Effective use of value-added features and services of information retrieval systems in an academic environment

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DECLARATION OF ORIGINALITY

UNIVERSITY OF PRETORIA

I declare that the mini-dissertation, **Effective use of value-added features and services of information retrieval systems in an academic environment,** which has been submitted in partial fulfilment of the requirements for the degree Masters in Information Technology (Specialising in Library and Information Science) at the University of Pretoria is my own work and has not previously been submitted by me for a degree at the University of Pretoria or any other tertiary institution.

I, Naailah Parbhoo, obtained the applicable research ethics approval in order to conduct the research that has been described in this mini-dissertation. I furthermore declare that I have observed the ethical standards required in terms of the University of Pretoria's ethics code for researchers and have followed the policy guidelines for responsible research.

SIGNATURE:  **DATE:** 20 March 2016

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ABSTRACT

When making use of information retrieval systems (IRSs), specifically proprietary databases, individual users often do not know or have limited knowledge about the value-added features and services provided, and how these can support successful academic task completion. Members of the academic staff influence the attitude and information practices of their students. An exploratory study was thus conducted in September - October 2015 with academic staff from three departments at a South African university to determine their awareness and use of features of IRSs. The IRSs were relevant to their disciplines and all were selected from IRSs to which the academic library subscribes. The three participating departments were Computer Science, Informatics and Information Science.

The research question was: *How are academics exploiting the features and services offered by databases in their academic task completion?* The research was approached as an exploratory study. The empirical component focused on the awareness and usage of the value-added features and services provided by IRSs, specifically databases. A selection of features and services provided by the databases (as IRSs) and the database service providers were presented to participants. These included among others RSS news feeds, exporting citations to reference management software, limiting results to full-text publications or peer-reviewed publications, checking for conferences and events, ResearcherID profiles, affiliation searches and history searches. Respondents could also comment on other features and services they found useful. The study followed a mixed methods approach. Quantitative data was collected by means of a self-administered electronic questionnaire. It covered the use of databases as IRSs and the use of the features and additional services offered by databases. Since it was an exploratory study the focus was, however, stronger on qualitative data that was collected by means of 12 individual and one focus group interview with five participants (thus 17 participants in total). Thirty-seven completed questionnaires were analysed. Participants included full professors, extraordinary professors, associate professors, research fellows, extraordinary senior researchers, senior lecturers, lecturers, junior research officers and assistant lecturers.

Findings from the exploratory study revealed the following: Many academic staff members had some knowledge about the value-added features and services, but were not making full use of

them. Some of the staff members were unaware of them, stating that they would like to explore these value-added features and services to help refine and narrow down their searches. Their motivations included finding relevant documents, saving on search time, avoiding irrelevant information and finding information matching the daily tasks they needed to complete more precisely. Such tasks included preparing for a lecture, teaching (e.g. methods, evaluation, testing), post-graduate supervision, publication and conference presentations, increasing their knowledge base and sharing information with others.

Recommendations included designing a tutorial booklet or online “How to guideline” or game to showcase the value-added features and services of databases (as examples of IRSs). Exploring Kuhlthau’s concept of zones of intervention in creating spaces for academic staff to explore the use of value-added features and services offered by proprietary databases and services in relation to academic tasks could be useful as well. The latter approach should explore fun ways of learning and incentives such as the badge system that might appeal to younger staff.

LIST OF ABBREVIATIONS

CS	Computer Science
FP	Focus group participant
IR	Information retrieval
IRSs	Information retrieval systems
IS	Information Science
IT	Information technology
N	Number of participants
P	Participant
PIMs	Personal information management systems
SPSS	Statistical Package for Social Sciences

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CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

Academics (also referred to as faculty or lecturing staff) make use of information retrieval systems (IRSs) to find information sources to teach their students, conduct research or complete other tasks (Re Cooper *et al*., 2015[1]: 6; Vicente-López *et al.*, 2014: 2). They can influence their students' perceptions on the use of the IRSs and the importance of information literacy skills (De Andrade & Baptista, 2014: 244; Johnston & Webber, 2003: 335). However, a major issue that arises is that academics often do not understand the full functions and value-added services of IRSs. This applies especially to proprietary databases (Dewald, 2005: 315). It even applies to the traditional functions of combining search terms with Boolean operators, phrase searching, limiting searches to specific fields such as title or abstract, and filtering search results according to year of publication – search features that have been available since the early days of online searching reported in Bourne and Hahn (2003). Kwafoa *et al.* (2014: 12), Jingjing and Chang (2012: 1) and Nielsen (2011: el) have reported poor use of such features. The early term for searching databases was online searching. Although still used (Kumar & Rai, 2013) the term features less often in present-day publications.

Academics' knowledge of IRSs and how these can support their academic tasks is thus important (Bronstein & Tzivian, 2013: 153-154). Many studies have reported on the important link between tasks and information seeking (Jingjing & Chang, 2012: 1, 4; Byström & Hansen, 2005: 1050-1051; Vakkari, 2003: 413). This would be especially important for academic departments teaching Information Science and related disciplines, such as Computer Science and Informatics. This chapter covers the background to the study, IRSs and databases, the research problem and sub-problems, research design and research participants, as well as dealing with ethical issues and chapter layout. A brief overview of the literature is provided to contextualise the study.

1.1.1 Background to the departments

Three departments from the academic institution in South Africa were chosen specifically because of their involvement with information and information technology, namely Computer Science,

[1] In-text references are ordered according to date of publication, most recent references first.

Informatics and Information Science. Academic staff on all levels of seniority from full and extraordinary professors to assistant lecturers were invited to participate. It was assumed that, similar to findings from reports in the subject literature, the academic staff members would have various levels of competency in the use of IRSs, variations in terms of the types of information and information sources they needed and variations in terms of their awareness of features offered by IRSs (Bronstein & Tzivian, 2013: 153).

In the Department of Computer Science, the courses for the degree are aimed at providing the students with deeper understanding of the diverse and interesting areas of Computer Science (Institutional website, 2015c: el). The Department of Informatics focuses on the study of applications as well as the use of computers and information systems within an organisation or institution (Institutional website, 2015e: el). The Department of Information Science focuses on Information Science, Multimedia and Publishing as fields of study; each has its own aims. For Information Science the aim is to address concepts and processes such as the organisation, collection, storage, retrieval, interpretation and utilisation of information (Bawden & Robinson, 2012: 2; Gilchrist, 2009: 35). All three departments offer degree programmes from under-graduate to post-graduate levels, including bachelors, honours, master's and doctoral degrees (Institutional website, 2015f: el). The three departments are also involved in a master's programme in Information Technology. In addition, the Department of Information Science offers a master's degree in Information Technology specialising in Library and Information Science (Institutional website, 2015f: el). The number of staff members in the three selected departments at the time of the study is depicted in Table 1.1.

Level	**Computer Science**	**Informatics**	**Information Science**
Full professors	3	1	3
Extraordinary professors	0	0	7
Associate professors	2	5	0
Research fellows	2	0	4
Extraordinary senior researchers	1	5	0
Senior lecturers	3	9	3
Lecturers	9	7	6
Junior research officers	3	0	9
Assistant lecturers	15	18	9

Table 1.1: Staff members in the three selected departments (Institutional website, 2015a: el).

1.1.2 Background to information retrieval systems in academic contexts

Interest in IRSs, their design, evaluation and improvement has been expressed since the very early days of IRSs (Ruthen & Kelly, 2011; Xie, 2008; Ingwersen & Järvelin, 2005; Harter & Hert, 1997; Soergel, 1985) up till recent reports of research projects (Bilal & Beheshti, 2014). Ingwersen (1992: 228) states that an IRS can be defined as "an information system which is constituted by interactive processes between its system objects, systems setting and the environment, capable of searching and finding information of potential value to an actual searcher of information" (Ingwersen, 1992: 228). According to Harter (1986: 2), the main purpose for many years was to provide users of IRSs such as databases with "… a device interposed between a potential user of information and the collection itself. For a given information problem, the purpose of the system is to capture wanted items and to filter out unwanted items. The goal is pragmatic: to make acceptable the time required to satisfy the information need, or to conclude that it cannot be satisfied." Using databases to find relevant information is still often the main focus. According to Ghorab *et al.* (2013: 381), IRSs "assist users in finding information from the myriad of information resources available on the Web."

Information retrieval (IR) is concerned with the processes involved in the representation, storage, seeking and finding of information sources (Ingwersen, 1992: 49). These sources should be relevant to the requirements of human users to satisfy their information needs (Ingwersen, 1992: 49). Ingwersen (1992: 11) also states that IRSs should provide information desired by users in order to facilitate effective communication. Over many years since the early days of computerised databases and online searching many studies have been conducted to improve IRSs. Among these is a study conducted by Belkin *et al.* (2004: 1) in order to evaluate different IRSs. The goal of the study was to articulate some of the opportunities and challenges of developing an effective IRS (Belkin *et al.,* 2004: 1).

Another study that was conducted by Shimray (2013: el) measured the effectiveness of IRSs and the contents of the collection, thus supporting the explanation that IRSs have been developed in order to make it easier for users to retrieve, find and gather all relevant information. Proprietary databases and journal platforms are examples of IRSs that are widely used in academic contexts. There is, however, more to these databases and journal platforms than just retrieving, finding and gathering information. Information service providers responsible for facilitating the use of proprietary databases offer many add-on services, such as alerting services, saving search strategies for future use and sharing information (Fourie & Fourie, 2014: 1; Fourie & Ball, 2012:

685-686). For the purposes of this study these will be referred to as value-added features and services. (A chart of features and services used in the study is provided in Appendix E.) There are many other examples of studies aimed at improving the ability of IRSs to retrieve relevant information (Dukic, 2014: 175; Beaulieu, 2000: 432).

1.2 RESEARCH PROBLEM AND SUB-PROBLEMS

Considering the importance of fully exploiting IRSs and benefitting from attempts to improve them, as well as new services and features, it seems timely to consider the awareness of academics of such features and how they use these. This study will be guided by the following research question:

> *How are academics exploiting value-added features and services offered by databases in their academic task completion?*

In order to answer the research question, the following sub-questions guiding the study were set:

(1) What unique functions and special features are available in a selection of IRSs relevant to disciplines such as Computer Science, Informatics and Information Science (with specific reference to proprietary databases and journal platforms)?

(2) What has been reported in the subject literature on academics' use of databases and other IRSs?

(3) What is the awareness of academics in the Departments of Computer Science, Informatics and Information Science of the selected IRS features and services?

(4) How do academics in the Departments of Computer Science, Informatics and Information Science use the IRS features and services?

1.3 PURPOSE, AIM AND OBJECTVIES OF THE STUDY

According to Ingwersen (2002: 1), over the years a new generation of information professionals and scientists has emerged. This generation has not been trained by the pioneers in the field; however, they have demonstrated an interest in the foundation and development of IR

(Ingwersen, 2002: 1). The desire to improve not only IRSs, but also users' abilities to seek and use the features effectively has been an ongoing pursuit in IRSs and information-seeking research (Ruthen, 2011: 5; Xie, 2004: 216-217; Ingwersen, 2002: 1). Professionals that have had an impact came from various disciplines, including information scienctists (focus on information and people) (Savarimuthu, 2015: el), computer scientists (focus on technology and programming) (Denning, 2005: 27) and those specialising in informatics (focus on people, technology and programming) (Fourman, 2002: 1). Table 1.2 below is a brief outline of what the disciplines that are included in this study entail:

Computer Science	**Informatics**	**Information Science**
Computer Science concerns the design of algorithms as well as the numerous techniques that can be used when designing and implementing algorithms (Zelle, 2004: 4). According to Zelle (2004: 4) programming is the fundamental part of Computer Science.	Informatics can be described as the science of information, engineering and development of information systems as well as processing of information, thus dealing with the analysis, collection, transmission, usage and dissemination of information (Study Portal, 2015: el). Informatics deals with the manner in which information is used and affects users' welfare (Study Portal, 2015: el).	Information Science can be described as the study of information, which includes the study and application as well as usage of information and knowledge organisation and interfaces or interaction between humans, technology and information (Bawden & Robinson, 2012: 2). It is concerned with the input, processing, output and feedback of data and information through the use of technology (Bawden & Robinson, 2012: 2).

Table 1.2: Explanations of academic disciplines included in the research

The purpose of the research is to determine to what extent academic staff members from these disciplines are aware of the features and services and thus by implication also the benefits of IRSs, and to determine how they align the use of databases with core academic tasks. Based on findings from the literature review and findings from the empirical component, the aim of the study is to raise awareness among academics about how they can benefit from what is offered by databases in terms of supportive features and services, and the value of noting these, and how these might also be of benefit to their students. The aim is to share findings with academic libraries to enhance their marketing of proprietary databases and information support to academics and to enhance training that might be offered to academic staff. The aim of the study was furthermore to

make database information service providers aware of the need to enhance or adapt the marketing of value-added services to IRSs.

The objectives of the study were thus to:

- Identify databases relevant to the subject fields covered by the participating disciplines (Computer Science, Informatics and Information Science).
- Identify core features and services from these databases that might support academics in their task completion.
- Determine the information-seeking behaviour of academics and their use of databases and other IRSs.
- Use findings on the information-seeking behaviour of academics and their use of databases and other IRSs to inform the design as well as marketing of such databases and other IRSs and to inform training in the use of databases.
- Inform methods for research on user's information behaviour in this regard.

1.4 CLARIFICATION OF TERMS

The following section covers the clarification of the terms that will be used throughout the study.

1.4.1 Information retrieval

Information retrieval (IR) is defined as "the process or method whereby a prospective user of information is able to convert his/her need for information into an actual list of citations to documents in storage containing information useful to him/her" (Mooers, 1951: 25). IR concerns the finding and discovering processes that an individual undergoes regarding information. Mooers (1951: 25) adds that "IR is crucial to documentation and organisation of knowledge." There are also many more recent interpretations of IR, including that of Ingwersen (1992: 11), who explains that it concerns how a user acquires information that is recorded in various systems (Ingwersen, 1992: 11). According to Norton (2010: 55), "IR refers to the processes and activities involved with making it possible to obtain information from some source." Such a source can be a database. For the purpose of this study, IR was accepted as the processes and activities involved with making it possible to obtain information. Furthermore, IR is defined as the method of searching textual artifacts as well as relevant information within those artifacts (Dit *et al*., 2012: 3).

1.4.2 Information behaviour

Information behaviour is an encapsulating term for all human behaviour related to information activities, such as recognising and expressing information needs, information seeking, information searching, IR, information encountering, browsing, information avoidance, information use and unawareness of information needs (Case, 2012: 5). Wilson (2000: 51) states that information behaviour is human behaviour in relation to information sources as well as information channels, which include active and passive information seeking and the use of information. It includes face-to face-communication as well as information gathered from passive sources, without any intentions of making use of the information (Fischer & Julien, 2009: 1; Wilson, 2002: 50). Like information seeking and information searching, IR is another information activity falling under the umbrella term of information behaviour.

1.4.3 Information need

An information need refers to the recognition by an individual that his/her information and knowledge are inadequate to satisfy his/her goals (Case, 2012: 5). According to Kuhlthau (2004: 5), "information needs are evolving from a vague awareness of something missing and as culminating in locating of information that contributes to understanding and meaning." Databases and other IRSs can be used to fulfil information needs.

1.4.4 Information seeking

Information seeking is defined as the conscious effort to acquire information in response to a need or gap in an individual's information and knowledge (Case, 2012: 5). Information seeking begins when an individual has a problem (Kuhlthau, 2004: 5). According to Pickard (2013: 26), information seeking is the ability to search for appropriate sources, scanning the literature effectively and efficiently to identify and obtain useful information. Chowdhury's (2010: 250) definition of information seeking is noted as "an interactive process that depends on initiatives on the part of the user, feedback from the information system, and the user's decisions about subsequent actions based on this feedback." According to Shah *et al*. (2014: 23), information seeking is more than just searching for and retrieving information; it includes the collection, analysis, sense-making and sharing of relevant information. It is a cognitive, psychological as well as physical activity (Shah *et al*., 2014: 23). Databases and other IRSs can be used for information seeking as well as other information-related information activities such as information organisation, information sharing and information monitoring, which all fall under information

behaviour. When seeking information from an electronic information source such as a database, it is referred to as IR.

1.4.5 Databases

Davis (2012: el) and Gahan (2000: el) define a database as a base for structured collections of data. In doing so, the data that is collected is organised in such a manner that an individual is able to find the information contained in the database easily and can retrieve the desired information. Davis (2012: el) further states that processing the data and information has become a sophisticated process of collecting, storing and retrieving information. Databases are stored and managed on media devices, that is, computers, and can be examined using specific programs (Gahan, 2000: el). These programs are more strictly known as database management systems (Gahan, 2000: el). Beunen (2007: 52) states that databases are "formae specialis of collections since they need to comply with special requirements that collections in general do not have to satisfy. In the literature on online searching, a database has been defined as "a collection of data or information". "As the term is usually employed in online IR, it refers to a collection of '*index records'* in *machine-readable form*" (Harter, 1986:243).

1.4.6 Effective

Effective is defined as producing the result that is wanted or intended (*Oxford Advanced Learner's Dictionary*, 2015: el). The term effective can be defined as producing a result that is wanted by someone and being able to produce a decided, decisive and/or desired effect (Merriam-Webster, 2015: el). For this research, the term effective will be used in light of producing a result that is wanted or intended in terms of the search queries and information found as needed by the user, and using the value-added features in to the way they were intended to be used.

1.5 DEMARCATION OF THE FIELD OF STUDY

The research was conducted at an institution of higher education (i.e. a university) in South Africa with a good academic library and good subscription to proprietary databases. It was further limited to academics from the School of Information Technology, specifically the academics from the departments of Computer Science, Informatics and Information Science.

The study did not include all the databases to which the academic library subscribes. Rather, selected proprietary databases and journal platforms (IRSs) relevant to the departments of Information Science, Computer Science and Informatics were looked at.

1.6 JUSTIFICATION OF THE RESEARCH

The reason for conducting the research was to determine to what extent academics are exploiting features of IRSs such as databases that might support them in information-related activities relevant to their task completion and to what extent they are aware of IRSs that can support them in their academic tasks. Findings can be used to make recommendations on training as well as suggestions on fully exploiting available features and in raising awareness of such value-added features and services.

1.7 BRIEF OVERVIEW OF THE LITERATURE

The purpose of the brief overview of the literature is to set the study in context and to show gaps in the existing literature (Leedy & Ormrod, 2014: 51; Pickard, 2013: 25-26). It notes related studies to show what is known and that there is insufficient knowledge to address the research problem from the literature. Available literature is explored in more detail in the second chapter to support choices and the focus for the empirical component. Studies and findings noted here will not be repeated in Chapter 2.

The research problem addressed in this study has many facets to consider, and these will be briefly noted in subsequent paragraphs: the purpose and focus of IRSs, the ongoing need to evaluate and improve IRSs, studies that have been conducted on the use of IRSs and databases, preference for internet resources at the cost of databases, ongoing improvements of databases and other IRSs, the complexity and staged nature of information seeking presenting challenges for IRSs, and the availability of models to serve as theoretical frameworks to guide the study. These facets are addressed in the paragraphs to follow.

According to the study problem individuals, including academics, encounter challenges when trying to locate relevant information effectively and efficiently (Kim, 2014: 104). Some of these challenges might be addressed by the features and services made available for IRSs. There are challenges in improving databases and other IRSs, there are challenges in the information literacy training to enable users to use databases effectively, and then there are concerns about the use

of databases for information seeking (Ingwersen, 2002: 83; Fitzgerald, 1999: 2). Ingwersen (2002: 83) states that IR research and development activities focus on the psychological and behavioural aspects of the user and the desired information needed to complete the tasks. IRSs have thus been researched for over 50 years and are still a relevant topic today (Calhoun, 2014: 1, 12; Clough & Sanderson, 2013: el).

The main goal of an IRS is to meet and satisfy the needs of users. The design, development and maintenance of IRSs have been evaluated to determine how effective and successful IRSs are (Clough & Sanderson, 2013: el). Ingwersen (1992b: v) furthermore declares: "Currently, information is continuing to grow exponentially, diversifying into many forms and media. In this complex retrieval labyrinth there is a definite need for increased effort aimed at tailoring IR performance to user demands" (Ingwersen, 1992b: v). Xie (2008: 334) also expressed concern about improving not only IRSs, but user skills as well. "However, new digital environments require users to apply multiple information-seeking strategies and shift from one information-seeking strategy to another in the IR process" (Xie, 2008: 334).

Many improvements to databases have been reported (De Groote *et al.*, 2014: 172; Cioloca & Georgescu, 2011: 13; Mitchell & Jones, 2005: 694), and many improvements can also be found when actually visiting the websites of database information service providers and journal platform providers such as Library and Information Science Abstract (LISA), ProQuest, SAGE Publishers, Scopus, Taylor & Francis, Wiley Online Library, UP Space, World Cat, IEEE Xplore and Science Direct (Bothma *et al*., 2009: 86-90).

Users are trained to use databases and other IRSs, and there is an ongoing search for new methods to improve information literacy programmes (Hepworth & Walton, 2009; Kuhlthau *et al.,* 2007). Fourie and Krauss (2010: 108) state that the value of information literacy and internet searching has been recognised in many schools, academic institutions and the workplace. The Department of Computer Science specifically stresses that it has recognised the need for research initiatives and collaboration on both international and national levels to make its field successful (Institutional website, 2014c: el). The pressure for performance and research output in academic contexts is widely noted (Nel, 2015). According to Aharony (2010: 261), "Information literacy is a necessary skill that is useful in every aspect of life, especially in the twenty first century where we are inundated with vast amounts of information." This would include skills in fully exploiting the features of IRSs.

According to an article by Fourie (2013: 558), there are many IRSs available to academics. This has also been noted by Dukic (2014: 174) and Dewald (2005: 213-214). In the academic context there are examples such as library catalogues, databases and journal platforms, Google Scholar, institutional repositories as well as digital libraries that are used to find and gather information (Fourie, 2013: 558). Fourie (2013: 558) states that the findings of research studies often show a preference for Google and Google Scholar, a lack of interest in databases and concerns about information literacy skills. This has been confirmed by studies conducted by Goodall (2012: 1-2) as well as Maharana and Mahapatra (2006: 475). Concerns about poor use of databases by under-graduate and post-graduate students and even academics are widely noted (De Andrade & Baptista, 2014: 247; Imler & Eichelberger, 2014: 289-290). IRSs and their use within academic contexts can be studied by evaluating IRSs, for example considering the quality of the document collection, the degree to which the collection meets user needs, as well as how effective and efficient the IRS is in retrieving information relevant to user needs (Manning, 2008: 140). It can also be studied from an information behaviour point of view, where the focus is on the use of IRSs and their features and value-added services (Case, 2012).

Chai (2007: 490) conducted a study on attempts to organise the library in order to suit the habits and needs of students with regard to gathering information. The results showed the differences in information-gathering behaviour of students from various fields of study, as well as the demands of the departments and the complexity of the tasks involved, which are affected by the need for information (Chai, 2007: 490). The findings also showed that each student had his/her own way of retrieving information and methods of seeking and gathering information to fulfil specific tasks (Chai, 2007: 490). Chai's (2007: 490) solution was to adapt the orientation and research assistance services to meet the needs of the students from various departments, as well as to address the use of specific databases. According to Shen (2007: 4), the information needs and information-seeking behaviour of social scientists in the library and information science fields have been investigated for many years. In the late 1960s and early 1970s social scientists preferred making use of journal citations instead of bibliographic tools (Shen, 2007: 4). They consulted with colleagues and subject experts instead of using library catalogues and information professionals in order to gather information (Shen, 2007: 4).

Ellis (1989), as well as Ellis, Cox and Hall (1993), conducted studies on researchers in the fields of physical and social science and elaborated on different information behaviours that involve information seeking. The model by Ellis (1989) includes stages such as starting, chaining,

browsing, differentiating, monitoring, extracting, verifying and ending, which are also accepted by Wilson (1999: 254). The Ellis (1989) model of information behaviour was also incorporated into Wilson's (1981) model. Wilson (1999: 252) suggests that browsing, chaining and monitoring should be categorised as search procedures and that extracting is executed on information sources. What is then important, when considering the use of databases and other IRSs in academic contexts, are features and services that can support such information-seeking behaviour and the different stages.

Although Shen (2007: 4) used the Ellis (1989) model as a framework for a study on "how social scientists arrive at and utilise information in the course of their research", the model was adapted to address the advancements in technology and user expertise as well. Additions to the model were made, involving accessing, networking, verifying and managing information (Shen, 2007: 4). The suggestions by Shen (2007) are in line with a study by Meho and Tibbo (2002) and are also noted by Ruthven and Kelly (2011: 22). Shen (2007: 6) also specifically noted the importance of the recognition of information needs, choosing the correct information resources, deciding whether the information is relevant or not and making use of the information. According to Shuib *et al*. (2010: 379), it is difficult for individuals to find accurate and relevant information on a specific subject. The materials that are retrieved may often not be suitable for the researchers' or students' learning style. Therefore, Shuib *et al*. (2010: 379) conducted a study on the usage of IR tools and the preferences for IR tools among Computer Science post-graduate students. The study by Shuib *et al*. (2010: 380) showed that the major functions of IRSs from which users can benefit include identification of information relevant to the interest of the users, an analysis of the content of the sources, representation of the content of the analysed sources, matching of a search statement to the databases with relevant information and providing feedback to users (Shuib *et al*., 2010: 380). This fits in with the purpose of an IRS. An IRS is designed to enable its users to find relevant information that has been stored and organised in a collection of documents and information artifacts (Chowdhury, 2010: 2). This will be discussed further in Chapter 2.

Database services and journal platform providers have made many attempts to add value-added features and services to the traditional ones that were available in the early years of online searching (Bourne & Hahn, 2003). Some of these are noted by Kumar and Rai (2013), Fourie and Ball (2012) and Blummer (2009). Fourie and Ball (2012: 687-688) identified a number of features of IRSs that are intended to encourage the use of IRSs: features to support visually disabled users, mobile views, reading lists, support for collaboration, links to social media platforms such

as Twitter, Facebook and YouTube and online tutorials on the use of the IRSs. As noted earlier, many such changes and improvements are also reported in the literature with regard to the specific databases and database service providers (Kumar & Rai, 2013: 6-7; Fourie & Ball, 2012: 688; Blummer, 2009: 16).

Information behaviour research conducted with academics (as with other target groups) mostly focuses on preference for information sources, search techniques and satisfaction with databases (Kumar & Rai, 2013: 4-7). There are seldom reports on the use of specific features, exceptions being searching bibliographic information (Cavacini, 2015: 2059), Boolean retrieval tools, (Hjørland, 2015: 1560) and index terms (Kim, 2014: 105). When preparing for this study, nothing could be traced on the effective use of value-added features and services when searching core databases such as Computer and Information Systems Abstracts, Emerald, ISI Web of Science or LISA, Library, Information Science & Technology Abstracts and Library & Information Science Source.

Many years ago Harter (1986: ix) made the statement that: “Curiously, online searching and its literature seem to have developed almost independently of the discipline of information storage and retrieval and its own literature, in spite of their many close conceptual relationships.” In a similar way Nesset (2014) notes that very few publications align findings on information behaviour and information literacy. From this brief literature review a few issues stand out, such as Google being the primary search tool for many academics, leading to lack of awareness of databases and their features (Calhoun, 2014: 195,197). Thus there seems to be a need for a study on determining whether or not academic staff members are aware and make use of the special features and services provided by IRSs. Much research has, however, been conducted on the development of methods for designing databases as IRSs, as stated by Chowdhury (2010: 21) and Lopez (2006: 2).

1.8 CHOICE OF RESEARCH DESIGN

When conducting research, an appropriate research design needs to be adopted. The research design depends on the type of study that will be conducted and the purpose of the study. Mouton (2011: 55) defines a research design as a “plan or blueprint of how you intend conducting the research.” According to Dyslex (2011: el), a research design is “the systematic study plan used

to turn research question(s) into a testing project or experimental study". There are three basic types of research designs (Pickard, 2013: 14, 18; Dyslex 2011: el; Harwell, 2011: 148), namely:

- Qualitative research approach: "collecting, analysing, and interpreting data by observing what people do and say" (Pickard, 2013: 14; Anderson, 2006: 3).
- Quantitative research approach: "measurement must be objective, quantitative and statistically valid" (Pickard, 2013: 18; Anderson, 2006: 3).
- Mixed methods research approach: "is in-depth, contextualized and more-efficient however time-consuming by making use of a combination of qualitative and quantitative research methods" (Leedy & Ormrod, 2014: 268; Anderson, 2006: 3-4).

For this study a mixed methods research approach will be used, with a strong qualitative component. Data will be collected on the IRSs and their functions, as well as the manner in which they are used by academics (Goddard & Melville, 2005: 9).

Furthermore, it will be a case study. Pickard (2013: 101) defines case study research as a "method designed to study the particular within a context that has a specific purpose." Because of the requirements for ethical clearance, the site of the case study will not be mentioned. It is merely referred to as institution of higher education (i.e. a university) in South Africa.

