EDRMS search behaviour: Implications for records management principles and practices

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Thesis Abstract

This study investigates the efficacy of electronic document record management systems (EDRMS) in enabling effective capture and dissemination of corporate information. The thesis examines the degree to which these systems are designed in accordance with the records management principles outlined in ISO 15489 (International Organisation for Standardisation, 2002a, 2002b) support the effective retrieval of records by knowledge workers. It also explores the impact of work tasks and training on knowledge workers' search behaviour.

Using the eight pillar RM principles in ISO 15489, the research explored how four of these key principles, metadata, classification schemes, retention and disposition schedules, and security permissions, were reflected in the design structure of the EDRMS. It also considered how the remaining four principles of policies, procedures, training, and auditing and monitoring supported the implementation and use of EDRMS in an organisation.

Building on the information seeking behaviour models of Ellis (1989), Meho and Tibbo (2003) and Marchionini (1995), this research hypothesised that the search behaviour model of EDRMS users would comprise seven search process stages and that different search activities would be performed at each stage.

A constructivist research paradigm and the case study methodology was used to collect the data, using multiple research tools such as interviews, questionnaires and protocol analysis. Four government institutions participated in the research. They were operating three different EDRMS. The participants in each organisation comprised one records manager and ten EDRMS users.

Interviews conducted with the four records managers revealed how each organisation implemented the eight RM principles. An examination of internal RM documentation and demonstrations of the EDRMS also formed part of the study.

A combination of interview and questionnaires were used to investigate the search behaviours of EDRMS users, and, protocol analysis was used to observe how each of the 40 users conducted a simple and difficult search.

The user-related research findings validate the hypothesised EDRMS search behaviour model, demonstrating a sequenced approach to EDRMS search. They provide insights into what knowledge workers consider to be simple and difficult searches and the processes users employ to resolve difficult searches. Further, the findings indicate that work tasks and training do affect knowledge workers' search behaviours.

The findings reveal the eight RM principles implemented in the sampled organisations partially support their knowledge workers' EDRMS search behaviours. However, there was evidence of insufficient recognition of user needs when developing EDRMS systems. The RM principles requiring refinement relate to: 1) policies, 2) procedures and standards; 3) metadata; 4) the classification scheme; 5) training; and 6) monitoring and auditing. The findings suggest that an information culture with visible senior management support is essential to encourage good information management behaviours amongst employees and improve their EDRMS search experiences. Recommendations on how records managers might improve these six RM principles are discussed in the thesis.

A major contribution of this study is the development of the EDRMS search behaviour model which will offer considerable guidance to the records management discipline. For the first time, RM professionals are positioned with an understanding of the seven search processes and varied search activities EDRMS users engage and exhibit when they start a search in the EDRMS. Given the shift in recordkeeping responsibilities from RM professionals to knowledge workers, this understanding provides insights for tailoring and delivering training programs that meet users' task requirements. It also provides guidance to simplifying RM tools like classification schemes, to enable ease of registration and search of corporate information by knowledge workers. The research offers useful guidance on possible revisions to ISO 15489, to support ultimate usage by organisational members.

This research identifies six possible future research topics that would extend or validate the current findings centered on the knowledge workers': training; tasks; preferred search styles; experiences working with classification schemes. Including; how their motivational and affect factors will influence their EDRMS searching?

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Dedication

This thesis is dedicated to my parents,

who believed in me

and provided constant encouragement

and support throughout.

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1 Introduction

Developments in information and communication technologies have led to the growth of electronic document and records management systems (EDRMS). The ease with which electronic information is created, received, changed and transmitted has led to the devolution of records management responsibilities to employees who may not be trained in, or wish to perform, this role. How then does an organisation ensure its employees are able to search and retrieve corporate information in a timely manner to meet business and regulatory requirements, and to defend itself in the event of e-discovery[1] litigation? With the growth in electronic information and increasing reliance on the capture and management of corporate knowledge, this has become a critical concern for many organisations. This thesis explores this issue from two perspectives: firstly, it questions whether current EDRMS designed using key records management (RM) principles achieve the necessary outcomes; secondly, it examines the alignment of EDRMS with the way their users search for information from these systems.

1.1 Background to the research topic and problem

1.1.1 Advancements in computing technologies led to information growth

Advancements in computing infrastructure and office computing systems in the 21st century have simplified access to computing and telecommunications systems for end users at home and in office environments. These in turn have equipped organisations' knowledge workers[2] with access to office technologies such as desktops, laptops, iPhones, Blackberries or thumb drives, thereby empowering employees to be mobile

[1] E-discovery refers to "a part of the pre-trial litigation process that gives opposing parties the opportunity to request relevant information, including records, from one another with the intent of discovering information to build their claims or defences" (Saffady, 2009, p. 136).

[2] Debowski (2006) defines "workers who spend most of their time generating, applying or conveying knowledge" as knowledge workers (p. 18).

workers, able to work from anywhere and at any time away from traditional office settings (McLeod, Hare, & Johare, 2004, p. 1; Miller, 2006, p. 38). The Interactive Data Corporation (IDC) estimates that "less than 5% of the digital universe actually emanates from datacenter servers, and only 35% emanates from the enterprise overall, mostly from workers at their desks, on the road, or working at home" (Gantz et al., 2008).

The introduction of email systems has enabled organisations to correspond efficiently with their employees, and meeting planner and appointment scheduling software like Microsoft's Outlook have led to the planning of meeting engagements electronically. Web 2.0, Enterprise 2.0 technologies or mashups which are "based on interactive and participatory applications" such as blogs, wikis, Twitter, Facebook and Flicker also enable employees to readily create content and collaborate outside the organisation's computing firewalls (Dearstyne, 2007, p. 27; Franks, 2009, pp. 109-110) Web 2.0 technologies and social media technologies in particular have blurred the boundaries of computer usage for business versus social networking in organisations (Bailey, 2008). Thus, although the use of paper continues, shared and local area network drives, desktop publishing, databases, email and Web 2.0 technologies have led to a reduction in paper communication (Saffady, 2009, p. 6), and have increased the complexity of managing electronic records.

As a result of these developments, knowledge workers in the 21st century have a greater capacity to create, receive and transmit information on demand (McLeod et al., 2004, p. 2). This has led to a growth of electronic information and increased the likelihood that knowledge workers will modify or generate many documents and records themselves. An IDC sponsored white paper states that "in 2008 alone, the digital universe grew by 487 billion gigabytes" (Gantz et al., 2008). It also pointed out that large organisations may have as much as five terabytes of data in email messages alone (Miller, 2006, p. 40). Compounding this information growth is the revelation in

IDC’s research that “although individuals still create more than 70 percent of digital information, enterprises eventually end up with the responsibility or liability for 85 percent of it” (Gantz et al., 2008, p. 6).

1.1.2 Business challenges in managing electronic corporate information

Electronic information is important: it contains valuable information that is critical to business operations (Saffady, 2009, p. 7). However, electronic information has considerable vulnerabilities as it can easily be tampered with, thereby raising questions regarding its authenticity. Additionally, unless preservation actions are taken, electronic information will neither survive technological obsolescence nor be accessible in the future. To make matters worse, organisations are operating in an increasingly litigious business environment that renders organisations liable for non-compliance with legislation. They may need to retain and submit information to prove their innocence (Miller, 2006). Access to different information technology systems in organisations has enabled employees to store uncontrolled information in shared network drives, personal network drives, email systems, filing cabinets and now in social media technologies, to name but a few repositories. These information avenues can be discoverable in a legal proceeding, exposing the organisation to e-discoveries (Miller, 2006).

A significant number of businesses have been negatively affected by the challenges of e-discovery (Fortiva Inc, 2007). One-fifth of professionals surveyed by Fortiva said their business had settled a lawsuit to avoid the cost of recovering and searching through electronic documents such as email (Fortiva Inc, 2007). Reportedly 37% of respondents annually conducted more than 21 searches through old email to gather information for legal reasons (Fortiva Inc, 2007). The Cohasset survey by Williams and Ashley (2009) reported that 65% of US organisations affirmed that their organisation had “some” (40%), “considerable” (17%) or “great” (8%) difficulty finding and retrieving information from backup and archival storage media in response to court-ordered discovery (p. 9). Businesses in the US are now actively taking steps to reduce risk and meet the US legislation Federal Rules of Civil Procedure (FRCP) requirements by improving their e-discovery processes (Fortiva Inc, 2007). In the UK in 2006, workers' inability to manage their email cost businesses £1.3 billion a week in lost time, according to the 2006 Information Management Survey conducted by YouGov and former content management company, Hummingbird (Fortiva Inc, 2007).

Organisations want to manage their electronic information content to protect themselves against costly e-discovery litigation processes (Kahn & Silverberg, 2008; Nelson & Simek, 2009; Swartz, 2006; Unger, 2007). Penalties or high litigation process costs have been incurred on various counts: for not having good recordkeeping practices *(Coleman Holdings, Inc v. Morgan Stanley & Co.)* (Dirking & Kodali, 2008, p. 57); for prematurely destroying evidence during litigation *(Applied Telematics v. Sprint)* (Kahn & Silverberg, 2008, p. 52); and for not implementing or adhering to retention and disposition programs *(Murphy Oil v. Fluor Daniel)* (Kahn & Silverberg, 2008, p. 52). Courts were favourable when organisations proved they had destroyed the required records in compliance with the organisation's retention schedules *(Moore v. General Motors)* (Kahn & Silverberg, 2008, pp. 50-51). Court cases or e-discovery litigation concerning malpractice or mismanagement of corporate information by private and government organisations[3] have led to government and industry regulations and legislation[4] which pressure organisations to become disciplined about their electronic documents and records management practices (Miller, 2006, p. 40).

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[3] Such as Morgan Stanley (Leon, 2006), Enron and Arthur Andersen (Fowler & Flood, 2002; United States. House of Representatives. Committee on Energy and Commerce, 2002; United States. Supreme Court, 2005), and Heiner Affair (Lindeberg, 2009).

[4] Examples of these compliance drivers for organisations to manage their information in the form of legislation are: Freedom of Information Acts; the Privacy Acts in different countries; various states' Records Acts in Australia (State Records Act, W.A.); Health Insurance Portability and Accountability

Legislation such as the US Sarbanes-Oxley Act imposes compliance not only on companies[5] but on individual executives, who can be exposed to serious penalties including jail sentences if they fail to put the right measures in place (Harvey, 2003; United States Congress, 2003b). The Gartner Group estimates that the Fortune 1000 companies have each spent about US$2 million to bring themselves into line with the Sarbanes-Oxley Act: about 20% of that expenditure went on software, but employee time on email is still mismanaged (Harvey, 2003). Employees are failing to find efficient ways of searching for emails and documents, thereby affecting an organisation's efficient running of its core business.

1.1.3 Challenges in searching and retrieving corporate information

The growth in electronic information usage has seen a commensurate increase in information management challenges. The 2006 Information Management Survey conducted by YouGov reported that "28% of 1,385 business people questioned said that more than 20% of the time they spend on email is unproductive; 41% of those surveyed said they spend between one and four hours on email a day" (Fortiva Inc, 2007). The survey also found "employees spend on average 66 minutes a day searching for email, almost a quarter of UK employees said they have lost an important email attachment" (Fortiva Inc, 2007). Research by the Delphi Group (2002) provides evidence that employees are having problems searching not only emails but also other electronic documents. The Delphi (2002, p. 10) research showed that 60% of knowledge workers agreed that finding information was a difficult process, and more than 50% reported that they spend more than two hours each day (25% or more of an 8-hour day) searching for the information they needed to perform their jobs. The Delphi (2002, p. 10) researchers

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Act (HIPAA) 1996 (United States Congress, 2003a); and Sarbanes Oxley Act of 2003 (United States Congress, 2003b).

[5] Refers to companies listed in the US Stock Exchange in New York, including subsidiaries of these companies trading outside the US (United States Congress, 2003b).

maintain that these results are consistent with those of many other surveys which have concluded that business professionals typically spend anywhere from 15% to 50% of their day seeking needed information, most of which is stored electronically and should be easily identified. Further, in the Delphi survey, “61% of respondents believe they have a less than 75% chance of finding the information they need” ("Delphi Group's results on searching," 2003). The main impediments to finding this information were reported to be poor tools (28%) and the concern that information is changing too fast (35%). These surveys reveal that in spite of a broad array of existing information management technology tools, knowledge workers are still either unable to find the needed information to perform their jobs or spending an inordinate amount of time searching for information ("Delphi Group's results on searching," 2003). Similar observations were made in 1997 by Senior Consultant Charles Abrams from the Integrated Document Output Management program. He commented that “25 to 35% of knowledge workers’ time is spent integrating and downloading information, trying to find it, then transmit, organise and output it” (Shillingford, 1997, p. 14).

