance No. 070000038
If you have any questions or concerns, please contact the QUT Research Ethics Officer.

+61 7 3138 2340

research.ethics@qut.edu.au

Do you know your information behaviours?

Participate in some exciting new research @ QUT and find out. Get paid for it too!

What you will do?
Maintain an information journal or information diary about your thriving and activities related to information and answer a few questions each day of your diary at the end of the study. A guide sheet will be provided.

Where will you do it?
In your own home or workplace.

When will you do it?
In your own time for a period of two weeks—choose any two weeks between now and the end of August.

How will you do it?
You can maintain your diary in one of the following ways:

- Write in a notebook, diary, or journal of your own choice.
- Write in an electronic Word (or other) document on your own computer.
- Maintain a secure web log (blog). We can help you set it up and show you how to use it if you like.
- Maintain on your iPad and transfer to a file periodically.
- Maintain an audio recording.
- Any other method you are comfortable with.

Why should you do it?
There are many wonderful reasons to participate in this exciting and engaging new research:

1. You will be helping with theoretical research into how people seek, find, use, and organize information, along with helping build a model of information-related behaviours that can help in improving information access for everyone.

2. You may obtain an insight into understanding your own information-related behaviours.

3. You will be compensated for your time and effort with a $100 gift voucher at the end of the study. Every participant is assured of this honourarium, as the funds are in place already.

Confidentiality and Privacy:

- The names of individual persons are not required in any of the requirements. All of your responses that may have any identification will be turned into anonymous responses for reasons of privacy.
- Your personal details will be erased from the records as soon as you submit your response and will not be revealed to anyone at any time including to QUT.

Make sure you write in your information journal DAILY for 14 days as often as you like and give as much detail about the content of the information as you like. The researcher would like to have as much detail as you can remember, but at your own discretion.

PLEASE NOTE: Your journal entries can be free form or narrative and do not need to follow any structure except chronological. You can write immediately after an experience or recount it later.

Some things to remember to note down:

- Purpose of Information need?
  - Work, study, personal etc.
- Method of Information searching or seeking?
  - Internet, library, media, person etc.
- Problems with finding information?
  - Access, cost, etc.
- How did you use the information you found?
  - Read, published, communication, etc.

A one-on-one information session and help sheets will be provided to help you get started with your information journal keeping.
Appendix III

PARTICIPANT INFORMATION for QUT RESEARCH PROJECT

Towards Developing an Integrated Model of Information Behaviours
Bhuvu Lakshminarayanan
07 326339248 OR 04 02598123
b.lakshminarayanan@student.qut.edu.au OR bhuvu.narayan@gmail.com

Description
This project is being undertaken as part of a PhD project for Bhuvu Lakshminarayanan under the principal supervision of Professor Amanda Spink

The purpose of this project is to study how people search for, organize, and use information in their everyday lives.

The research project requests your assistance because the research involves studying the information-related activities in people’s everyday lives, which includes searching for information, seeking information, finding information, organising information, using information, and thinking about information.

Participation
Your participation in this project is voluntary. If you do agree to participate, you can withdraw from participation at any time during the project without comment or penalty. Your decision to participate will in no way impact upon your current or future relationship with QUT (for example your grades).

Your participation will involve the maintenance of a daily journal of all your information-related activities and thoughts throughout the day for a period of 2 weeks at your own convenience with the help of a loosely structured checklist. You will be asked to make detailed notes in regard to your information-related tasks and activities, and also your thoughts and feelings about them, if any, throughout the day. You will not have a predefined task in relation to this study, as this research hopes to study people’s everyday routines as they are carried out in everyday settings. For example, typical information tasks in your everyday life might include organising recipes or family information, using lists of information, searching the Web, asking for information during telephone calls, researching for assignments, seeking information about people, places and events etc., through conversations, through media, or just absorbing unsolicited information that comes your way.

The researcher will also have a one-on-one informal interview with you, once before, and once after the 2-week journaling period, and will be available throughout the study to answer your questions, if any. Depending on what you feel you will be comfortable with, you are free to maintain the information journal in one of several formats: a private webpage (blog) online, a Word document on your computer, an audio or text recording on a hand-held device, or a hand-written paper journal or diary that you can carry around with you on your person.

Expected benefits
It is expected that this project may benefit you by helping you better understand your own information-related behaviours.