1.8.1 Methods for data collection

Three data collection methods will be used: a semi-structured electronic questionnaire, focus group interviews and individual interviews.

Interviews: According to Brinkmann and Kvale (2013: 3-4), as well as Goodman (2011: 14), interviews are widely used in order to gather information for particular studies that include participants. Three main types of interviews have been identified, namely standardised, semi-structured and unstructured. Interviews are defined as "a conversation with a purpose" (Goodman, 2011: 14). There are among others individual, paired and focus group interviews (Brinkmann & Kvale, 2013: 3-4; Goodman, 2011: 14).

For this study, semi-structured individual and focus group interviews were used. A focus group interview is defined as an interview that is predominantly made up of open-ended questions asked of a group of participants (Bryman, 2012: 213). The questions posed are related to a specific

situation, subject or event that is relevant to the participant and the researcher (Bryman, 2012: 213; Jackson, 2008: 97). According to Brinkmann and Kvale (2013: 175), academic interviews are generally one-to-one interviews, but over time the use of focus group interviews has increased. The interviewer of the focus group introduces the topics for discussion and facilitates the interaction between the participants (Brinkmann & Kvale, 2013: 175).

Jackson (2008: 96) states that an individual interview is conducted face to face and allows the researcher to record not only the verbal communication but also the non-verbal cues being displayed by the participant. Participants are more likely to devote more time to answering the questions, as opposed to questionnaires and online surveys (Jackson, 2008: 96). Individuals who participate in individual interviews are not influenced by other participants, which allows them to feel comfortable sharing information (Blumberg, 2005: 390).

Electronic questionnaires can be seen as either an online (emailed) questionnaire or a questionnaire contained within an email message (Pickard, 2013: 222). An electronic semi-structured self-administrated questionnaire was used for this study. The questionnaire consists of both open and close ended questions (Maree, 2007: 160-161). It was compiled to take no more than 10 minutes to complete.

1.8.2 Participants

For this study the target population was the academic staff members from the departments of Computer Science, Informatics and Information Science at the institution of higher education in South Africa selected for the case study. The academic staff members who were asked to participate in this study were professors, associate professors, senior lecturers, lecturers, junior research officers and assistant lecturers. Since the participants were easily accessible and available to the researcher, the study was based on convenience and purposive sampling (Pickard, 2013: 64; Blumberg *et al*., 2005: 252).

1.8.3 Ethical clearance

When conducting research that involves people as test subjects, ethical clearance or statements need to be included in the proposal (Pickard, 2013: 89-90; Bak, 2004: 28). These indicate that the researcher is aware of ethical considerations and procedures (Bak, 2004: 28). The aim is to ensure that no one is harmed when conducting the research (Pickard, 2013: 93; Bak, 2004: 28).

Ethical clearance also allows the readers to understand what one has done in order to adhere to the university's ethical guidelines (Hofstee, 2006: 118). If there are ethical implications that may arise during the research process, the researcher needs to address them in the proposal and obtain ethical clearance (Hofstee, 2006: 118). According to Bak (2004: 28), there are a number of ethical guidelines that the researcher needs to adhere to, namely:

- design, conduct and reporting of research according to the ethical standards of the university;
- compliance with national and provincial law and regulations;
- minimising of the possibility of misleading results;
- ensuring that there is no plagiarism;
- acquisition of consent from the research participants; and
- guarantee of confidentiality of data provided by participants.

Ethical clearance to do this study was obtained from the faculty committee for research ethics as well as the dean of the faculty where the case study was conducted. The Research Committee of the Department of Information Science, University of Pretoria approved the documentation, including the questionnaire and interview schedule for the study on behalf of the institution that will grant the degree.

1.8.4 Reliability and validity

According to Ritchie and Lewis (2003: 270), the concepts of reliability and validity were developed in the natural sciences. The broad definition of reliability is 'sustainable' and validity refers to 'well grounded' (Ritchie & Lewis, 2003: 270).

Reliability is also concerned with the replication of research findings (Ritchie & Lewis, 2003: 270), that is, would the findings be the same if another study made use of the same or similar methods (Ritchie & Lewis, 2003: 270). According to Bryman (2012: 46), reliability is "concerned with the question of whether the results of a study are repeatable." Reliability is mostly connected with quantitative studies. It relates to whether or not the measure of the study is stable (Bryman, 2012: 46).

According to Ritchie and Lewis (2003: 273), the "validity of research findings is generally understood to refer to the 'correctness' or 'precision' of a research reading". Validity is divided into two distinct dimensions, namely:

- internal validity (deals with whether the study investigates what the researcher claims to be investigating); and
- external validity (deals with the abstract constructs or hypotheses generated as well as the tests applied to the target group) (Leedy & Ormrod, 2014: 272; Ritchie & Lewis, 2003: 273).

Bryman (2012: 47) states that validity is "concerned with the integrity of the conclusions that are generated from the piece of research". Reliability and validity will be addressed in this study and will be discussed further in Chapter 3.

1.9 DIVISION OF CHAPTERS

The dissertation will comprise five chapters. These chapters will encompass specific topics that will add value to the study related to IRSs and the effective use of value-added features and services of IRSs, as well as the manner in which they can be exploited by the academic staff members of academic departments and incorporated in their task completion.

Chapter 1: In this chapter the introduction and a brief overview of the research project will be discussed. This chapter will include the research problem and sub-problems that need to be investigated in order to complete the study.

Chapter 2: In this chapter an in-depth literature analysis will be conducted on the research topic. It will comprise studies on the use of databases and other IRSs, the information behaviour of academics and the manner in which databases and IRSs are used by users, including the use of value-added features and services. Literature on the different functions and features of IRSs and the use of these (as noted in the research findings) will be highlighted. Publications reporting on the design of databases and other IRSs and the concern expressed that information literacy does not sufficiently affect the use of databases will also be briefly noted.

Chapter 3: Chapter 3 will present the research design, including the ethical considerations as well as the limitations of the proposed research methodology that was applied in the research.

Chapter 4: In Chapter 4 the findings from the data collected will be presented and analysed.

Chapter 5: In Chapter 5 the findings, recommendations, suggestions for further research and conclusion are discussed.

A list of references as well as appendices containing the questionnaires that have been used to conduct the study will be added to the research report.

1.10 CONCLUSION

This chapter provided a general overview of the research study that was conducted. It provided a brief summary of the subject areas that are related to the research problem that has been identified with regard to the effective use of IRSs. It also explains the processes that had to be undertaken to complete the research.

CHAPTER 2: LITERATURE ANALYSIS – INFORMATION BEHAVIOUR AND IRSs IN CONTEXT

2.1 INTRODUCTION

The manner in which users search for information manifests in a context that comprises the complex set of variables that have an impact on users' intentions, personal characteristics, the data and systems available for searching in a specific environment, as well as users' awareness thereof. The environment also forms a context (Lopes, 2009: 37; Courtright, 2007: 276). Different contexts may have different effects on the manner in which users search for information through the use of IRSs such as databases (Bierig & Göker, 2006: 79; Leckie *et al*., 1996: 183). This study is concerned with an academic context, academic staff (i.e. faculty), their tasks and how the features and services provided by IRSs can support them. An important point of departure is a literature analysis.

This chapter comprises an analysis of selected literature on information behaviour and information seeking and retrieval and contexts including academic contexts. Since many studies focusing on the actual use of databases and their features were noted in Chapter 1, only a few will be noted in this chapter to support the discussion on context, the features of IRS and the use of IRSs by academics in an academic context. Although all individuals are different, make use of different IRSs and develop their own search techniques and preferences, much can be learnt from the overall findings of such studies. Reports on the value of databases as IRSs, as well as the advantages of IRSs, will also be briefly discussed to provide insight into the growth of IRSs and databases (Ishikawa *et al.,* 2000: 431-432), and why they are of importance for academics (Hjørland, 2014: 6). In addition, the chapter will analyse reports on the functions, features, services and other value-added additions of databases that can be explored by academics. The discussion in this chapter should be read in conjunction with the contextualising discussion of findings in Chapter 1.

The order of discussion will be: IRSs and their functions and features as point of departure; information behaviour, information seeking and IR in context; evaluation of IRSs and models that can serve as framework for studies of information behaviour regarding IRSs.

2.2 PURPOSE OF THE LITERATURE ANALYSIS

When conducting a research study, the aim is to find out what research has already been conducted (Watkins, 2012: 153; Mouton, 2011: 87). Therefore, a review of the existing bodies of knowledge should be given, as well as an overview of how the research was conducted (Mouton, 2011: 87). The reason for providing a literature analysis is to:

- reduce duplication or ensure that there is no duplication in the research to be conducted;
- discover the most recent and authoritative theories about the research topic;
- determine what the most widely accepted empirical findings in the field of study are;
- help the researcher identify the available instruments that will prove the research to be valid and reliable;
- allow the researcher to define his/her search objectives as well as outlining the main arguments of the research;
- allow the researcher to identify keywords, phrases and subject objectives; that can be used when conducting the research;
- enable the researcher to avoid plagiarism and evaluate previous studies that have been conducted;
- allow the researcher to analyse the methodologies that have been used and avoid making the same mistakes as the reporting researchers, thus decreasing time and efforts when collecting the data; and
- provide a clear theoretical framework, thus supporting the researcher's view and ideas regarding the research problem.

(Pickard, 2013; 27-28; Mouton, 2011: 87; Leedy & Ormrod, 2005 cited in The University of Adelaide, 2014: 1).

2.3 DATABASES AS IRSs: FUNCTIONS, FEATURES, SERVICES AND OTHER VALUE-ADDED ADDITIONS

2.3.1 Value of databases

As noted earlier, databases are a type of IRS. The value of databases links well to the purpose of IRSs. In essence databases can allow their users to find information, share references, filter information according to key words, browse and add to citation lists (Chowdhury, 2010: 17). Because of the availability of advanced search features, databases can allow users to filter

information very specifically to their information needs, for example according to date, language, author, exact words, exact phrases or Boolean operators. Although some of these features are also available for some search engines and search tools such as Google, Bing, Yahoo, MSN, About, Ask.com and Google Scholar, these are not as useful in terms of the efficiency and effectiveness of IR with regard to filtering of information (Williamson & Mirza, 2015: 35, 42). The same applies to eliminating duplicate references to information sources, exporting information to personal databases, setting alerts and sharing information (Williamson & Mirza, 2015: 35). As noted in Section 5.2, Ellis (1989: 178) already in 1989 argued that features of IRSs should support information behaviour. Databases allow users to specify the display of results, for example titles only, bibliographic references only, or bibliographic reference, abstract and list of references. The value of choosing display formats is also noted by Chowdhury (2010: 17), as well as Stubinz and Whighli (2002: 3-4). However, in most cases databases in an IRS environment are bibliographic or referral in nature (Chowdhury, 2010: 21; Lopez, 2006: 2-3). A further value of databases is that they can be grouped according to type, for example reference and full-text databases, directories providing factual information, for example on companies (Hanyurwimfura, 2015: 265) and research that has been conducted, that is, databases according to focus of scope, such as medical databases and library and information science databases. Databases such as the ones available through ProQuest, EbscoHost, JSTOR, Elsevier, and ScienceDirect are designed to allow users to search according to fields and subfields, the nature of the publication type, content, length of the document, year of publication, author affiliation, indexes and various other attributes, to filter and limit search results, to use a thesaurus or topic path and search for keywords and exact phrases (Olivier & Fourie, 2013: 35-37; Chowdhury, 2010: 23). In the design of a database, the choice of such features, as well as decisions on the sorting, display and printing format, depends on knowledge and understanding of users' information behaviour and especially their preferences (Chowdhury, 2010: 23; Bawden, 2006: 674; Stubinz & Whighli, 2002: 4). In addition to the basic and advanced IR features offered by databases, there are many value-added features and services that need to be noted.

2.3.2 IRS features and services

Researchers such as Fourie and Fourie (2014), Lewandowski (2014) and Fourie and Ball (2012) have noted some of the features and services that IRSs and databases provide. The focus in this study is only on databases. The following are widely acknowledged functions of an IRS: identifying information sources that are relevant to the areas of interest of the users, providing an analysis of the contents of the information sources, ranking the most relevant items before non-relevant

items, representing the content of the analysed information source in order to match users' queries, analysing users' queries and presenting them in a form that will be suitable for matching the database, matching the search statements with the information stored in the databases and retrieving relevant information (Cummins & O'Riordan, 2011: 1, 13; Chowdhury, 2010: 6-7; Stubinz & Whighli, 2002: 4). Table 2.1 (not intended as comprehensive) shows features and value-added services that can be used by researchers to find information that will aid them in accomplishing their tasks, research and other daily activities. This table is based on reports in the subject literature on marketing such features and services or commenting on their value, as well as consideration of what the databases chosen for this study offer. The features are:
(Presented in random order)

• Alerting or notification services for example of new publications on a topic, new work by an author • RSS news feeds • Add to "My Citation Alerts" • Adding references to "your library", "favorites", "add to folder" • Exporting citations to reference management software (e.g. Endnote, RefWorks, Mendeley) • Limiting results to full-text publications • Limiting results to peer-reviewed publications • Searching for figures and tables • Finding similar or related publications • Searching for specific document types (e.g. advertisements, annual reports, articles, bibliographies, biographies, conferences, curricula, fact sheets/brochures, newsletters) • Searching for specific format types (e.g. audio, video, blogs, images) • Checking data and reports • Checking curricula recommendations • ResearcherID profile (to showcase one's publication history) • Command search interfaces • Create and maintain custom journal lists	• Tutorials (e.g. how to search, browse), help guides and materials on using the database • Case studies (e.g. Emerald provides case study materials and research) • Checking lists of journal titles for databases • Checking for conferences and events • Browsing options (e.g. broad topics, country reports) • Topic path (e.g. in one's fields for useful publications) • Affiliation search (e.g. allows researchers to identify and assess an affiliation's scholarly output and collaborating institutions) • Top keywords (Researchers interested in topics may click on the words to open up publications on the terms) • Critical reviews of publications • Sharing references with other (e.g. EbscoHost folders) • History of searches • Thesaurus to look up terms • Advanced search interfaces • Subject suggestions by databases related to query • Viewing publications with open access • Viewing top downloaded articles

Table 2.1: Selected IRS value-added features and services

When considering research findings on IRSs, academic contexts and information behaviour, it must be noted that, as explained in Section 1.4.2, information behaviour is the umbrella term for many information activities, such as information seeking (which is described as the conscious effort to acquire information to satisfy a gap in the information and knowledge of the user) and IR (actual interaction with IRSs).

2.4 IRSs AS POINT OF DEPARTURE FOR INFORMATION BEHAVIOUR AND INFORMATION SEEKING

Interpretations of IR have been considered in Chapter 1 (Section 1.4.1). According to the accepted operational definition, IR is "the processes and activities involved with making it possible to obtain information." According to Chowdhury (2010: 2), an IRS is designed to enable the users to find relevant information that has been stored and organised in a collection of documents and information artifacts. The main objective of an effective IRS is to retrieve information by matching the user's query to the documents and information artifacts stored in the databases (Chowdhury, 2010: 2; Blandford & Buchanan, 2003: 3). As shown in Table 2.1, IRSs can, however, offer even more than this.

Before considering findings of studies on IRSs such as databases and internet search engines from an information behaviour point of view, some key benefits captured in the features of IRSs are noted:

- IRSs are capable of the storage, retrieval, and maintenance of information (Kowalski, 1997: 2).
- IRSs can provide access to text, but other data types are also treated as highly informative sources (Kowalski, 1997: 2, 12, 14).
- IRSs can act as a central repository of information (Kowalski, 1997: 2).
- IRSs can assist users in finding information; many features ranging from search features such as Boolean operators to advanced search interfaces are in place to support users in finding information (Kowalski, 1997: 27).
- IRSs can support the development of personal information management (PIM), which holds its own benefits, including ease of use and convenience to create and share a bibliography and references (Fourie, 2011: 767).
- IRSs can guide users to suitable terminology to find information, for example by showing keywords, abstracts, thesauri, indexing and term weighting (Zhang *et al.*, 2011: 2760).

Such benefits and features will be considered when collecting empirical data on the manner in which academic staff members make use of the value-added features and services of the IRSs subscribed to for the selected departments.

2.5 CONTEXTUAL APPROACH

Dervin (2003: 111) states: "Context is . . . the pattern that connects . . . all communication necessitates context . . . without context there is no meaning." According to Dervin (2003: 111), context can also be defined as "a spatial and temporal background which affects all thinking and a selective interest or bias which conditions the subject matter of thinking."

Context features in various ways in studies of IRSs and information behaviour (Case, 2012: 13; Courtright, 2007: 276; Johnson, 2003: 736). It serves as the background for studies of information behaviour and the use of IRSs, for example studies in academic contexts will differ from studies in everyday-life contexts (Maleki-Dizaji *et al*., 2014: 105-106; Savolainen, 2008: 4). With regard to IRSs there are also researchers that argue that IRSs exist within specific contexts and that there is a need to learn from the information behaviour and information needs of users in such contexts (Ruthven & Kelly, 2011: 273; Johnson, 2003: 736-737).

2.5.1 IRS using context to support users

Applying contextual approaches to IR holds the potential to design different types of systems (Limbu *et al*., 2014: 2; Ruthven, 2011: 5). These systems could determine what information users want by observing their reaction to information (Ruthven, 2011: 5), and also their reactions to and perceptions of the IRSs. From Ruthven's point of view an IRS can use contextual information for the system to learn users' regular information needs and thus to provide the users with additional information as well as new materials on the same or similar topics that capture their interest (Ruthven, 2011: 5). An IRS may thus be able to predict what information is needed by the users. Learning and predicting what information is wanted are two different functions that can be provided by IRSs (Limbu *et al*., 2014: 2-3; Ruthven, 2011: 5). In most cases, users may say what they want but not what information would be useful to know. Many information professionals understand this statement and provide contextual information to the user making the request, as well as providing direct and relevant information (Aharony & Prebor, 2015: 430; Fourie & Meyer, 2014: 97; Cassell & Hiremath, 2013: 18; Ruthven, 2011: 5; Taylor 1968). Ideally IRSs should learn how the system can support users in this, for example through the manner in which information is displayed. For some users a simple display might be needed and for others it might mean that

the information itself needs to be tailored to the age or subject experience of the reader (Ruthven, 2011: 5). If this is achieved, there is, however, still the need for users to exploit such features and other value-added features offered by IRS.

An IRS might also be able to indicate how information or information resources relate to other information and information resources. IRSs that relate to or allow opportunities for users to provide detail on their context might be able to inform users on their information needs, for example recommendation systems (Dean-Hall *et al.,* 2015: 2; Cassell & Hiremath, 2013: 18-19; Ruthven, 2011: 5). Other researchers focus on the information user and his/her background, experiences, access to researchers, etcetera. Ingwersen and Järvelin (2005: 1) state that "retrieval of such information depends on time, place, history of interaction, task in hand, and a range of other factors that are not given explicitly but are implicit in the interaction and ambient environment, namely the context." Therefore, contextual data may be used effectively in order to limit the retrieval of information, thus reducing the complexity of the retrieval process (Hyldegård *et al.*, 2015: 8; Ingwersen & Järvelin, 2005: 1).

2.5.2 Importance of tasks in context and task-related use of IRS

IR research has been conducted on many aspects such as multi-media, multilingual, and multi-modal environments in relation to a context-free manner (Ingwersen & Järvelin, 2005: 1). It can, however, also be considered in a specific context. "The retrieval of information depends on time, place, history of interaction, task in hand, and a range of other factors that are not given explicitly but are implicit in the interaction and ambient environment" (i.e. the context) (Xie, 2007: el; Ingwersen & Järvelin, 2005: 1). The elements or features of context that are potentially significant to IR are work or daily-life tasks (Xie, 2007: el), interest, searcher, interaction, system, document, environmental or physical and temporal features.

In relation to tasks and roles in contexts, various researchers (Byström & Hansen, 2005; Ingwersen & Järvelin, 2005; Vakkari, 2003; Leckie, Pettigrew & Sylvain, 1996) reported findings, for example creating awareness among users about information sources and methods to examine them. These models emphasise the importance of the complexity of the task and whether the manner of seeking information, judging what needs to be done and evaluating the information is efficient and adequate. Ellis (1989) found that IRSs need to provide more navigational routes for the users; Boolean operators and best match search strategies should not only be provided as

search tools, but citations, last search and users' profiles should also be incorporated (Wilson, 1999: 258).

With regard to an academic perspective, the measurements of effective IRSs (as alternative to studies of information behaviour and information seeking) are focused on the usefulness of a system as well as applying the effects of changing system algorithms or comparing algorithms among systems (Mizzaro, 2004: 1; Kowalski, 1997: 224). Many studies on IRSs *per se* (i.e. the effective and efficient functioning of the systems), as well as on the information behaviour of people in academic contexts, have been reported (Case, 2012; Fidel, 2012). More detail on the latter is given in Section 2.4. Tasks and roles also feature in some information behaviour and IR models: Wilson's information-seeking behaviour model (1981) and Leckie, Pettigrew and Sylvain's information-seeking of professionals model (1996: 160), Byström's task-based information-seeking model (1999) and Vakkari's theory of the task-based IR process model (2003).

2.5.3 Reasons for using IRSs and typical activities when using IRSs

On the one hand there is the value of IRSs and what they offer, and on the other hand the reasons why people use them. Many reasons for using databases and other IRSs have been noted in the subject literature (Case, 2012: 81-87; Revell & Dorner, 2009: 3-4). Reasons for using IRSs to find literature, and the importance of literature in academic contexts are also clear from textbooks on conducting research (Leedy & Ormord, 2013: 1; Pickard 2013: 27; Maree, 2008: 26-27), and are noted in section 2.5.5. Apart from seeking information and finding literature in academic contexts, there are also various activities that have been noted when people such as academics make use of IRSs, as reflected in Figure 2.4, based on the work of Chowdhury (2010: 3-4) and Singh (2001: 19-20). Various information activities support the reasons for using IRS. Some of the most important ones are noted in Figure 2.1.

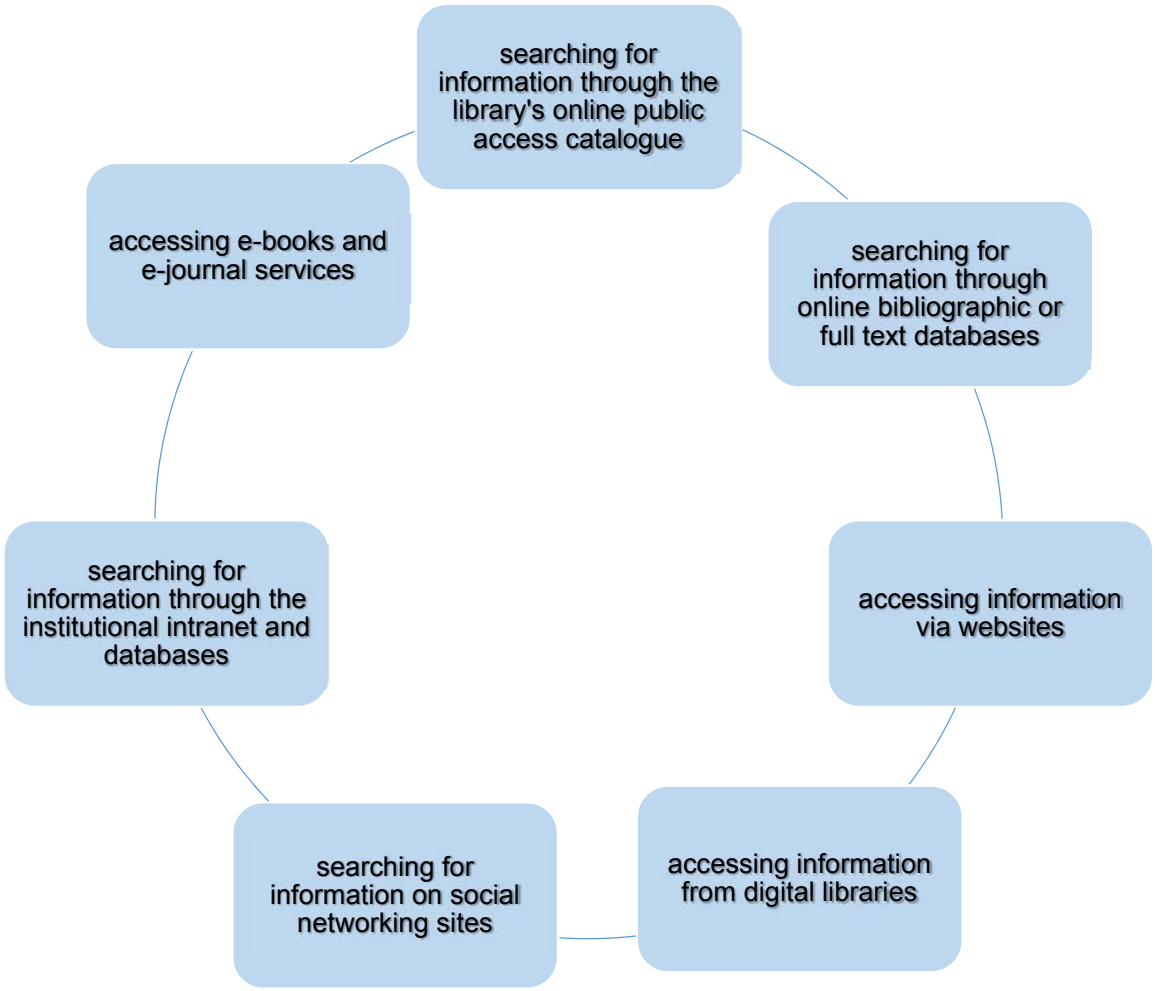


Figure 2.1: Users' information activities when using IRSs (based on the activities noted by Chowdhury (2010: 3-4) and Singh (2001: 19-20))

The activities noted in Figure 2.1 mostly deal with seeking information from various types of IRSs, ranging from traditional library catalogues to social networking sites. Other typical information activities that have been noted in the subject literature with regard to the use of IRS in academic contexts include the use of current awareness or alerting services, personal information management or reference management systems, intranets and social networks (Fourie, 2011: 764; Oinas-Kukkonen *et al*., 2010: 63). Personal information management was discussed in Section 2.4.

Tahira (2010: 12) states that libraries and online sources to which they provide access aid users to meet their different information needs, such as obtaining information for academic, research

and other purposes, for example topics of interest or subject fields. Apart from literature reviews for research (noted in Section 2.5.5), academic staff also use IRSs for other reasons. The following list of reasons have been compiled from the work of Tahira (2010: 49-50) and Singh (2001: 22):

- To update the information in their personal collections of information
- To guide students in their research (e.g. post-graduate students)
- To aid in preparing or supplementing lectures
- To publish a paper, book or other publications
- To gain awareness of the scope of existing information and new information being published
- To participate in seminars, conferences and workshops
- To aid in positioning for promotional opportunities.

IRSs and the value-added features and services offered that are mentioned in Table 2.1, are designed to support such reasons.

2.5.4 User information behaviour and IR in academic contexts

Context can also influence the actual information seeking, for example in terms of using or not using information sources (Case 2012; Meyer, 2009: el). The Ellis model (1989) (noted in section 1.7, Chapter 1) was specifically developed from empirical work with academics. The Wilson models (1981, 1996) were also reported for studies in academic contexts – albeit not always with academics (Case, 2012: 135, 139-140; Jones, 2007: 457; Johnson, 2003: 748; Azami & Fattahi, 2002: 2; Meho & Tibbo, 2002, 571).

Many studies on information seeking and the use of databases, search engines, repositories and library catalogues (De Groote *et al.*, 2014: 172; Cioloca & Georgescu, 2011: 13) have been conducted. Some findings of studies on information behaviour (including information seeking and IR) in academic context were noted in Chapter 1. These include findings regarding academics as well as students. For the purposes of this study, the information behaviour of academics is important. Chapter 1 revealed that IRSs have many benefits for academics in terms of identifying relevant information that is in the interest of the users and match the search queries in the databases to retrieve relevant information. IRSs have many functions that could help academics with searching for information, such as mobile views, online tutorials that can be used when teaching and linking users to social media such as ResearchGate and YouTube videos (also refer to Table 2.1 for more examples). The main findings from the literature presented in Chapter 1

show that Google and Google Scholar are used as the primary search tools that allow academic staff members to initiate their searches. This raises concern about the use of databases and the effective use of IRS features, as noted in an earlier section, 2.3.2.