1.1.4 Records management programs as a solution

In the current age of information and communication technologies that are readily accessible to their employees, the implementation and strengthening of programs for managing corporate documents and records, including emails in both paper and electronic formats, is vital for business efficiency. It is therefore essential to understand the theoretical context of records so that the underpinning records management solutions can be built.

There are various models, to explain the records lifecycle concept and lead to the current records continuum model (Penn, 1983; Upward, 1996 & 1997). Xiaomi (2003) provides an useful overview of the development and compares the similarities and differences between the record lifecycle and record continuum models, some aspects are discussed here. Penn (1983, p.6) graphically illustrates lifecycle of creation, maintenance and use and disposition of records in the broader framework of the formats, activities and technologies related to a records management solution. Shepherd and Yeo (2003) cite Schellenberg who developed the idea of the 'records lifecycle' concept; Schellenberg indicates "that records are not static but have a life similar to that of biological organisms: they are born, live through old age and then die" (p. 230). During this lifecycle, records are used until they are finally destroyed or archived. Since the 1950s, there have been many variations on the records lifecycle concept.

Most models aim to show a progression of actions taken at different times in the life of a record: typically, its creation, capture, storage, use and disposal. Shepherd and Yeo (2003) also refer to a model which suggests that

> records pass through three stages: a current stage, where they are used for business; a semi-current stage, when their business value is reduced; and a non-current stage, when they have little or no business value but may be used for other purposes (Shepherd & Yeo, 2003, p.5).

However, the three stages lifecycle model has been criticised for the following reasons: 1) some records do not 'die' but are retained permanently owing to their continuing value; 2) the divisions of three different lifecycle stages is artificial as records classed as non-current may have a renewed period of currency if the activity that led to their creation is revived; 3) the model does not allow the repetition or omission of stages when in fact this frequently happens in the field; 4) the model is centred on paper-based records and physical operational tasks of managing paper records, which is not the case in an electronic record environment (Shepherd & Yeo, 2003, pp. 9-10).

In the 1980s and 1990s, the 'records continuum' model was developed by Frank Upward and his colleagues at the Monash University in response to criticisms of the record lifecycle model (Upward, 1990, 1996 & 1997). The continuum model has no separate steps or stages, in fact "managing records is seen as a continuous process where one element of the continuum passes seamlessly into another" (Shepherd & Yeo, 2003, p. 9). It is not time based, that is records are managed according to the activities they document, not according to separate record lifecycle stages.

Xiaomi (2003) cites McKemmish's description of how the record continuum model provides an integrated framework for records and archive management that "guarantees the reliability, authenticity, and completeness of records" thereby ensuring the evidentiary, content and context values of records (p. 26).

The AS 4390 describes the record continuum as "a consistent and coherent regime of management processes from the time of the creation of records (and before creation, in the design of recordkeeping systems), through to the preservation and use of records as archives" (Standards Australia, 1996, p.7). ISO 15489 which supersedes the AS 4390 is based on the record continuum model and theory and as such defines records management as

> the field of management responsible for the efficient and systematic control of the creation, receipt, maintenance, use, and disposition of records, including processes for capturing and maintaining evidence of and information about business activities and transactions in the form of records. (International Organisation for Standardisation, 2002a, p. 3)

The burgeoning need to effectively control corporate records has stimulated the professional discipline of records management. The discipline focuses on systematically managing records across their lifecycle, from the time of creation or receipt, during their use, and until their destruction or archiving (Kennedy & Schauder, 1998). Records management services fulfil a number of roles: a business and operational role; a regulatory or social role; a business risk management role; and a corporate memory/social context role (Shepherd & Yeo, 2003). Initially established as paper-based services, they have increasingly had to manage the broad span of records that can be found across an organisation.

1.1.5 Implementation of Electronic Document and Records Management Systems (EDRMS)

Increasingly, organisations are turning to electronic document and records management systems (EDRMS) to assist with the management of both paper and electronic documents and records. For the purposes of this research, an EDRMS is defined as an automated, electronic document and records management system that enables organisations to manage semi-structured and unstructured information captured in paper and electronic formats. It also includes ISO 15489's definition of a records system: an "information system which captures, manages and provides access to records through time" (International Organisation for Standardisation, 2002a, p. 3). EDRMS have functionalities that preserve the content and context of records thereby ensuring the authenticity and evidentiary value of corporate information stored in the EDRMS.

The extent of adoption of EDRMS is reported in the 2009 Cohasset survey of electronic records management practices in the United States, co-sponsored by the American Records Management Association International (ARMA) a professional organisation dedicated to the field of records management (Williams & Ashley, 2009). The survey organisers reported that nearly 1,200 of the survey respondents were records, archives and information management professionals. Seventy-five percent (75%) of the respondents reported that electronic records were included in their organisation's current records management programs: a positive step, given that information is increasingly created and received electronically rather than on paper (Williams & Ashley, 2009, p. 17). Most respondents (83%) affirmed that their organisation had a formal records management program. Of these respondents, three quarters (76%) evaluated the effectiveness of their organisation's program as either "excellent" (6%), "great" (19%) or "good" (51%) (Williams & Ashley, 2009, p. 17). However, the review does not clearly identify the degree of integration of electronic documents, nor the mechanisms by which they are captured, managed or retrieved.

A similar survey in Australia reported 93% adoption of EDRMS in the Australian public sector by federal, state and local government organisations (Nguyen, Swatman, & Fraunholz, 2008, December 3 - 5, p. 5). Sixty-five percent (65%) of the respondents reported they currently had a recordkeeping system in place, whilst 28% stated they were in the process of planning and/or implementing an electronic recordkeeping system (Nguyen et al., 2008, December 3 - 5, p. 5). The results found that HP TRIM (38%) was the most popular EDRMS, followed by Dataworks (20%), InfoXpert, RecFind, Livelink, Objective and SynergySoft, in descending order (Nguyen et al., 2008, December 3 - 5, p. 6 and 7). A major finding reported in the survey is that the Australian public sector is "progressing towards compliance with the laws and regulations on effective and efficient records management" (Nguyen et al., 2008, December 3 - 5, p. 7).

The Gartner Group has made the following assumptions about EDRMS implementation:

- "By 2013, 50% of all Global 2000 companies will implement enterprise-wide records management solutions.
- By 2013, records management will be pervasive and will extend beyond existing content repositories into file stores, archive repositories and business applications.
- By 2013, discovery support will be a core capability for records management solutions" (Chin, 2008).

Gartner's forecast affirms the desire of organisations to employ EDRMS to manage their corporate information. The off-the-shelf systems that dominate the EDRMS market emphasise the organisation and control of records for the purposes of accountability, evidentiary requirements, regulatory compliance, business decision making and archiving. These systems use techniques described in the records management literature (Kennedy & Schauder, 1998; McLeod & Hare, 2005; Shepherd & Yeo, 2003) and the Records Management (RM) standard ISO 15489 (International Organisation for Standardisation, 2002). However, there has been little evidence to date as to how the various systems achieve these ambitious goals in a corporate setting, or whether the designs fit the purpose.

The newer releases and upgraded versions of EDRMS are designed with functions that enable integration with common office word processing, scanning, and email management applications. These electronic repositories enable organisations to register, capture, store, use, search, retrieve, modify, maintain, dispose of, and archive corporate information in electronic formats. EDRMS has functionality that enables the management of the lifecycle of paper documents and records, using a database approach to record the physical location and content description of paper information. The document management functions of check-in, check-out and version control in the EDRMS enable organisations to modify documents, track changes and maintain an automated audit trail of their corporate information. These electronic document management functionalities functions generally support the short- to medium-term information requirements of organisations.

The records management functionalities of the EDRMS enable organisational management of electronic and paper documents and records. To ensure compliant recordkeeping of the organisation's corporate information, an EDRMS has unique records management functionalities that support a corporate filing structure, the classification of corporate information within the filing structure, and the assignment of retention periods to records. Further description of the EDRMS and the differences between document and records management functions are addressed in Chapter 2.

Implementation of EDRMS solutions comes at a high cost to organisations. The Scottish Executive in the United Kingdom (UK) spent £15 million for their EDRMS project, and from 2001 the Department of Industry and Technology in the UK spent £50 million on EDRMS implementation (Bailey, 2007). It was predicted that the enterprise content management (ECM)[6] software licence market would grow by US$4.2 billion in 2010 (Pettey, 2007) ; therefore, it is important that organisations reap the return on their investments in EDRMS by ensuring their employees are effectively using the system on a daily basis for all necessary purposes. Additionally, the integration of the EDRMS with other enterprise content management (ECM) applications implemented in the organisation will further enhance enterprise records management benefits for the organisation (Sprehe, 2005, p. 297).

At a time when the classification and registration of documents was the domain of professional records managers in the 1980s and 1990s, most EDRMS, like Hewlett Packard's TRIM Context and Open Text's e-Docs began as systems for indexing paper and electronic documents and records. However, EDRMS are no longer the sole domain of dedicated, trained personnel. On the contrary, all knowledge workers now perform the role of record keepers. In Australia, it is legislated through various State Records Acts that government employees have responsibility for the records they receive and create. Thus knowledge workers throughout an organisation now must use information and communication technologies to receive, create and register electronic corporate information into the EDRMS, and subsequently to search for and retrieve them (Miller, 2006).

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[6] EDRMS software is a subset of the enterprise content management suite of software. ECM comprises other business applications in an organisation, like web content management systems, groupware applications and finance or human resource management applications.

1.1.6 Retrieving corporate information

An organisation's information is only useful if it can be found and retrieved to complete a task at hand. Qualified records management (RM) professionals design these electronic document and records management systems according to best records management practices, specified in the international records management standard ISO 15489. However, knowledge workers are tasked with records management responsibilities that require them to identify, register, search for and retrieve corporate information stored in systems by themselves and their colleagues. This devolution of the specialist RM role to all employees has increased the challenge of managing an effective EDRMS.

Given their ubiquity, it is reasonable to suggest that EDRMS are no longer the back-office systems they once were. Instead, EDRMS are systems that people throughout an organisation are expected to use (Kittmer, 2005). In many organisations, knowledge workers who create or receive documents and records are required to save and register them in the EDRMS, and ascribe at least basic descriptive metadata such as title, author and creation date, so that the record can be managed throughout its life span and retrieved by others. Because such a high proportion of organisational corporate information is now in electronic form, all staff, not just records managers, are engaged in using EDRMS to search for documents and records to support their day-to-day operational activities.

Perhaps because of the evolution of EDRM as systems originally developed for use by records managers, there is very little evidence about how organisational users interact with EDRMS. We know very little about how knowledge workers actually use an EDRMS to search for and retrieve corporate information. Neither do we know if users are successful in searching for and retrieving required information from an EDRMS. There has been little research on the factors that make information search and retrieval from the EDRMS difficult or easy for users. As a result, organisations have little guidance on how to develop a system that meets the day-to-day operational needs of users throughout the organisation as well as the needs of records managers and other professionals who rely on the EDRMS for evidentiary and regulatory purposes. Current records management and EDRMS literature remains focused on judging the need for, and compliance design of, EDRMS. Issues such as the establishment and design of EDRMS systems, how EDRMS are implemented, lessons learnt and the benefits of EDRMS are therefore prominent in the professional literature (Gunnlaugsdottir, 2006; Murphy, 2005; Smyth, 2005; Winkelen, Silburn, & Sinclair-Thomson, 2007). While some writers recognise the need for culture change management strategies to prepare the organisation and knowledge workers prior to implementation of the EDRMS (Horne, 2006; McLeod & Hare, 2005; Oliver, 2007), they generally tend to present their papers as conceptual, highlighting issues to be addressed more than offering advice on how to address them.

These research gaps and the increasing use of EDRMS to manage corporate documents and records provided the impetus for the primary research question (*PQ*) for this study.

PQ: Does the management of corporate documents and records in the EDRMS support the search behaviour of EDRMS users?

1.2 Aim and objectives of the research

This research investigates whether electronic document and records management systems complement the way knowledge workers or users of the systems search for information. A case study approach is taken to investigate how four sampled organisations have implemented their records management programs to reflect the records management standard ISO 15489.

The introduction of user-managed records management is also explored, to determine how readily knowledge workers, unskilled in RM principles, interrogate and use the EDRMS for work-related search and retrieval needs. Prior research into EDRMS has generally not explored the types of searches that users undertake in an EDRMS setting.