Risks
There are no risks beyond normal day-to-day living associated with your participation in this project.
Confidentiality

All comments and responses are anonymous and will be treated confidentially. The names of individual persons are not required in any of the responses. All of your responses that may have any identification will be turned into anonymous responses and your personal details will be erased from the records as soon as you submit your response and will not be revealed to anyone at any time including to QUT.

Consent to Participate

We would like to ask you to sign a written consent form (enclosed) to confirm your agreement to participate.

Questions / further information about the project

Please contact the researcher named above if you have any questions answered or if you require further information about the project.

Concerns / complaints regarding the conduct of the project

QUT is committed to researcher integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Officer on 3138 2340 or ethicscontact@qu.edu.au. The Research Ethics Officer is not connected with the research project and can facilitate a resolution to your concern in an impartial manner.
CONSENT FORM for QUT RESEARCH PROJECT

Towards developing an integrated model of information behaviours

Statement of consent

By signing below, you are indicating that you:

• have read and understood the information document regarding this project
• have had any questions answered to your satisfaction
• understand that if you have any additional questions you can contact the research team
• understand that you are free to withdraw at any time, without comment or penalty
• understand that you can contact the Research Ethics Officer on 3138 2340 or ethicscontact@qut.edu.au if you have concerns about the ethical conduct of the project
• agree to participate in the project

Name ____________________________________________

Signature ____________________________________________

Date _________ / _________ / _________
Appendix IV

Invitation to Participate in
TOWARDS DEVELOPING A HOLISTIC AND INTEGRATED MODEL OF
INFORMATION BEHAVIOUR
Research
PRINCIPAL ADVISOR: PROFESSOR AMANDA SPINK

Dear potential participant,

This is an invitation to participate in an ethics-approved research being conducted by Ms Bhuvn Lakshminarayan under the supervision of Professor Amanda Spink at the Faculty of Information Technology, Queensland University of Technology, Gardens Point campus, Brisbane.

This research study explores how we find, organize, and use information in our day-to-day lives including at work and at home. **If you volunteer to participate, you will be asked to maintain a daily journal of all your information-related activities and thoughts throughout the day for a period of 2 weeks at your own convenience with the help of a loosely structured checklist.** You will be asked to make detailed notes in regard to your information-related tasks and activities, and also your thoughts and feelings about them, if any, throughout the day. You will not have a predefined task in relation to this study, as this research hopes to study people’s everyday routines as they are carried out in everyday settings. For example, typical information tasks in your everyday life might include organizing recipes or family information, using lists of information, searching the Web, asking for information during telephone calls, researching subjects for assignments, seeking information about people, places and events etc., through conversations, through media, or just absorbing unsolicited information that comes your way.

Additionally, the researcher will have a one-on-one informal interview with you, once before, and once after the 2-week journaling period, and will be available throughout the study to answer your questions, if any—the interview will not be recorded and only pertinent notes will be written down. Depending on what you feel you will be comfortable with, you are free to maintain the information journal in one of three formats: a private weblog (blog) online, a Word document on your computer, or a hand-written paper journal or diary that you can carry around with you on your person.

Participation in the study is completely voluntary. You may withdraw from participating in the study now, or at any point whilst completing the journal (particularly if you experience distress). You are not required to write your
name on the journal/diary; thereby assuring the information you provide will remain anonymous. Once data are collected, your results will form part of a larger database, from which only group data will be reported. Only the researchers (Ms Bhuva Lakshminarayanan and Professor Amanda Spink) will have access to these data. We would like to ask you to sign a written consent form (enclosed) to confirm your agreement to participate.

If you have any concerns during or after the completion of the journal, you are encouraged to discuss these at any time with either researcher or the QUT Research Ethics Officer. QUT is committed to researcher integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Officer on 3138 2340 or ethicscontact@qut.edu.au. The Research Ethics Officer is not connected with the research project and can facilitate a resolution to your concern in an impartial manner.

Detailed summary of the results will be available towards the end of the year 2008. Participants interested in receiving this information are asked to contact the researcher for a summary to be posted out.

Thank you for your time and consideration in participating in the present study. As an appreciation of your time and effort, an honorarium will be made available to you at the end of the study in the form of some bookshop gift vouchers and movie passes worth AUD 100.