To put research on how IRSs could support information seeking in academic contexts in perspective, the following comment and finding on information seeking are also noted: academics make use of both print and electronic resources, which are made available through the institutions' libraries (George *et al*., 2006: 20). As for electronic materials, they use library databases, indexes, online journals, online articles, conference proceedings, reference materials, images and other materials such as videos and audio sources (George *et al*., 2006: 20). Thus there is a need for information in different formats, which according to Saracevic *et al.* (1988: 170) has been provided for many years by IRS. This is in line with the functions of IRS noted:

- Information seeking includes the way in which individuals articulate their information needs, how they seek, evaluate, select and make use of the required information (Majid & Tan, 2000 cited in Tahira, 2010: 5). An IRS should offer support in this regard.
- Information-seeking behaviour concerns the purposive seeking for information that is used to justify and reach goals (Tahira, 2010: 5; Choo, 2006: 69). Therefore, it begins when people perceive that the current state of their knowledge base is less than that needed to handle issues, gaps and problems they are experiencing (Wilson, 2000: 52; Krikelas, 1983 cited in Tahira, 2010: 5; Choo, 2006: 77). Again, there is an indication of the importance of recognising an information need as point of departure for IR or other forms of information seeking.

Research on IRSs and information seeking noted a number of influencing factors (Chowdhury, 2010: 234). Such factors are related to the users' personal characteristics and traits (Case, 2012: 58; Chowdhury, 2010: 234). Case (2012: 15, 16, 109) and Chowdhury (2010: 234) also note other factors influencing information seeking and thus also the use of IRS. These include the general educational level of users, awareness of people in a society and the overall context in which they need to operate, awareness of and the ability to access various sources of information, users' working conditions, time allocated to consulting information systems, their hierarchical status as well as their socio-professional position, their personal and professional connections or networks, how stimulating their jobs are, the amount of competition that may exist in their job field, the

various products and services provided by the information unit, the manner in which the users formulate their queries, the manner in which they make use of the information obtained, the user-friendliness of the information system and the effectiveness of the marketing policy of the information unit. These factors are also noted in many other reports on specific studies, which will not be cited here.

The influencing factors noted above also relate to factors portrayed in the information behaviour models of Ingwersen and Järvelin (2005), Wilson (1996), Leckie, Pettigrew and Sylvain (1996), Ingwersen (1992) and Wilson (1981). Such factors can lead to failure to find information, or may be the reason why information needs are deferred or not satisfied. Failure may again cause stress (Case, 2012: 39). Acknowledging the spectrum of influencing factors, what is of essence for the design of IRS is that information needs (which again can be related to roles and tasks such as in academic contexts) very often serve as instigator of information seeking, which might then include the use of IRSs such as databases (Given, 2000: 4). A key function of a database as an IRS should then be to support users in recognising and formulating their information needs. This was also noted in section 2.6. The information-seeking behaviour of academics has been found to be repetitive, becoming more refined and organised as they become knowledgeable about the research topic or field of study (Makri *et al*., 2008: 613; George *et al*., 2006: 19). Apart from support in recognising information needs, IRS should specifically also support information use and personal collection of information. These are covered in respectively sections 2.5.6 and 2.6.

2.5.5 IRS and information use

Although a number of studies have been reported on the use of IRSs such as databases, online library catalogues and document management systems (Hiemstra & Mihajlovi´c, 2010: 2), the effectiveness and efficiency of IRSs in finding relevant information (Ingwersen, 1992: 12; Kowalski, 1997: 4; Onwuchekwa & Jegede, 2011: 109, and others noted in the preceding sections), few studies report on the actual use of the information found by using IRSs. According to George *et al*. (2006: 19), information seeking is more effective in the planning stage where researchers choose an area of focus. They thus develop a search strategy and browse for information on the search topic (George *et al*., 2006: 19), which is an important feature that needs to be supported by IRS.

The use of information varies according to disciplines and study fields (Case, 2012: 10; Fisher & Julien, 2009: 1; Makri *et al*., 2008: 613-614; Courtright, 2007: 273; George *et al*., 2006: 19). The

use of online information resources may vary with regard to the level of studies and disciplines. Tariq *et al*. (2015: 258) further state that a trend in the usage of information can be observed at a higher level of study; for example, academics in their master's or doctoral programmes. This involves accessing and making use of online resources within IRSs on a frequent basis (Tariq *et al*., 2015: 258).

2.5.6 IRS and personal collection of information

In academic contexts, information can often be searched for and collected for personal use in a purposive manner (Johnson, 2003: 736; Kingrey, 2002: el). Fourie (2011: 769) and Jones (2007: 453) report on the value of personal information management (PIM). Elsweiler and Ruthven (2007: 1) also report findings in this regard, for example noting that the features of PIM research are that many IRSs have been designed to assist the users' management and refinement of information in order to complete tasks. Furthermore, Elsweiler and Ruthven (2007: 1) state that users collect information according to their unique tasks and thus develop collections that are intrinsically linked to their personal experiences. Support offered by IRS functions and features for personal collection of information and sharing of information is thus important and is in fact offered by some IRSs (see also the features noted in Table 2.1).

2.6 EVALUATING IRSs IN ADDITION TO NOTING INFORMATION BEHAVIOUR IN CONTEXT

As noted in the introduction to this chapter, various facets of IRSs and their use need to be noted, namely users' intentions, personal characteristics, the data and systems available for searching, including users' awareness of their information needs. In addition, the importance of evaluating IRSs *per se* needs to be noted as background to this study. IRSs such as databases can be assessed from the user perspective (i.e. how it meets users' information needs or points of view and requirements in IR) (Case, 2012; Hepworth, 2007; Ellis, 1989). This includes studies falling under information behaviour, noted in section 2.4, and studies on the user-friendliness and human-computer interaction of IRS interfaces (Calhoun, 2014: 1; Kowalski, 1997: 27), where the focus is specifically on how users experience the IRSs.

When evaluating an IRS, it is also important to understand the components of the system and the methods that the system may use (Korfhage, 1997: 11). In order to measure the effectiveness and efficiency of IR, the collection needs to be tested. According to Manning *et al*. (2008: 140) and Craswell (2000: 27-28), there are three items that need to be evaluated, namely the document

collection, the test suit of the information needs and a set of relevance judgments (normally a binary assessment of either relevant or non-relevant for each query-document pair).

There is also the system's or technical point of view (Ingwersen & Jàrvelin, 2005). Some research projects taking a system's point of view have been noted in Chapter 1 (Section 1.1.2), for example projects by Belkin *et al.* (2004: 1), Ingwersen (1992: 11) and Shimray (2013: el). Numerous studies have reported on the evaluation of the effectiveness and efficiency and other technical issues of IRSs. Lewandowski (2014: 1) conducted research that is based on the evaluation of search engine quality. In order to conduct the research, a retrieval effectiveness test was conducted. This measured the effectiveness of search engines. According to Lewandowski (2014: 1) and Mizzaro (2004: 7), the methods used were inadequate for evaluating web search engines, as the results differed from other IRSs. The investigation showed that users rarely view more than the first page of results when searching, because there are too many sources that are tagged with metadata to the specific search terms used. These search engines tend to add additional results such as newspaper articles, videos and images, thereby increasing the pages of results (Lewandowski, 2014: 3). Still, search engines and tools such as Google and Google Scholar have been noted as preferred IRSs for many users (Williamson & Mirza, 2015: 211). Google Scholar has gained a powerful position, as libraries have yet to develop an effective means of searching across IRSs (Williamson & Mirza, 2015: 211). This makes Google Scholar the default search mechanism for scholarly works across multiple disciplines (Williamson & Mirza, 2015: 211). Google Scholar further offers many options for academic libraries to develop their IR collection (Williamson & Mirza, 2015: 211).

According to Xie and Cool (2009: 477), as well as Blandford and Buchanan (2003: 2), there are many concerns that deal with IR concerning how to support users effectively in their interaction with digital information resources that may be unfamiliar to them. Xie and Cool (2009: 477) state that there are new searching environments where users face a variety of requirements, leading to them learning to use the new IRSs. This includes browsing, refining and evaluating the results found. Xie and Cool (2009: 479) further state that systems are designed to assist users in overcoming searching issues and making better use of the advanced searching methods by a variety of names including intelligent IRSs, explanation systems, contextual help systems, recommender systems and relevance feedback systems (Xie & Cool, 2009: 479; Blandford & Buchanan, 2003: 2-3). Much of the research that has been conducted on IR focuses on the evaluation of the help features, including the users' experiences with various help functionalities, for example to assist users with formulating search queries, providing context-sensitive help and

allowing access to tutorials and frequently asked questions as help functionalities to users (Xie & Cool, 2009: 479). This combines a system and user-centred approach.

According to Kowalski (1997: 224) and Craswell (2000: 27-28), there are many reasons for the evaluation of the effectiveness of an IRS. These are aiding the selection of the system to procure, monitoring and evaluating the system's effectiveness, evaluating the query generation process to determine improvements, providing the inputs for a cost-benefit analysis of an information system and determining the effects of changes made to an existing information system. According to Manning *et al.* (2008: 140), a document is relevant if it addresses the stated information needed, not only because it contains all the words in the query. The numerous issues important in the effective and efficient functioning of IRSs and their use are also clear from the six criteria identified by Chowdhury (2010: 284) for the evaluation of IRSs. These are reflected in Figure 2.2.

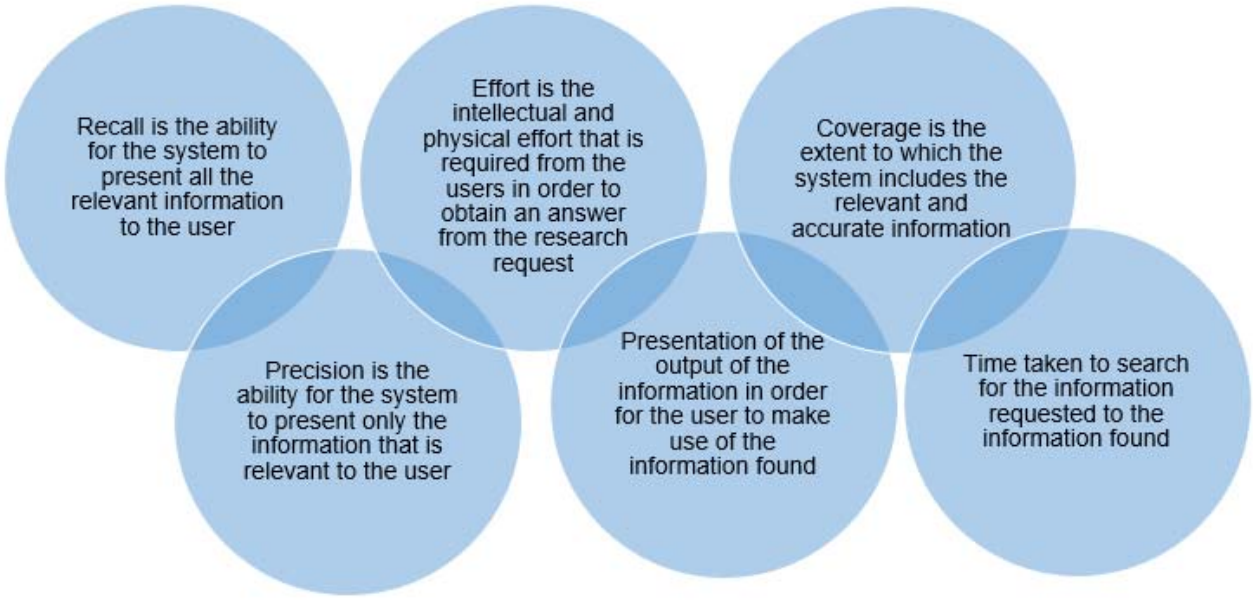


Figure 2.2: Criteria used to evaluate IRSs (Chowdhury, 2010: 284)

Relevant items refer to those documents that contain information that aid or help the researcher in answering his/her queries (Kowalski, 1997: 4). Non-relevant items refer to those items that do not provide any direct or useful information (Kowalski, 1997: 4). Therefore, the two possibilities with regard to each item include information being retrieved or not retrieved by the user's queries (Kowalski, 1997: 4). The following equations are used to calculate the precision and recall of an IRS:

- Precision = number of retrieved relevant items divided by the total number of retrieved items (Inkpen, 2015: 14; Kowalski, 1997: 4).
- Recall = number of retrieved relevant items divided by the number of possibly relevant items (Inkpen, 2015: 14; Kowalski, 1997: 5).

According to Kowalski (1997: 5), precision measures the aspect of IR overhead for a user related to a particular search. The various types of tests implemented in IRSs are design-formal modelling, analytical studies, simulations, laboratory tests and user tests (Inkpen, 2015: 14; Korfhage, 1997: 11). For this research study, the systems will not be tested; however, the functions will be looked at, in order to determine whether the academics use the selected value-added functions and services of IRSs effectively. This study, however, did not work from a systems point of view (Ingwersen & Järvelin, 2005), but a user's point of view (Case, 2012) and more specifically the point of view of a user in context (i.e. an academic context) (Courtright, 2007; Ingwersen & Järvelin, 2005).

Onwuchekwa and Jegede (2011: 110) and Chowdhury (2010: 10) argue that in order for an IRS to be effective, provision must be made for several features and functions. The features they note are portrayed in Figure 2.3. These can be aligned and supplemented with the value-added features and functions (see Appendix E) that have been selected for the purpose of this study.

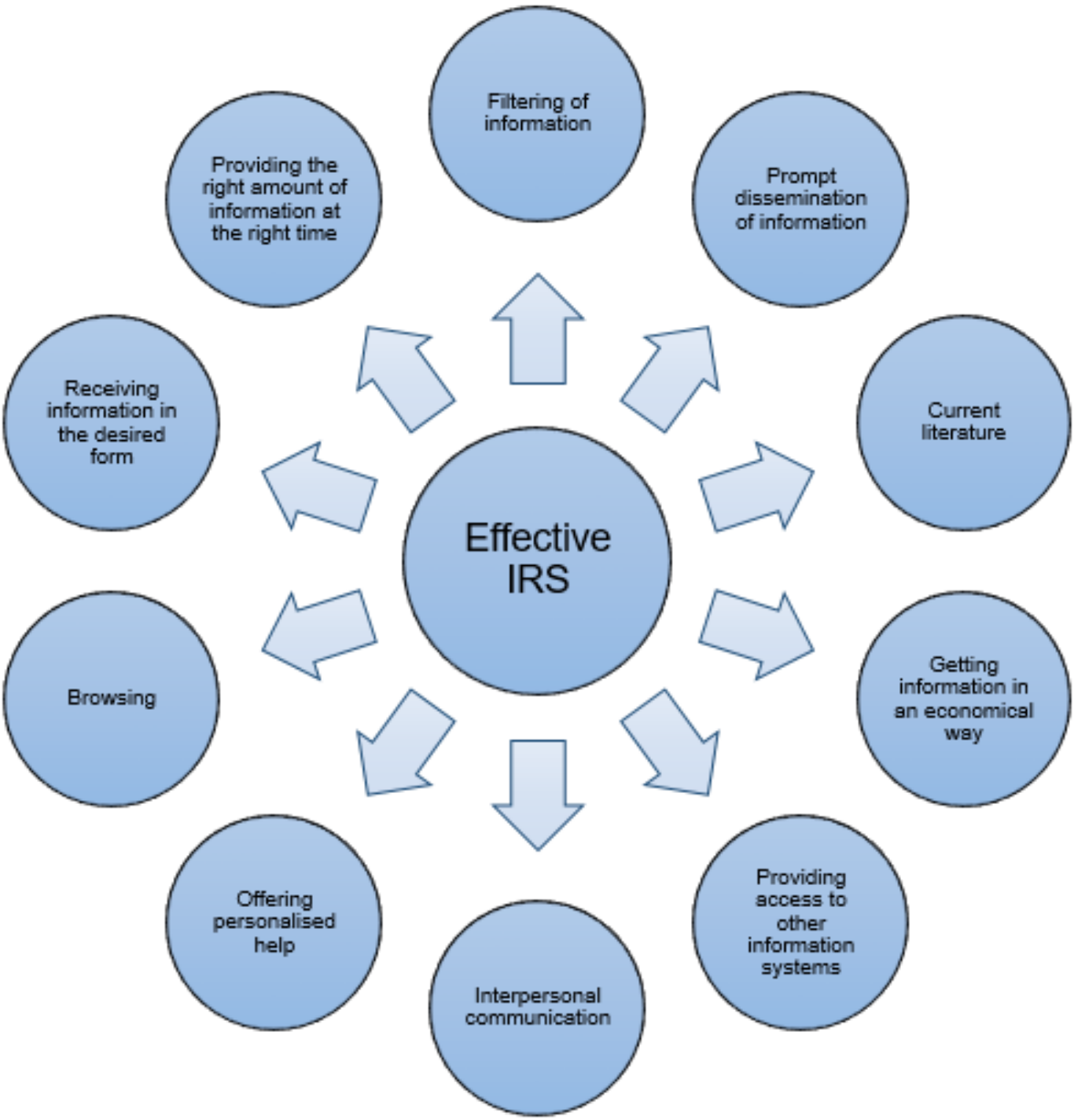


Figure 2.3: Features and functions required for effective use of IRSs (Onwuchekwa & Jegede, 2011: 110; Chowdhury, 2010: 10)

In sections 2.3.2 and 2.6 typical functions and value-added functions of IRSs and findings from studies on information behaviour in context, information use and personal collection of information were noted. In this section (2.6) the assessment of IRSs from a system as well as user-centred approach was discussed. In conclusion, features and functions typically associated with effective use of IRSs *per se* are presented in Figure 2.3. The issues noted in these two sections and the models of information behaviour will serve as theoretical frameworks in guiding the empirical component of this study.

2.7 MODELS OF INFORMATION BEHAVIOUR THAT ADDRESS CONTEXT, TASKS AND IR

With regard to focus on IR as one of the core information activities falling under information behaviour, six models are especially worth noting for a study on IRSs and information behaviour in academic contexts. These are the models of Wilson (1981 [two models], 1996) (information behaviour models), Leckie, Pettigrew and Sylvain (1996) (information seeking of professionals model), Kuhlthau (1991) (model of information search process) and Ingwersen (1991) (simplified cognitive model of interaction). Some of these models specifically also refer to context, for example Wilson's models (1999: 250-251).

According to Tahira (2010: 2) and Anwar (2007: 26), different theories and schematic models have been presented by scholars in different fields of Information Science, Library Science and Communication Studies. Tahira (2010: 2) states that "Leckie, Pettigrew, Sylvain, Wilson, Ellis, Haugan, Cox, Hall, Kuhlthau, Dervin, Fidel, Petersen and Goldbold have made the efforts to present and revise the models and theories in a structured way." Although the model of Leckie, Pettigrew and Sylvain (1996) does not specifically refer to context in the graphical portrayal of the model, their article deals in detail with the importance of context, as well as the impact of context on the work environment, roles and tasks. Such models need to be noted, as they can serve as frameworks for the empirical component of this study.

The primary model that has been selected to guide this study is Wilson's (1996) information behaviour model. The reason for selecting this model is that it has been the framework for many information behavioural studies and has been adapted by many researchers, for example in a recent study reported by Bawden and Robinson (2015: 1965). The other information-seeking and behaviour models presented here have been used to supplement this model, for example with regard to considering the context or environments in which participants (i.e. the users of the IRS)

worked, the tasks that can be completed and the feelings that may influence the users when they are searching for information.

2.7.1 Wilson's models of information behaviour

Wilson developed several models of information behaviour that were considered as theoretical framework for this study. Figure 2.4 presents the 1996 information behaviour model (Wilson 1996). It can be used to study and describe the information behaviour of individuals (see Figure 2.4), and specifically notes the context of information needs and the person-in-context.

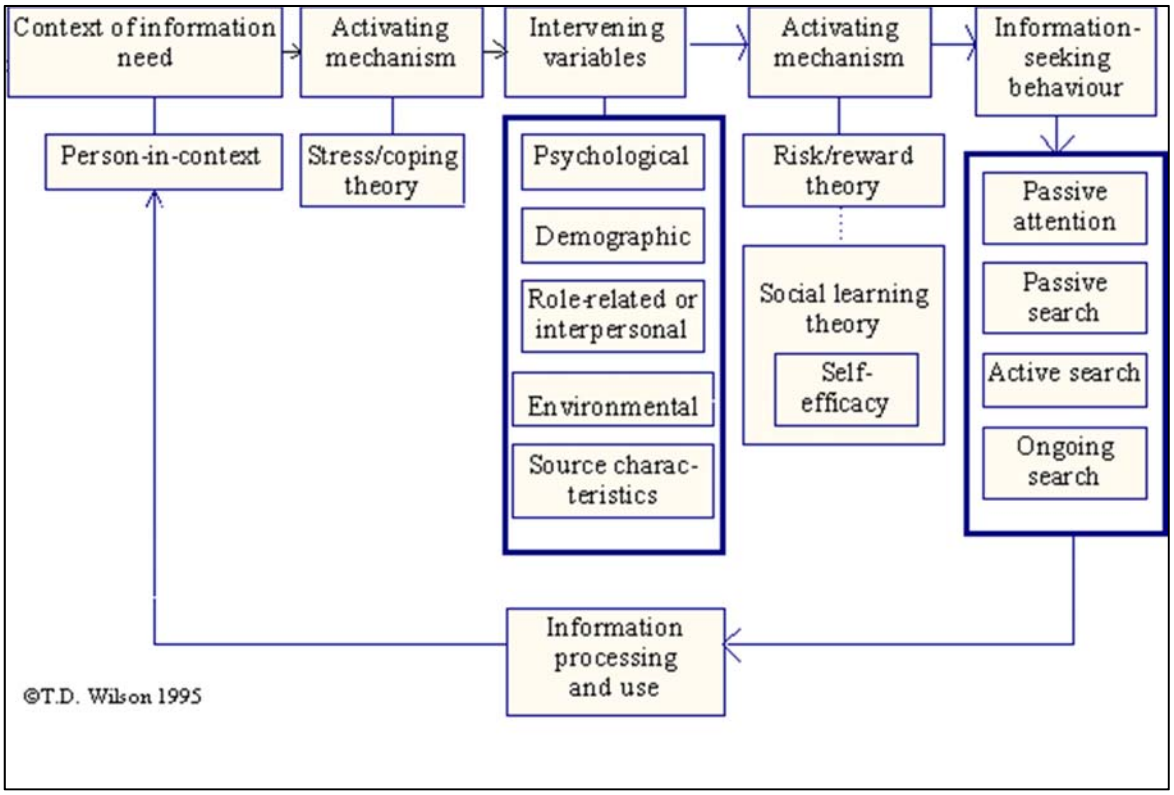


Figure 2.4: Wilson's (1996) information behaviour model (Wilson 1999: 257)

Apart from highlighting the importance of context, the 1996 model notes different types of information seeking: passive attention, passive search, active search and ongoing search (Wilson (1996). For the purposes of this study, the "person-in-context' will be the academics. The intervening variables, such as role-related or interpersonal and environmental factors, as well as information use, are also important for the purpose of this study. Ongoing search (referring to the use of RSS feeds or alerting services) is important as well.

Wilson's (1981) general model of "information behaviour" is noted here because the model addresses information-seeking behaviour and the manner in which users make use of information systems and sources. This model is depicted in Figure 2.5.

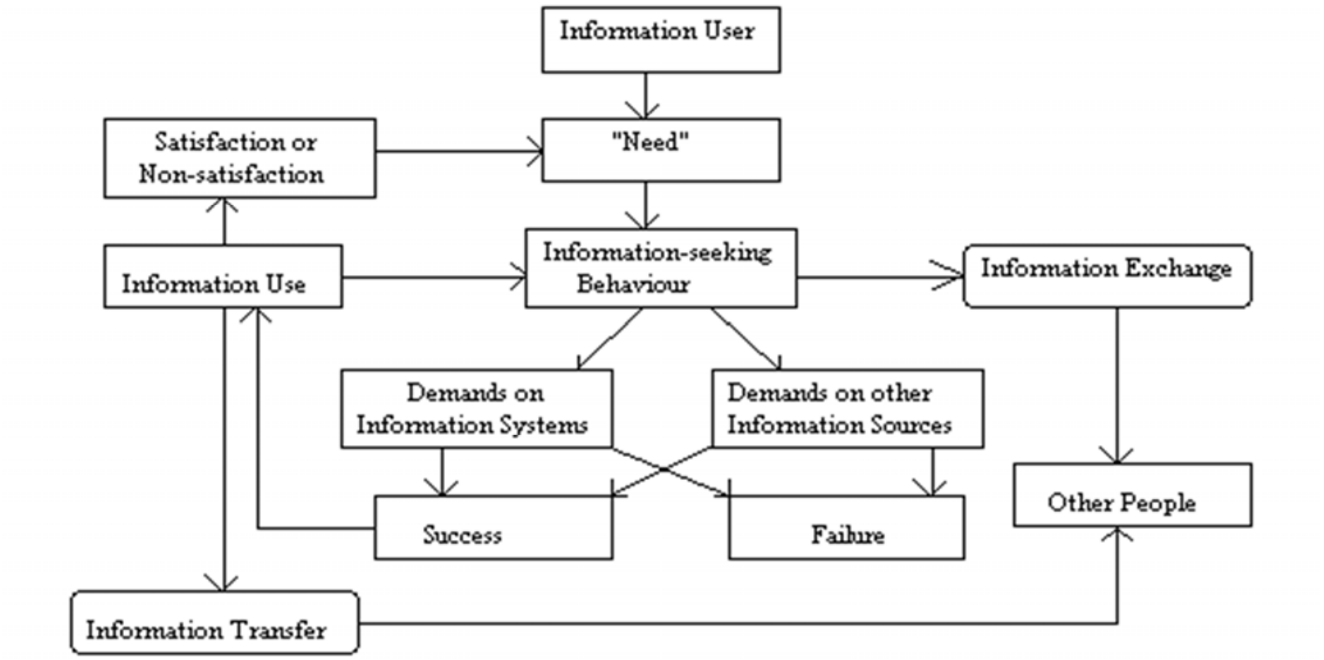


Figure 2.5: Wilson's (1981) information behaviour model (Wilson, 1999: 251)

The 1981 Wilson model outlines the various areas that are covered by what Wilson proposed as information-seeking behaviour and the needs of the individual searching for information (Matsveru, 2014: 67; Wilson, 1999: 8). Wilson's 1981 model suggests that information-seeking behaviour arises from the consequences of a need that is experienced by an information user (Wilson, 1999: 8). The information-seeking behaviour, for example, using a database or other IRSs, can result in satisfying the need by making use of formal or informal information sources and services (Matsveru, 2014: 67; Wilson, 1999: 8). This may result in failure or success to find information relevant to the information needs, as well as reliable information (Wilson, 1999: 8). Researchers such as Byström and Hansen (2005), as well as Vakkari (2003), have noted that information needs and information seeking are often influenced by roles and specifically the tasks for which people are responsible (Meyer, 2009: el). This was also noted in an earlier model proposed by Leckie, Pettigrew and Sylvain (1996) with regard to the information seeking of professionals (discussed in the next sub-section). The 1981 Wilson model specifically also refers to the exchange of information, the transfer of information and interaction between people and the importance of information needs triggering information seeking. These are all behaviour that

can be supported by IRSs. From later models that also acknowledge the work of Wilson, such as the models of Byström (1999), Vakkari (2003) and Leckie, Pettigrew and Sylvain (1996), work tasks and roles have been noted to have an important influence on information needs.

2.7.2 Leckie, Pettigrew and Sylvain's model of the information seeking of professionals

The model by Leckie, Pettigrew and Sylvain (1996) portrayed in Figure 2.6 has also been considered for this study, as it indicates that work roles and tasks can guide information-seeking behaviour. Although not explicitly shown in the model, context features strongly in the article in which Leckie, Pettigrew and Sylvain (1996) discuss their model.

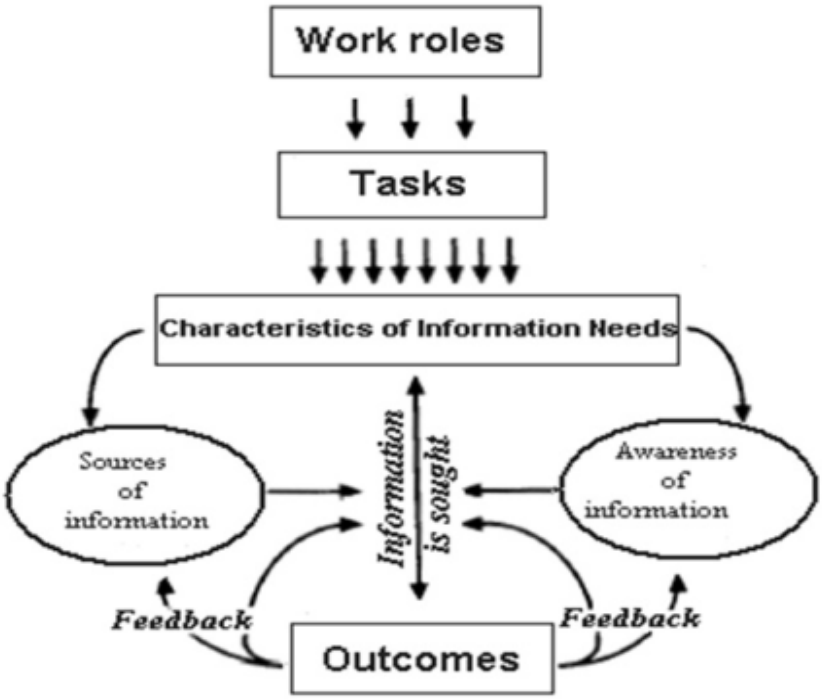


Figure 2.6: Leckie, Pettigrew and Sylvain's (1996) information seeking of professionals model

(Leckie *et al.,* 1996: 160)

Leckie, Pettigrew and Sylvain (1996) identified six major components in their model. These are work roles, associated tasks, characteristics of information and three factors affecting the information-seeking process, namely awareness, sources and outcomes (Tahira, 2010: 17; Anwar, 2007: 26-27; Xie, 2007: el). The model shows that work roles and tasks are part of individuals' (professionals') daily practices that influence their information needs (Tahira, 2010:

17; Anwar, 2007: 18). Leckie, Pettigrew and Sylvain's (1996) investigation concluded that lawyers and engineers, two groups of professionals, have immediate information needs and need immediate access to information (Tahira, 2010: 17). They thus expect fast communication owing to the rapid advances in technology, as well as wide and universal access to the internet, search engines and mobile technologies when searching for information (Tahira, 2010: 17). Although this model makes reference to information professionals, there is a difference between professionals in practice and academics (Bitso & Fourie, 2014: 3). The model was, however, considered for the purpose of this study, as it was noted to have value for non-professionals operating in a context as well. This was confirmed by Veinot (2007: 158-159).