Figure 1.1 depicts the broad theoretical framework of the research, reflecting its dual focus on the use of records management principles in the design of EDRMS and their influence on, or support of, users' search behaviours.

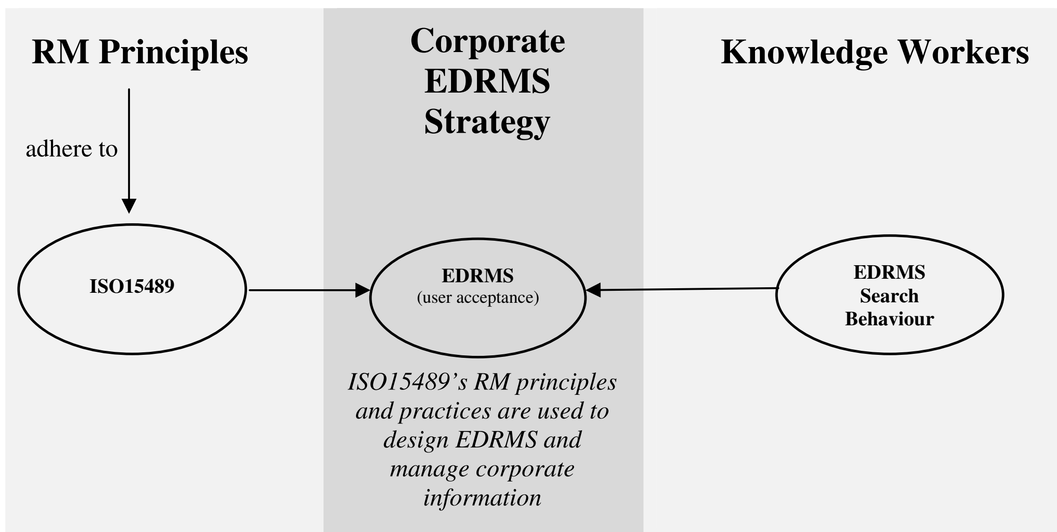

Figure 1.1: Theoretical framework for research

Two levels of investigation will be undertaken. At the macro level, the research explores the way EDRMS are designed. The study examines the way in which electronic document and records management systems are managed and designed using the best practice principles and practices outlined in the international records management standard ISO 15489 (International Organisation for Standardisation, 2002a, 2002b). This is depicted in the left hand panel of Figure 1.1. This research examines the way these standards are incorporated and applied in individual organisations.

At the micro level, the ways in which employees work with the electronic document and records management systems is explored: that is, this thesis will investigate how knowledge workers search for information using EDRMS. The study investigates if knowledge workers' search behaviours are aligned to the way records managers have implemented their EDRMS.

1.3 Significance of research

This research aims to address some significant gaps in the theoretical knowledge relating to the EDRMS implementation and applications.

1.3.1 Theoretical significance

Little is written about how users search for information stored in an EDRMS from the perspective of information search theory, information seeking behaviour or records management. The first theoretical contribution, therefore, is an EDRMS search behaviour model to explain user strategies. The second is the provision of empirical evidence on the effectiveness of the use of RM principles in EDRMS design in enabling users to search and retrieve information from the EDRMS.

1.3.2 Practical significance

There are three practical contributions to the RM discipline. The first is an understanding and a description of the information search behaviour of EDRMS users when presented with an information need to discharge their business responsibilities. This includes how a knowledge worker's task influences their search behaviour. The second is an awareness of how to design corporate EDRMS that are in line with the search behaviour characteristics of users. The third contribution provides records management professionals with different suggestions to better manage the delivery of records management services to users, with the aim of improving users' information search and retrieval experience working with EDRMS. The importance of RM and

EDRMS training, and how these improve knowledge workers' search and retrieval experience, is highlighted. Finally, the fact that this is an empirical research conducted in a real business context, unlike most laboratory-based research, provides valuable accurate insights into knowledge workers' EDRMS search behaviour and how tasks and training influence their search behaviour.

1.4 Key definitions

This section defines four key definitions used in this thesis. Definitions of other terms are provided as they are introduced.

1.4.1 Corporate information (documents and records)

As used in this thesis, corporate information comprises documents and/or records that are received or created by the organisation in order to conduct its business.

A document is defined as a vessel that gives information shape and structure, making it tangible and understandable. A document can be either electronic or paper, and may have different media embedded in it, including text, graphics, data, spreadsheets, CAD (computer-aided design) drawings, images, video, and sound (Enlightened, 2000, p. 4).

A record is defined as "information created, received, and maintained as evidence and information by an organisation or person, in pursuance of legal obligations or in the transaction of business" (International Organisation for Standardisation, 2002a, p. 3). The RM standard *ISO 15489 Parts 1 and 2: Information and Documentation – Records Management* (International Organisation for Standardisation, 2002a, 2002b), hereafter referred to as ISO 15489, outlines the characteristics[7] of a full and accurate record.

[7] Records need to be **compliant** with the recordkeeping requirements arising from the regulatory and accountability environment in which the organisation operates. They also need to be **adequate** for the purposes for which they are kept and **complete** containing not only the content, but also the structural

Electronic information includes both 'born digital' and digitised documents. Born digital documents or records are records that originated from or were created and retained in digital format from electronic applications like the Microsoft Office suite, electronic facsimiles or digital devices (cameras or iPhones) (State Records of Western Australia, 2009). Digitised documents and records are those that originated on paper format and were subsequently converted into a digital format through a scanning process (State Records of Western Australia, 2009). Generally, this corporate information is in the form of unstructured data or documents,[8] defined as data or information that "can appear in unexpected places on the document" (Van Ittersum & Spalding, 2005, p. 2). Content management professionals estimate that 85% of an organisation's knowledge store is in the form of unstructured data, predominantly text files (Robb, 2004), and the volume of unstructured textual data is increasing at a greater rate than that of traditional structured data (White, 2003, p. 31).

There are differences between documents and records. A "crucial difference between documents and records is that documents can change, whereas records do not and must not, change" (Adam, 2008, p. 8). While corporate records can be in different formats, not all documents are records. Records are the result of business transactions, recording evidence of decisions or the state of knowledge at a point in time: photographs, audio and video recordings and even geological core samples are records rather than documents. Documents, on the other hand, may be drafts that have not yet been associated with a business transaction, material that is developed in-house or by

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and contextual information necessary to document a transaction. It is essential for records to be **meaningful** containing information and/or linkages that ensure the business context in which the record was created and used is apparent. Further records must be **comprehensive** documenting the complete range of the organisation's business for which evidence is required. Another important characteristic is records need to be **accurate** reflecting accurately the transactions that they document. **Authenticity** of records to enable proof that they are what they purport to be and that their purported creators did indeed create them. Last but not least, records need to be **inviolate** securely maintained to prevent unauthorised access, alteration or removal. Most importantly, records need to be **useable** enabling location, retrieval, presentation, and interpretation (International Organisation for Standardisation, 2002a, p. 7).

[8] The free-form text in emails and word-process documents are examples of unstructured data or documents.

third parties for reference purposes, or early work on concepts under development. Not all such documents will be records. Nevertheless, some documents are important as they hold corporate memory or value, and as such need to be managed in the same way as records.

As documents and records can be in many formats, one important consideration in the management of electronic documents and records is the point at which an electronic document becomes a record.

In this research, it is assumed that an electronic document becomes part of a company's electronic record when it is associated with a business transaction or exhibits the characteristics of a record, defined in Footnote 7. Examples of document and record types that can be included in an EDRMS are memos, word processed documents, HTML documents, PDFs, spreadsheets, project plans, graphics, presentations, faxes, telexes, user manuals, project documents, technical documents, annual reports, marketing documents, archived information (for example microfiche), invoices and scanned or digitised documentation. More recently, EDRMS are able to capture and manage records from social media technologies like Twitter, Flicker and Facebook.

1.4.2 Electronic Document and Records Management System (EDRMS)

In this thesis, the term EDRMS describes electronic systems that manage documents or records or both, thus encompassing both electronic document management systems (DMS) and records management systems (ERMS). An overview of the historical background to the development of EDRMS as well as the different design options of EDRMS are addressed in Chapter 2.

1.4.3 EDRMS search behaviour

As used in this research, EDRMS search behaviour refers to both the information search processes and the activities that EDRMS users employ to identify or access corporate information. Search behaviour starts from the time an EDRMS user commences their search and retrieval using the EDRMS, and ends when they decide to end their search and retrieval using the EDRMS (Ellis, 1989, p. 10; Kuhlthau, 2005; Marchionini, 1995; Meho & Tibbo, 2003).

The term *search behaviour* is used throughout the thesis to describe EDRMS users' information searching behaviour or EDRMS search behaviour. The search behaviour of EDRMS users refers to the combination of search processes and search activities they conduct in each stage of these processes.

1.4.4 EDRMS users

The end users of the electronic document and records management system are an organisation's knowledge workers: professional employees of the organisation with responsibilities to create, receive, use, maintain and manage the organisation's corporate information, knowledge and memory. In this thesis, the terms *user*, *users*, *EDRMS users*, *office workers*, *knowledge workers* and *employees* are used interchangeably to refer to EDRMS users.

1.5 Thesis outline

Chapter 1 has introduced the research topic and identified the research problem. In summary, the aim of the research is to find out if the manner in which records managers manage corporate information supports the way knowledge workers of the organisation search for information using electronic document and records management systems (EDRMS). Synopses of each of the following chapters are presented next as a means of introducing the rest of the content covered in this research thesis.

Chapter 2 provides a literature review of the records management discipline. Importantly, it introduces the industry standard for record management principles and practices ISO 15489 Parts 1 and 2: Information and Documentation – Records

Management (International Organisation for Standardisation, 2002a, 2002b), hereafter referred to as ISO 15489 or 15489. It describes the eight pillar records management principles and standards outlined in ISO 15489 that were used as benchmarks in the study to investigate how the four sampled organisations had reflected each of these principles in their EDRMS. The chapter particularly examines how four RM principles, metadata, classification schemes, retention and disposition schedules and security controls, guide EDRMS structures. Chapter 2 also describes the key functionalities of an EDRMS, including an overview of two possible system designs of the EDRMS. The chapter concludes with a literature review of how other information systems have been adopted by organisations and the role organisational cultures have on user acceptance of these systems.

Chapter 3 focuses on the theoretical understanding of user search behaviour. It particularly describes the research by Ellis (1989), Meho and Tibbo (2003) and Marchionini (1995) in detail as their information seeking behaviour models were used in the current research as a scaffold to develop an hypothesised EDRMS search behaviour model. Two other factors that affect the search behaviour of users, namely task and training, are discussed. A start is made in defining and distinguishing the specific aspects of work tasks, search tasks and knowledge tasks. This is followed by a literature review of research conducted by others on the impact of training on search behaviour.

Chapter 4 outlines the constructivist research paradigm and case study research methodology adopted. Multiple research tools such as semi-structured interview questions and questionnaire and protocol analysis provide both quantitative and qualitative data. Four different organisations using three different EDRMS, four records managers and 40 users (10 in each organisation) are sampled in order to investigate and answer the primary and secondary research questions of this study. Detailed descriptions of the eight variables explored in this study and how they were measured, and the data analysis methods, are also described.

Chapter 5 reports the findings relating to the implementation of EDRMS in the four organisations: specifically, how the eight pillar records management principles were implemented. Additionally, it explores the customisation of the EDRMS in each organisation.

Chapter 6 reports on the ways users employed the EDRMS in their work activities. It describes their search behaviours across several work tasks and tests the hypothesised EDRMS search behaviour model. The chapter also examines the impact of search task, task knowledge and training on different search methods users employed in their searches.

Chapter 7 first discusses the summarised EDRMS search behaviour model presented in Chapter 6, then compares it with the hypothesised information seeking behaviour and processes models of Ellis (1989), Meho and Tibbo (2003) and Marchionini (1995). After this, the primary research question is reviewed to determine whether users and their EDRMS operate as a synergistic process. Finally, the chapter discusses the implications of the research findings for records managers, with recommendations on how delivery of RM services can be aligned to support users' search behaviour.

Chapter 8 begins by outlining how the organisational and information culture, information systems in the four organisations studied have impacted on user acceptance of these systems. Then the theoretical and practical significance of the research to the records management discipline and profession is presented. This is followed by a discussion on the perceived limitations of the research. Chapter 8 concludes the thesis by identifying possible future research topics that might follow from the findings of the current research.

The primary research question has been introduced in this Chapter and will be expanded into additional secondary research questions in Chapters 2 and 3.