CONTACT: Bhuva Lakshminarayanan at Phone: 04 02598123 or E-mail: Bhuva.Narayan@yahoo.com
Appendix V

Appendix: COPY OF E-MAIL SOLICITATION

Seeking participants in an ethics-approved PhD research project at QUT

I am looking for research participants who are willing to maintain an information journal for a period of two weeks—a journal where you write down all the ways and means and resources you employed to find, organize, and use Information in your daily life.

You are welcome to participate in your own time and place, and in your own choice of formats—a written journal, an electronic journal, or a secure weblog.

As an appreciation of your time and effort, an honorarium will be made available to you at the end of the study in the form of bookshop gift vouchers and movie passes worth AUD 100.

If you are interested in participating or just curious to learn more, please do not hesitate to contact me:

Bhuva Lakshminarayanan
E-mail: Bhuva_Narayan@yahoo.com
Phone: 07 3263 9248
Mobil: 04 0259 8123
Appendix VI

My Information Journal: Practice Blog Space for All Participants

ABOUT THIS BLOG

Edit this entry.

Dear research participant,

This is a secure blog and only you and I can access it. Each research participant has a separate blog with a separate password. You (the participant) need not password-protect every post of yours on the WHOLE blog is password-protected.

Initially, the blog will greet you with your Word Press username. If you’d like to change that to a nickname, you can click on the “My Dashboard” tab on top of the blog, and then click on “Users” on the right to change your nickname.

Once again, anything you write here will be entirely confidential and will not be shared with anyone at all. The blog will be downloaded to an XML file for data analysis by the researcher alone. Please note that I am looking for cognitive cues and triggers between the various kinds of information behaviors categorized here, so please feel free to talk about your thoughts and feelings and other System that affect your day to day interaction with information and information sources.

Please read the instructions for participants page before you begin.

Thank you,

[Signature]

Leave a Comment
Appendix VII

My Information Journal: Practice Blog Space for All Participants

Hi, Bhav. Whatcha up to?

Tag it

Latest Updates

Dear Research Participant,

Thank you for agreeing to participate in my ethically-approved PhD research at the Faculty of Science and Technology at the Queensland University of Technology, Brisbane, Australia. Please read the about this blog, instructions for participants, and the some categories of Information behaviour pages on the right before you begin to maintain your Information journal. The what you can write about page can help you with some of the things you may want to write about.

You can begin anytime you like, but please make sure to write in your blog everyday for 14 days once you begin. Please feel free to contact me if you have any questions at any time.

If you are using a private computer, you can bookmark the personalisation blog page I will send you soon and come back to it every time you have some time to write. You can opt for your browser to auto remember the login and password if you are using a private computer.

NOTE: The current page you are on (http://participantsample.wordpress.com) is a sample page, but feel free to practice here if you like, but please don’t ask any personal stuff until you get your own blog.
Appendix VIII

Thank you for agreeing to participate in my ethics approved PhD research at the Faculty of Science and Technology at the Queensland University of Technology, Brisbane, Australia. Please read about this blog, instructions for participants, and some categories of information behavior pages on the right before you begin to maintain your information journal. The idea you can write about pages can help you with some of the things you may want to write about.

You can begin anytime you like, but please make sure to write in your blog everyday for 14 days once you begin. Please feel free to contact me if you have any questions at any time.

If you are using a private computer, you can bookmark the personalized blog page I will send you soon and come back to it every time you have some time to write. You can opt for your browser to also remember the login and password if you are using a private computer.

NOTE: The current page you are on (http://partnersample.wordpress.com) is a sample page, but feel free to practice here if you like, but please don’t write any personal stuff until you get your own blog.

There are two ways to make entries in this blog. You can use the “new post” tab to the right of the “My Dashboard” on top of the blog to write your new entries, and tick off on the “categories” button underneath the blog composing window. Or you can just use the little text box (called a Microblog) on top of the main blog page to write a quick note and use your own tag words if you like. The text box will take up to 50 lines of text.

You can use the My Dashboard on top “message” your blog page to add them at a later date, or delete them if you need to.

This blog can be updated also via a smartphone or from your PC. If you prefer any of these methods, I will need you more details.

Happy blogging!

Cheers,

Bella

Potential participant

Tags: Information storage

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Appendix IX

My Information Journal: Practice Blog Space for All Participants

MAINTAINING YOUR JOURNAL
Edit this entry.

Make sure you write DAILY for 14 days. Make as many posts a day as you like, but please write AT LEAST once a day. Provide as much detail as you like. Your privacy and confidentiality are assured. The entries can be free-form narrative and do not need to follow any structure. You can write immediately after an experience or revisit it at the end of the day. Feel free to use any of the tags or categories available on the web log or feel free to create your own.