According to Vakkari (2003: 452), various aspects of information seeking is entrenched in the process of task performance. Therefore, search tactics used are systematically linked to the task performance of users (Vakkari, 2003: 452). Most users make use of search-supporting tools; however, these may vary owing to the features of the tasks (Vakkari, 2003: 452). For this study it was thus necessary to consider the tasks of participants and the impact of these on their use of the value-added features of IRS.

2.7.3 Kuhlthau's model of the information search process

Kuhlthau designed a model based on the information search process. Kuhlthau's model furthermore focuses on the conceptualization and development of tools to understand the information search experience of individuals within various library and information settings (Kuhlthau *et al*., 2008: el). Kuhlthau's information search process model reveals that students were involved in complex processes of collecting and reporting of information found (Kuhlthau *et al*., 2008: el).

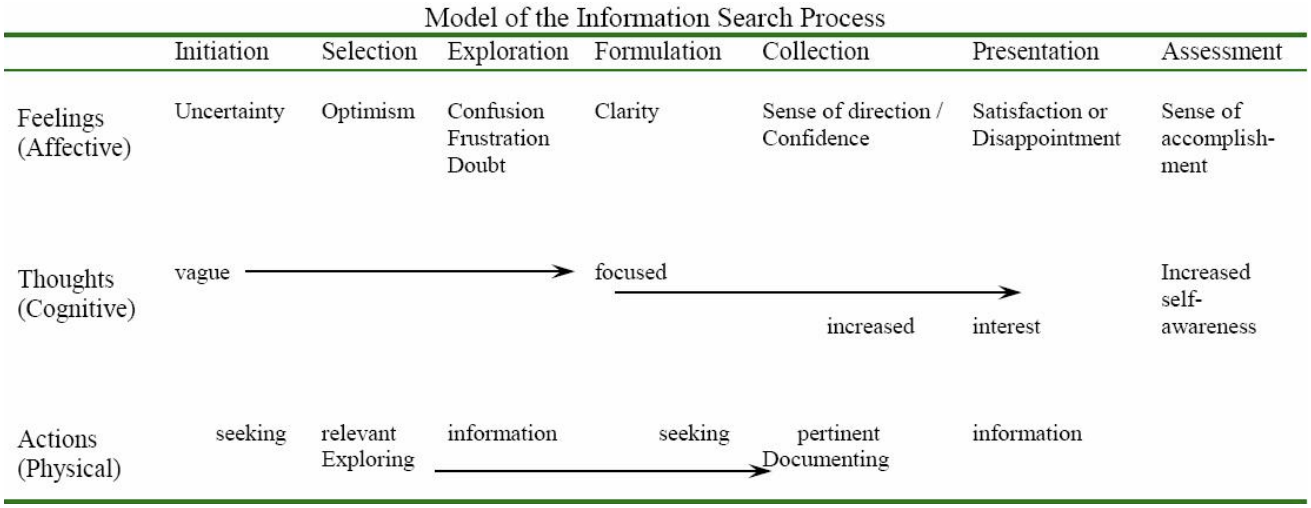


Figure 2.7: Kuhlthau's (1991) model of the information search process (Case, 2012: 145)

Kuhlthau's information search process model allows for various processes: initiation, selection, exploration, formulation, collection, presentation and assessment. It also allows for feelings, thoughts and actions at various stages, thus showing that each user has a unique information-searching process that is affected by multiple factors. Each user has his or her own thinking process and searching techniques that influence information gathering and retrieval. This has for example been confirmed by the studies of Case (2012) and Savolainen (2015).

2.7.4 Ingwersen's model of the IR process

Ingwersen developed various versions of what is referred to as a cognitive model to IR (Ingwersen & Järvelin, 2005: 1). The 1991 version of this model is presented in Figure 2.8.

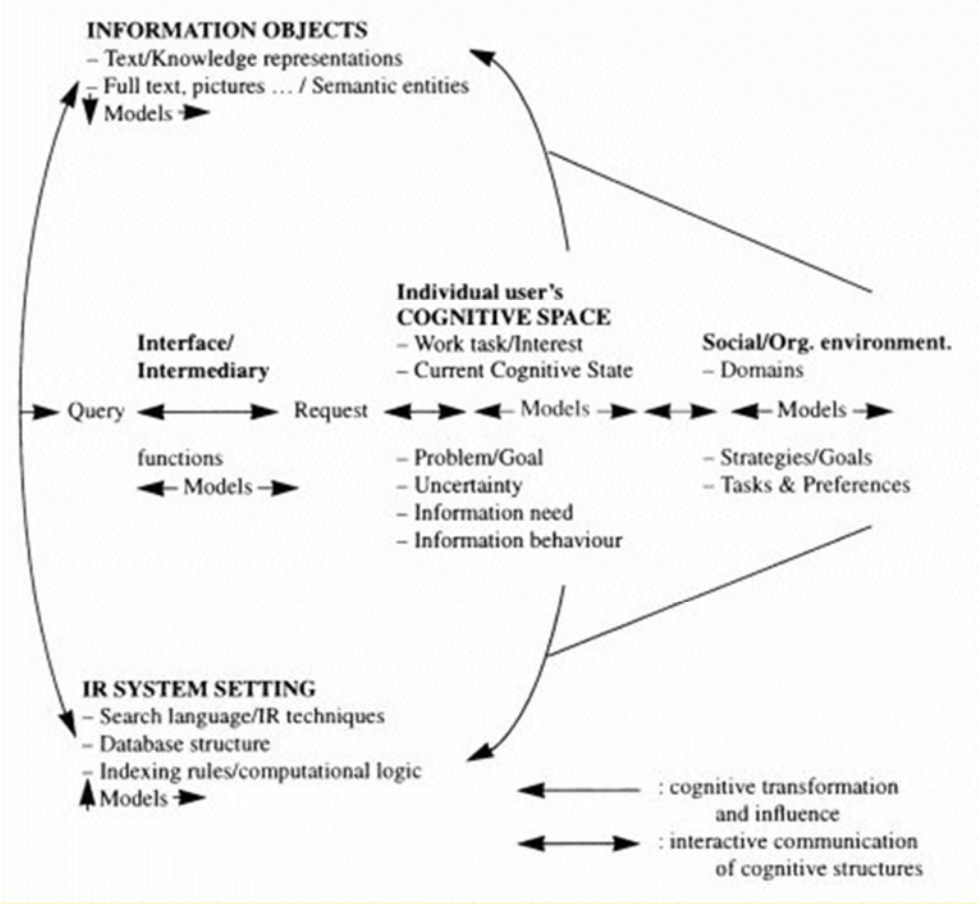


Figure 2.8: Ingwersen's (1991) simplified cognitive model of interaction (Wilson, 1999: 259)

The model of Ingwersen showcases information objects and the IRS setting, as well as the interface, the user in the environment and the importance of cognitive awareness and interaction. The model illustrates the importance of the IRS interface and recognition of the individual user's cognitive space (i.e. the user's own knowledge). Figure 2.8 further illustrates the IRS setting, which includes the IR techniques incorporating the special features and services that have been discussed in section 2.3.2, as well as the database structure. This is important in terms of the logical sequence in which the database is structured in order to allocate the relevant information according to the query of the users and the search techniques.

2.7.5 Ingwersen and Järvelin's model of the IR process

Ingwersen and Järvelin proposed a framework that was based on the cognitive model of IR interaction as well as the integrated information seeking and retrieval research (Ingwersen & Järvelin, 2005: 1-2). Therefore, Ingwersen and Järvelin (2005) incorporated integrated information seeking and retrieval research with a holistic cognitive viewpoint as well as a relevant theoretical and empirical research in information-seeking and retrieval (Ingwersen & Järvelin, 2005: 1-2).

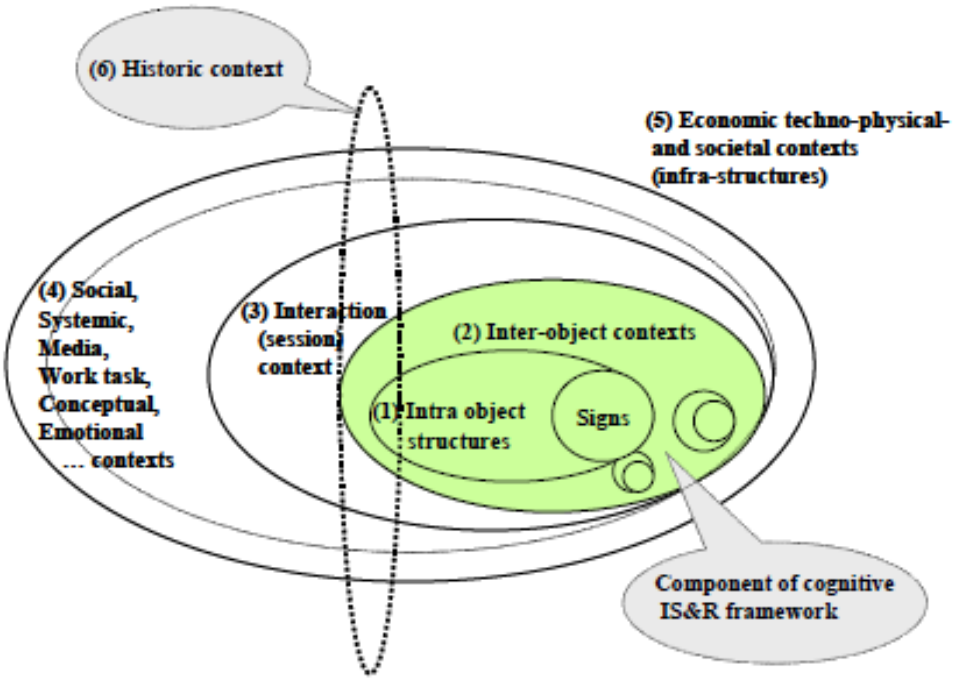


Figure 2.9: Ingwersen and Järvelin's (2005) nested model of context stratification for IR
(Ingwersen & Järvelin, 2005: 1)

The model of Ingwersen and Järvelin (2005) portrayed in Figure 2.9 observes the stratification of the contexts with regard to IRSs. Furthermore, showing the strata range from the traditional content features between the information objects, for example, the words within a paragraph and hyperlink, mouse and eye movements during the users work as well as the daily tasks which includes the use of IR (Ingwersen & Järvelin, 2005: 1). Figure 2.9 further shows that context can be created, designed and developed, delivering performance exceeding that of out-of-context engines in the IR process (Ingwersen & Järvelin, 2005: 1). The nested model of context stratification for IR illustrates the importance of the cognitive information seeking and retrieval framework that was evident in Ingwersen's earlier 1999 model discussed in section 2.7.4. This

can be implied to academics using IRSs as each academic staff member follows a cognitive information seeking and retrieval pattern when searching for information to complete tasks.

All the models discussed in sections 2.7.1-2.7.5 are relevant to the study in that they all relate to IR and searching techniques, as well as the work and tasks that require such IR methods. It can be noted from the information behaviour models that address context, tasks and IR resented between 1981 to 2005 not much changed in terms of IR and context; however, technology, experience and personal needs do have an impact on the manner in which users retrieve information to satisfy their information gaps and needs, and technology has seen drastic changes. For the purposes of this study, the data collected was mainly informed by the Wilson (1996) model, specifically the context of IR. The issues illustrated in table 2.2 also include issues taken from the other models:

Model	Issues/ Factors	Issues featured in the research
Wilson's (1996) information behaviour model	• Importance of context as well as person in context • Factors influencing information behaviour	• Context plays a major role in IR. All disciplines and individuals have a specific manner in which they search and retrieve information
Wilson's (1981) information behaviour model	• Information-seeking behaviours and the use of information systems and sources • Failure or success of finding information relevant to the user's information needs	• Different IRSs and databases have specific features and services that are designed to make searching in the database easier and faster
Leckie, Pettigrew and Sylvain's (1996) information seeking of professionals model	• Information behaviour in context • Factors influencing the work roles and tasks are part of the professional's daily practices	• Academics and researchers' complete multiple tasks with regard to lecturing, researching study topics, updating their knowledge. Each of these tasks influences the manner in which information is searched and retrieved.
Kuhlthau's (1991) model of information search process	• Seven steps in the information search process • User's own thinking process and searching techniques	• The seven steps featured in the model are the exact manner in which many academics and researchers search for information. It still proves to be the process individuals follow when searching for relevant information.
Ingwersen's (1991) simplified cognitive model of interaction	• The importance of cognitive awareness and interaction • The importance of the IRS interface and recognition of individual users	• The ease of use with regard to interfaces allows researchers to find information and allows the users to feel comfortable with using the database and IRSs
Ingwersen and Järvelin's (2005) nested model of context stratification for IR	• The stratification of the contexts • The importance of the cognitive information-seeking and retrieval framework	• Context in which the searches are completed is important; this will direct the users which databases, IRSs and search terms to make use of.

Table 2.2: Overview of models directing the empirical component of the study

2.8 CONCLUSION

In conclusion, information needs and seeking behaviour manifest in all contexts and at different stages of completing tasks such as assignments, research or the work of a professional (Case, 2012: 10-11; Tahira, 2010: 20; Leckie *et al*., 1996: 161). There is no universal model that supports and directs all studies on information needs and information seeking (Tahira, 2010: 20). Information behaviour differs in each context. Information behaviour concerns information seeking, recognition and acknowledgement of information needs, IR techniques and the effective use of all features and value-added services of IRS, such as databases.

IRSs are often evaluated in terms of their collections, effectiveness (recall) and efficiency (precision), with less focus on how people (referred to as users) exploit the features of IRSs that can support information seeking and other information activities, such as information use and information monitoring. A study on the awareness and use of such features and functions in academic contexts would require the combined use of information seeking and IR models for a framework that can guide the empirical component. It will also require consideration of the impact of tasks, acknowledgement of contents and the different stages in information seeking.

Following the literature analysis, the combined use of these three models of information behaviour and information seeking (Wilson 1981, 1996; Leckie, Pettigrew and Sylvain 1996) (with input from other models as shown in Table 2.2) will be considered in section 3.6 and 3.9 to suggest a framework that could guide the empirical component (i.e. data collection and data analysis) of this study. In section 5.3.5 the model accepted as framework for the study will, based on findings from the empirical component, be reconsidered for its applicability to further research.

This chapter covered the literature on IRSs, selected findings from information behaviour and IR studies, as well as the features and services that are provided by IRSs - specifically databases and information service providers, and models that can serve as theoretical framework. The next chapter will deal with the research methodology and choice of research design.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter describes the research methodology that was used to investigate the effective use of selected features of IRSs by academic staff members at the selected institution of higher education. The research design, including the research approach, research methods, overview of the research study and research setting, population and sampling, is discussed. The data collection methods, ethical concerns and ethical clearance, data analysis and the importance of reliability and validity are also discussed. The data collection methods are discussed with regard to the research question and the sub-questions that focus on the following issues:

- Use of databases as IRSs
- Use of value-added features and additional services offered by databases
- Usefulness of features and services.

Findings on these, based on the application of the research design, are discussed further in Chapter 4.

3.2 RESTATEMENT OF THE RESEARCH PROBLEM GUIDING DATA COLLECTION

The goal of the study was to determine to what extent academics are aware of selected value-added features and services of IRSs, how they use these, how they align these with their work-related tasks, what hinders them in using them in relation to various information activities and what motivates them to use these features and services. The objectives of the study were to evaluate and determine whether the academic staff members of the selected departments were aware of the features and services provided by the IRSs and how the use of such features can be aligned with academic tasks. The research study attempted to provide an understanding of whether the identified features were used. If the study determined that the features were not used, it would seek to discover the reason(s) for that. It thus focused on a study of both information seeking and IR behaviour.

The study was guided by the following research question:

> *How are academics exploiting value-added features and services offered by databases in their academic task completion?*

The sub-questions to the research question were provided in Section 1.2 in Chapter 1. However, for this section only the sub-questions that address the empirical component will be restated, thus helping the researcher complete the analysis in Chapter 4. In order to investigate the effective use of IRSs, the following sub-questions were addressed:

(1) What unique functions and special features are available in a selection of IRSs? (Partially answered from the literature; see Section 2.4.4).
(2) What has been reported in the subject literature on academics' use of databases and other IRSs? (has been addressed in Chapter 2).
(3) What is the awareness of the selected features of IRSs by academics in the Departments of Computer Science, Informatics and Information Science?
(4) How do academics use IRS features in the Departments of Computer Science, Informatics and Information Science?

In order to answer the last two questions (each with sub-issues), data had to be collected empirically. The following section provides a discussion on the research design and methodology chosen for the empirical component.

3.3 RESEARCH DESIGN

Research needs a design or structure to guide a researcher in completing the data collection or conducting an analysis of the data (Leedy & Ormrod, 2014; Creswell, 2013; Pickard, 2013; Turner, 2010: 754). Therefore, the research design needs to ensure that the evidence obtained enables the researcher to answer the initial research and sub-problem questions as clearly as possible (Turner, 2010: 754). According to Yin (1989: 29), research design "deals with a logical problem and not a logistical problem". Salkind (2010b: 1252) defines a research design as a plan that provides the logical structures that aid in guiding the researcher to address the research problem and answer the research questions. This is similar to explanations provided by Leedy and Ormrod (2013: 74) and Pickard (2013: 14, 16).

The importance of a research design is that it aids the researcher in understanding what needs to be done and why it is being done (Davies, 2013: el; Kumar, 2011: 94; Blumberg *et al.,* 2005: 195). Once the researcher has decided on the broad areas of the research study or project, he or she needs to establish a good rationale and reason for undertaking the study or project (Davies, 2013: el). The research design aids the researcher in determining how the problem set in Chapter

1 should be addressed (Davies, 2013: el; Kumar, 2011: 94-95; Blumberg *et al.,* 2005: 195). The research design also helps the researcher to determine the testing of the hypothesis and allows the identification of the key deliverables (Davies, 2013: el; Kumar, 2011: 95).

3.3.1 Research approach

When designing the research, some of the key factors the researcher needs to consider is the time-frame and the risks that may be encountered (Davies, 2013: el; Maree, 2008: 3; Blumberg *et al.,* 2005: 195). The research approach will also be determined. According to Creswell (2013: 3), research approaches are defined as the plans and procedures for research that extend from broad assumptions to detailed methods of data collection, analysis and interpretation. Research approaches comprise the following three types:

- *Qualitative research:* This is used to explore and understand the meaning of individuals' or groups' expressed formulations of a social or human problem (Creswell, 2013: 4). This approach involves emerging questions and procedures, as well as data collected in the participant's setting, the data analysis that builds from particulars to general themes, and the researcher's interpretations of the meaning of the data (Creswell, 2013: 4). According to Maree (2008: 257), qualitative research is an inquiry process of understanding where the researcher develops a complex, holistic picture, analysis and detailed views of the participants and conducts the study in a natural setting. A researcher often approaches reality from a constructivist position, thus allowing exposure of multiple meanings of an individual's experiences (Maree, 2008: 257).

- *Quantitative research:* This approach is used for testing theories by examining the relationship among variables (Creswell, 2013: 4). These variables may be measured by instruments in order for numbered data to be analysed using statistical procedures (Creswell, 2013: 4). It can also provide descriptive statistics for a research problem.

- M*ixed methods research:* This approach involves the collection of both quantitative and qualitative data (Creswell, 2013: 4), thus integrating the two forms of data as well as using distinct designs that may involve philosophical assumptions and theoretical frameworks (Creswell, 2013: 4). Quantitative and qualitative approaches are followed when analysing the data. A mixed methods approach can be based on both descriptive and inferential statistics collected through a quantitative approach (Gorman & Clayton, 2005: 12).

The importance of carefully considering the choice of an appropriate research approach is also noted by Leedy and Ormrod (2014), Pickard (2013) and Gorman and Clayton (2005). Each of the approaches has its strengths and weaknesses.

According to Leedy and Ormrod (2013: 98, 139), Pickard (2013: 14) and Johnson and Christensen (2006: el), there are many advantages and disadvantages that can be identified when making use of a qualitative research approach. Table 3.1 reflects some of these advantages and disadvantages:

Advantages	Disadvantages
The data collected is based on the participants' own ideas and meaning	The knowledge produced cannot be used to generalise to other people or other settings
It is useful for studying a limited number of research subjects in depth	It could be difficult to make quantitative predictions
It is useful for describing complex phenomena	The results collected may be more easily influenced by the researcher's personal biases and idiosyncrasies
It can provide the individual's case information	It may be time-consuming to collect the data
It can be used to determine how participants interpret constructs	It may lead to lower credibility with some administrators and commissioners of programs or projects
One can conduct cross-case comparisons and analysis	Analysing the data may be time-consuming
The data can provide an understanding and description of people's personal experiences	
Researchers are able to identify contextual and setting factors	
The data may provide rich detail	
Researchers may be able to study dynamic processes	
The data that is collected is in its naturalistic settings	

Table 3.1: Advantages and disadvantages of qualitative research

There are also advantages and disadvantages that can be identified when making use of a quantitative research approach. Table 3.2 reflects advantages and disadvantages according to the viewpoints of Leedy and Ormrod (2013: 98, 139) and Johnson (2006: 1).

Advantages	Disadvantages
It allows the researcher to generalise the research findings and make possible predictions	The researcher may lose phenomena that may occur because of focusing on theory or hypothesis testing rather than on theory or hypothesis generation
It provides the researcher with precise, quantitative and numerical data	It is time-consuming if the analysis is completed manually
Quantitative methods are useful for studying large numbers of participants	When using a quantitative method, it may ignore very important human elements that may strengthen the research
It is less time-consuming if using software programs	

Table 3.2: Advantages and disadvantages of quantitative research

For this research study, a qualitative research approach of data collection and analysis combined with a descriptive quantitative component of limited scope was adopted. This is considered a mixed methods approach. A mixed methods approach holds the benefit that it allows the researcher to integrate the findings from both the qualitative and quantitative approaches in order to draw conclusions and make recommendations (Pickard, 2013: 18-19), thus using qualitative and quantitative methods in the collection and analysis of data.

3.3.2 Research methods

The research method was a case study. According to Maree (2012: 83), a case study can be understood as a decision on what is to be studied; thus it is not a methodological decision. A case study is defined as an in-depth exploration from multiple perspectives revealing the complexity and uniqueness of a particular project, policy, institution, programme or system in a real-life context (Maree, 2012: 83), as well as the interaction among participants, their tone of voice and their perspectives in a situation. Pickard (2013: 101) states that a case study "can be both the process engaged in to investigate a phenomenon and the written output of that investigation." It is a method designed to study a particular context and has a specific purpose. According to Yin (1989: 1), a case study is "used in many situations to contribute to the knowledge of an individual, groups, organisation, social, political and related phenomenon." Making use of a case study

method allows the researcher to retain the holistic and meaningful characteristics of real-life events (Yin, 1989: 1). This includes individual life cycles, organisational and managerial processes (Yin, 1989: 1). A case study allows a researcher to investigate a contemporary phenomenon in its real-life context (Creswell, 2011: 96). Case studies are often used in social and behavioural science studies (Salkind, 2010a: 115).

It was decided to treat this research study as a case study at one institution of tertiary education, involving three academic departments related to the disciplines involved in various aspects of information studies, such as information organisation, IR and information seeking, information systems and designing information systems. Findings from such a case study can then be used to make recommendations on further exploration of the topic in different academic contexts.

3.4 RESEARCH SETTING

The study was conducted at a tertiary institution in South Africa with a good academic library. The departments that were involved were Computer Science, Informatics and Information Science. The rationale for choosing these departments and the scope of disciplines covered were discussed in Chapter 1 (Section 1.3 and 1.8.2).

3.5 SAMPLING METHOD

Sampling is defined as a method or technique that consists of the selection of participants for the study or research being conducted (Pickard, 2013: 60; Singh, 2012: el; Lohr, 2009: 16-17). A sampling method is further defined by Singh (2012: el) as “the process or the method of drawing a definite number of the individuals, cases or the observations from a particular universe, selecting part of a total group for investigation.” Some characteristics of the sampling technique are that it is cheap, saves the researcher time, is reliable and is suitable for carrying out different surveys (Leedy & Ormrod, 2013, 2016; Singh, 2012: el). The advantages of sampling are that it provides the researcher with accurate results, is economical and when dealing with large groups of individuals or participants, the sampling method is a practical method for collecting data (Pickard, 2013: 59-60; Singh, 2012: el; Lohr, 2009: 17).

The disadvantages of sampling are that there may be inadequate samples, there is a higher chance of bias, it may be difficult to get a correct number of representative samples, informants may be unavailable and there is a higher chance of committing errors in sampling (Singh, 2012: el; Blumberg *et al*., 2005: 249).

The sampling method that was used for this study was purposive sampling. Purposive sampling is used in special situations, where the sample is selected with a specific purpose in mind (Pickard, 2013: 64; Maree, 2008: 178). Researchers may rely on their experience and resourcefulness, as well as previous research findings, to obtain units of analysis purposely in such a manner that the sample the researchers obtain may be regarded as representative of the relevant population (Welman *et al*., 2005: 69).

The researcher made use of purposive sampling, as academic staff members were the target group of the research in order to make recommendations to enable the staff members to make full use of the special features and services of IRSs. The concern of Welman *et al*. (2005: 69) is that the problem with this type of sampling is that different researchers may proceed in different ways to obtain such a sample. Therefore, it is impossible to evaluate the extent to which such samples are representative of the relevant population (Welman *et al*., 2005: 69). Academic staff members from the Departments of Information Science, Informatics and Computer Science were invited with a purpose, as explained in Chapter 1 (section 1.8.2), to participate in this study.

The study also used convenience sampling. Convenience sampling is defined as the selection of a sample of participants from a population that is based on how convenient and readily available the participants are (Salkind, 2010a: 254; Maree, 2008: 177; Blumberg *et al*., 2005: 252) to the user. The cost that may be incurred is furthermore relatively low (Kumar, 2011: 192-193; Salkind, 2010a: 254). The disadvantage to this type of sampling is that the sample cannot be generalised easily to other settings owing to the narrow focus of this sampling technique (Kumar, 2011: 192-193; Salkind, 2010a: 254).

In this case the researcher targeted the academic staff members of three departments in an institution of higher education to which the researcher had easy access. The research settings (departments) were chosen because of the availability of academic staff members to the researcher, and for the disciplinary scope of the departments, as explained in section 1.1.1, thus combining a purposive and convenience sampling technique.

3.6 DATA COLLECTION

Data collection is defined as the gathering of data using a range of methods such as questionnaires, surveys, observations, interviews and standardised tests (Blumberg *et al.,* 2005: 74; Welman *et al*., 2005: 13, 134).

Harrell and Bradley (2009: 2) define data collection as the process of gathering and measuring information on variables of interest. It thus enables a participant to answer research questions as well as the researcher to test hypotheses and evaluate outcomes (Harrell & Bradley, 2009: 2-3). This has been confirmed by the Department of Health and Human Service (2012: el). The following data collection methods were chosen to gather data to answer the research question posed.

3.6.1 Electronic questionnaire

An electronic self-administered semi-structured questionnaire was used for this study. The type of questions that are used for questionnaires can be subdivided into two categories, namely open-ended and closed-ended questions (Maree, 2008: 160). Open-ended questions are used when the researcher requires words, phrases or comments (Pickard, 2013: 218; Maree, 2008: 161). Closed-ended questions are used to test research hypotheses, for example, a researcher requires a single response, choosing an answer or making use of a scale (Kumar, 2011: 151; Maree, 2008: 161). The advantages of open-ended questions are that they help participants to provide honest and detailed answers; their thinking process may be revealed to the researcher and the complex question posed can be adequately answered by the participant (Pickard, 2013: 207-208; Kumar, 2011: 148; Maree, 2008: 161).