2 Literature Review:
Records Management and EDRMS

2.1 Introduction

The investigation of EDRMS theory and practice is challenged by a dearth of scholarly research. However, a large mass of practitioner standards and publications[9] offer practical guidance on records management (RM) principles and practices. This chapter reviews RM principles and practices, as outlined in the records management standard ISO 15489, then describes how EDRMS are structured, taking into consideration RM tools such as classification schemes, thesauri, retention schedules and information management security standards. EDRMS system functions are described before the chapter presents the study's first secondary research question, about how the sampled organisations have implemented RM principles and practices in the EDRMS. A literature review of how other information systems have been adopted by organisations and the role organisational cultures have on user acceptance of these systems concludes the chapter.

2.2 Records management principles and practices

ISO 15489, the industry standard, is a voluntary code of practice that influences how record management principles and practices are implemented in organisations (Healy, 2010, p. 98). It is a widely accepted international standard with its share of commendation and criticism. This section explains how the standard is critical in the design of EDRMS to incorporate four of the eight pillar RM principles.

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[9] Examples of these include: *Information Management Journal* by the American Records Management Association (ARMA); *AIIM E-Doc Magazine* by the Association for Information and Image Management (AIIM); and *Informaa Quarterly Magazine* (IQ) by the Records Management Association of Australasia. Of these journals, only IQ is a peer-reviewed publication; and this only since November 2007.

2.2.1 ISO 15489 Parts 1 and 2: Information and Documentation – Records Management

The RM standard, *ISO 15489 Parts 1 and 2: Information and Documentation – Records Management* (International Organisation for Standardisation, 2002a, 2002b), hereafter referred to as ISO 15489 or 15489, is commonly used by organisations as a benchmark when designing and implementing their RM regime to manage paper-based or electronic records, or both. ISO 15489 is an international standard that provides best practice guidelines for the management of corporate memory and information assets, whether stored on paper and/or in electronic applications. ISO 15489, defined and maintained by the ISO, has two parts.

AS ISO 15489.1-2002, *Records Management – Part 1: General* provides a high-level framework for RM, with emphasis on the requirements for the design of an RM system, the benefits of RM to the organisation, the requirement to comply with legislation and the need to assign and assume responsibility for adequate RM policies and procedures. It also identifies the requirements for RM training and support systems. AS ISO 15489.2-2002, *Records Management – Part 2: Guidelines* is a technical report that provides practical guidance on how to implement an effective RM system as described in Part 1, using the DIRKS methodology (discussed later in this chapter). It provides practical guidance for the development of records processes and controls, and addresses the development of key recordkeeping tools like classification schemes, thesauri and retention schedules. It discusses the use of these tools to "capture, register, classify, store, provide access to and otherwise manage records" (State Records Authority of New South Wales, 2008b). Part 2 also contains guidance about the establishment of "monitoring, auditing and training programs to promote and implement RM systems" (State Records Authority of New South Wales, 2008b).

Table 2.1 summarises the eight principles for managing both paper and electronic records contained in ISO15489. The RM principles are listed in the left-hand column, and in the right-hand column is a description of the relevance of each principle to EDRMS implementation. These eight principles provide a benchmark of excellence for the implementation of RM programs.

Table 2.1: Records management principles

Principles	Relevance of implementation to EDRMS
Policies	Records management *policies* are written to establish that the EDRMS is the corporate information repository. Policies also outline roles and responsibilities for RM.
Procedures	Records management *procedures* and *standards* identify what a record is, what information is to be created and captured in the EDRMS and how information should be stored and managed in the EDRMS.
Metadata Standards	Recordkeeping *metadata standards* provide the contextual framework for records, and specify the metadata elements that need to be captured for records stored in the EDRMS. They also state what the mandatory and optional fields in the EDRMS are, and provide a pick list in some fields to restrict the metadata to be captured.
Classification Scheme and Thesauri	Records are managed using a corporate *classification scheme*. The classification scheme enables information stored in the EDRMS to be classified based on business process or subject.
Retention and Disposition Schedule	A corporate *retention and disposition schedule* is implemented in the EDRMS to sentence records stored in the EDRMS.
Security Permissions	*Security permissions* are set on records to limit access to authorised personnel.
Training	*Training* is provided to users, on records management practices as well as on how to use the EDRMS. RM training includes records awareness-raising training and information on how the corporate classification scheme works.
Monitoring and Auditing	*Monitoring* and *auditing* of the record management practices and systems is performed to ensure that the established RM strategies are followed and that they meet the business requirements of the organisation.

Adapted from (International Organisation for Standardisation, 2002a, 2002b).

2.2.2 Use, acceptance and criticisms of ISO 15489's principles and practices

ISO 15489 comprehensively addresses the key RM principles and best practices in one standard (Table 2.1). Healy (2010), who was part of the working group for developing

ISO 15489, states that having an international standard “is a statement of good practice in records management” and that it “improves the image and status of records management” (p. 140). A criticism of ISO 15489 is that its content is “so strongly based on the Australian standard” AS 4390-1996: *Records Management*, developed to promote best practice for recordkeeping (McLeod & Childs, 2007, p. 164). After ISO released ISO 15489, the Australian government withdrew the Australian standard AS 4390-1996, replacing it with AS ISO 15489 while recognising that AS 4390 "has played a very significant role in the development and codification of the records management discipline" in Australia and globally (Cumming, 2005, p. 11).

ISO 15489’s objective is to set out the strategic directions on how to implement a RM system by identifying the key principles and best practices that make up a good RM system; it was not intended to be a ‘how to’ guide (McLeod & Childs, 2007, p. 154). It is therefore generally perceived, and used, as a benchmarking and/or compliance standard by organisations implementing a RM program (McLeod & Childs, 2007; Steemson, 2002, 2005; White-Dollmann, 2004). There are separate “how to” guides[10] that provide assistance in implementing the various RM principles articulated in 15489. Briefly, these guides provide detailed instructions, for example on how analysis of the organisation’s business operations and legislation needs to be reviewed to develop the various tools like classification schemes, policies and retention schedules specified in 15489. However, they do not include guidance on implementing change management, or on how senior management and employee support can be elicited for successful RM implementation.

[10] An example of a guide to the implementation of 15489 in Britain is the publication *BSI-DISC PD0025-1-2002 – Effective Records Management*, which has the subtitle, *A Management Guide to the Value of BSI/ISO 15489-1* (Maclean & Shipman, 2003). Another is the Designing and Implementing Recordkeeping Systems (DIRKS) Manual, a guide to the implementation of 15489 developed by the National Archives of Australia (2001). Initially developed to provide a practical eight-step guide complementing the implementation of the AS 4390’s RM principles and practices in Australian government agencies, the DIRKS methodology is included in ISO 15489 and the AS ISO 15489, Australian standard; hence DIRKS is based on and expands the best-practice approach outlined in ISO 15489 (Adam, 2008, p. 25). Like ISO 15489, the DIRKS manual is also used internationally by records managers designing and implementing RM systems.

ISO 15489 is recognised as the international standard by the RM profession, as evidenced by its adoption by the National Archives of Australia and various State Records Offices in Australia. The States Records Office of New South Wales approved the AS ISO 15489 as a code of best practice for RM by its public offices under section 13 of the State Records Act 1998 in the NSW public sector (State Records Authority of New South Wales, 2008a). Likewise, in its *SRC Standard 1: Government Recordkeeping*, the States Records Commission of Western Australia (2002, p. 3) stated that "The Australian Standard AS15489 Records Management is the accepted Australian Standard for all aspects of recordkeeping in Australia. It is a useful guide to supplement existing standards produced by the State Records Office."

Internationally, 15489 was endorsed by the United States' National Archives and Records Administration (NARA) (Weinstein, 2005). There is evidence in the literature that ISO 15489 is internationally accepted and used as a best practice standard in RM in the US, UK, France, Jamaica, Australia and New Zealand (Alexander-Gooding & Black, 2005; Dherent, 2006; McLeod & Childs, 2007; State Records Commission of Western Australia, 2002; Steemson, 2005; Weinstein, 2005; Xiaomi, 2006). To demonstrate their strong support for ISO 15489, Archives New Zealand's purchased a licence for the standard so that they could offer it free of charge to their public offices as defined by their Public Records Act (Archives New Zealand, 2006). The 2009 Cohasset survey reported that 47% of records and archives professionals cited the ISO 15489 as their primary source of guidance to determine their organisation's RM requirements and practices (Williams & Ashley, 2009, p. 21). The fact that ISO 15489 complements other international quality assurance standards like the ISO 9000 series, and uses simple language to explain complex RM principles, has contributed to its global acceptance (White-Dollmann, 2004).

ISO 15489's use and acceptance internationally and in Australia has been reported widely via case studies in practitioner publications more than in scholarly publications. A Jamaican case study reported that as part of the implementation of ISO 15489, the following steps were taken: development of draft guidelines to the standards; building capacity for the implementation of the standard by supporting workshops and training sessions; incorporating the standard in policy and procedures manuals; and lobbying national and regional support for integrating RIM standards in relevant legislation (Alexander-Gooding & Black, 2005, p. 66). Tough (2004, p. 157) reports how a number of Commonwealth African nations have provided assurance to their funding bodies for investment in the organisation's RM programs by citing the use of the ISO 15489 standard for implementation. Steemson (2005) reports similar initiatives to implement 15489 carried out in Spain, China, Iceland, the Baltic states, Great Britain, the United States and France, to name a few. Examples of ISO 15489's implementation include it being employed as a benchmarking tool to critically analyse RM issues in China (Xiaomi, 2006; Xiaomi & Hongyan, 2004), its use by the National Library of France to design RM best practices for the management of electronic documents (Dherent, 2006) and the management of email records by the International Committee of the Red Cross (Willemin, 2006).

Cladwell (2001) reports that a number of Australian case studies have described the use and acceptance of AS 4390 and/or ISO 15489 in government organisations for RM activities such as audit programs (Crockett & Foster, 2004; Onopko, 1998), the development of an online recordkeeping manual (Brady & Muir, 1999) and the development of a business classification scheme (Keay, 1999). The *Archives Recordkeeping Metadata Standard* was also "developed with reference to the AS 4390, in particular Part 4: Control, which recommends that records should be registered in a recordkeeping system and linked to descriptive information about their context" (Parer,

p. 21). The release of the Australian standard AS 4390 (Standards Australia, 1996) influenced the writing of the seminal textbook *Records Management* by Kennedy and Schauder (1998).

The literature reports a range of criticisms of ISO 15489 (Alexander-Gooding & Black, 2005; Healy, 2010; Hofman, 2006; McLeod, 2004), similar to those discussed below, from McLeod & Childs' research. Email discussions conducted with a group of international experts using the Delphi research method[11] agreed that RM standards in general are a requirement for professional practice (McLeod & Childs, 2007). However, despite agreement that ISO 15489 provided "a high-level framework" and is more a "strategic" standard, there "was no clear consensus" from the experts on whether ISO 15489 could be the "imprimatur for managing records" (McLeod & Childs, 2007, p. 164). Although one opinion held that the standard was not intended to be a replacement for RM knowledge gained from education, training and textbooks, there was general criticism of 15489's lack of guidance for non-experts in developing or implementing the tools referred to in the standard (McLeod & Childs, 2007, p. 163). In addition, the experts' views on 15489 being a compliance standard varied as their views on the meaning of "compliance" were reported to differ (McLeod & Childs, 2007, p. 164).

In summary, ISO 15489 defines RM and its core principles and practices and offers flexibility in how it is implemented internationally across jurisdictions and industry types. As Hofman (2006) points out, RM professionals working with the standard need to be aware that 'one size does not fit all', and complimentary standards and guidance publications need to be consulted when working with ISO 15489.

[11] The Delphi research method refers to research conducted using a systematic approach to elicit consensus opinions from a group of carefully selected but anonymous experts (Busha & Harter, 1980a, p. 176; Powell, 2004, p. 62).

2.2.3 Standards for the Design of Functional Specifications for EDRMS (Design Standards)

In ISO 15489, the recommended RM principles and practices are identified and various supporting guides like the *Designing and Implementing Recordkeeping Systems (DIRKS) Manual* are available to assist with the implementation of these RM principles and practices (National Archives of Australia, 2001). It is therefore not surprising that organisations implementing EDRMS to manage both their paper and electronic corporate documents and records endeavour to incorporate these RM principles and practices into their EDRMS implementation. There are a number of international (Serco Consulting, 2008; United States Department of Defense, 2007) and local functional specification standards (National Archives of Australia, 2006; Public Records Office Victoria, 2007) developed to assist with the design of EDRMS aligned with ISO 15489. Described briefly in the next paragraph are the two key standards used as benchmarks for functional specifications internationally: *European Model Requirements for the Management of Electronic Records* (MoReq2)[12] (Serco Consulting, 2008); and *DoD 5015.02: Design Criteria Standard for ERM Software Applications* (DoD 5015.2-STD). This is followed by descriptions of two Australian standards: the *Victorian Electronic Records Strategy* (VERS) and *Functional Specifications for Electronic Records Management Systems Software* (ERMS Specifications).