You will be sent a AUD $100 bookstore voucher upon completion. Please be prepared to briefly discuss your experience with the researcher afterward, over a meal, phone, or in person, or to answer any questions or clarifications.

Please read these pages before you begin
A title about
who receives this,
ABOUT THIS BLOG
MAINTAINING
YOUR JOURNAL,
SOME CATEGORIES OF INFORMATION BEHAVIOR
WHAT YOU CAN
WRITE ABOUT
Categories
identified by
participants
Everyone
Researching
Deliberate generalization
Face-saving
Information-gathering
Information-scrambling
Marketing
Multitasking
Optimal focusing
Organizing
Searching
Snooping
Savvy reading

Logged in as Researcher. Log out →

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Appendix X

WHAT YOU CAN WRITE ABOUT IN YOUR INFORMATION JOURNAL

Edit this entry:

These are only general guidelines. Please feel free to add your own
explanations. You can use the keywords here as tags or add them as
categories in your blog, or add your own.

Were you intentionally looking for the information? If so,
why? Because could be related to any of the following: Personal
curiosity, work-related, school-related, dating, writing, genealogy,
research, entertainment, family, vacation, teaching, group, helping
someone,伊朗-国际关系, security issues, leapfrogging, cooking,
planning a party, etc. If you were not intentionally looking for the
information, how did you come across the information?

Where did you look for the information you needed and/or
who did you ask help from? Did you consult any of the following?
Your own memory, your name, a library, colleague or friend, books,
ewspapers, interiors, media, or Internet search. Discuss with an
expert or post a question to a forum. Asked a teacher, student,
stranger, relative, friend, pastor, or other member of your community
in your vicinity or online on a social network or a Facebook
or Twitter. Why did you choose the method you used?

What are the problems you encountered, if any, in your search
for information? Information was not accessible, was not
understandable, was lost, hidden, complex, or cost too much. You
were uncertain, afraid, anxious, stressed, too late, not motivated
or didn’t feel confident enough. What would have made it easier for you?

How did you use, remember, communicate, or use the
information you found? How did you file the information? Did you
write it down, print it out, or record it in any other way? Did you just
remember it for later? Did you send the information to someone? Did
you enjoy it and keep it for later? Did you change the information? Did
you hide the information? Did you publish it? What influenced your
decision?

How would you classify your information behavior at this time
based on the key definitions provided in the categories pages
on the right? Please click on the relevant categories at the bottom
of your page. Use any of the key words from the descriptions in
the answers above as “tags” under your entries if appropriate. Would you
explain your behavior in some other way? If so, please elaborate.

Leave a Comment

Done

Tags used by participant.

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Appendix XI

SOME CATEGORIES OF INFORMATION BEHAVIOUR

Information Behaviour Categories: Some definitions for your handy reference.

- Information Scanning: Information scanning is a term often used in information retrieval to describe the act of quickly browsing through a large volume of information, looking for specific pieces of information. It is often used in the field of library science to describe the behavior of students who are looking for information for a particular assignment.

- Information Seeking: Information seeking is the process of identifying information needs and finding, evaluating, and using information to meet those needs. It can be a conscious or unconscious process, and it can involve a variety of strategies and tools.

- Information Retrieval: Information retrieval is the process of finding relevant information from large collections of unstructured data. It involves searching for, selecting, and retrieving information based on a set of criteria.

- Information Usage: Information usage is the process of using information to achieve a particular goal. It involves integrating the retrieved information into an individual's knowledge base and using it to solve problems or make decisions.

- Information Sharing: Information sharing is the process of exchanging information with others. It involves the dissemination of information and the establishment of connections between individuals, groups, and organizations.

- Information Creation: Information creation is the process of producing new information. It involves generating ideas, concepts, and innovative solutions that can be shared with others.

- Information Evaluation: Information evaluation is the process of assessing the quality and usefulness of information. It involves analyzing and critiquing information to determine its relevance and accuracy.

- Information Storage: Information storage is the process of preserving information for future use. It involves organizing and managing information so that it can be easily accessed and retrieved when needed.

- Information Analysis: Information analysis is the process of examining information to identify patterns, trends, and insights. It involves using statistical and computational methods to interpret and make sense of data.

- Information Communication: Information communication is the process of transmitting information to others. It involves using various channels and technologies to convey information and establish connections with others.