The disadvantages of open-ended questions are that as the amount of information may differ among the participants, the coding of answers may become difficult for the researcher, it may be time-consuming, as participants need to think about the answers, and the statistical analysis may become difficult (Kumar, 2011: 148; Maree, 2008: 161).

According to the University of Portsmouth (2012: el) and Kumar (2011: 148) the advantages of questionnaires are that they allow for a large number of participants, they can be used as a demonstrative sampling method, the questions posed can be highly structured and it is easy to code responses. Numerical testing may be made possible and participants can have enough time to consider the questions and provide appropriate, well-considered answers. It is also one of the most economical options to cover a large geographical area (University of Portsmouth, 2012: el; Kumar, 2011: 149).

The University of Portsmouth (2012: el) further discusses the disadvantages of questionnaires. The questions are not administered face to face and there is a possibility of a low response rate.

The participants may not be able to understand the questions fully, thus misinterpretations and misunderstandings may occur, as there is no interaction between researcher and participant (University of Portsmouth, 2012: el; Kumar, 2011: 149). The questionnaires are not able to tell the researcher about the context and meaning behind a response of the participant (University of Portsmouth, 2012: el; Kumar, 2011: 149).

3.6.2 Interviews: focus group and individual interviews

Focus group interviews are sometime also referred to as focus groups. According to Welman *et al*. (2005: 201), focus groups can be described as grouped in-depth interviews. The groups consist of a small number of individuals who are brought together for the purpose of expressing their opinions and answer a specific set of open-ended questions (Pickard, 2013: 244; Welman *et al*., 2005: 201).

The purpose of a focus group interview is based on the collection of qualitative data (Pickard, 2013: 244; Welman *et al*., 2005: 201). The aim of using focus group interviews is not to replace individual interviews, but rather to collect information that can perhaps not be collected easily by means of individual interviews (Flick, 2014: 250-251; Welman *et al*., 2005: 201).

The advantages that have been identified by Welman *et al*. (2005: 203) and others such as Babbie (2013), Leedy and Ormrod (2013) and Creswell (2011) are that focus groups provide the researcher with sources of information that might be obtained rapidly and inexpensively. They can be conducted in a wide range of settings and with a vast range of participants. The researcher can be in direct communication with the participants, thus clarifying aspects of the questions of the participants (Flick, 2014: 250; Welman *et al*., 2005: 203). The participants in a focus group can discuss their opinions and experiences with the researcher (Flick, 2014: 250; Welman *et al*., 2005: 203). Focus group interviews may be conducted with participants who are unable to complete self-reporting questionnaires (Welman *et al*., 2005: 203). These interviews may be conducted by means of teleconferencing or face-to-face interaction (Blumberg *et al.,* 2005: 282-283; Welman *et al*., 2005: 203). According to Welman *et al*. (2005: 204), the disadvantages of focus group interviews are that some participants may not be able to express their feelings freely for fear of intimidation because of the presence of other respondents in their group (Welman *et al*., 2005: 204).

3.7 RELIABILITY AND VALIDITY

Validity and reliability are terms used in research methodology. The validity and reliability of the measurement instruments influence the extent to which the researcher can learn something about the phenomenon the researcher is studying (Leedy & Ormrod, 2014: 91). It concerns the probability that the researcher will obtain statistical significance in the data analysis and the extent to which the researcher can draw meaningful conclusions from the data in order to formulate appropriate recommendations (Leedy & Ormrod, 2014: 91).

According to Leedy and Ormrod (2014: 91), the "validity of a measurement instrument is the extent to which the instrument measures what is supposed to be measured." Internal validity relates to the manner in which a causal relationship is demonstrated (Pickard, 2013: 22). When inspecting causal relationships, there are two sets of variables, namely the dependent variable of the outcome and the independent variable. These variables can be manipulated in order to determine a relationship (Pickard, 2013: 22).

External validity is focused on the extent to which the findings from the investigation may be generalised to the wider context. It depends on the sample used when conducting the investigation and to what extent it may represent the broader population (Pickard, 2013: 22). Thus demonstrating the statistical examination of probability and the significance of the sample is paramount (Pickard, 2013: 22).

Reliability is "the consistency with which a measuring instrument yields a certain result when the entity being measured hasn't changed" (Leedy & Ormrod, 2014: 93). According to Pickard (2013: 22), reliability is concerned with the stability of the research findings over time as well as across locations. The test and retesting methods are used to demonstrate reliability. Pickard (2013: 22) further states that "the research may be conducted more than once and by other researchers, if the results are found to be significantly similar then reliability is accepted." According to Leedy and Ormrod (2014: 91) both validity and reliability thus reflect the degree to which the researcher learns of the error of the measurements.

Before applying the data collection methods, a pilot study was conducted to test the methods. In order to do so, an Information Science post-graduate student employed at the institution's library as a junior information specialist was asked to complete the questionnaire and participate in the interviews. This allowed the researcher to determine the time taken to complete the data collection

and to assess whether the questions posed were relevant and easy to understand. No problems were experienced with this. In addition, since questions in both the questionnaire and for the individual interviews/focus group interview were developed from findings of the literature review, this ensured the reliability and validity of the research study in noting possible information trends and patterns that may be found once the data has been analysed.

3.8 ETHICAL CONCERNS

According to De Vos *et al.* (2011: 129), ethics is defined as a set of acceptable morals and principles that offer rules including behavioural expectations of the most acceptable and correct conduct towards the participants of the research study. De Vos *et al*. (2011: 126) state that all universities, research institutions and major welfare organisations have ethics committees. These committees review the research according to strict guidelines and procedures before the researcher is allowed to go ahead with administering the research and the research methods (De Vos *et al*., 2011: 126). Ethics play an important role in protecting the participants from researchers who undertake unethical projects that do not serve the purpose of the research (De Vos *et al.,* 2011: 126).

The main aim of an ethics committee is to ensure that the risks faced by participants with regard to the research are minimal (De Vos *et al*., 2011: 126). Furthermore, De Vos *et al*. (2011: 126) state that an ethical clearance number relating to a specific project is usually provided by the universities, researcher institutions and major welfare organisation committees.

As an ethical consideration, the information obtained from participants needs to remain confidential (Kirkless Council, 2014: 5). In this regard, the participants need to be reassured that the information they provide in the questionnaire and through the focus group interviews will remain confidential. They will also need to be informed about the intentions of the research and the potential use of the information (Kirkless Council, 2014: 5). According to Welman *et al*. (2005: 201), a researcher needs to pay attention to four ethical considerations:

- *Informed consent:* the researcher needs to obtain the necessary permission from the participants in order to do the research
- *Right to privacy:* the participants need to be assured that their identities will remain anonymous

- *Protection from harm:* the participants should be assured that they will be indemnified from any physical or emotional harm
- *Involvement of the researcher:* the researcher needs to guard against manipulating the participants or treating them as objects or numbers rather than individual human beings

When administering the questionnaire, a participant's identification and personal information should not be disclosed (Kirkless Council, 2014: 5). For this research study, personal information such as name, surname and date of birth or gender was not asked. The study also adhered to all other ethical issues such as signed informed consent for participation in the questionnaire and focus groups and for tape-recording. The researcher transcribed the information collected through tape-recording by making use of a coding system, such as individual participant 1 (P1) or focus group participant 1 (FP1) to record the information and to ensure the anonymity of the participant, but also making it possible to trace and verify statements at a later stage if needed.

The researcher applied for ethical and research clearance from the faculty committee for research ethics as well as the dean of the faculty where the case study was conducted. The Research Committee of the Department of Information Science (University of Pretoria) (where the study was supervised) approved the documentation, including the questionnaire and interview schedule for the study.

The researcher had to ensure that the participants' information remained confidential by undertaking the following:

- The information provided by the questionnaire was reported in an aggregated format that did not discriminate against any individuals.
- When recording the interviews, participants were not asked their names or encouraged to use names of their colleagues or acquaintances.
- The participants completed a form granting informed consent in an electronic format for the questionnaire and a printed form of informed consent for the individual and focus group interviews, stating whether or not they agreed to participate in the study and for the interviews to be recorded.

The participants' information could therefore remain anonymous and it was confirmed with participants that the data would not be used for any other research or purposes other than the mini-dissertation, an article(s) and conference paper(s).

3.9 DATA ANALYSIS

Rice-Lively, cited in Williamson (2002: 293), states that "data analysis is the process of bringing order, structure and meaning to the mass of collect data." Data analysis is defined as the processed extracting, compiling and modelling of raw data for the purpose of obtaining constructive data and information that will enable the researcher to formulate conclusions and predictions on the outcomes and support decisions in specific settings (InvestorWords, 2015: el; Pickard, 2013: 274; Blumberg *et al.,* 2005: 75). In an exploratory study data analysis can be defined as a statistical tradition that provides the researcher with conceptual and computational tools in order to discover patterns that allows one to develop a hypothesis (Behrens, 1997: 131).

Exploratory data analysis can be viewed as a method for comparing observed data to the data that would be obtained under an implicit or explicit statistical model, as stated by Gelman (2004: 755). Furthermore, an exploratory data analysis makes use of various techniques that includes maximising insight into the data set, extracting important variables and testing underlying assumption that may arise (Gelman, 2004: 770).

3.9.1 Analysis of data collected by electronic questionnaires

Various methods can be used for data analysis (Pickard, 2012: 267; Maree, 2008: 99). The methods differ according to whether quantitative or qualitative data is analysed (Pickard, 2012: 268; Maree, 2008: 99). The researcher made use of an Excel spreadsheet, which is automatically compiled by Google Forms, to complete the quantitative data analysis for the questionnaires. This made it easier to analyse the data, as the researcher could make use of formulas to help search for specific data and information. An alternative that quite often features in textbooks on research methods for quantitative data is statistical package for social sciences (SPSS) (Pickard, 2013: 304). SPSS has become one of the standard analytical tools that make analysis easier and ensure fewer errors and less time taken by the researcher to conduct quantitative research (Pickard, 2013: 304). Researchers are able to extract meaningful information from the data collected through quantitative research methods. SPSS allows the researcher to complete a thorough analysis of the data with in-depth statistics and charts (Pickard, 2013: 305).

3.9.2 Analysis of data collected by the focus group and individual interviews

For qualitative data analysis, content analysis and thematic analysis are widely noted (Maree, 2008: 101 Braun & Clarke, 2006: 2). For this study thematic analysis was used. According to Braun and Clarke (2006: 6), thematic analysis is a method that is used to identify, analyse and

report patterns that may emerge when analysing the data collected. A thematic analysis can be used to identify the data collected that is related to patterns that have emerged from the data as well as through the literature review (Aronson, 1995: 3). Thematic analysis allows the researcher to organise and describe the data collected in rich detail and the researcher may interpret various aspects of the topic being investigated (Braun & Clarke, 2006: 6).

For this study an audio recorder was used, with signed consent from participants, to capture the data. The interviews were freely transcribed and then thematic analysis was applied according to guidelines by Braun and Clarke (2006: 6) and Flick (2014: 421-422), namely:

- Familiarisation with the data
- Generation of the initial codes
- Search and identification of themes
- Reviewing of themes
- Defining and naming of themes
- Reporting the themes and supporting verbal confirmation of themes.

The qualitative data analysis reported in Chapter 4 will be guided by these analysis guidelines.

3.10 CONCLUSION

In conclusion, the chapter summarised the research design, research methodology, research methods, data collection methods and sampling approach adopted by the researcher. The chapter also addressed adherence to ethical issues and the analysis of qualitative and quantitative data. The researcher applied the findings of the literature review to the research methodology in order to investigate the effective use of value-added features and services of IRSs by academic staff members. The following chapter will present the findings of the questionnaire and focus group and individual interviews.

CHAPTER 4: DATA ANALYSIS

4.1 INTRODUCTION

The purpose of this chapter is to describe the data that has been collected during the empirical component of the study, using an electronic questionnaire, a focus group interview and individual interviews. The empirical study was done from September to November 2015. The electronic questionnaires were administered in September and October and the focus group and individual interviews were conducted in October and November. This chapter includes the background to the study and data collection, the findings and analysis from the questionnaire, as well as the focus group and individual interviews.

The main research question for the study was:

> *How are academics exploiting value-added features and services offered by databases in their academic task completion?*

The empirical component addressed the following sub-questions:

(1) What is the awareness of academics in the Departments of Computer Science, Informatics and Information Science of the selected IRSs features and services?
(2) How do academics in the Departments of Computer Science, Informatics and Information Science use the IRS features and services?

4.2 BACKGROUND TO THE EMPIRICAL COMPONENT OF THE STUDY

This section reports on how the empirical component of the study was conducted, the academic staff composition of the three departments selected for participation, the overview of the data collection methods and the analysis of the information retrieved from the participants from the questionnaire and focus/individual interviews.

An electronic, self-administered questionnaire was used to ask questions about the manner in which the academic staff members of the selected departments made use of IRSs and about the use of value-added features and services provided by the databases subscribed to by the institution's library. The link to the questionnaire, comprising 10 questions with a letter of invitation and consent forms, was disseminated through the emailing list of the School of Information

Technology for academic staff members, including the heads of departments, via the Department of Information Science secretary. Once the questionnaire had been completed, the participants were asked to indicate if they were interested in participating in a focus group or individual interview. If the participants stated that they would like to participate in the interviews, the researcher sent them an appointment invitation to confirm their availability to participate. Thereafter, a focus group interview and individual interviews were set up to ask the academic staff members further questions on the topic. Copies of the questionnaire and the interview schedule are provided in Appendix B (Questionnaire) and Appendix D (Interview – profile questionnaire and interview schedule). A copy of the form for informed consent was provided to each participant, stating that the information provided would remain confidential and asking the participants if they agreed to being recorded in the case of the interviews and focus group (Appendix C).

The study made use of convenience and purposeful sampling, as discussed in Chapter 3. The Departments of Computer Science, Informatics, and Information Science were conveniently selected to participate in both the questionnaire and focus group/individual interviews. The academic staff members were purposefully selected based on the assumption that they made use of some IRSs, and because of the disciplines in which they lectured.

As noted in Chapter 3, permission to conduct the study was first obtained from all appropriate ethics committees, such as the faculty committee for research ethics, as well as the dean of the faculty at the institution where the research was conducted and the Research Committee of the Department of Information Science on behalf of the institution that will grant the degree. The researcher also signed a declaration on adhering to ethical issues (this has been attached in Appendix F: Researcher Declaration). An overview of the ethical issues has been provided in chapter 3, section 3.8.

4.2.1 Potential participant numbers and actual participation

The following section provides the demographics of the staff members for the three selected departments and the actual number of staff members that agreed to participate. The staff composition of the Department of Computer Science (Institutional website, 2015a: el) and the research participants are depicted in Table 4.1. In total six staff members participated in the questionnaire and two staff members participated in the interview from the Department of Computer Science:

Level	Number of staff members	Number of participants for questionnaire	Number of participants for focus group/individual interviews
Full professors	3	0	0
Extraordinary professors	0	0	0
Associate professors	2	0	0
Research fellows	2	0	0
Extraordinary senior researchers	1	0	0
Senior lecturers	3	1	0
Lecturers	9	3	1 (participated in an individual interview)
Junior research officers	3	0	0
Assistant lecturers	15	2	1 (participated in an individual interview)

Table 4.1: Participants from the Department of Computer Science (Institutional website, 2015b: el)

The staff composition of the Department of Informatics (based on information from the institutional website) and the research participants are portrayed in Table 4.2. In total 10 staff members answered the questionnaire and no staff member participated in the interview from the Department of Informatics.

Level	Number of staff members	Number of participants for questionnaire	Number of participants for focus group/individual interviews
Full professors	1	1	0
Extraordinary professors	0	0	0
Associate professors	5	3	0
Research fellows	0	0	0
Extraordinary senior researchers	5	0	0
Senior lecturers	9	1	0
Lecturers	7	3	0
Junior research officers	0	0	0
Assistant lecturers	18	2	0

Table 4.2: Participants from the Department of Informatics (Institutional website, 2015b: el)

The staff composition of the Department of Information Science (based on the institutional website) and the research participants are portrayed in Table 4.3. In total 20 staff members answered the questionnaire and 16 staff members participated in the interview from the Department of Information Science.

Level	**Number of staff members**	**Number of participants for questionnaire**	**Number of participants for focus group/individual interviews**
Full professors	3	1	1 (participated in an individual interview)
Extraordinary professors	7	0	0
Associate professors	0	0	0
Research fellows	4	0	0
Extraordinary senior researchers	0	0	0
Senior lecturers	3	2	1 (participated in a focus group interview)
Lecturers	6	6	3 (2 participated in an individual interview; 1 participated in a focus group interview)
Junior research officers	9	7	8 (6 participated in an individual interview; 2 participated in a focus group interview)
Assistant lecturers	9	4	3 (2 participated in an individual interview; 1 participated in a focus group interview)

Table 4.3: Participants from the Department of Information Science (Institutional website, 2015d: el)

4.2.2 Overview of the data collection methods

The rationale behind the choice of the research approach and the instruments for data collection was explained in Chapter 3. Table 4.4 provides a brief overview of the data collection methods, the response rates and the software that was used to administer the methods.

Overview of the data collection methods	
Methods	Self-administered, semi-structured electronic questionnaire Focus group interview Individual interviews
Software	Electronic questionnaire: Google forms Focus group interviews: Video recording software - Samsung Voice Recorder Individual interviews: Video recording software - Samsung Voice Recorder Transcribing software: Dragon
Ethical clearance	Ethical clearance was requested from the Research Committee of the Department of Information Science (as the degree-granting institution) in August 2015 and approved in August 2015. Thereafter ethical clearance was requested from the faculty committee for research ethics, as well as the dean of the faculty of the institution where the research was conducted. This was done in August 2015 and approved in September 2015.
Time frame for data collection	Electronic questionnaire: September to October 2015 Focus group interview: November 2015 Individual interviews: October to November 2015
Follow-up	Emails were sent out on a weekly basis; the first email of invitation was sent by the Department of Information Science secretary to the mailing list for the School of Information Technology and to the three heads of departments to disseminate to their staff members. Thereafter the researcher sent two more reminder emails to the heads of departments to inform the staff members of the invitation and link to the questionnaire. Once questionnaires had been administered, participants who indicated “yes” to the interviews or a focus group interview were contacted and appointments were set up.
Rate of response	Electronic questionnaire - 37 participants (although some of the participants in the questionnaires did not respond to all the questions, the information obtained from this data collection instrument was sufficient to allow the researcher to complete the study and draw conclusions and make recommendations). Focus group interview - 5 participants Individual interviews - 12 participants
Number of questions asked	Electronic questionnaire - 10 questions Focus group interviews - 7 questions Individual interviews - 7 questions *(The focus group interview and the individual interviews were guided by the same interview schedule; see Appendix D)*
Approximate time taken to answer	Electronic questionnaire - 10 minutes Focus group interviews - 30 minutes Individual interviews - 5 minutes to 1 hour 45 minutes
Consent	Electronic questionnaire - consent was given online, if consent was not given or participants did not want to answer the questionnaire they would be redirected to a “Thank you” page. The consent form can be viewed in Appendix A. Focus group interviews - a printed consent form was administered before the interview began. Individual interviews - a printed consent form was administered before the interview began. The consent form can be viewed in Appendix C.

Table 4.4: Overview of the data collection methods and administration of the data collection instruments

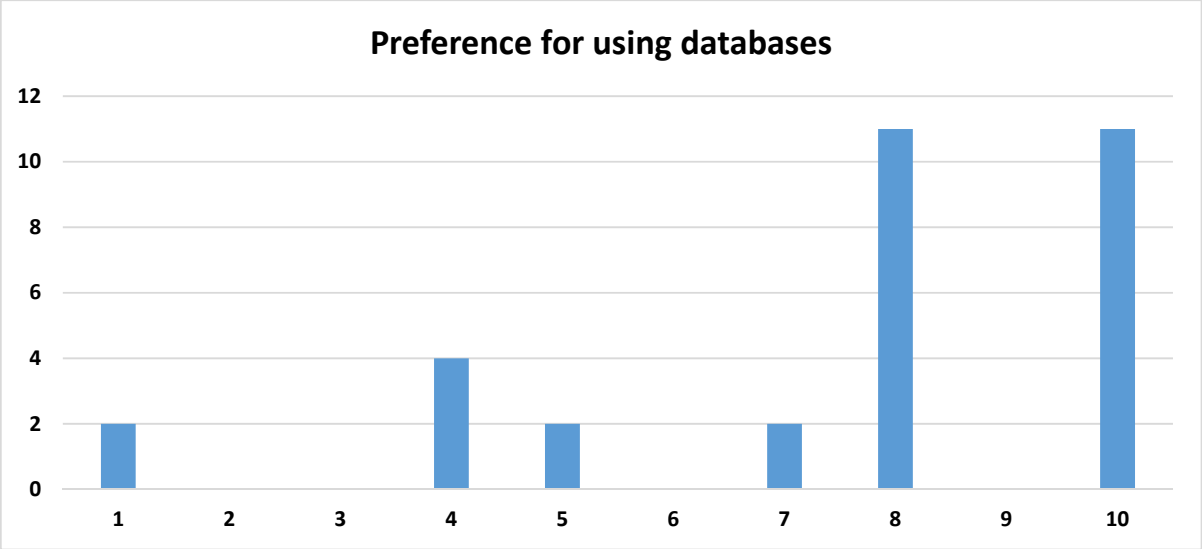
4.3 FINDINGS FROM THE QUESTIONNAIRE

The data that has been collected from the questionnaire (see Appendix A) is reported and analysed in the following sub-sections. It addresses all questions in the order used in the questionnaire. The questionnaire covered the following main issues: preferred use of databases subscribed to by the the institutional library, usage of databases subscribed to by the institutional library, usage of other databases, web search tools, the academic tasks that require the use of databases and reasons for searching databases, as well as the available value-added features and services that are used or explored.

Questions 1 and 2 were based on the general information of the academics who participated. This included their post level as well as the department by which they were employed. This has been portrayed in section 4.2.1 – Table 4.1 (Department of Computer Science), Table 4.2 (Department of Informatics) and Table 4.3 (Department of Information Science). In the discussion of findings, responses will not be linked to departments. Owing to a low response rate from two of the departments, it was easier to work with input from individual participants, instead of grouping their responses according to their departments.

4.3.1 Preferences in making use of the databases subscribed to by the institutional library

Academics were asked to specify their preferences in making use of databases to which the library subscribes in question 3 of the questionnaire. The question used a 10-point Likert scale with 1 = the lowest preference and 10 = the highest preference. Question 3 was answered by 32 /37 participants (86.5%). Graph 4.1 shows the responses regarding preferences for using databases.



Graph 4.1: Preferences for using databases

Most academic staff members, 22/32 (69%), prefer using databases (selecting respectively 8 and 10 on the Likert scale). The following specific findings were noted:

- Two/32 (6.5%) participants stated that they had a very low preference for the use of databases (they both chose 1 on the Likert scale).
- Four/32 (12.5%) participants indicated a fair amount of preference for the use of databases (they chose 4 on the Likert scale).
- Eleven/32 (34.5%) participants indicated that they had a fairly high preference for making use of databases (they chose 8 on the Likert scale).
- Eleven/32 (34.5%) participants stated that that they had a high preference for the use of databases (they chose 10 on the Likert scale).

The reason for not using databases was discussed in the interviews. This will be further discussed in section 4.4.5. Most participants made use of Google Scholar as the starting point for any research they conducted. This will be further discussed in Chapter 5, sections 5.2.1.3 and 5.3.2.

4.3.2 Usage of databases subscribed to by the institutional library

Question 4 required participants to indicate how often they made use of the databases to which the library subscribes. The list of databases they were presented with was selected from the institutional library's lists of recommended databases for the selected departments. Therefore, the list represented below only indicates the databases the institutional library specified and subscribed to at the time of the study for the three selected departments on which the research

focuses. A four-point Likert scale was used for Question 4, namely never, seldom, infrequently and frequently. Although 37 participants answered the question, participants did not always indicate their usage of each database. N thus differs slightly for the individual databases. The percentages were calculated for the responses for each individual database in the list. The participants were required to indicate other databases they used that were not indicated in the list in Table 4.5. This has been discussed further in section 4.3.3. There is a contradiction between the preferred use of databases to which the library subscribes (question 3) and participants' self-reported actual use of specific databases. This was discovered when the researcher compared the findings in section 4.3.1 and section 4.3.2. Although 11/32 (34.5%) participants stated that they had a high preference for the use of databases, and 11/32 (34.5%) participants stated that they had a fairly high preference for using databases (in total thus 69% for fairly high to high preference), it does not appear from the answers to question 4 as if they make full use of the databases. Only two databases, the ACM digital library and the library catalogue, were reported to be used frequently (ACM Digital Library – 17/36; 47.2%; library catalogue – 21/36; 58.3%). Furthermore, as explained in section 4.3.3, participants seem to prefer search engines such as Google Scholar (30/36; 81.1%). The results for Question 4 are depicted in Table 4. 5.

Databases	**N =**	**Never**		**Seldom**		**Infrequently**		**Frequently**	
			%		%		%		%
ABI/Inform Complete	35	18	51.4	10	28.6	5	14.3	2	5.7
Academic OneFile	35	18	51.4	11	31.4	4	11.4	2	5.7
ACM Digital Library	36	8	22.2	6	16.7	5	13.9	17	47.2
Cambridge Books Online	35	21	60	9	25.7	2	5.7	3	8.6
Computer and Information Systems Abstracts	35	22	62.9	3	8.6	5	14.3	5	14.3
EI Engineering Village	35	28	82.4	4	11.8	2	5.9	0	0
Emerald	37	8	21.6	5	13.8	12	32.4	12	32.4
ERIC (Ebscohost)	36	9	25	8	22.2	7	19.4	12	33.3
ERIC (Proquest)	35	13	37.1	5	14.3	6	17.1	11	31.4
Gartner Research	34	16	47.1	6	17.6	7	20.6	5	14.7

Databases	N =	Never		Seldom		Infrequently		Frequently	
Google Scholar (not a traditional proprietary database)	37	1	2.7	1	2.7	5	13.5	30	81.1
IEEE Xplore	35	3	8.6	11	31.4	7	20	14	40
InfoTrac	32	20	62.5	8	25	3	9.4	1	3.1
ISI Web of Science	36	11	30.6	5	13.9	12	33.3	8	22.2
Library Catalogue	36	3	8.3	6	16.7	6	16.7	21	58.3
Library and Information Science Abstract (LISA)	36	12	33.3	10	27.8	7	19.4	7	19.4
Library, Information Science & Technology Abstracts	36	16	44.4	5	13.9	7	19.4	8	22.2
Library & Information Science Source	35	17	48.6	7	20	4	11.4	7	20
SAGE Knowledge	35	12	34.3	10	28.6	6	17.1	7	20
Scopus	36	16	44.4	10	27.8	8	22.2	2	5.6
SpringerLink	35	4	11.4	9	25.7	11	31.4	11	31.4
UNICEF	36	25	69.4	10	27.8	0	0	1	2.8
UPSpace	32	11	34.4	11	34.4	5	15.6	5	15.6
Wiley Online Library	36	8	22.2	10	27.8	11	30.6	7	19.4
WorldCat Local	35	13	37.1	7	20	9	25.7	6	17.1
50+ killer online resources for Computer Science students	35	31	88.6	3	8.6	0	0	1	2.9

Table 4.5: Use of databases to which the institutional library subscribes

By analysing Table 4.5, the following was discovered:

- Eighteen/35 (51.4%) of staff members never make use of databases such as ABI/Inform Complete and Academic OneFile.
- Ten/35 (27.8%) of respondents indicated that they seldom made use of databases such as ABI/ Inform Complete and SAGE Knowledge.