The MoReq2 functional specifications simply list what an EDRMS must do. As such, MoReq2 provides guidelines on the functional specifications of all the major components of an EDRMS in order to manage electronic and paper documents and records throughout their information lifecycle (Serco Consulting, 2008).

DoD 5015 performs the same function for the United States as MoReq2 does for Europe. However, unlike MoReq2, which provides specifications for both electronic and paper documents and records, *DoD 5015.02-STD* is focused only upon

[12] At the time of writing the thesis, an update to MoReq2 with MoReq2010 is in progress.

specifications for electronic records, and thus for electronic records management systems (ERMS). The United States Department of Defense's *DoD 5015.02-STD* standard sets the mandatory baseline functional requirements and identifies non-mandatory features deemed desirable for ERMS used by US Department of Defense organisations (United States Department of Defense, 2007), as well as for transferring the records to the NARA (Fanning, 2007). *DoD 5015.02-STD* is based on and endorsed by NARA's regulations in the US, where it is used extensively as the benchmark for ERMS (Adam, 2008, p. 28).

In Australia, the VERS developed by Public Record Office Victoria (PROV) provides a basis for capturing, managing and preserving electronic records. VERS is a framework of standards, guidance, training, consultancy and implementation projects, centred around the goal of reliably and authentically archiving electronic records (Public Records Office Victoria, 2007). Since its introduction in 2000, VERS has grown as the accepted certification standard across Australia for electronic records management. VERS sets standards for the management of digital records from creation to long-term preservation, through a series of detailed specifications and advice (Public Records Office Victoria, 2007). The standard is designed to ensure that all records can be accessed and read at any point in the future, regardless of their origin or format, or the software program that created them. Unlike MoReq2 for EDRMS and DoD 5015.02-STD for ERMS, the VERS standard provides five design specifications for the preservation of permanent or long-term electronic records in recordkeeping systems (Public Records Office Victoria, 2007; Serco Consulting, 2008; United States Department of Defense, 2007).

Another Australian design standard is *ERMS Specifications,* developed in February 2006 by the National Archives of Australia (NAA). This functional specification provides Australian government agencies with a set of generic requirements for ensuring adequate recordkeeping functions within ERMS. NAA's DIRKS methodology provided Australian agencies with an approach for designing recordkeeping systems. But the NAA's 2002 survey of the state of recordkeeping in the Australian government indicated that a high proportion of respondents expressed the need for guidelines and more practical tools in order to undertake DIRKS steps D to H (National Archives of Australia, 2006, p. 7). The *ERMS Specifications* responded to that need (National Archives of Australia, 2006, p. 7).

Each of the above functional specifications are specific to the jurisdiction they represent; hence, in 2008 a globally harmonised set of principles and functional requirements[13] for software used for the creation and management of electronic records was developed under the sponsorship of the International Council on Archives (ICA) (International Council on Archives (ICA), 2008a, 2008b, 2008c).

These design standards for EDRMS are used by RM professionals in public and private organisations as a basis for preparing invitations to tender for an EDRMS. In organisations that have already implemented EDRMS, they are used as a reference by RM professionals for auditing or checking EDRMS compliance. Generally, organisations use these standards as a benchmark mechanism for specifying the system functionalities for the EDRMS that they intend to, or have already implemented. Likewise, EDRMS vendors and developers use these standards as a guide to further develop or improve the functionality of their EDRMS product suite of applications (Fanning, 2007).

[13] This suite of publications include: 1) Principles and functional requirements for records in electronic office environments – Module 1: Overview and statement of principles; 2) Principles and functional requirements for records in electronic office environments – Module 2: Guidelines and functional requirements for electronic records management systems; and 3) Principles and functional requirements for records in electronic office environments – Module 3: Guidelines and functional requirements for records in business systems (International Council on Archives (ICA), 2008a, 2008b, 2008c).

2.3 An overview of EDRMS structure and design

An understanding of how EDRMS are structured using ISO 15489 principles, and the functions of an EDRMS as an application for the capture, storage, search and retrieval of corporate documents and records, offers valuable background information about the EDRMS.

2.3.1 Structure of the EDRMS

EDRMS are structurally designed to take into consideration the four RM principles outlined in ISO 15489: metadata; classifications schemes; retention and disposition schedules; and security and access controls. This section first defines and describes each of these RM principles, including the various standards and tools in place to implement them. It then explains how EDRMS are structured with functionalities to implement each of these RM principles.

2.3.1.1 Metadata management

Metadata is best described in an RM context as "data describing context, content and structure of records and their management through time" (International Organisation for Standardisation, 2002a, p. 3). It has been also simplistically described as "data about data" (Reed, 2003, p. 19), as metadata is structured information that describes the characteristics of digital and non-digital information resources (Jones & Skelton, 2008, p. 83). Examples of record metadata properties include author, document or record title, date of creation, classification scheme terms and record number. Recordkeeping metadata provide labels to electronic documents and records registered and managed in an EDRMS, like a label on a can of food describing its contents, ingredients and expiry date (Jones & Skelton, 2008, p. 84).

A primary purpose of metadata is to enable information search and retrieval. For information discovery, metadata comprise the particular set of elements that contain the data necessary for the effective retrieval of information. Metadata are also important in the management of the complete lifecycle of records registered in the EDRMS as they bind each record to the "context of its creator and the business activity that creates it" (Jones & Skelton, 2008, p. 82). Further, metadata are important to the management of electronic records as they ensure the "authenticity, reliability, integrity, and usability of a document as a record" (Chester, 2006, p. 12).

The literature identifies various values and benefits of using metadata for managing corporate documents and records, which are presented here (Chester, 2006; Cumming, 2005, p. 35; International Organisation for Standardisation, 2006, 2007, pp. 2-3; Jones & Skelton, 2008; National Archives of Australia, 1999; Reed, 2003; State Records Authority of New South Wales, 2001b). Metadata support logical linkages, the structural relationships between corporate documents and records as well as the context of their creation, in a reliable and meaningful way. This enables identification and ensures the protection of the evidential value of corporate documents and records. Consequently, metadata facilitate the ability to understand records as they ensure their authenticity, reliability and integrity. In turn, this facilitates the management of accessibility to corporate documents and records (privacy and rights) and usability through time. Additionally, metadata facilitate interoperability[14] (standardisation). These interoperability strategies enable authoritative capture of records created in diverse technical and business environments and their sustainability for as long as required. They thereby enable identification of the technological environment in which digital records were created or captured, and successful migration of records from one environment or computer platform to another, and any other preservation strategy. Metadata also support tracking and logging of corporate document and record usage.

[14] "Interoperability is the ability of systems or processes to have a common understanding of data exchanged between them" (Jones & Skelton, 2008, p. 89).

Most importantly, metadata improve granularity of a search, thus supporting efficient retrieval. They are especially invaluable for searching non-text objects like photographs.

Chester (2006) lists several ways to categorise metadata:

1) descriptive – describing content;
2) structural – information that ties an item with other items such as documents in a folder;
3) administrative – information that is used to manage and control access to an item;
4) content – information based on the content and form of the item, like recording the location of related records;
5) records management – pertaining to the classification, maintenance and preservation or records; and
6) usage metadata – recording the capture, access, audit trails, use and disposition of the record.

These different categories of metadata need to be considered by records managers when designing an EDRMS so that decisions are made on which metadata categories can be captured automatically, entered by users or records managers as well as what metadata need to be controlled and how (Sanders, 2001, pp. 21-22).

Given technological advancements, the consequent growth in electronic information and the vulnerability of corporate information in electronic format, there is increasing research focused on metadata. Hunter (2003, pp. 318-344) states that areas of research include: what metadata need to be captured; the best methods to capture them automatically; how to manage metadata; interoperability issues, i.e. how to transfer metadata between electronic systems that create, manage and preserve them using technologies such as Extensible Markup Language (XML)[15] and semantic web[16] technologies; and lastly, how metadata can assist with searching electronic information. The research initiatives have led to the development of metadata standards that differ in scope and application, such as those for generic (International Organisation for Standardisation, 2003), web-based (National Archives of Australia, 1998), email (National Archives of Australia, 2005), and recordkeeping information resources (International Organisation for Standardisation, 2006, 2007; National Archives of Australia, 1999; State Records Authority of New South Wales, 2001b).

The Dublin Core Metadata Initiative (hereafter Dublin Core) an international research initiative that originated in Dublin, Ohio in 1995, led to the development of the Dublin Core element set (Chester, 2006; Day, 2001; International Organisation for Standardisation, 2003; State Records Authority of New South Wales, 2001b). This is a vocabulary of 15 properties for use in resource description. Useful for describing a wide range of resources, Dublin Core's metadata elements are broad and generic, developed to facilitate cross-domain information resource description. Table 2.2 presents the 15 metadata elements of the Dublin Core standard, published by the International Standardisation Organisation in 2003 as *ISO 15836 – Information and Documentation – The Dublin Core Metadata Element Set* (International Organisation for Standardisation, 2003, pp. 3-6).

[15] XML is a simple, very flexible data/text representation format derived from Standard General Markup Language (SGML) (International Organisation for Standardisation, 1986) and XML has the ability to describe the nature of the information being presented (Jones & Skelton, 2008, p. 95). "Because XML makes it possible to exchange data in a standard format, independent of storage, it has become the de-facto standard for representing metadata descriptions of resources on the Internet" (Hunter, 2003, p. 321).

[16] Berners-Lee describes the semantic web as "an extension of the current one, in which information is given well-defined meaning, better enabling computers and people to work in cooperation.… The Semantic Web will bring structure to the meaningful content of Web pages, creating an environment where software agents roaming from page to page can readily carry out sophisticated tasks for users" (Berners-Lee, 1998).

Table 2.2: Dublin Core – 15 metadata elements

Term Name	Definition
1. Title	A name given to the resource.
2. Creator	An entity primarily responsible for creating the content of the resource.
3. Subject	The topic of the content of the resource.
4. Description	An account of the content of the resource.
5. Publisher	An entity responsible for making the resource available.
6. Contributor	An entity responsible for making contributions to the resource.
7. Date	Of an event in the lifecycle of the resource.
8. Type	The nature or genre of the resource.
9. Format	The physical or digital manifestation of the resource.
10. Identifier	An unambiguous reference to the resource within a given context.
11. Source	A reference to a resource from which the present resource is derived.
12. Language	The language of the intellectual content of the resource.
13. Relation	A reference to a related resource.
14. Coverage	The extent or scope of the content of the resource.
15. Rights	Information about rights held in and over the resource.

Adapted from (International Organisation for Standardisation, 2003)

The metadata elements in Dublin Core (International Organisation for Standardisation, 2003) are intended as a basic set of metadata, with the intention that other project- or application-specific metadata (for example recordkeeping metadata) are built onto it. Likewise, another generic form of a structural metadata set, the Standard Generalised Markup Language (SGML), is used to "break a document into its component parts in order to facilitate its mark-up and flexible, electronic representation" (Cumming, 2005, p. 35).

Two recordkeeping metadata standards developed and used internationally and locally in Australia are worth describing in detail. The ISO 23081: Metadata for Records (Parts 1 and 2) is an extension of the RM standard ISO 15489. It is intended both as a guide and framework to understand, implement and use metadata within the framework of ISO 15489. Its scope is to assist in understanding metadata from an RM and archival perspective. ISO 23081 does not define a mandatory set of RM metadata to be implemented, since these metadata differ in detail according to organisational or specific requirements for jurisdiction. However, it does assess whether the main existing metadata sets are in line with the requirements of ISO 15489. ISO 23081 identifies two forms of recordkeeping metadata: 1) the point of capture metadata[17] and 2) the recordkeeping process metadata[18] (International Organisation for Standardisation, 2006, 2007; Jones & Skelton, 2008, p. 84). The point of capture metadata advocates the capture of each piece of metadata at the point of record creation or registration into the EDRMS. These metadata are fixed and should not be altered once the record is registered into the EDRMS. Likewise, recordkeeping process metadata "aggregates over the life of the record" as new layers of metadata are added and as the record is used in different business contexts (International Organisation for Standardisation, 2006, 2007; Jones & Skelton, 2008, p. 84). The accurate capture of metadata is critical in the EDRMS as it has implications for search and later retrieval from the system.