- Information Negotiation: Information negotiation is the process of discussing and negotiating the exchange of information. It involves negotiating terms and conditions for the sharing of information and establishing agreements for its use.

- Information Engagement: Information engagement is the process of actively participating in the information-seeking process. It involves engaging with information in a meaningful and purposeful way to achieve a particular goal.

- Information Synthesis: Information synthesis is the process of combining and integrating information to create new knowledge. It involves analyzing and synthesizing information from multiple sources to generate novel insights and ideas.

- Information Visualization: Information visualization is the process of representing information in a visual format. It involves using graphs, charts, and other visual tools to convey information and make it more accessible and understandable.

- Information Technology: Information technology is the study and application of computer systems and processes to store, retrieve, and manipulate data and information. It involves the use of technology to support various aspects of information management and information processing.
Appendix XII

- Searching: Information seeking behavior is the process of seeking out new or interesting information. It involves the use of various methods to find the information needed, such as searching online databases, libraries, or asking others.

- Scanning: Information scanning behavior is the process of seeking out information in a specific area. It involves rapidly reading through a large amount of information to find the specific information needed.

- Reading: Information reading behavior is the process of seeking out information in a specific area. It involves reading through a large amount of information to find the specific information needed.

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Appendix XIII

Co-occurrence of Information Behaviours:

Complete List

135 sense-making / monitoring
128 sense-making / seeking
128 organising / use
117 sense-making / use
117 seeking / searching
110 seeking / use
108 sense-making / searching
99 sense-making / organising
92 seeking / monitoring
92 seeking / encountering
90 monitoring / searching
88 seeking / organising
85 monitoring / use
83 monitoring / encountering
78 sense-making / encountering
75 searching / use
75 organising / monitoring
65 use / encountering
65 organising / searching
62 sense-making / organising / use
60 sense-making / seeking / searching
60 sense-making / foraging
60 foraging / searching
57 sense-making / seeking / use
57 sense-making / monitoring / searching
57 seeking / organising / use
55 organising / encountering
54 monitoring / foraging
51 seeking / foraging
51 searching / encountering
50 sense-making / monitoring / use
50 organising / foraging
50 foraging / use
47 sense-making / seeking / monitoring
45 sense-making / seeking / organising
45 sense-making / searching / use
45 sense-making / organising / monitoring
45 organising / monitoring / use
43 seeking / monitoring / encountering
43 foraging / encountering
42 seeking / searching / use
41 seeking / organising / searching
41 seeking / monitoring / searching
40 sense-making / foraging / searching
39 sense-making / organising / searching
39 seeking / monitoring / use
39 organising / searching / use
37 sense-making / monitoring / encountering
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35 sense-making / use / encountering
35 seeking / use / encountering
34 seeking / organising / monitoring
33 sense-making / seeking / foraging
33 sense-making / organising / foraging
33 sense-making / foraging / use
33 seeking / organising / encountering
33 seeking / foraging / use
33 organising / use / encountering
33 monitoring / searching / use
32 sense-making / organising / encountering
32 organising / monitoring / searching
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31 sense-making / seeking / searching / use
31 sense-making / seeking / monitoring / searching
31 seeking / foraging / searching
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1247 DIFFERENT COMBINATIONS
Bhuvaneshwari Lakshminarayanan (Bhuva Narayan) has studied and worked in three continents over the past twenty years. After earning a BA and an MA in English from India, Bhuva worked as a consultant in the book industry for over a decade, both in India and the US. She earned a second BA in English Literature with summa cum laude distinction from Chatham University in Pittsburgh in 2000 and went on to the Radcliffe Publishing Institute at Harvard University to obtain a certificate in publishing procedures.

While working as an editor in the academic publishing industry for a number of years in New York, she developed an interest in digital libraries and enrolled at the University of Pittsburgh where she completed a Masters in Library and Information Science (MLIS) in 2005. While at the iSchool in Pittsburgh, Bhuva was drawn to studying information behaviours and proceeded to Australia on a PhD scholarship at Queensland University of Technology. Following completion of her PhD, she works as a lecturer and researcher at the Queensland University of Technology, Australia.

The common theme that connects all of Bhuva's professional and academic pursuits is her passion for making information accessible to everyone who needs it, and hence her interest and expertise in researching and teaching information behaviour, user needs, usability, user experience, interaction design, and information architecture.