- ACM Digital Library is used frequently by 17/36 (47.2%) of staff members, infrequently by 5/36 (13.9%), and when combined there is 61.1% frequent to fairly usage. ACM Digital Library is relevant to all three departments.
- Databases most frequently used include ACM Digital Library 17/36 (47.2%), Emerald 12/37 (32.4%), ERIC from EbscoHost 12/36 (33.3%), ERIC from Proquest 11/35 (31.4%) and Google Scholar (not a traditional proprietary database) (30/37; 81.1%).
- Emerald is used by 12/37 (32.4%), ERIC (Proquest) is used by 11/35 (31.4%) and Eric (Ebsco) is used by 12/36 (33.3%) of staff members on a frequent basis. However, responses show that the use of these databases is infrequent. Emerald is infrequently used by 12/37 (32.4%), ERIC (Proquest) is infrequently used by 6/35 (17.1%) and Eric (Ebsco) is infrequently used by 7/36 (19.4%). When combined, the percentage of frequent and infrequent use for Emerald is 64.8%, for ERIC (Proquest) 48.5% and for Eric (Ebsco) 52.7%.
- Twelve/37 (32.4%) of staff members stated that they made infrequent use of databases such as Emerald. Furthermore, 12/36 (33.3%) of the participants indicated that they made infrequent use of the ISI Web of Science database.
- According to the responses the Library Catalogue is frequently used by 21/36 (58.3%); however, 6/36 (16.7%) indicated that they used it infrequently or seldom, leading to slight concern that the library catalogue is not being used sufficiently.
- Ten/36 (27.8%) participants indicated that they seldom used Wiley Online Library and 11/32 (30.6%) made infrequent use of the database.
- IEEE Xplore and Academic OneFile are seldom used, as stated by 11/35 (31.4%).
- Databases such as LISA, Scopus and UNICEF are seldom used, as stated by the statistics: 10/36 (27.8%). Furthermore, the responses show that LISA is infrequently used by 7/36 (19.4%), Scopus by 8/36 (22.2%) and UNICEF by none. When combined, the percentage of use for LISA is 47.2%, for Scopus 50% and for UNICEF 27.8%. Participants from the Information Science department indicated the following: LISA is frequently used by 7/21 (33.3%), infrequently used by 4/21 (19%), seldom used by 6/21 (28.6%) and never used by 4/21 (19%). Scopus is frequently used by 1/21 (4.8%), infrequently used by 4/21 (19%), seldom used by 5/21 (23.8%) and never used by 11/21 (52.3%). UNICEF was never used frequently or even infrequently by any of the participants: seldom by 7/21 (33.3%) and never by 14/21 (66.7%).
- ISI Web of Science has a high percentage of 11/36 (30.6%) of participants that never make use of this database or only use it infrequently 12/36 (33.3%). Considering the value

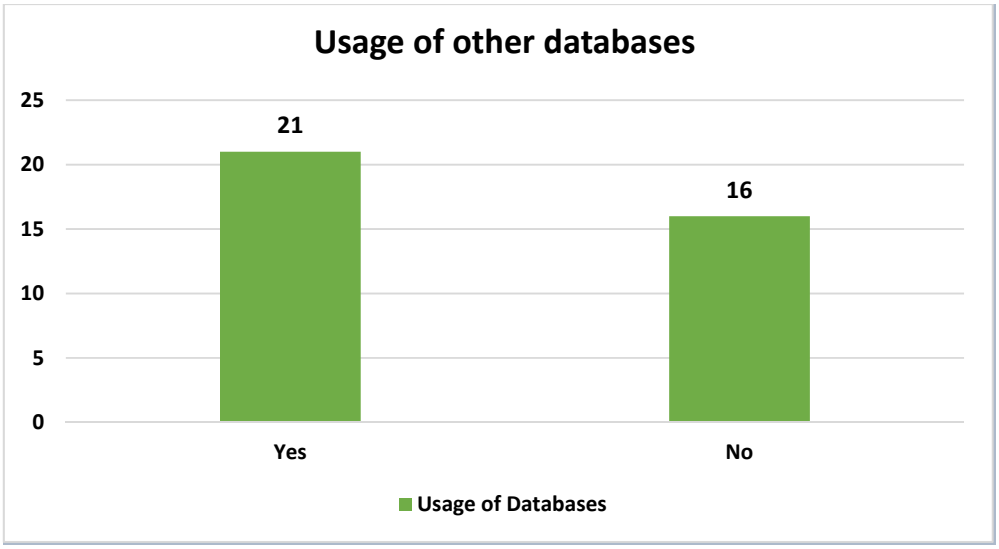
of the database as an interdisciplinary database and for following up on forward and backward citations, this is of concern.

- The library catalogue was indicated as the second most used database: 21/36 (58.3%).
- Furthermore, Google Scholar was indicated as being frequently used by 30/37 (81.11%) of staff members.
- A possible reason why some databases are not used more often is the different needs of the participants from the various disciplines. The common trend that emerged from the data collected is that participants from all three disciplines make frequent use of Google Scholar 30/37 (81.1%), IEEE Xplore 14/35 (40%) and SpringerLink 11/35 (31.4%).
- Five/32 (15.6%) of the participants stated that they made frequent use of the UPSpace database.
- Thirty-one/35 (88.6%) stated that they never made use of 50+ killer online resources for computer science students; 3/35 (8.6%) stated they seldom used the database and only 1/35 (2.9%) made frequent use of this database.

The responses portrayed in Table 4.5 thus show that some of the databases to which the library subscribes are not used very often by the participants in this study. Although results may differ when involving more participants or a wider range of disciplines, this finding is reason for concern.

4.3.3 Usage of other databases

Question 5 requested participants to indicate whether or not they made use of other databases. Furthermore, they needed to specify which databases they were using on a regular basis, which were not indicated in the list provided in the previous section. Graph 4.3 depicts responses on using and not using databases other than those listed in Graph 4.1.



Graph 4.2: Usage of other databases

The number of responses to the question was 37. Graph 4.2 shows that 21/37 (56.8%) of the participants made use of other databases on a regular basis. It also shows that 16/37 (43.2%) of the staff members did not make use of other databases. This was due to the fact that participants stated that they made use of Google, Google Scholar or textbooks when searching for information (a finding that also emerged from the information collected in the interviews, which will be discussed further in section 4.4.3). The other databases that were indicated include AIS digital library (Association of Information Systems is a central repository for research papers as well as journal articles that are relevant to information systems in an academic community), Taylor & Francis database, JStore, Ingenta Connect, ScienceDirect, SafariTech Online, Cite SeerX, Proquest and Business Collection. Some of these, such as Proquest and Google Scholar, were actually included in the list of databases to which they had to respond (see Graph 4.1). Participants also noted search engines such as Google, Yahoo, Ask.com and Search Edu.

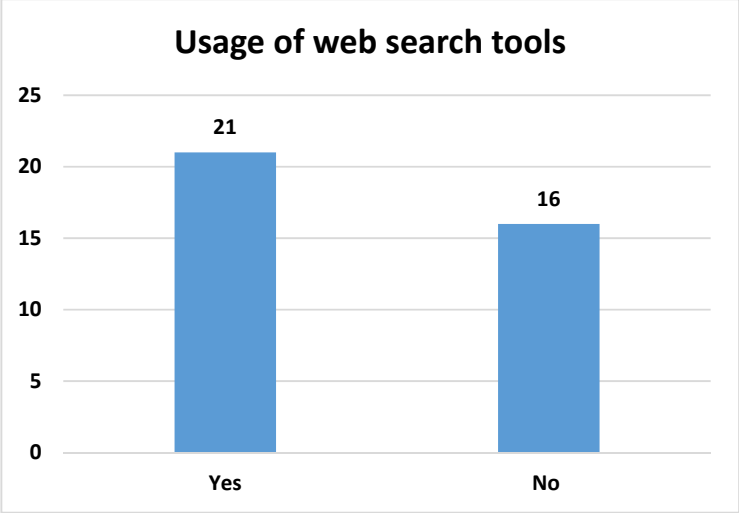
Some of the databases, such as Taylor & Francis and ScienceDirect, are subscribed to by the library. (They are, however, not on the list of databases the library recommends for the three departments.) Others, such as SafariTech Online, Proquest Business Collection, Ingenta Connect and Cite SeerX, were not subscribed to by the library at the time of the study; participants did not indicate how they got access to these databases.

The disadvantage of posing this type of question was that the researcher did not foresee the type of answers given and was therefore not prepared to pose a follow-up question on how they gain

access to the specific databases to which the institution's library does not subscribe. Since the questionnaire was electronic and self-administered in order to protect the participants' anonymity, the participants could not be contacted afterwards for further detail if they stated that they did not wish to participate in the interview. The reasons for this may have been that the participants were enrolled as students at other universities, that they requested access from other institutional libraries, purchased monthly or yearly subscriptions to the databases or created ResearcherID profiles with specific databases.

4.3.4 Web search tools

Question 6 asked whether they preferred to make use of web search tools rather than databases. N = 37 participants responded to this question.



Graph 4.3: Usage of web search tools

Graph 4.3 shows that 21/37 (56.8%) indicated that they preferred making use of web search tools, whereas 16/37 (43.2%) indicated that they did not prefer to make use of web search tools.

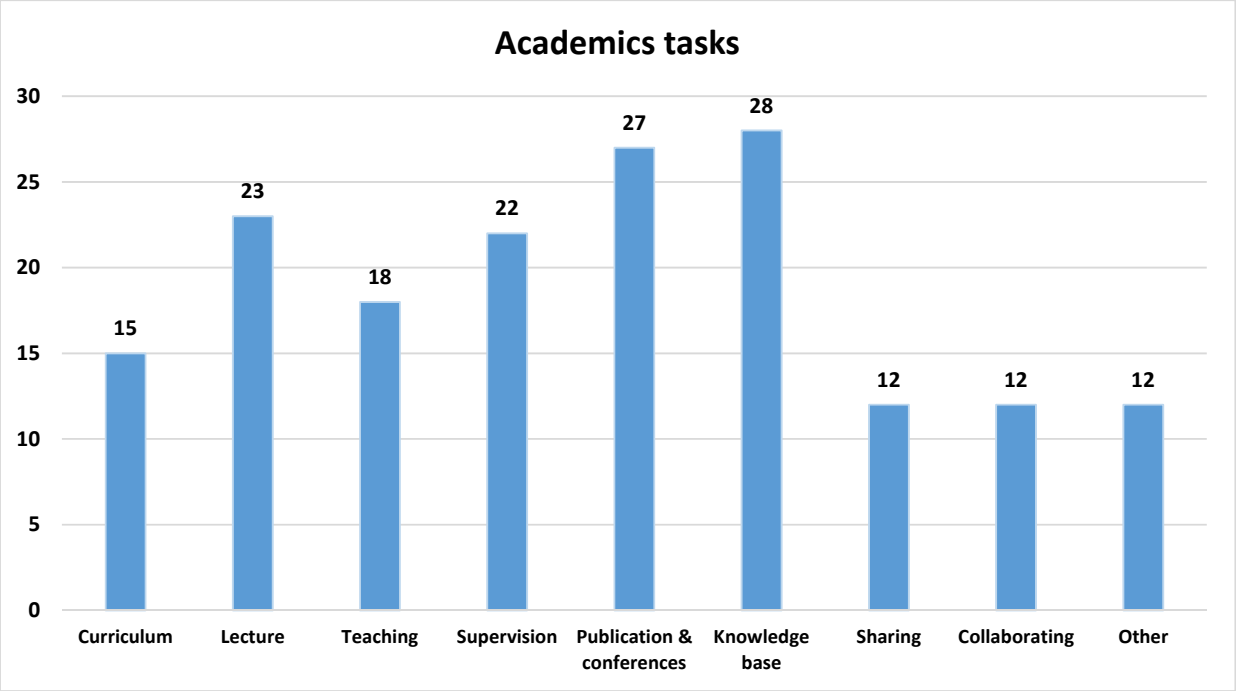
Question 7 asked participants to list sources they used regularly. This question was answered by 15 of the 37 participants (40.5%). The following sources were recorded: Google Scholar, Wikipedia, ResearchGate, Mendeley, Bing, Publishing in Africa databases, directories (findhow.com), Informine.com, graphics (Artfind.net), periodicals (OnlineNewpapers.com), government (Fedworld.com), direct links from author websites, conference proceedings, Google books and research groups. The participants who stated that they made use of research groups did not specify or provide examples of the types of groups from which they gathered information.

Participants also mentioned web search tools when responding to question 5. It is evident from these responses that 9/15 (60%) of participants made extensive use of Google Scholar, proving the overwhelming frequency with which Google Scholar is used, as noted in Table 4.5.

Some of the respondents (unexpectedly) interpreted the question as techniques that they used when conducting searches. They thus stated that they made use of inverted commas in their command line searches, Boolean operators in addition to excluding dates and excluding citations. This reflects a strong awareness of the traditional features offered by proprietary databases.

4.3.5 Academic tasks that require the use of databases

As academics make use of a variety of types of information on a daily basis, it is important to understand what the information is used for and how task-related information needs and information seeking can be supported by proprietary databases. The importance of tasks in influencing information-seeking behaviour was also noted when discussing information behaviour models in Section 2.7. Question 8 provided a list of academic tasks from which participants had to select the tasks they completed on a daily or regular basis by making use of databases. They were asked to select all applicable tasks. The tasks listed included deciding on the curriculum, preparing for a lecture, teaching (e.g. methods, evaluation, testing), post-graduate supervision, publication and conference presentations, increasing their knowledge base, sharing information and collaboration. Participants also had the option to indicate other tasks. The results are depicted in Graph 4.3. Question 8 was answered by 37 respondents (N=37).



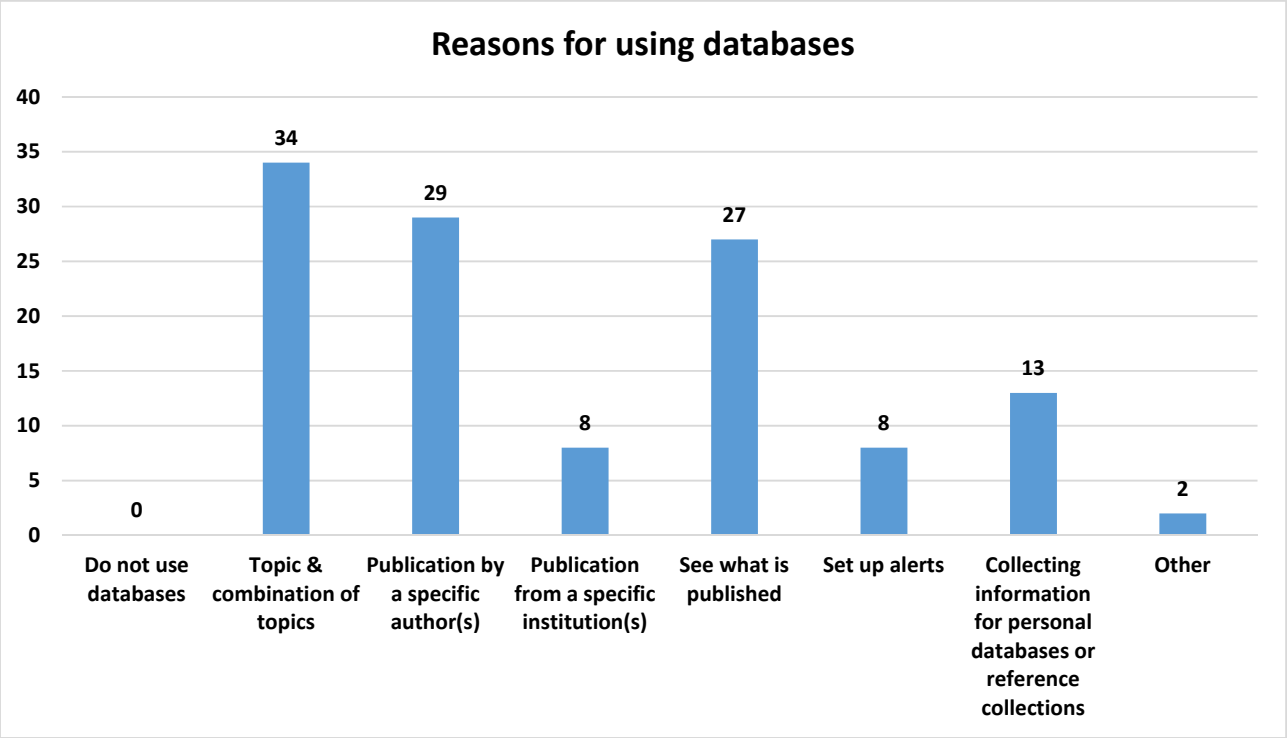
Graph 4.4: Academic tasks

Databases are mostly used by academics to increase their knowledge base on a specific topic 28/37 (75.7%) and when working on publications and conference presentations 27/37 (73%). Preparing for lectures was indicated by 23/37 (62.2%). Sharing information and collaboration were both indicated by 12/37 (32.4%). Studies reported by Ipe (2003: 345) and Haeussler *et al.* (2014: 466-467) also note that individuals are reluctant to share information, for fear of losing their job or providing others with opportunities to be promoted, as opposed to encouraging and supporting other researchers in the same field of study.

Databases are used less for curriculum design and collecting information on teaching *per se,* as indicated by 12/37 (32.4%) of the participants. Post-graduate supervision motivated 22/37 (59.4%) of the participants to make use of databases for academic tasks. Of the respondents, 12/37 (32.4%) indicated other tasks for which they are using databases. Although they had the opportunity, they did not elaborate on this. However, responses from the interviews showed that participants made use of databases for their own studies, such as honours, master's and doctoral research.

4.3.6 Reasons for searching or using databases

As shown in Chapter 2, there are many reasons why academics search databases. Question 9 asked participants about their reasons for searching databases. There was also an option where they could indicate reasons not listed in the questionnaire. The participants were given a choice of reasons: to search for information on a topic or combination of topics, to search for publications by a specific author(s), to search for publications from a specific institution(s), to see what is published on a topic in a specific journal (when deciding on where to publish), to set up alerts (i.e. subscribing to services where one will be notified about new information on a topic, author, etc.) and collecting information for a database or reference collection, for example for a RefWorks or EndNote database. They also had the option to indicate that they were not using databases. The results are portrayed in Graph 4.5.



Graph 4.5: Reasons for using databases

Thirty-four/37 (91.9%) of academic staff members searched for information on a specific topic or a combination of topics, 29/37 (78.4%) stated that they searched for publications by specific author(s), and 27/37 (73%) would like to see what is published about a specific topic in a specific journal. The last-named reason will allow participants who are publishing to decide on the best

journal options to publish their research or students' research. Two/37 (5.4%) of the staff stated other reasons, but did not mention what the other reasons were.

4.3.7 Use and exploration of special features and services

Before compiling the questionnaire, each database was inspected in order to identify the special features and services it provides to users. The academic staff members were asked in Question 10 to indicate whether they were aware of these special features and functions, whether they used them or were willing to explore them. The special features and services included in the questionnaire are included in Table 4.6. They are also listed in Appendix B.

Participants did not always respond to all the features/services listed in Question 10. N thus fluctuates for the different features/services.

Special features and services	N = (number of participants that responded)	Not aware of		Used		Not used		Willing to explore		Not willing to explore	
			%		%		%		%		%
Alerting or notification services for example of new publications on topic, new work by an author	37	5	13.5	14	37.8	9	24.3	9	24.3	0	0
RSS news feeds	36	6	16.7	12	33.3	13	36.1	3	8.3	2	5.6
Adding to “My Citation Alerts”	36	6	16.7	6	16.7	12	33.3	12	33.3	0	0
Adding references to “your library”, “favorites”, “add to folder”	35	4	11.4	8	22.9	13	37.1	10	28.6	0	0
Exporting citations to reference management software (e.g. Endnote, RefWorks, Mendeley)	37	2	5.4	22	59.5	6	16.2	7	18.9	0	0
Limiting results to full-text publications	35	1	2.9	26	74.3	4	11.4	4	11.4	0	0
Limiting results to peer-reviewed publications	35	4	11.1	16	44.4	7	19.4	9	25	0	0
Searching for figures and tables	36	7	19.4	8	22.2	16	44.4	5	13.9	0	0
Finding similar or related publications	35	3	8.6	23	65.7	3	8.6	6	17.1	0	0
Searching for specific document types (e.g. advertisements, annual reports, articles, bibliographies, biographies, conferences, curricula, fact sheets/brochures, newsletters)	36	6	16.7	13	36.1	9	25	8	22.2	0	0

Special features and services	N = (number of participants that responded)	Not aware of		Used		Not used		Willing to explore		Not willing to explore	
Searching for specific format types (e.g. audio, video, blogs, images)	36	5	13.9	13	36.1	10	27.8	8	22.2	0	0
Checking data and reports	34	5	14.7	11	32.4	9	26.5	9	26.5	0	0
Checking curricula recommendations	34	9	26.5	7	20.6	10	29.4	8	23.5	0	0
Tutorials (e.g. how to search, browse), help guides and materials on using the database	36	6	16.7	11	30.6	13	36.1	6	16.7	0	0
Case studies (e.g. Emerald provides case study materials and research)	36	7	19.4	14	38.9	7	19.4	8	22.2	0	0
Checking lists of journal titles for databases	36	5	13.9	24	66.7	4	11.1	3	8.3	0	0
Checking for conferences and events	36	5	13.9	14	38.9	8	22.2	9	25	0	0
Browsing options (e.g. broad topics, country reports)	36	7	19.4	12	33.3	10	27.8	7	19.4	0	0
Topic path (e.g. in specific fields for useful publications)	36	7	19.4	14	38.9	6	16.7	9	25	0	0
Critical reviews of publications	36	5	13.9	7	19.4	12	33.3	11	30.6	1	2.8
Sharing references with other (e.g. EbscoHost folders)	36	4	11.1	2	5.6	17	47.2	12	33.3	1	2.8
History of searches	36	5	13.9	14	38.9	8	22.2	9	25	0	0

Special features and services	N = (number of participants that responded)	Not aware of		Used		Not used		Willing to explore		Not willing to explore	
Thesaurus to look up terms	36	5	13.9	10	27.8	12	33.3	9	25	0	0
Advanced search interfaces	35	4	11.4	21	60	4	11.4	6	17.1	0	0
Command search interfaces	35	9	25.7	11	31.4	8	22.9	7	20	0	0
Subject suggestions by databases related to query	36	5	13.9	18	50	3	8.3	9	25	1	2.8
Viewing publications with open access	37	4	10.8	24	64.9	2	5.4	7	18.9	0	0
Viewing top downloaded articles	36	5	13.9	21	58.3	3	8.3	7	19.4	0	0
Creating and maintaining custom journal lists	36	10	27.8	5	13.9	12	33.3	8	22.2	1	2.8
ResearcherID profile (to showcase your publication history)	36	9	25	6	16.7	10	27.8	10	27.8	1	2.8
Top keywords (Researchers interested in topics may click on the words to open up publications on the terms)	36	8	22.2	8	22.2	11	30.6	9	25	0	0
Affiliation search (e.g. allows researchers to identify and assess an affiliation's scholarly output and collaborating institutions)	36	9	25	6	16.7	11	30.6	10	27.8	0	0

Table 4.6: Use of value-added features and services

Most participants were aware of the selected value-added features and services of IRS. Reponses for awareness of the various features ranged between 37 and 34 participants. Thirty-seven of the participants responded to the popular features, such as “Alerting or notification services”, “Exporting citations to reference management software” and “Viewing publications with open access”, whereas 34 participants responded to less popular features such as “Checking data and reports” and “Checking curricula recommendations”. Often they did not make use of these value-added features and services or made very little use of them.

Features such as adding references to “your library”, “favorites” and “add to folder” have a high awareness rate 31/35 (88.5%), but a low usage rate of 13/35 (37.1%). Sharing references with others has a high awareness rate of 32/36 (88.9%), but a low usage rate of 17/36 (47.2%) and tutorials, help guides and material on using the database have a high rate of awareness of 30/36 (83.3%) but a low rate of usage of 13/36 (36.1%). Most participants were willing to explore the use of the selected value-added features and services. The highest response for willingness to explore the features and services was 12/36 (33.3%), including “adding to my citation alerts” and “sharing references with others”, and the lowest response rate was 3/36 (8.3%), including “RSS news feeds” and “checking lists for journal titles for databases.” The following represents the most important of the findings portrayed in Table 4.6. The findings are presented in such a manner that the popular features and services are discussed first before presenting the less popular features and services.

- Fourteen/37 (37.8%) participants indicated that they made use of “Alerting or notification services”, a further 9/37 (24.3%) indicated that they were willing to explore this service.
- Twelve/36 (33.3%) participants indicated that they made use of “RSS news feeds”. However, 12/37 (36.1%) stated that they did not use this feature and 6/37 (16.7%) indicated that they were not aware of this feature.
- “My citation alerts” has not been used by 12/36 (33.3%) of participants; 12/36 (33.3%) participants, however, indicated that they were willing to explore this feature.
- Twenty-two/37 (59.5%) of participants stated that they made use of the “Exporting citations to reference management software” and 7/37 (18.9%) were willing to explore this feature.
- “Limiting results to full-text publications” was used by 26/35 (74.3%) and “Limiting results to peer-reviewed publications” was used by 16/35 (44.4%) of the participants.

- Sixteen/36 (44.4%) of the participants stated that they did not make use of the "Searching for figures and tables feature" and 7/36 (19.4%) indicated that they were not aware of this feature.
- Thirteen/36 (36.1%) of the participants indicated that they made use of the "Searching for specific format" while 10/36 (27.8%) stated that they did not use this feature. Eight/36 (22.2%) specified that they were willing to explore this feature.
- Fourteen/36 (38.9%) of the participants specified that they made use of the "Case Studies" feature, whereas 7/36 (19.4%) stated that they were not aware of this feature.
- "Checking lists of journal titles for databases" was used by 24/36 (66.7%) of the participants. Three/36 (8.3%) of the participants indicated that they were willing to explore this feature.
- Five/36 (13.9%) indicated that they were not aware of the following features: "Checking lists of journal titles for databases", "Checking for conferences and events", "Critical reviews of publications", "History of searches", "Thesaurus to look up terms", "Subject suggestions by databases related to query" and "Viewing top downloaded articles". Furthermore, 9/36 (25%) of the participants stated that they were willing to explore features such as "Checking for conferences and events", "History of searches", "Thesaurus to look up terms", "Subject suggestions by databases related to query". Eleven/36 (30.6%) stated that they were willing to explore the "Critical reviews of publications" feature and 7/36 (19.4%) indicated they were willing to explore the "Viewing top downloaded articles" feature, thus showing interest in such features.
- Fourteen/36 (38.9%) of the participants recorded that they made use of the following features: "Checking for conferences and events", "Topic path" and "History of searches".

Overall, the results in Table 4.6 reveal that academic staff members make use of a wide variety of special features and services that databases and database services provide. Question 10 had no open-ended options.

4.4 FINDINGS FROM THE FOCUS GROUP AND INDIVIDUAL INTERVIEWS

The number of focus group and individual interviews, the number of participants and the duration of the interviews are reflected in Table 4.4. The questions put to the participants can be seen in Appendix D; the focus group and individual interviews covered the same questions. Participants

gave permission for the interviews to be recorded (see Appendix C). The researcher used a Samsung S5 cell phone with video recording software to record the interviews and also made handwritten notes. Recordings were transcribed using transcribing software named Dragon. Thereafter the researcher manually checked and supplemented the transcriptions.

Questions for the interview schedule covered the following:

- Awareness of the special features and services of databases
- Interest level regarding the special features and services of databases
- Use of special features and services of databases
- Opinions on the usefulness of the special features and services of databases
- Potential for using special features and services of databases
- Comments on other features and services provided by IRSs.

Thematic analysis as discussed in section 3.9.2 was used to analyse the responses. The questions were translated into main themes and for each question sub-themes were identified according to the responses to the question. Findings are discussed in sections 4.4.1.1 to 4.4.1.5. Each participant was assigned a number to maintain the participants' anonymity; the individual interviews range from P1 to P12. The participants who responded to the focus group interviews were assigned numbers ranging from FP1 to FP5. When transcribing the interviews, the researcher made slight corrections to the grammatical errors that occurred, thus deleting paralanguage interferences such as "emm", "errr" and repetitive words, for example, "the, the".

4.4.1 Quantitative findings from individual and focus group interviews

Quantitative findings allow the researcher to describe, summarise and compare the data collected from participants. The researcher is able to analyse the quantitative data in order to understand the participants within the research context and draw conclusions, thus enabling the researcher to make recommendations and suggest solutions to issues that may arise after the data has been analysed.

A profile questionnaire was handed to each participant before starting the interview. This questionnaire can be viewed in Appendix D. The questions that were asked included demographic information based on the departments where they were employed and their professional level in the department. The findings are reported in section 4.2.1 and in tables 4.1, 4.2 and 4.3. Question

3 asked whether participants made use of databases when searching for information to complete an academic task. All the participants indicated that they did.

4.4.2 Qualitative findings from individual and focus group interviews

For each of the questions, responses from the individual and focus group interviews will be reported. The purpose of the qualitative findings is to explore and understand the views, opinions and ideas of the participants. Using a qualitative research method allows the researcher to achieve deeper understanding of the manner in which the participants make use of IRSs (i.e. the databases) and their special features and services. This allows the researcher to evaluate the findings, in combination with quantitative findings from the questionnaire and the literature analysis, in order to understand and strengthen the researcher's recommendations.

Under each theme responses were mostly analysed in terms of the features noted, importance, frequency of use, reasons for using the features, reasons for not using the features and *ad hoc* comments shedding further light on opinions on the features and services presented in the chart (Appendix E).

4.4.2.1 Awareness of the special features and services of databases

Question 1 addressed awareness of the special features and services of databases. The question posed to the academic staff was whether or not they were aware of the special features and services offered by the databases subscribed to by the institution's library. Probing questions (questions 1.1 - 1.3) were based on their interest levels, checking for the features and services presented in the chart (Appendix E), as well as how they made use of these features and services.

In the responses to these questions several issues emerged. There were some overlapping responses that related to the other questions. These responses were however, reported under specific headings that related to the issues that were raised, such as value-added features and services, reasons for using the features and the reasons for not using the features.