In Australia, recordkeeping metadata standards have been developed by State Records Offices as well as by the Commonwealth government. Examples include the New South Wales State Records Authority's *NSW Recordkeeping Metadata Standard* (*NRKMS)* (State Records Authority of New South Wales, 2001b); and at the Commonwealth Government level, the National Archives of Australia's *Recordkeeping Metadata Standard for Commonwealth Agencies* (*NAA's Metadata Standard*) (National Archives of Australia, 1999). These recordkeeping metadata standards outline the types of elements that need to be captured in EDRMS used in these jurisdictions. The

[17] Point of capture metadata "contain information about the context of the record's creation, including the business context driving the creation of the record and the agents or people involved in the action, as well as information about the content, structure and technical attributes of the record itself" (Jones & Skelton, 2008, p. 84).

[18] Recordkeeping process metadata capture the processes about managing records such as the alterations, linkages, and uses of the record tracked over time as the record progresses through its record continuum lifecycle processes (Jones & Skelton, 2008, p. 84). Thus, "recordkeeping process metadata ensure the integrity and authenticity of the record, as any modifications to the record are authoritatively documented over time" (Jones & Skelton, 2008, p. 84).

standards are detailed, providing a list of metadata elements and stating which are mandatory and which are optional.

NAA's Metadata Standard is designed to be consistent with the *Australian Government Locator Service (AGLS) Metadata Element Set* (National Archives of Australia, 1998). The AGLS was developed by NAA to improve the visibility, accessibility and interoperability of Web-based or online information resources (National Archives of Australia, 1998). The AGLS (National Archives of Australia, 1998) has adopted the 15 metadata elements of the Dublin Core (International Organisation for Standardisation, 2003) and added an additional four elements: 1) availability; 2) audience; 3) function and 4) mandate (National Archives of Australia, 1998). Whilst the *NAA's Metadata Standard* is closely aligned to the AGLS, it has five extra recordkeeping metadata elements: 1) use history; 2) preservation history; 3) location; 4) disposal; and 5) mandate (National Archives of Australia, 1999). Figure 2.1 represents the existing conceptual relationship between the four metadata elements of Dublin Core, AGLS, *NAA's Metadata Standard*, and the NRKMS. Table 2.3 provides a quick visual comparison of these four metadata elements (International Organisation for Standardisation, 2003; National Archives of Australia, 1998, 1999; State Records Authority of New South Wales, 2001b). The metadata elements marked with an asterisk in Table 2.3 are mandatory elements in the relevant metadata standard.

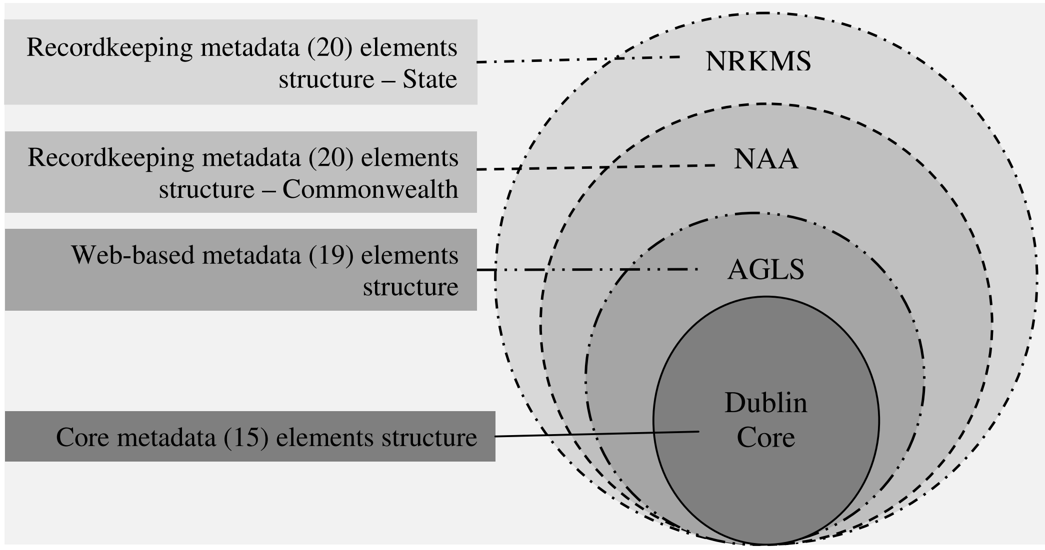

Figure 2.1: Conceptual relationship between the Dublin Core, AGLS, NAA and NRKMS metadata element sets

Although a number of recordkeeping metadata standards have been developed (some of which are discussed later), the practical implementation of these standards has been problematic owing to a lack of awareness of the importance of metadata by records managers and their information technology counterparts, and because users are required to enter metadata manually (Jones & Skelton, 2008, p. 91; Sanders, 2001, pp. 21-22). This motivated the researchers in the Clever Recordkeeping Metadata Project[19] (CRKM Project), who adopted three objectives: 1) to find solutions that would make the implementation of metadata easy; 2) to automate metadata creation and capture in electronic systems; and 3) to enable the transfer of metadata created in one system to another system, to ensure the sharing and preservation of metadata over time using a Metadata Broker tool (Evans et al., 2005, pp. 22-23). To achieve these objectives a prototype of a CRKM Metadata Broker I tool[20] was developed (Evans et al., 2005). The

[19] The CRKM Project was a collaborative Australian Research Council initiative led by Victoria's Monash University from 2003 to 2005 (Evans, McKemmish, & Bhoday, 2005).

[20] The CRKM Metadata Broker I was conceived as a form of middleware operating as an application-independent service for translating metadata between schemes (Records Continuum Research Group, 2007).

Table 2.3: Comparison of recordkeeping metadata element sets

Dublin Core	AGLS	NAA	NRKMS
1. Title	1. Title *	1. Title *	1. Title
2. Creator	2. Creator *	2. Agent * Publisher Other Contributor	2. Agent
3. Subject	3. Subject *	3. Subject	3. Subject
4. Description	4. Description	4. Description	4. Description
5. Publisher	5. Publisher	Merged with Agent	Covered by AGENT entity
6. Contributor	6. Contributor	Merged with Agent	
7. Date	7. Date *	5. Date *	5. Date
8. Type	8. Resource Type	6. Type	6. Category Type
9. Format	9. Format	7. Format	7. Documentary Form
10. Identifier	10. Identifier *	8. Record Identifier *	8. Identifier
11. Source	11. Source	Merged with Relation	Merged with Relation
12. Language	12. Language	9. Language	9. Language
13. Relation	13. Relation	10. Relation, includes Source	10. Relation
14. Coverage	14. Coverage	11. Coverage	–
15. Rights	15. Rights Management	12. Rights Management *	Covered by Access & Use
	16. Availability	–	–
	17. Audience	–	Covered by AGENT entity
	18. Function	13. Function	11. Function
	19. Mandate	14. Mandate	12. Mandate
		15. Aggregation Level *	Covered by Category Type
		16. Management History *	Covered by Use, Retrieval & Event History
		17. Use History	13. Event History
		18. Preservation History	14. Preservation
		19. Location	15. Place
		20. Disposal *	16. Disposal
			17. Control
			18. Access
			19. Use
			20. Retrieval

CRKM Project concluded that there was currently limited capacity to support recordkeeping metadata re-use because "recordkeeping processes, practices, standards and infrastructure still largely operate in paper-based paradigms" (Records Continuum Research Group, 2007, p. 20). Further, there was a significant problem in that the systems required to support compliance to the metadata standards and to enable the interoperability of metadata were not present; nor was there consistency or definitional clarity around the metadata terminology outlined in the standards (Jones & Skelton, 2008, p. 90). There were also limitations with the current CRKM Metadata Broker I[21], as it is only able to pass metadata from one known environment to another, for example between a specific business system and a records system.

As shown by the metadata standards described earlier, variations to the metadata elements need to be captured for different document and record types so that the unique metadata properties of the item can be captured in the EDRMS. There will be similar as well as unique metadata elements that will be captured for the different types of corporate documents and records stored in the EDRMS. EDRMS have the functionality to customise as well as manage multiple metadata sets to cater for the indexing of different document and record types: for example, the metadata fields to be completed when registering an invoice will be different from the metadata fields for registering contracts in the EDRMS. There are options to standardise the capture of some metadata elements in the EDRMS by using pick lists so that, for instance, the names of companies and suppliers with whom the organisation has dealings can be entered or imported into the contact metadata field in order to ensure that they are entered consistently in the EDRMS. EDRMS also can automate the capture of contextual

[21] A workable broker would be able to pass metadata from different electronic systems, for example from the business system that created the metadata (by the user in MS Word or on the Internet) to the recordkeeping system (EDRMS used in the organisation), and then to archive systems (like Xena digital preservation software developed by the National Archives of Australia, used by archival institutions). CRKM Metadata Broker I demonstrated limited interoperability between business, RM, and archival control applications as they are currently conceptualised and configured (Records Continuum Research Group, 2007).

metadata at the point of registration, however knowledge workers are still required to enter some metadata accurately and meaningfully so that efficient search and retrieval, and the lifecycle management of records, is possible.

2.3.1.2 Classification schemes and thesauri

To begin, an understanding of the relationships and differences between classification schemes, business classification schemes (BCS) and thesauri is important because classification schemes, BCS and thesauri operate similarly but are presented in different formats. In this thesis, ISO 15489's definition of classification is adopted: the "systematic identification and arrangement of business activities and/or records into categories according to logically structured conventions, methods, and procedural rules represented in a classification system" (International Organisation for Standardisation, 2002a, p. 2). Classification schemes are designed to facilitate the creation and retrieval of records, including electronic records, particularly where large amounts of information are involved. They provide users with a structure for filing and retrieving records, generally using a controlled vocabulary, which is referred to as a thesaurus. ISO 15489 identifies the following benefits of a classification scheme:

- provides linkages between individual records which accumulate to provide a continuous record of activity;
- ensures records are named in a consistent manner over time;
- assists in the retrieval of all records relating to a particular function or activity;
- determines security protection and access appropriate for sets of records;
- allocates user permissions for access to, or action on, particular groups of records;
- distributes responsibility for the management of particular sets of records,

> distributes records for action and determines appropriate retention periods and disposition actions for records. (International Organisation for Standardisation, 2002a, p. 13)

The classification scheme is thus derived from the thesaurus, and the thesaurus and classification scheme are each used to classify information so that it can be searched and retrieved later. ISO 15489 defines a thesaurus as a

> controlled list of terms linked together by semantic, hierarchical, associative or equivalence relationships. Such tools act as a guide to allocating classification terms to individual records. In a thesaurus the meaning of the term is specified and hierarchical relationships to other terms shown. A thesaurus provides sufficient entry points to allow users to navigate from terms which are not to be used to the preferred terminology adopted by the organisation. (International Organisation for Standardisation, 2002b, p. 10)

This definition describes a thesaurus as an alphabetical listing of all the controlled vocabulary terms listed on any subject or discipline in the thesaurus. Of interest to this research is a functional thesaurus, which is defined by the NSW State Records Authority (2003) as "a thesaurus that reflects the unique functions of an organisation."

Both the Australian functional thesauri used by the organisations studied in this research are the Keyword AAA[22] (KAAA) and the Keyword for Councils (KFC) both developed by the States Records Authority of New South Wales. Both the KAAA and the KFC are business functional thesauri that provide comprehensive, controlled vocabulary to describe paper and electronic records. A functional thesaurus covers terms of a business nature relating to an organisation's specific functions, and contains

[22] Accuracy, Accessibility, and Accountability

keywords, descriptors and forbidden terms.[23] Examples of business functions include human resource management, community relations, financial management, and information management.

A keyword functional thesaurus is produced and maintained by an organisation that has implemented a Business Classification Scheme (BCS). In other words, the BCS is a classification scheme and tool derived from the functional thesaurus. As such, the BCS contains terms and scope notes that represent and describe organisational business functions, activities, transactions (or other elements) and show their relationships. The BCS is defined by the NSW State Records Authority as

> a conceptual model of what an organisation does and how it does it. It involves the identification and documentation of each business function, activity and transaction and the documentation of the flow of business processes, and the transactions which comprise them. It can be used to support a number of records management processes. (State Records Authority of New South Wales, 2003)

In this thesis the term *classification scheme* includes the business classification scheme (BCS), and the term *thesauri* includes functional thesauri.

In summary, as defined in ISO 15489, classification is the organisation of corporate documents and records based on their similarity. This literature review and discussion is limited to two thesauri (KAAA and KFC) and their respective BCS because of their use by the sampled organisations studied in this research. However, there are other functional thesauri used in Australia, such as the *Australian Government's Interactive Functional Thesaurus (AGIFT)* (National Archives of Australia, 2007), and outside Australia, such as the Alberta Government's *Modified Functional Classification System Model*, Draft March 29, 2007 (Information Services

[23] Forbidden terms refer to specific terms in the thesaurus which should not be used for classification as it conflicts with similar terms already present in the thesaurus. Reference to the alternative terms to be used will be stated next to the forbidden terms to guide the user.

Alberta, 2007), the *Local Government Classification Scheme (LGCS)* in UK (Records Management Society of Great Britain-Local Government Group, 2006) and the Business Activity Structure Classification System (BASCS) in Canada (Library and Archives Canada, 2006).

The KAAA, developed in 1995, is a keyword thesaurus of general terms based on the keyword classification method. It covers administrative terminology common to most government organisations and "is constructed to reflect an organisation's business functions and activities as they are documented by records" (Robinson & Knight, 1998, p. 12). The KFC is an adaptation of KAAA for local government councils. Similar to the KAAA, the KFC is a thesaurus designed for use in classifying, titling and indexing council records in technological environments (State Records Authority of New South Wales, 2001a). The developers of these tools state that they need to be used in conjunction with a functional thesaurus, developed to include the business functions, activities and subjects that are unique to an organisation.

KAAA and KFC use a structured hierarchy of keywords and activity and subject descriptors. Keywords are allocated to describe broad business functions; activity descriptors describe business activities, and subject descriptors are used to describe subjects or topics that connect related business transactions (State Records Authority of New South Wales, 1998, p. 10). KAAA has 17 keywords and 105 activity terms, while KFC has 32 keywords and 189 activity terms.

As noted, the classification scheme is derived from the thesaurus. In the case of KAAA and KFC, the classification scheme is referred to as the business classification scheme (BCS). KAAA and KFC are based on the BCS advocated in ISO 15489, and are derived from the analysis of an organisation's business processes. The analysis focuses upon

- the goals and strategies of the organisation;

- the broad functions and activities of the organisation which support the pursuit of the goals and strategies;
- the activities of the organisation which constitute the accomplishment of the functions; and
- the groups of recurring transactions which constitute each activity. (State Records New South Wales, 2000, p. 9)

The keywords and descriptors are the authorised terms provided by these thesauri, and may be supplemented by “free text”: that is, words not derived from the thesaurus such as the name of an organisation, an individual or a project. The thesauri developers have designed these tools so that the title of a paper or electronic folder in the EDRMS is constructed by allocating a keyword followed by an activity descriptor, then a subject descriptor and/or some free text. In these thesauri, the keyword always takes first place in a title, followed by an activity descriptor. These two levels are compulsory, but there is flexibility at subsequent levels (State Records New South Wales, 2000). The developers of these tools state that besides being tools for classifying the organisation’s business corporate documents and records, the tools can assist with determining how long corporate documents and records should be retained, how corporate documents and records should be handled and stored, and who should have access to them (State Records New South Wales, 2000).

There are functions in the EDRMS to manage the classification schemes and thesauri that enable the classification and indexing of EDRMS content. Some EDRMS are able to handle multiple thesauri as well as to upload electronic versions of thesauri such as the Australian Keyword AAA (KAAA) or the Keyword for Councils (KFC) thesaurus. Some EDRMS do not have a thesaurus module, but instead are able to integrate with third-party thesaurus software applications to provide this function. Examples of third-party thesaurus software implemented widely in Australia include *a.k.a.® Classification Software* by Synercon Management Consulting PLC, and *Term Tree* and *One-to-One* by This to That Pty Ltd. EDRMS that provide thesaurus functions enable searching using the content classified against the terms in the thesaurus. In EDRMS that are designed to provide a tree view of the classification scheme, users can search by browsing and/or navigating the folder structure, as in Microsoft's Windows Explorer view.

2.3.1.3 Retention and disposition of records

A Retention and Disposition Schedule (RDS), or record disposal authority, is a listing of the records series of an organisation, with directions on how long records that are useful to the organisation are to be retained and disposed of after their creation and use. It also identifies records of social and historical importance and archival value so that they can be preserved, as well as the requirement for the permanent retention of such records, either locally or by transfer to archival authorities (Kennedy & Schauder, 1998). An RDS also legitimises the destruction of records, and in litigation can be used to show that records have been destroyed under an approved policy rather than as a cover-up.

RDS are developed by individual organisations (referred to as record disposal authorities), and are then developed and published for use across specific groups of organisations (Kennedy & Schauder, 1998, p. 79). General disposal authorities (GDAs) are usually developed by State or Commonwealth government archival agencies that have legislative responsibilities to ensure public records are identified and preserved as historical archives or permanent records. Like the RDS, a disposal authority specifies classes of records and the minimum length of time they should be kept. Disposal authorities are legal documents issued by a State or Commonwealth government in Australia to authorise the disposal of government records. Australian government agencies need to submit their functional RDS, which incorporate records series that are unique to their agencies and not covered in the general disposal authorities, for approval by the relevant State or Commonwealth government.

In Australia, all State Records Offices are issued specific GDAs that meet the State's legislative requirements for record retention. For example, the State Records Office of Western Australia and the State Records Authority of New South Wales have individually issued three different GDAs, each covering a specific business record series: 1) administrative; 2) financial and accounting; and 3) personnel (State Records Authority of New South Wales, 2007; State Records of Western Australia, 2007); and the Commonwealth government's National Archives of Australia (2007) has issued the *Administrative Functions Disposal Authority* (*AFDA*). GDAs in Australia are aligned to the classification scheme and thesaurus of the KAAA, described at 2.5.5. At the time of writing, alignment of the GDA for local government records with the classification scheme in the KFC thesaurus was completed and about to be released by the State Records Office of Western Australia (State Records of Western Australia, 2007).

Retention and Disposition Schedules (RDS) are an aspect of RM principles that are implemented in the EDRMS. EDRMS have functionality to upload multiple schedules relating to the organisation. Included are functions that enable the assignment of retention periods for records and the ability to produce reports on the disposition or archiving of records. These are not without problems: Williams (2000, pp. 12-14) expressed concern about implementation issues in the then draft version of the National Archives of Australia's *AFDA,* concerns still applicable to the other GDAs in Australia He pointed out the need to implement event-based triggers for the efficient retention/disposition process citing events such as the destruction of records when reference ceases, the policy is superseded, or a new standard is developed (Williams (2000, p. 13).

Williams' (2000) concerns are echoed by other professionals in the RM listserves. As Williams (2000, p. 13) recognised, the event trigger "destroy when reference ceases" is difficult to implement. It requires agencies to determine when this should occur: whether five years after last access, last search, or last opening. In the EDRMS environment it is harder to implement this trigger, for when users accidently view a record is this to be perceived as the date last accessed or referenced?

Dan and McEwen, representatives involved in the project to develop AFDA, respond to Williams' (2000) concerns by noting that schedules are "designed to be flexible in implementation and can be tailored to suit an agency's particular needs and organisational culture" (2000, p. 14). They state that agencies are sometimes required to consult with their organisation's action areas/officers in order to decide implementation of the event triggers. However, this can generate inconsistent protocols in practice.

Another concern expressed by Williams (2000, p. 13) is the need to differentiate between working documents and final records, as retention periods are different for each. In the EDRMS environment, record managers rely upon users to make this distinction. The risk is that final records may be prematurely destroyed when users fail to flag the differences in the EDRMS.

Implementation of RDS still remains an issue, as evidenced in US organisations. Although 88% of the RM professionals in the 2009 Cohasset survey reported their organisation had a retention schedule, only 65% stated their retention of electronic records was included in their schedule (Williams & Ashley, 2009, pp. 22-23). Furthermore, approximately 78% reported they had not implemented retention practices for emerging sources of Web 2.0 records like blogs, web pages and instant messages (Williams & Ashley, 2009, p. 8).

2.3.1.4 Security and access control

Just as important as sentencing records for prompt destruction or further retention is the need to ensure the security of records stored in the EDRMS. The *ISO/IEC 27002: Information Security Standard* provides best practice recommendations on information security management for RM professionals initiating, implementing or maintaining information security management systems in applications like the EDRMS (International Organisation for Standardisation & Commission, 2005). Information security is defined within the standard as the preservation of confidentiality (ensuring that information is accessible only to those authorised to have access), integrity (safeguarding the accuracy and completeness of information and processing methods) and availability (ensuring that authorised users have access to information and associated assets when required) (International Organisation for Standardisation & Commission, 2005).

EDRMS have mechanisms that enable the implementation of security settings within the system. There are layers of security settings that can be implemented at folder levels, cascading to the contents stored within the folder, down to individual document or record levels. Examples of security access include permission only to view the metadata of the content, only to read the content, or to read and edit the content. Users can be classed by their business groups and/or ad hoc projects, and have access to information that only their groups or that they as individuals have.

If the organisation uses information security classifications (such as classified, unclassified, restricted and most confidential) to distinguish the sensitivity levels of its information, these can be applied to the content of EDRMS as well. Users are assigned an information security classification level (also referred to as a caveat) and will only be able to access information that matches their classification.

Administrators of the system have full permission to manage the content. Some organisations[24] appoint Record Focal Points, staff within a business unit trained to become power users of the EDRMS so that they can assist their team on RM and EDRMS matters. Usually, organisations provide these focal points with semi-administrative rights, to assist with the management of the EDRMS by undertaking functional tasks such as adding users to specific user groups and granting security permissions.

2.3.2 Functionality

An EDRMS has functions that enable users to electronically store, search, filter, retrieve, share, publish and track documents and records throughout their lifecycle. Table 2.4 presents the distinction between the document management and records management functionalities of EDRMS (Serco Consulting, 2008).

Table 2.4: Comparison of document and records management system functionalities of EDRMS

Document Management	Records Management
Documents can be modified or exist in several versions.	Records cannot be modified.
Documents may be deleted by owners or assigned RM focal points with relevant security permissions.	Records cannot be deleted except in certain strictly controlled circumstances.
Some retention controls may be included.	Rigorous retention controls must be implemented.
A folder structure for classifying documents is implemented, with users having permission to alter the structure.	A formal rigorous corporate folder structure adhering to an approved classification scheme is implemented, with controlled changes implemented by records management staff.
It is intended primarily to support day-to-day use of documents for ongoing business.	It supports day-to-day use but is also intended to provide a secure repository for business records.

[24] Examples of Australian organisations that have appointed Record Focal Points include: Woodside Energy Ltd, Shell Development Australia Pty Ltd, Fremantle Ports, Water Corporation and Western Power.

Table 2.5 summarises the differences and similarities of each of the core document and RM functions of the EDRMS. The discrepancies between the functionalities of a document and RM system may appear significant, as documents can be modified but records are final versions that cannot be modified. This indicates the need for RM functions in the EDRMS to ensure the authenticity of records, their accessibility by authorised personnel, and classification into the correct folder so that they can be sentenced appropriately for retention or disposition later.

Table 2.5: Similarities and differences of the core functionalities of an EDRMS

Document Management	**Records Management**	**Both**
Check-in and check-out	Metadata management	Document capture and registration
Version control	Classification	Viewing
Document review and approval	Archives and disposal	Auditing
	Management of physical records	Security of documents
		Search and retrieval of information
		Renditions
		Scanning, imaging and Optical Character Recognition (OCR)

Table 2.6 describes the generic document and records management functions common in current established EDRMS offered by vendors like Tower Software (2007), Open Text Corporation (2007), Objective Corporation (2007), Documentum (EMC Corporation, 2007) and FileNet (IBM Corporation, 2007). These were derived from the web sites of the EDRMS and enterprise content management (ECM) vendors stated above. Detailed descriptions of the EDRMS functions are provided in Appendix 2.1.