(a) Value-added features and services: Many of the features included in the chart featured in the responses. Some participants focused on what they were aware of and used and some focused on what they were not aware of and/or did not use. Participants referred to the use of ResearcherID profile, case studies, conferences, browsing, alerting and RSS feeds, searching for figures and tables, topic paths, curricula recommendations, downloading references and

searching for affiliations. Other features and services that were acknowledged were “adding references to your library”, “limiting to full text searches” and advanced options.

Three out of the five focus group participants stated that they were aware of some of the features and services. They were making use of full text searches, advanced searches, adding references to “your library”, “favourites” and “add to folders”. Nine out of the 12 participants often made use of features such as exporting citations, limiting results to full text and peer reviews, advanced search options, add to folder and history searches. Ten of the 12 participants did not make use of features such as the ResearcherID Profile, case studies, sharing references’ topic path and checking curricula recommendation. The following verbatim quotations reflect individual and focus group participants’ feedback:

- “I'm aware of alerting and RSS feeds, I don’t really know anything about citation alerts and adding referencing, I don’t use it so I don’t know it really well. Exporting citations, limiting results to full text and peer review I know how to do that, searching for figures and tables, similar publications, search specific document types and format types yes I do that. I don’t really know what topic path is I don’t really know what command search is I don’t know how to do custom journal lists and I’ve never used affiliation searches” (P4).
- “Not all of these no, the alerting notification services of the new publications of a topic and work, I do know of the service but I never knew that you could look for something new, the searching of figures and tables, case studies, topic path I’m not quite familiar with, the creating and maintaining customized journals lists, ResearcherID profile and affiliation searches” (P7).
- “I'm aware of alerting and RSS feeds, I don’t really know anything about citation alerts and adding referencing, I don’t use it so I don’t know it really well. Exporting citations, limiting results to full text and peer review I know how to do that, searching for figures and tables, similar publications, search specific document types and format types yes I do that. I don’t really know what topic path is I don’t really know what command search is I don’t know how to do custom journal lists and I’ve never used affiliation searches” (P4).
- “I make use of most of these features because I teach them, so I make use of: Alerts, full text, peer-review, figures and tables, case studies, conferences, browsing. I don’t share my references, customised journal lists and topic path” (FP4). This shows that researchers may not like to share their information or knowledge with others. The reason could be that they are concerned that others may use their information for their own gain, or they have not yet started publishing co-written articles.

- "I have an Academia and Research gateway ResearcherID profile; other than that I would say no to using all of these features. I use Google Scholar a lot" (FP2).
- "I have added to my library because then it's easier to download all the citations from that, I do share references with my supervisor, so usually I get the abstract and just the title and the references as well. I have a Research gateway ID and Google Scholar profile" (FP5).

(b) Reasons for using the features: Some of the participants indicated that they taught the features and services and therefore they used them (FP4, P3); because a participant teaches students about IR, he/she feels the need to know what features and services are available and what their capabilities are (FP4). Another participant indicated that he/she teaches the features and services to students, but was not necessarily using all (P10): "I've taught students about some of the features, without necessarily using them myself". Other reasons were that it makes their searching easier. Making use of the features and services allow the participants to keep up to date with their research for both teaching and personal studies. The trend from the responses was that being introduced to the features and making them more visible on the interface would encourage users to make use of the "old" and "new" features and services. Another reason why participants made use of features and services was to cut down on the time spent searching for information and to limit results to relevant information (FP4). The following are verbatim quotations of the individual and focus group participants:

- "Yes I am because I teach Module XYZ[2] which is basically information retrieval systems. I sort of have to teach all of these features so we go through databases extensively; I've made it my business to know all of the features and services so I know all of them" (P3).
- "It's very useful, it essentially helps you find the information you are looking for quicker, saves you time and saves you effort, because when you don't have those features it takes you longer to find relevant information so you get frustrated because you can't find information you are looking for" (P1).
- "It's great if you know how to use it" (P5). This reinforces the researcher's theory that special features and services need to be advertised and taught to all staff members to enable them to get more out of databases, thus increasing their research outputs and possibly strengthening their knowledge base.
- "My opinion of the usefulness is first of all I will say it's overwhelming if a researcher is not overly acquainted with these they just decide not to make use of this. They will go about using

[2] To maintain participant anonymity, the module code is replaced with XYZ

Google Scholar and search and use whatever comes up. But I do think that becoming more familiar with and acquainted with this will help as a researcher. So I do think it is useful if one knows how to use these and are comfortable with it, that is, it not being too complicated to use" (P7).

- "I use them both for my personal studies and updating my class notes and slides, I need new information so I often use these features when looking for different types of sources and comparing resources" (P3).
- Three of the five focus group participants stated that they did know how to make use of the features and services since they taught their students how to make use of these features and services.
- Two out of the five focus group participants stated that they made extensive use of the advanced search option when they wanted to find a specific article, thus refining the search query and retrieving the specific document required.
- Search history works best when a participant needed to "backtrack" a lost article or information, as stated by FP4.
- "I do keep up to date with the special features and services indicated in the list because I teach my second years how to search databases. It's also helpful if I want to do a quick search for my studies" (FP5).

(c) Reasons for not using the features: Many reasons for not using the special features and services surfaced in the responses. What was conspicuous were features that were not relevant to the academic tasks at the time of the participant's career, for example if he or she was not publishing or not attending conferences, as well as an overall perception that such features and services were not useful. Other reasons for no usage included lack of awareness, preference for another tool such as Google Scholar or the physical library collection, lack of knowledge or insufficient knowledge of features (e.g. ResearcherID profiles, customising journals, searching for conferences and events). Some participants were aware of "older" features that were taught during their studies, but not of newer features. For example, they were aware of RSS news feeds and limiting searches, but were unaware of features such as case studies and tutorials, topic paths and affiliation searches. Features and services were also not used because they were not advertised more. Some of the participants did not like to share their searching techniques with others. They did not have prior experience with the features and services and some did not like changing their style of searching, as their existing techniques worked well for them. One

participant explained that despite teaching information retrieval in the past, he/she did not make full use of the services. Although these features and services are important, it may be time-consuming to learn about them. Knowledge of the services does not necessarily mean that the participant will make more use of them (FP3). The participant further stated: “I know enough to make a judgement call so I don’t really need to make use or more use of them”, showing that the participant is reluctant to make use of the features and services. The following are additional verbatim quotations from the individual and focus group participants:

- “If I can’t find the information and the interface is not user-friendly the information doesn’t exist and I won’t look further, you don’t think to look further because you don’t think there is something else” (P1).
- “No I don’t really look for them, normally what I try to do is do something as fast as possible, but I suppose if you use these things it would help. I don’t put enough thought into using the databases’ extra features” (P4).
- “I don’t make use of a lot of online sources, I prefer going to the library and checking out physical books” (P8).
- P12 stated: “when I get all these alerts and so on they get filed and by the time I need them I have forgotten what’s in them so then I’d rather do a search from scratch and find what I need”. Furthermore, the person stated “I’m too set in my ways and too old. You get into a rhythm of how you do these things and in the end it works very easily for me.”
- “I know about them sometime theoretically and don’t always get to use them actually myself. There are some of them that I have not come across” (P10).
- Three out of 12 participants stated that they did not make use of other features and services provided by the IRSs.
- “I have clicked on some of these features like related or similar but I never found it useful” (FP2).
- FP3 indicated: “I am aware of them but that doesn’t mean I use them, well use them that often”, further stating: “I don’t share from one person to the next so sharing references with others, I don’t do that at all.”
- FP4 stated: “I’m very stingy with my information so I don’t share my references and I have a Google Scholar profile”. “No, even with the new features no, but if what I use works and if it’s not broken why fix it?” (FP3).
- FP1 stated: “If I know more about these features it would have made my searching much easier than browsing hundreds of databases and articles that wasted my time.”

4.4.2.2 Interest level in the special features and services of databases

The academic staff members were asked if they were interested in the special features and services that are provided by the IRSs and whether they had ever checked for such features and services to enhance the recall and precision of information retrieved. As mentioned in section 4.4.1.1, question 1.1 pertained to the interest level. The importance of the value-added features and services will be discussed below. Question 1.1 of the interview asked the academic staff members if they were interested in the special features and services that are provided by the IRSs and databases that the institutional library subscribed to for the selected departments. It also required them to indicate whether they had ever checked for such features and services to enhance the recall and precision of information.

(a) Importance of the value-added features and services: participants differed in their perceptions of the importance of value-added features and services, ranging from important and valuable to of no importance because another search tool considered more important could be used, for example Google Scholar or Wikipedia, or even the physical library collection. This will be discussed further in 4.4.3. The importance of these features are acknowledged by the participants and the responses trending among the participants were that these features and services would be useful, make the participants better researchers, make life easier and take up less time searching for relevant information.

Nine out of 12 participants acknowledged the importance of the features and services by indicating that they would like to make more use of the special features and services for their own studies, updating their information and knowledge and looking for resources to provide them to their students. One out of 12 participants also stated that these special features and services allowed researchers to broaden their knowledge base and to filter out unimportant and irrelevant information that was found. Because of this they would retrieve the information they wanted and needed and decrease the recall of information, thus refining the research terms. The following are verbatim quotations of the individual and focus group participants:

- “I am sure it will make me a better researcher” (P7). This shows the importance of the features and services, and that knowing about these features and services could increase people’s searching skills.
- P11 stated that special features and services are important. Once individuals understand the use and capabilities of IRSs and their features and services they will be able to increase their

retrieval skills. The person also said that many people are not aware of or ignorant about the capabilities of the IRSs and databases and should be taught from an undergraduate level about these special features and services.

- "I think they are very useful. It really helps to make searching for information so much more efficient, so I'm so much faster when I'm trying to find specific types of information and then also it makes it more effective, I'm more likely to find exactly what I need because a lot of these allow you [to] really narrow down your search it allows you to review previous searches, so I find that it makes it a lot more effective and efficiency for my personal use" (P3).
- Two out of the five focus group participants acknowledged the importance of making use of special features and services; they however felt that it could be complicated if they do not get technical support or have background knowledge on making use of these features and services.
- "Due to the fact that I am familiar with the majority of them, yes I will use them, like I know what they are and what they do. I know how to make my life easier with them but if for example students we teach don't know what they are or how to use them they less likely to use them" (FP3).
- "It would be useful if you knew how to use them. The library only teaches you how to get online stuff from the website they don't teach you all this stuff. So if the library was more involved it would help. But I also hate having to log into all the different databases so Google Scholar works" (FP1).

4.4.2.3 The use of special features and services of databases

Academics were asked if they knew how to make use of features and services. Probing questions (1.3.1 and 1.3.2) related to whether they made use of these features and services as well as what they were and the reason for using them. Furthermore, if they did not make use of the features and services, they were asked what the reasons for this were. Some of the issues were raised in the participants' answers to question 1. Thereafter the academic staff were asked their opinion on how useful they found the features and services that are provided to the users. The frequent use of the features, the reasons for using the features and services and the reasons for not making use of them are discussed below, including verbatim quotations from the individual and focus group participants.

(a) Frequency of use: Participants indicated that they made use of the popular features and services such as the RSS news feeds, advanced searches, reference managers, limiting searches and basic search features such as Boolean operators. Many of the responses pertained to the frequent use of the features and services such as advanced options, history searches, limiting searches and command searches and the building block feature located in the history option of specific databases. The following are verbatim quotations from the individual and focus group participants:

- One out of the 12 participants stated that there were only two special features that he/she preferred to use, namely the advanced option and history of searches. The person indicated that all the IRSs should integrate all the special features and services. They should also integrate interlinking of databases so users may browse through all the databases with ease. Although this stresses the importance of convenience to the user, it does not reckon with the proprietary nature of the databases and the need for database service providers to maintain a competitive edge.
- “Not really; I only like the Boolean operators and usually the proximity indicators such as the p/1, n/1 and custom stuff you can type in with your search string or search query to make your results more relevant; I like to use that” (P1).
- “I like advance search interface because one page gives you all the different options to narrow down the search. Like to publications and formats. Limiting results to full text and peer review publications I do often and definitely finding similar or related publications as well” (P3).
- “No, I think the most I use is the advanced search interface, including and excluding of words so using the inverted commas ‘and’ and ‘or’ “(P7).
- According to P8, reference managers are a “Godsend and amazing”, as they allow the participant to keep track and a record of all the articles viewed and used. It allows the participant to develop a customised database with articles that are required for teaching purposes and research outputs.
- Three of the five focus group participants stated that features such as advanced options, conferences and events, history searches, limiting searches and command searches were mostly used.
- “The building block method in the history is useful, I learnt that from dialog training in undergrad” (FP3). It was further stated that the participant made use of one long search string before narrowing down the search.

4.4.2.4 Chances for future use of the special features and services of databases

Question 3 asked the staff members if they foresaw making use of or increasing the use of the features and services in the future. They provided reasons for their answers. Examples of ways to inform the staff members that emerged from the discussion were training, workshops, 'how to' guides and tutorials.

(a) Acknowledging and learning more about the features and services: Some databases such as Emerald send emails to their users about the changes being made to the database features, services and interfaces. However, this does not apply to all the databases; therefore, the participants indicated that emails, pop-ups on the home page, "Hover over" on the feature and services clicking on a question mark next to the features and services will be effective when changes are made to the features and services. The manner in which participants would like to learn more about the features and services are "click on me" options, training, and a "how to guide" after a one-day training session. All participants in the focus group agreed that a workshop would be easier to implement and it would be more useful, as they could develop background knowledge. The following are statements and verbatim quotations from the individual and focus group participants:

- Ten of the 12 participants stated that they would like to make more use of the special features and services and some of the features that they now know about.
- One of the 12 participants indicated that a workshop or training course would be better. This would allow the participants to ask questions and receive an immediate response from an information specialist or librarian.
- Two out the 12 participants stated that they made use of Google Scholar as a starting point for research and if need be they would make use of the features and services.
- "I think a "How to guide" would be nice because if you working or have a job you don't always have the time to attend a workshop or even read a lot of emails that aren't related to your own job so if it's like the marketing emails" (P1).
- "Training because if you have the link you don't use it unless you need it and know about it, if someone did training with me, and said these are the features and services and you can do all of this that would be more valuable to me. I've never seen marketing of this but I have seen computer training courses for ClickUp but not for databases" (P5), therefore databases should consider marketing their new and old features and services to gain attention from the researchers using their databases.

- "I would make use of the features, it will make me a better researcher and will allow me to grow. It can help me network and get information from RSS feeds related to my field of study as I work in a forever growing discipline. A one-day training, just to show you what the possibilities are because you do not know what you don't know" (P7).
- P4 indicated: "Yes, a help-link on the homepage and the workshops. If you have a how to guide it usually requires more work from your side and if you have a workshop you can work through them because you set time for it. So in my case a workshop would work better."
- "Yes some of them I would, I think the idea of informal training would work out like organising one for once a year and a how to guide after the training. A hover option would be nice" (FP2).
- FP3 stated: "I think before a how to guide they need to inform the users of what has changed and then an extra help like 'click on me' for more information. Then you can follow the steps or even hovering over as mentioned by P2 on a question mark box that is next to the feature that could work."
- FP1 and FP2 stated that a "hover over" option should be implemented on the special features and services in all the databases, thus providing additional information about what the special feature and service mean.

4.4.2.5 Other features and services provided by IRSs

The staff were asked to discuss other features and services provided by IRSs, specifically databases that they preferred to use. They were asked to specify such features and services.

(a) Preferred use of Google Scholar: Many of the participants mentioned that they first used Google Scholar before making use of the databases to which the library subscribes. P5 stated that the participant's best journals were Google Scholar, EbscoHost and Springer. [Springer is actually a database service provider and a publisher, and Google Scholar a search tool; none of these is a journal]. The following are verbatim quotations from the individual and focus group participants:

- P2 stated: "I primarily make use of Google Scholar then if I find something that may be relevant I go to the library and search pointedly for that article because then I can access the full text if I can't access the full text I try other locations" …" I know about the custom journal stuff but never use it. I have a ResearcherID profile through Google."

- “I don’t make use of a lot of online sources, I prefer going to the library and checking out physical books” (P8). This participant also mentioned that he/she tended to use Google Scholar because it takes too much time to search through a lot of databases.
- “I search very basically. As I search I follow the search and if I see a good article I try to find that article. I very seldom use Google Scholar, I find it very frustrating, but I do use Google Scholar often but only to find specific articles if I got the name, but if I search for a new topic I go to a database and try and narrow down as much as I can and get specific articles” (P10).
- “If I am familiar with the topic I will go straight to the databases like Emerald and EbscoHost but if I’m not sure I start with Google Scholar and then narrow down my search” (P11).
- Two out of the five focus group participants stated that they did not know how to make use of some of special features and services. They started their searches through Google Scholar and once they had found the information or articles they need, they gained access to them through the library interface.
- “Usually I type a sentence into the search bar of Google Scholar, I scroll through a few articles and if it’s something worth reading and I need access to it, I use the library website, if I still need to pay for the article I either ask the specialist to retrieve it or I look for something else” (FP1).

The overall findings were that most of the participants from the individual interviews were interested in the special features and services, since these special features and services allow the participants to refine their searches and to narrow or broaden their searches on a specific topic. In the focus group it was found that participants who did not teach IR were open to learning more about the special features and services and would like to implement some of these features and searches in their research and find information related to the topics they were teaching. Another trend that was uncovered by the researcher was that some of the participants who taught these special features and services and were aware of the special features and services, were not necessarily particularly interested in making use of them. Furthermore, Google Scholar was identified as the preferred source of information and platform for starting new searches before narrowing the query down and retrieving the articles from proprietary databases. Participants who did not know of the special features and services since they were not teaching them to students made use of long search strings in the search bar. This does cause information overload owing to the incorrect meta-tags linked to the information, causing frustration. All participants in the focus group stated that it was important to acknowledge that some of the features and services are

useful. They allow the participants to refine their searches. Some are more useful than others. For example, adding to “my citation”, peer-reviewed publications, specific document types, formats and browsing options are useful when conducting searches for personal research. This allows the participants to keep track and stay up to date with their information and knowledge base.

4.5 TRIANGULATION

After completing the analysis from the electronic questionnaires and the focus group/individual interviews, it is evident that two trends emerged from both instruments. The first trend was that Google Scholar was the foundation search tool for most researchers. The second trend was that most academics in the Information Science discipline are aware of the special features and services that databases and IRSs provide.

Google Scholar provides researchers with a vast amount of academic information and allows anyone access. However, the articles that cannot be accessed without payment can be accessed through the library website, as the library subscribes to a large number of databases. Even if the library unsubscribes to important databases and journal platforms, researchers are able to request access through inter-lending capabilities. Google Scholar also provides researchers with citations and similar articles that they can use. Google Scholar offers a number of the value-added features and services provided by proprietary databases, for example a Google ResearcherID profile, RSS news feeds and building one’s own customised journal and document library. Google Scholar also provides researchers with a reference tool link that allows them to save their references and add them to their research papers, reports and publications. With regard to the literature in Chapter 1, section 1.7, it is clear that the data collected confirms the research that Google Scholar is a preferred start for research. Thus showing that even though the academic staff members are aware of the value-added features and services, Google Scholar has become a serious and popular competitor to IRSs and proprietary databases. Thus becoming an issue to address in future studies.

Both data collection instruments (i.e. questionnaire and the schedule for interviews and focus group interviews) provided the researcher with information that proved the trend of differences between academic staff members within the three selected departments. Another trend that emerged was that Information Science staff members are aware of the value-added features and services but may not make use of them when searching for information. Participants from the

Computer Science and Informatics disciplines indicated that they did not know much or did not make use of the special features and services but would like to explore these options, after the special features and services had been brought to light by the questionnaire.

The interviews held with the participants from the Computer Science department clearly indicated that they would like to make use of these features and services, since it would make it easy for them to search and retrieve information. Chapter 1, section 1.7 provides a brief discussion on a study conducted among Computer Science post-graduate students (Shuib *et al*., 2010: 379), illustrating their use of IRS tools and the manner in which the participants benefited from the IRSs with regard to completing their research, matching search statements within the databases in order to retrieve relevant information and allowing users to comment on the usefulness of the databases (Shuib *et al*., 2010: 379-380; Shen, 2007: 7). When analysing the data collected from the questionnaire it was later confirmed by the individual interviews that academics from the Departments of Computer Science and Informatics are interested in making use of the value-added features and services as many of these features and services can make their search strings less and quicker. It will allow them to find information that can satisfy their information needs and reduce their stress. These findings could not be confirmed from the literature, since similar studies on academic used of value-added features and services have not been reported.

4.6 FINDINGS ON THE SUITABILITY OF WILSON'S (1996) MODEL AS A CONCEPTUAL FRAMEWORK, SUPPLEMENTED BY OTHER MODELS

As mentioned in Chapter 2, section 2.7, models of information behaviour, seeking and retrieval play a fundamental role in studies concerning IR, and other information activities. The model by Wilson (1996) plays an important role in the study, as it relates to the context of information and all the factors that influence searching for information. Over the years there have been many adaptions to this model (Bawden & Robinson, 2015: 1966-1967; Niedźwiedzka, 2003: el), which has been a guiding force. Each of the models that was discussed in section 2.7 has variations, but there are also commonalities in terms of the factors that influence the IR behaviour.

Based on the findings of this exploratory study, and with consideration of other models that influenced the research design for this study, the framework for this study (Figure 2.5) is adapted.

4.6.1 Adaptation of Wilson's model and other models influencing the study

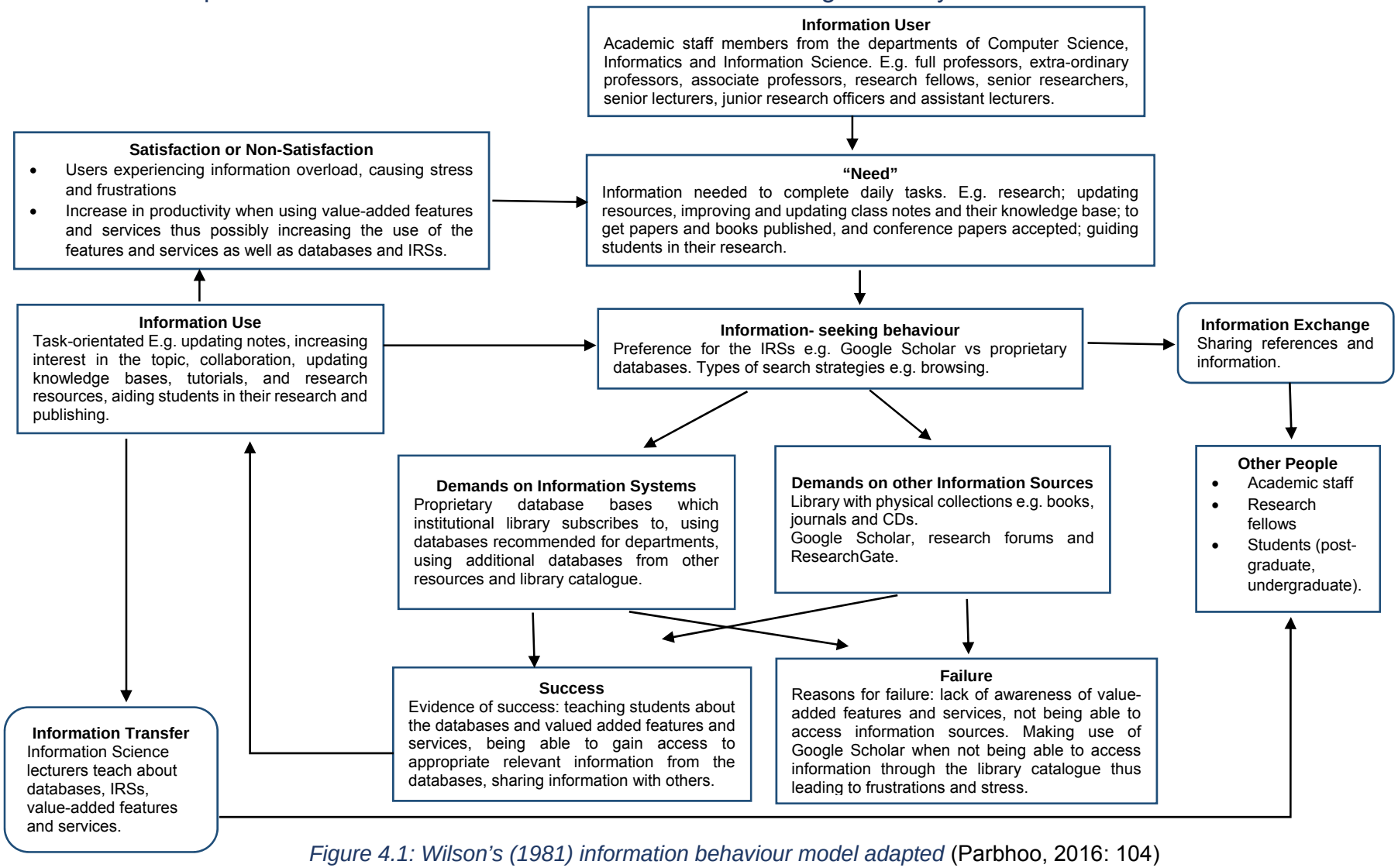


Figure 4.1: Wilson's (1981) information behaviour model adapted (Parbhoo, 2016: 104)

The researcher used the Wilson (1996) model supplemented from Wilson (1981 [two models], 1996), Leckie, Pettigrew and Sylvain (1996), Kuhlthau (1991), Ingwersen (1991) as well as Ingwersen and Järvelin (2005). Based on the findings from the empirical component and the adapted model designed by Van Wyk (2015) influenced the adapted Wilson's (1981) model as shown in figure 4.1. Overall the Wilson (1996) model and the framework adapted for the study was useful. It could, however, be supplemented in terms of Academics' information behaviour. For example, the manner in which they recognize their information needs and searching for the information making use of the IRSs and proprietary databases. Furthermore, the manner in which they make use of the information, for example, updating class notes and resources, publishing articles and conference papers, increase their knowledge base and providing assistance to students' research. Each individual's thought processes, searching styles and techniques may differ, but each individual has the same reason for searching for information, which is to fill an information gap. This will be discussed further in Chapter 5.

4.7 CONCLUSION

This chapter was based on the findings of the study and graphs, tables and descriptions were provided. The findings were based on the data that was collected from the academic staff members of selected departments in the School of Information Technology. The data was collected through self-administered electronic questionnaires via Google Forms, as well as focus group/individual interviews. The following chapter discusses the main findings and issues that have been identified by the analysis.

CHAPTER 5: FINDINGS, RECOMMENDATIONS, SUGGESTIONS FOR FURTHER RESEARCH AND CONCLUSION

5.1 INTRODUCTION

This chapter comprises a summary of the study, the main findings of the research study and an evaluation of the research methodologies that have been used. Recommendations to improve the usage of the special features and value-added services of IRSs by academic staff members are noted, as well as recommendations for theory, practice and further research. Finally, an overall conclusion to the study is provided. The main research question was:

> *How are academics exploiting value-added features and services offered by databases in their academic task completion?*

To answer the research question, the following sub-questions were set:

(1) What unique functions and special features are available in a selection of IRSs relevant to disciplines such as Computer Science, Informatics and Information Science (with specific reference to proprietary databases and journal platforms)?

This question was answered by the literature analysis and the researcher checking the databases for their value-added features and services.

(2) What has been reported in the subject literature on academics' use of databases and other IRSs?

This question was answered by the literature analysis.

(3) What is the awareness of academics in the departments of Computer Science, Informatics and Information Science of the selected IRS features and services?

This question was answered by the empirical component.

(4) How do academics in the departments of Computer Science, Informatics and Information Science use the IRS features and services?

This question was answered by the empirical component.

The objectives of the study were thus to:

- Identify databases relevant to the subject fields covered by the participating disciplines (Computer Science, Informatics and Information Science).
- Identify core features and services from these databases that might support academics in their task completion.
- Determine the information-seeking behaviour of academics and their use of databases and other IRSs.
- Use findings on the information-seeking behaviour of academics and their use of databases and other IRSs to inform the design and marketing of such databases and other IRSs and to inform training in the use of databases.
- Inform methods for research on user's information behaviour in this regard.

This will be discussed further in section 5.2.1.

5.2 SUMMARY OF THE STUDY

The following table provides a summary of the study that has been conducted. This includes the study that was conducted, the participants, the institution where the case study was conducted and the reason for selecting it, and the research approach and research methods. The methods of data collection, including the number of participants that responded to the electronic questionnaire and the focus group/individual interviews, as well as the period of the study, are indicated in the table.

Study conducted	The study that was conducted was based on the awareness of academic staff members of the special features and services that are provided by IRSs and databases to which the institution's library subscribes.
Participants and sample	Three departments were chosen. The reason for choosing these departments is that the staff members teach, develop and make use of the IRSs. Therefore, the academic staff members of the Departments of Computer Science, Informatics and Information Science were the target participants. It was a purposive sample, as well as a sample of convenience, since the researcher had easy access to the participants. All academic staff in the three departments were invited to participate.
The institution used as a case study	An institution convenient to the researcher was chosen for the case study.
Research methods	Case study
Research approach	The research study used a quantitative research approach combined with a qualitative component of limited scope, thus using a mixed methods research approach collecting quantitative and qualitative data, and applying quantitative and qualitative methods of analysis.
Methods of data collection	An electronic self-administered, semi-structured questionnaire as well as focus group/individual interviews were used to collect the data from the participants. The questionnaire is available in Appendix B and the interview schedule in Appendix D.
Number of participants	37 participants responded to the questionnaire 12 participants participated in the individual interviews 5 participants participated in the focus group interviews
Period of the study	The period of data collection was over two and a half months: September to mid-November 2015.
Adhering to ethical issues	Ethical clearance was requested from the Research Committee of the Department of Information Science (as the degree-granting institution) in August 2015 and approved in August 2015. Thereafter ethical clearance was requested from the faculty committee for research ethics as well as the dean of the faculty of the institution where the research was conducted. This was done in August 2015 and approved in September 2015.

Table 5.1: Summary of the study

5.2.1 Sub-questions of the study

This section provides a summary of the answers to the sub-questions set in Chapter 1, section 1.2.

5.2.1.1 Unique functions and special features available in a selection of IRSs relevant to disciplines

After selecting databases appropriate to the three departments, the researcher worked through all the databases to compile a list of the unique functions and features that are available, and that were considered suitable for the purpose of this study. The list can be viewed in Appendix E: Special features and services chart presented to participants. The types of features and services selected included alerting or notification services, RSS news feeds, exporting citations to reference management software, searching for figures and tables, checking curricula recommendations, case studies, tutorials, checking for conferences and events and the topic path. Many of these features and services can be found in all (or almost all) of the databases; others were unique to the specific database or database service provider. The selection and choice of value-added features and services were discussed in more detail in Chapter 2, section 2.7.2.

5.2.1.2 Reported subject literature on academics' use of databases, other IRSs and information literacy skills

The literature reported in Chapter 2 section 2.4 provided the researcher with the background information on IRSs and the information behaviour of academics. IRSs are used in all disciplines and allow users to retrieve information that is relevant to their search queries, thus satisfying their information needs and fulfilling information gaps. Academics make use of IRSs and databases in order to update their information and knowledge base and update their study material and curriculum. These resources also allow them to aid their students' and their own research. They are able to find information that already exists, thus decreasing duplication of information. The literature found helped the researcher to understand that there are challenges with regard to improving IRSs and databases and furthermore a challenge in the information literacy training that enables users to make effective and efficient use of IRSs and databases.

5.2.1.3 Academics' awareness of the selected IRS features and services

Findings on the answers to this question were discussed in detail in Chapter 4. After analysing the data that had been collected from the academic staff members, it was evident that most staff members teaching in the department of Information Science or who had studied Library and/or

Information Science were aware of the IRSs and their special features and services. Staff members who may not deal directly with the IRSs or databases may be aware of the "popular" features and services, such as "RSS new feeds" and "Add to my citation", but they are not aware of features such as "ResearcherID profile" and "Affiliation searches". Although participants indicated in the questionnaire that they were willing to explore these features, there are staff members who teach these features and services who stated that it is "not necessary to explore these features", as they already know how and where to search. Awareness thus seems to be related to teaching and curriculum content, that can link to the work by Leckie, Pettigrew and Sylvain (1996) noting the importance of tasks and roles. The findings were further that those who were not actively involved in teaching these features and services were more open to learning and implementing them when conducting research. The main reason for this is that it makes life easier and users waste less time searching and browsing. Many staff members are aware of the special features and services, but do not necessarily make use of them. Other staff members acknowledge the special features and services and have made use of them. Furthermore, junior research officers and assistant lecturers, who are in the beginning stages of research outputs and still developing their lecturing skills, state that they have not been aware of the special features and services, but would like to explore these options. Findings on this issue were discussed in more detail in Chapter 4, section 4.3.4.

5.2.1.4 Use of IRS features and services

When conducting the study, the researcher was able to understand how academics make use of the IRS features and services and the reasons why they make use of them. The reason for using such features and services is that it makes searching easier and lessens the time spent searching for articles that may not be relevant to their search query. It also allows them to find related articles that have the same query words or synonyms for their search terms. Overall there was a preference for Google Scholar with some noting that Google Scholar has similar features (although many of the features and services are not offered by Google Scholar). When conducting the research, the researcher came to the conclusion that many of the academics make use of Google Scholar and Wikipedia as a starting point of research. They make use of Google Scholar if they are looking for articles pertaining to their research topic and if they are unable to find resources they use the references found in Wikipedia. Once the academics have found articles related to their topic of research, they start researching databases that have e-journals with similar topics.

5.2.2 Overview of satisfying the objectives of the study

As pointed out in section 5.1, the study met all the set objectives, namely:

- Identifying databases that are relevant to the subject fields of the target group.
- Identifying the core features and services of the databases.
- Determining the information-seeking behaviour of the academics and usage of databases and other IRSs.
- Addressing marketing of databases to academics.

5.2.2.1 Identify databases relevant to the subject fields

The researcher was able to identify the databases that are relevant to the disciplines related to the study, by searching the institutional library's website. The databases to which the specific departments subscribed were linked to the various disciplines taught at the tertiary institution.

5.2.2.2 Identifying the core features and services from the databases

In order to complete the objective of identifying the core features and services within a database, the researcher was required to search through each of the databases subscribed to by the institutional library for the disciplines participating in the research. The researcher then considered all the advanced features, value-added features and services that were found in these IRSs and databases and compiled a selected list from these. Furthermore, this list was used in the questionnaire as well as the interviews. It can be found in Appendix E: Special features and services chart presented to participants.

5.2.2.3 Determining the information-seeking behaviour of academics and usage of databases and other IRSs.

In order to determine the information-seeking behaviour of academics and their usage of the databases and other IRSs, the researcher administered a questionnaire and conducted individual/focus group interviews. Most participants' information-seeking behaviour followed a trend. The trend that was found was that many participants made extensive use of Google Scholar before making use of databases and used the institutional library website as the gateway to gain access to the information required to complete a task.

5.2.2.4 Exploring options for marketing databases to academics

Several possibilities were noted by participants, namely:

- Information by email on the new features and services they are offering, sent by database service providers.
- A “hover over” option that allows users to place their cursor over the feature and service for a brief description.
- Possible training sessions to learn more and understand the uses of the value-added features and services.
- A link on the home page of the new features and services that will allow the users to click on specific feature to learn more about what it is used for.
- Furthermore, a one-day workshop twice a year to refresh users’ knowledge of the old and new features and services.

Furthermore, these participants stated that they would like the department to implement a training programme once or twice a year to refresh their knowledge about the special features and services or teach them from scratch before sending out a “how to guide” or emails on the changes and/or additions to the special features and services.

Most staff members who participated in the questionnaire and focus group/individual interviews stated that Google Scholar was used as the starting point of the searches. Before narrowing down the search, they made use of full text search strings. Once they found relevant information and needed access to the databases, they made use of the library website as their gateway. This allowed the staff members to access the documents without having to purchase the articles themselves, as the library subscribes to these journals and journal platforms (i.e. full-text databases).

Staff members for the Departments of Computer Science and Informatics who are not involved in teaching IR stated that they would like to explore many of the special features and services made available to them. Some of the staff members from these departments stated that they did not know much about the special features, therefore the assumption that could be made from this information is that if they do not teach modules that include IR they are unaware of the special features and services available to them.

5.2.2.5 Staff members teaching information retrieval modules

Additional findings were that some academic staff members are aware of the special features and services, as they teach them in their modules. These staff members belong to the department of Information Science. Although they teach these features and services, some of the staff members know how to make use of them in theory, but do not actually use them.

Staff members who participated in the study and who teach modules such as Information seeking and retrieval; Organisation and representation of information, stated that students taking these modules do not understand how these features and services work. Although all students and staff members who have started working at the department took compulsory information and computer literacy modules, some admitted that they are still not taking note of value-added features and services. In such under-graduate work, they were introduced to basic and not the value-added features and services. The students majoring in Information Science and the staff members teaching in the department are equipped with knowledge about value added features and services, but not all apply it.

5.3 EVALUATION OF THE RESEARCH DESIGN USED

The data collection instruments were developed from the literature analysis and were pilot-tested (discussed in Chapter 3 section 3.7). In conclusion of the study, strengths as well as weaknesses of the research design are noted.

5.3.1 Positive aspects of the research design used

The positive aspects of the data instruments were:

- The questionnaire was useful in collecting data on numbers for practices, preferences, usage and awareness. Google Forms made it easy to collect and statistically analyse the data.
- Both individual and focus group interviews managed to collect rich data, as well as revealing unexpected issues, for example preferring to use physical books in the library or Google Scholar and not making use of the available features and services, although some of the participants teach modules that focus on IR.
- Making use of interviews allowed the participants to share their experiences and views in their own words and emphasised important aspects of the features and services.
- There were different dynamics in individual interviews and focus groups in terms of the manner in which the participants shared their information. The individual interviews

allowed the participants to give their own views; the focus group interview allowed the participants to share their insight with participants who did not know much about the features and services and encouraged the participants to incorporate them in their research to make their searches easier.

- When analysing the qualitative data collected, it was easy to identify trends, similar and related issues experienced by participants, as well as solutions to such issues.
- Quantitative data allows the researcher to collect precise data on the percentage of staff members who make use of databases, as well as the features and services with which they were provided.
- The online questionnaires were easier to interpreted and analyse because Google Forms allowed the researcher to make use of the "view summary" option, thus providing the researcher with graphs and percentages. This saved time on designing graphs and tables presented in Chapter 4.
- Individual and focus groups interviews allowed the researcher to gather more information. This also allowed the participants to be open about their searching techniques.
- The focus group interviews allowed the staff members from different fields to discuss their issues with IR and discuss possible solutions that could be offered by the staff members who teach the modules on IR and seeking. This allowed the participants to network and communicate freely, without feeling intimidated.

5.3.2 Drawbacks of the research design used

- A limitation of the project was a lower response rate than hoped for. This, however, often happens, as mentioned in Chapter 3, section 3.6.1; if the questions are not administered face to face there is a possibility of a low response rate (Kumar, 2011: 149).
- One of the questions – question 5 - was incorrectly interpreted by two recipients. The question posed was "Are there any other databases you make use of on a regular basis?" The participants interpreted the question as referring to the techniques they used.

5.4 RECOMMENDATIONS

The following recommendations address theory as well as practice aspects of the study.

5.4.1 Recommendations for theory

From a theoretical perspective the adapted Wilson model (supplemented with input from other models) can be further, refined through future studies, specifically focusing on the impact of task completion, the development of social capital through features that support the sharing of information and the building of scholarly networks and proprietary forums, for example research forums for research groups such as African Academic Research Forum and Information Systems Research Forum, thus allowing researchers to share their references and create ResearcherID Profiles. In doing so, increasing their knowledge base and retrieving information that are similar to their field of interest and teaching materials. IRSs and proprietary databases need to market their contents and old as well as new value added features and services in order to compete with Google Scholar which is a fast growing information source for academics.

5.4.2 Recommendations for practice

Various practical recommendations can be made, based on feedback. These include context-sensitive support/help on the use of value-added features and services, brief online guidelines, training and refresher courses, notification of new services and reward systems such as online badges or games to showcase these features and services of databases (as examples of IRS).

A “hover over” option should be implemented in all databases, allowing users to place their curser above the value-added features and services, which would provide them with a short description of the special features and services. This would make it easier for users who are not familiar with these special features and services. With this option, a link should be placed in this description bubble to a user manual of the specific feature. This will allow the user to click on the link and be directed to the exact page in the training manual or “how to guide” of the special feature and services.

Another recommendation is a refresher course presented at the beginning of the academic year that will allow the academic staff to attend and refresh their knowledge or learn some of the new special features and services. Other recommendations are that the staff members should be emailed about the new special features and services that are available in specific databases. This will allow them to keep up to date with what is new. This email should include a link to the database, with a quick review of the special feature and services. This could be useful for academic staff members in the Department of Information Science who teach the modules, as discussed in the previous section.

5.5 SUGGESTIONS FOR FURTHER STUDY

The following recommendations are made with regard to future studies:

- The potential of value-added features and services provided by proprietary databases for the development of social capital in academic contexts.
- Affordance theory and the use of value-added features and services in an academic context.
- Extended disciplinary differences in the effective use of IRSs features and services (including a larger variety of disciplines from all three broad science groups, namely Natural Science, Social Science and the Humanities).
- The use of IRSs as well as value-added features and services by information specialists, librarians and academic staff members who teach modules on IR and seeking as user groups who are specialising in information retrieval.
- Motivators for students to explore and make more effective use of the features and services provided by IRSs.
- Enhancing the refined Wilson (1981) model by task-based models of information behaviour to collect task specific information on the use of value added features and services.

5.6 CONCLUSION

In conclusion, the research study proved that academic staff members in the field of Information Science are aware of the special features and services provided by the databases to which the library subscribed. However, disciplines such as Computer Science and Informatics should be provided with more information about such features and services.

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APPENDIXES

Appendix A: Informed consent form: Questionnaire

Informed consent form for participation in study (questionnaire)

Title of study: Effective use of features and services of information retrieval systems in an academic environment

I …… acknowledge that I have been given full information about the project by Naailah Parbhoo.

- The nature, objective, possible safety and health implications have been explained to me and I understand them.
- I understand my right to choose whether to participate in the project and that the information furnished will be handled confidentially. I am aware that the results of the investigation may be published.

By clicking on the appropriate box.

I agree to participate ☐

I decline to participate ☐

Appendix B: Questionnaire

Letter of invitation

Title of study: Effective use of features and services of information retrieval systems in an academic environment

It will be appreciated if you could find the time to participate in a study on the above-mentioned topic. The study is conducted in partial fulfilment of the requirements for a Master's degree in Information Technology. It is being supervised in the Department of Information Science (tertiary institution in South Africa). The intention of the study is to explore how academics use a spectrum of features and services available from databases (i.e. information retrieval systems) to which the Department of Library Services subscribes. The findings will be used to make recommendations on how to make use of the features and services offered by databases, how academics can benefit from these, and how library services can raise awareness about the value of such features and services. Even if you prefer to use Google, Google Scholar or other Web search and information-sharing tools, your input will be useful.

The first component of the study is a questionnaire. Permission to conduct the study has been received from the Research Committee of the Department of Information Science, Faculty Committee for Research Ethics and Integrity (Engineering, Built Environment and Information Technology), and the Dean of the Faculty, of the tertiary institution in South Africa.

Researcher name: Ms Naailah Parbhoo Contact detail: Email: naailah.parbhoo@up.ac.za Office phone: (012) 420-4070	Supervisor name: Professor Ina Fourie Contact detail: Email: ina.fourie@up.ac.za Office phone: (012) 420-5216

If you are willing to participate, please read the form of informed consent. Clicking on the "I agree to participate" box will be taken as consent.

Title of study: Effective use of features and services of information retrieval systems in an academic environment

Researcher: Ms Naailah Parbhoo (Email: naailah.parbhoo@up.ac.za; Office number: 012-420-4070)

Questionnaire

Instructions to complete the questionnaire:

1. Kindly answer all the questions and answer them as honestly and objectively as possible. This will increase the accuracy of the results.
2. Please click on the appropriate box(es) of your choice.
3. For open questions, you can give you answers in the spaces provided.
4. **Thank you for your time and cooperation in participating in the research. It is much appreciated.**

Section A: General

1. Please indicate your department. This data will only be used to describe the participant profile and not for comparison of the departments.

Computer Science	
Informatics	
Information Science	

2. Please indicate your professional level in the department.

Level	
Full professor	
Extraordinary professor	
Associate professor	
Research fellow	
Extraordinary senior researcher	
Senior lecturer	
Lecturer	
Junior research officer	
Assistant lecturer	

Section B: Use of databases as information retrieval systems

3. Please specify your preference for using databases to which the University of Pretoria's Department of Library Services subscribes (e.g. IEEE Explore, Infotrac and ISI Web of Knowledge).

   1 = low preference and 10 = high preference

1	2	3	4	5	6	7	8	9	10

4. How often do you use the following databases?

Databases	**Never**	**Seldom**	**Infrequently**	**Frequently**
ABI/Inform Complete				
Academic OneFile				
ACM Digital Library				
Cambridge Books Online				
Computer and Information Systems Abstracts				
EI Engineering Village				
Emerald				
ERIC (Ebscohost)				
ERIC (Proquest)				
Gartner Research				
Google Scholar (not a traditional proprietary database)				
IEEE Xplore				
InfoTrac				

ISI Web of Science				
Library Catalogue				
Library and Information Science Abstract (LISA)				
Library, Information Science & Technology Abstracts				
Library & Information Science Source				
SAGE Knowledge				
Scopus				
SpringerLink				
UNICEF				
UPSpace				
Wiley Online Library				
WorldCat Local				
50+ killer online resources for computer science students				

5. Are there any other databases you use on a regular basis? (Please specify)

_____

6. Do you prefer to use web search tools rather than databases?

Yes	No

7. If yes, will you please list not more than five tools you use most often?

_____

8. Please indicate the academic tasks for which you make use of databases by marking all appropriate options.

- o Deciding on the curriculum
- o Preparing for a lecture
- o Teaching (e.g. methods, evaluation, testing)
- o Post-graduate supervision
- o Publication and conference presentations
- o Increasing your knowledge base
- o Sharing information
- o Collaboration
- o Other (please specify)

_____

Section C: Use of the features and additional services offered by databases

9. Why do you search databases? Please mark all the options that apply.

- o I do not use databases
- o To search for information on a topic or combination of topics
- o To search for publications by a specific author(s)
- o To search for publications from a specific institution(s)
- o To see what is published on a topic in a specific journal (when deciding on where to publish)
- o To set up alerts (i.e. subscribing to services where you will be notified about new information on a topic, author, etc.)
- o Collecting information for a personal database or reference collection for example. for a RefWorks or EndNote database
- o Other (please specify)

_____

10. Which of the following special features and services that are available from one or more of the databases listed in question 3 have you used or would you be willing to explore?

Special features and services	**Not aware of**	**Used**	**Not used**	**Willing to explore**	**Not willing to explore**
Alerting or notification services for example of new publications on topic, new work by an author					
RSS news feeds					
Adding to “My Citation Alerts”					
Adding references to “your library”, “favorites”, “add to folder”					
Exporting citations to reference management software (e.g. Endnote, RefWorks, Mendeley)					
Limiting results to full-text publications					
Limiting results to peer-reviewed publications					
Searching for figures and tables					
Finding similar or related publications					
Searching for specific document types (e.g. advertisements, annual reports, articles, bibliographies, biographies, conferences, curricula, fact sheets/brochures, newsletters)					
Searching for specific format types (e.g. audio, video, blogs, images)					
Checking data and reports					
Checking curricula recommendations					

Tutorials (e.g. how to search, browse), help guides and materials on using the database					
Case studies (e.g. Emerald provides case study materials and research)					
Checking lists of journal titles for databases					
Checking for conferences and events					
Browsing options (e.g. broad topics, country reports)					
Topic path (e.g. in your fields for useful publications)					
Critical reviews of publications					
Sharing references with other (e.g. EbscoHost folders)					
History of searches					
Thesaurus to look up terms					
Advanced search interfaces					
Command search interfaces					
Subject suggestions by databases related to query					
Viewing publications with open access					
Viewing top downloaded articles					
Creating and maintaining custom journal lists					
ResearcherID profile (to showcase your publication history)					

Top keywords (Researchers interested in topics may click on the words to open up publications on the terms)					
Affiliation search (e.g. allows researchers to Identify and assess an affiliation's scholarly output and collaborating institutions)					

Please indicate whether or not you would like to participate in the second component of the study, which includes a focus group interview. The focus group interviews will last between 45 and 60 minutes. If a focus group interview is inconvenient, you can also participate in an individual interview. The individual interview will not last longer than 30 minutes.

I am willing to participate in a focus group interview ☐
I am willing to participate in an individual interview ☐
I cannot participate in a focus group interview or individual interview ☐

Thank you for taking the time to fill in this questionnaire. The information that you have shared with me will be kept confidential and used only for the purpose of this study.

Appendix C: Informed consent form: Interview

Informed consent form for participation in study (interview)

Title of study: Effective use of features and services of information retrieval systems in an academic environment

I ……. acknowledge that I have been given full information about the project by Naailah Parbhoo.

- The nature, objective, possible safety and health implications have been explained to me and I understand them.
- I understand my right to choose whether to participate in the project and that the information furnished will be handled confidentially. I am aware that the results of the investigation may be published.
- Upon signing this form, I am to be provided with a copy.

I agree to participate ☐ I decline to participate ☐

I agree to a recorded interview ☐ I do not want to be recorded ☐

Signed: _____ Date: _____

Witness: _____ Date: _____

Researcher: _____ Date: _____

Appendix D: Interview – profile questionnaire and interview schedule

Title of study: Effective use of features and services of information retrieval systems in an academic environment

Researcher: Ms Naailah Parbhoo (Email: naailah.parbhoo@up.ac.za; Office number: 012-420-4070)

Section A: Demographic Information

1. Please indicate your department. This data will only be used to describe the participant profile and not for comparison of the departments.

Computer Science	
Informatics	
Information Science	

2. Please indicate your professional level in the department.

Level	
Full professor	
Extraordinary professor	
Associate professor	
Research fellow	
Extraordinary senior researcher	
Senior lecturer	
Lecturer	
Junior research officer	
Assistant lecturer	

3. When searching for information to complete an academic task, such as preparing for a lecture or doing research, do you make use of databases (e.g. ERIC, Library and Information Science Abstract (LISA), Library, Information Science and Technology Abstracts)?

Yes	No

INTERVIEW SCHEDULE

Title of study: Effective use of features and services of information retrieval systems in an academic environment

The interview is part of a study in partial fulfilment of the requirements for a master's degree study (Master in Information Technology). Focus group interviews will last between 45 and 60 minutes and an individual interview will not last longer than 30 minutes.

The intention of the study is to explore how academics use a spectrum of features and services available from databases (i.e. information retrieval systems) to which the Department of Library Services subscribes. The findings will be used to make recommendations on how to make use of the features and services offered by databases, how academics can benefit from these, and how library services can raise awareness of the value of such features and services.

Permission has been received from the Research Committee of the Department of Information Science, Faculty Committee for Research Ethics and Integrity (Engineering, Built Environment and Information Technology), and the Dean of the Faculty, of the tertiary institution in South Africa.

Researcher name: Ms Naailah Parbhoo Contact detail: Email: naailah.parbhoo@up.ac.za Office phone: (012) 420-4070	Supervisor name: Professor Ina Fourie Contact detail: Email: ina.fourie@up.ac.za Office phone: (012) 420-5216

Title of study: Effective use of features and services of information retrieval systems in an academic environment

Researcher: Ms Naailah Parbhoo (Email: naailah.parbhoo@up.ac.za; Office number: 012-420-4070)

Databases – additional features and services

The databases that are made available by the Library Services are important for academic and research work. The Library Services subscribe to these databases, as they index a large portion of the most important journals, conference proceedings, cases, books, etc. The databases are specific to subject fields and enable users to find the relevant references. The databases are mostly available through database information services such as Proquest and EbscoHost, which provide access to a number of databases that can be searched at the same time and journal publishers such as Emerald. These databases often provide additional features and services to support users, academic staff and authors. The purpose of this study is to determine how these are used by academics. Examples of advanced search features and services include a thesaurus to look up terms, subject suggestions by databases related to query, finding similar references and customizing searches.

Please refer to the separate chart for more detail on these.

Section B: Special features and services

1. Are you aware of the special features and services offered by the databases as portrayed on the chart?

Probing questions:

1.1 Are you interested in such features and services?

1.2 Do you ever check for such features and services?

1.3 Do you know how to make use of these features and services?

1.3.1 If yes, which features and services do you make use of and why?

1.3.2 If no, why do you not make use of these features and services?

2. What is your opinion on the usefulness of the features and services listed on the chart?

3. Do you foresee making use (more use) of such features and services in future or not? Please give a reason for your answer.

Probing questions:

3.1 Would you consider using the search features and special services if you knew more about them?

3.2 How would you like to be informed (e.g. training, workshops, 'how to' guides, tutorials)?

4. Are there other features and services provided by information retrieval systems, specifically databases, that you prefer to use?

Probing question:

4.1 If yes, can you please indicate what they are?

Thank you for taking the time to participate in this interview. The information that you have shared with me will be kept confidential and used only for the purpose of this study, and publications/conference papers reporting on the findings.

Appendix E: Special features and services chart presented to participants

Special features and services
Alerting or notification services e.g. of new publications on topic, new work by an author
RSS news feeds
Adding to “My Citation Alerts”
Adding references to “your library”, “favorites”, “add to folder”
Exporting citations to reference management software (e.g. Endnote, RefWorks, Mendeley)
Limiting results to full-text publications
Limiting results to peer-reviewed publications
Searching for figures and tables
Finding similar or related publications
Searching for specific document types (e.g. advertisements, annual reports, articles, bibliographies, biographies, conferences, curricula, fact sheets/brochures, newsletters)
Searching for specific format types (e.g. audio, video, blogs, images)
Checking data and reports
Checking curricula recommendations
Tutorials (e.g. how to search, browse), help guides and materials on using the database
Case studies (e.g. Emerald provides case study materials and research)

Checking lists of journal titles for databases
Checking for conferences and events
Browsing options (e.g. broad topics, country reports)
Topic path (e.g. in your fields for useful publications)
Critical reviews of publications
Sharing references with other (e.g. EbscoHost folders)
History of searches
Thesaurus to look up terms
Advanced search interfaces
Command search interfaces
Subject suggestions by databases related to query
Viewing publications with open access
Viewing top downloaded articles
Creating and maintaining custom journal lists
ResearcherID profile (to showcase your publication history)
Top keywords (Researchers interested in topics may click on the words to open up publications on the terms)
Affiliation search (e.g. allows researchers to Identify and assess an affiliation's scholarly output and collaborating institutions)

Appendix F: Researcher declaration

Title of study: Effective use of value-added features and services of information retrieval systems in an academic environment

Hereby I, Naailah Parbhoo, in my capacity as Master in Information Technology Research student/researcher, declare that:

1. Research subjects will be informed, information will be handled confidentially, research subjects reserve the right to choose whether to participate and, where applicable, written permission will be obtained for the execution of the project.

2. No conflict of interests or financial benefit, whether for the researcher, company or organisation, that could materially affect the outcome of the investigation or jeopardise the name of the university is foreseen.

3. Inspection of the experiments in loco may take place at any time by the committee or its proxy.

4. The information I furnish in the application is correct to the best of my knowledge and I will abide by the stipulations of the committee as contained in the regulations.

5. I will also request permission from the Dean of the Faculty of Engineering, Built Environment and Information Technology, to conduct the study with staff members from the tertiary institution in South Africa, specifically staff from the Faculty.

Signed:  Date: 20 March 2016

Appendix G: Overview of the data collection methods

Overview of the data collection methods	
Methods	Self-administered, semi-structured electronic questionnaire Focus group interview Individual interviews
Software	Electronic questionnaire: Google forms Focus group interviews: Video recording software - Samsung Voice Recorder Individual interviews: Video recording software - Samsung Voice Recorder Transcribing software: Dragon
Ethical clearance	Ethical clearance was requested by the Research Committee of the Department of Information Science (University of Pretoria) (as the degree-granting institution) in August 2015 and approved in August 2015. Thereafter ethical clearance was requested from the faculty committee for research ethics as well as the Dean of the Faculty of the institution where the research was conducted. This was done in August 2015 and approved in September 2015.
Time frame for data collection	Electronic questionnaire: September to October 2015 Focus group interview: November 2015 Individual interviews: October to November 2015
Follow- up	Emails were sent out on a weekly basis; the first email of invitation was sent by the Department of Information Science secretary to the mailing list for the School of Information Technology as well as to the three heads of departments to disseminate to their staff members. Thereafter the researcher sent two more reminder emails out to the heads of departments to inform the staff members of the invitation and link to the questionnaire. Once questionnaires had been administered, participants who indicated “yes” to the invitation to take part in interviews or a focus group interview were contacted and appointments were set up.
Rate of response	Electronic questionnaire - 37 participants (although some of the participants in the questionnaires did not respond to all the questions, the information obtained from this data collection instrument was sufficient to allow the researcher to complete the study, draw conclusions and make recommendations). Focus group interview - 5 participants Individual interviews -12 participants
Number or questions asked	Electronic questionnaire - 10 questions Focus group interviews - 7 questions Individual interviews - 7 questions *(The focus group interview and the individual interviews were guided by the same interview schedule; see Appendix D)*
Approximate time taken to answer	Electronic questionnaire - 10 minutes Focus group interviews - 30 minutes Individual interviews - 5 minutes to 1 hour 45 minutes
Consent	Electronic questionnaire - consent was given online; if consent was not given or participants did not want to answer the questionnaire they would be redirected to a “Thank you” page. The consent form can be viewed in Appendix A. Focus group interviews - a printed consent form was administered before the interview began. Individual interviews - a printed consent form was administered before the interview began. The consent form can be viewed in Appendix C.