Table 2.6: Generic functionalities of EDRMS

Functionality	Purpose	Applications Used
Document capture and registration	Enable central storage of documents and records (items) in one single corporate information repository.	Integration with Microsoft Word, Excel, PowerPoint and Outlook or Lotus Notes.
Viewing	View items using either the EDRMS' inbuilt viewing tool or in the native application of the CDR.	Microsoft Word, Excel, PowerPoint, Project and Outlook, Lotus Notes or other native applications including Adobe Acrobat.
Check-in and check-out	Edit a draft item and then return an updated version back into the EDRMS. While the item is checked out, a lock is placed on the item preventing edits by other users.	Integration with Microsoft Word, Excel, PowerPoint and Outlook.
Declare record	Declare a document a "record" so that it is frozen in the EDRMS as a final record, to prevent further editing.	Any application.
Version control	Automatically track the version and revision history of the document. Allow authorised users to view previous versions or revisions of documents.	Any application.
Auditing	Keep an audit trail of actions that happen to the item.	Any application.
Renditions of documents and records	Maintain multiple renditions of the same document. For example, a version of a word-processing document created using Microsoft Word may be saved in HTML or PDF format for publishing, review and approval.	Any application.
Workflow Module	Manage the flow of work in the organisation. It can, for example, be configured to process and approve an incoming invoice into the organisation by scanning the invoice and routing it through the invoice approval workflow by relevant staff.	Workflow module is an add-on to the EDRMS.
Scanning Module	Capture incoming correspondence or convert paper documents or records into electronic content. Optical Character Recognition (OCR) software is used to turn a picture of words such as a scanned or typed letter into an editable document. This process enables indexing the text contents of the documents and records to enable searching contents using the full text search mechanism of the EDRMS.	Scanning module is an add-on to the EDRMS. OCR software like OmiPage.
Managing physical records	Manage the physical location of corporate documents and records in the form of paper files, CD-ROMs, DVDs, reports and archive boxes and their storage locations, including record registries, filing cabinets, offsite commercial storage locations and archival repositories.	Another add-on module to the EDRMS.
Classification or thesaurus module	Construct and manage a classification scheme or thesaurus so that it can be assigned to records registered in the EDRMS.	Another add-on module to the EDRMS or functionality is inbuilt in EDRMS.
Retention and Disposition Schedules (RDS)	Construct and manage a RDS so that it can be used to sentence records registered in the EDRMS.	Functionality is inbuilt in EDRMS with options to import relevant GDAs.

Selecting the right EDRMS solution for an organisation is a daunting task that requires both an understanding of the organisation's information and business requirements, and the ability to match these with the EDRMS functionalities provided by the vendors. Guides such as The ECM Suites Report 2008 (CMS Works Inc, 2008) is a good reference source for developing business cases and evaluating and selecting ECM solutions or EDRMS for implementation. It contains critical evaluations of 32 ECM solutions, including in-depth reviews of 18 major vendors. Examples of the evaluation criteria for each of the ECM solutions include strengths, weaknesses, comparisons to competitor solutions, the fit of the ECM solution to industry types, description of the ECM functionalities offered and some background to the vendor's company and business (CMS Works Inc, 2008). There are also certification programs (Joint Interoperability Test Command, 2007; The National Archives of United Kingdom, 2002) in place that enable RM professionals to evaluate and select appropriate EDRMS solutions.

2.3.3 Search and retrieval of information from the EDRMS

Search and retrieval functionalities in EDRMS continue to improve with advances in technology. Different types of search functions are available depending on the design and features of specific EDRMS. There is more than one search method by which users can seek information from the EDRMS, including the use of integrated menus within the authoring application, search menus, and shortcuts to access frequently searched items, favourite items or links to saved searches. Most EDRMS are designed to enable users to search the following:

- metadata information like author, document title, format and date, which are drawn from metadata assigned to the document by the system or user during the registration of the document or record.
- combinations of metadata, for example author and creation date.

- words in the full text (content) of the document or record.
- combination searching covering both the metadata fields and the full text of the item's content. (Asprey & Middleton, 2003, p. 98)

Generally, these search options are available to users as basic or advanced search functions presented in the form of search screens or menu options in the EDRMS. To conduct a basic search, users type words or their search criteria into the search window, which will retrieve all content in the system accessible by the user and matching the search terms in either the metadata fields or the full text contents of the system. The advanced search functionality enables users to conduct complex search queries, combine multiple metadata fields and search for words or phrases within the document content. Boolean logic operators such as AND, OR and NOT may be used when conducting advanced searches.

Full text searching of the contents of the document or record can be refined using proximity search operators and context search mechanisms. Proximity searching enables users to specify how close together words should be. For example, "legal (w5) litigation" means that the word legal must appear within five words of litigation. Context searching enables users to search for a word or a string of words and be presented with result sets that have found relevant content. For example, if the user searches for case documents and enters "fired from job" into a concept search engine, the application is smart enough to exclude information such as flames, smoke and fireplaces. The search engine will, however, effectively expand the search to include terms such as dismissal, separation, layoff and suspension.

Table 2.7 provides a description of each of the possible search methods that are available to EDRMS users to employ when searching an EDRMS.[25]

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[25] The EDRMS studied were implemented using thin client and not browser interfaces. As such, web 2.0 search and retrieval functionalities like tagging and folksonomies were not available in the versions of the EDRMS studied in the research.

Table 2.7: Description of the search methods available to users in the EDRMS

Search method	Explanation
1. Metadata searching using Boolean logic	Searching by using the search window in the EDRMS for terms in the metadata fields of the record by using Boolean logic terms like AND and OR. An example would be “performance appraisals AND Joe Bloggs.” The words “performance appraisal” would be part of the title metadata field and “Joe Bloggs” the author metadata field of the record.
2. Navigating tree structure of classification scheme	Navigating or browsing the tree view of the classification scheme presented in the EDRMS.
3. Metadata and navigation	A combination of search methods 1 and 2.
4. Retrieval searching from shortcuts	Retrieving a search from the shortcut functionality available in the EDRMS. This includes retrieving searches from recently accessed or saved search folders, or retrieving records stored in a favourites folder for quick access.
5. Metadata searching using terms in classification scheme	Searching by using terms in the classification scheme as metadata fields under the classification metadata. Examples of first-level terms are personnel, financial management and legal services. Examples of the second-level terms are planning, reviewing, advice and compliance.
6. Using terms in the thesaurus	Searching by using terms in the classification scheme that are listed in the thesaurus. The thesaurus can be uploaded either into the thesaurus functionality in the EDRMS or into software that integrates with the EDRMS. In either of these installations, it is possible to search for records classified against the terms in the thesaurus. If the thesaurus is not integrated to the EDRMS it will not be possible to perform this search.
7. Sorting search results	Using the sorting functionality in the EDRMS to sort the search results presented after a search by preferred metadata fields such as author, title, date and record number.
8. Filtering search results	Using the filtering functionality in the EDRMS to filter the search results by preferred record types such as invoices, contracts or records by a specific department.
9. Viewing related documents / records / containers	When the search results are displayed it is possible to highlight a specific record and find out which records or containers (folders) are related to the record. This functionality enables users to identify and browse related or similar records held in other containers relevant to their search.
10. Refining search using Boolean or by varying metadata	Conducting a refined search using either Boolean logic terms like AND / OR to expand or narrow the search results, or refining the existing search by changing the search terms that are assigned as metadata for the record being searched.

2.3.4 System designs of the EDRMS

Most of the prominent EDRMS available in the marketplace provide two standard design options for implementation: the tree view and the virtual database design view (Hewlett-Packard Development Company, 2010; Objective Corporation Limited, 2007; Open Text Corporation Limited, 2007).

2.3.4.1 Tree view folder structure design

The tree view folder structure design implemented in the EDRMS is like the folder structure view presented in Microsoft's Windows Explorer view of the network drive. EDRMS users in the tree view design are able to navigate to folders, sub-folders and documents or records. The classification scheme implemented in the organisation is displayed in the tree view design.

Usually the first- to the third-level folders are titled using the keywords in the classification scheme, and the fourth level is titled using the free-text terms used in the organisation. The tree view design enables users to navigate and browse through the scheme when seeking information in the EDRMS. Additionally, it provides users with a view of where their information is physically filed or stored in the EDRMS. Being able to see where their information is stored in the EDRMS gives confidence to users and contributes to the browsing search behaviour that they exhibit. An example of the tree view design is presented in Figure 2.2.

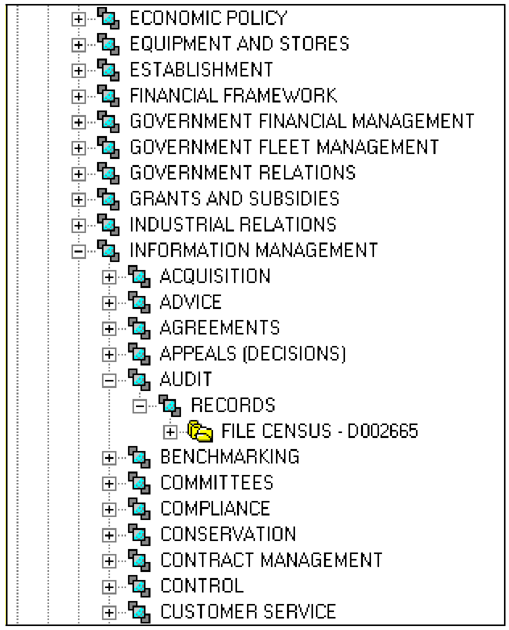

Figure 2.2: Tree view folder structure design in EDRMS

2.3.4.2 Virtual database design view

Rather than a tree view, in the virtual database design view of the EDRMS there is no tree view of the folder structures, so users rely upon the search and registration windows. An example of a search screen in the virtual database design view is presented in Figure 2.3.

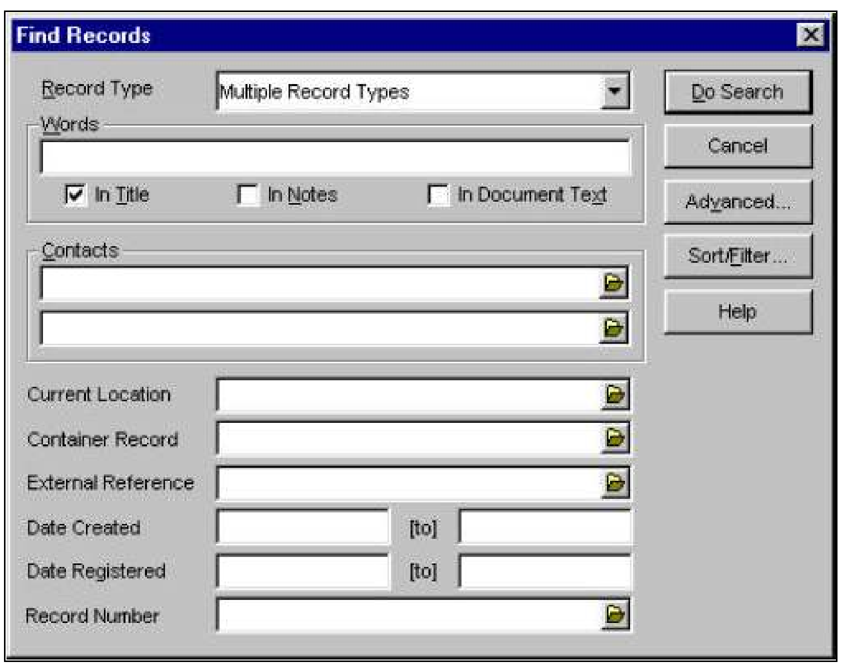

Figure 2.3: Search screen in virtual database design view in EDRMS

In this virtual database design users are not able to see where their information is filed or stored; nor does it visually represent how information is physically organised within the EDRMS. There is no opportunity to search for information by navigating the system. Browsing can be performed using the search results page.

Most EDRMS provide organisations with the option to use both design views described above. How the user acceptance of information systems is influenced by organisational and information culture is reviewed next.

2.4 Organisational and information culture, information systems and user acceptance

Organisational culture is defined in the literature as a representation of the psychology, values, attitudes, experiences, beliefs, and behaviours of an organisation's employees (Hofstede, 1980; Twati & Gammack, 2006). The following factors can influence an organisation's culture and its work environment: organisational strategic visions, aims and objectives; employees' hidden assumptions of common appropriate behaviours and importantly senior management's leadership (Cameron & Quinn, 1999; Schein, 2004; Schwartz & Davis, 1981; Twati & Gammack, 2006). Successful change is facilitated by shared value systems, in the form of work practices, behaviours and attitudes particularly where they are and be manifested across all levels of the organisational hierarchy (Hofstede, 1980, 1991, 2001; Krumbholz and Maiden, 2000).

An *information culture* that is embedded within the organisational culture greatly assists the successful implementation and adoption of information programs and systems in work environments. Information culture refers to the organisation's values, attitudes and behaviours which influence how information is managed in their organisation, subsequently affecting the organisational culture (Oliver, Evans, Reed, & Upward, 2009, 2010, p. 44).

Twati & Gammack's (2006) study on the impact of organisational culture on the adoption of information systems in Libya's oil and banking sectors revealed there is a relationship between organisational culture innovations and the adoption of information systems.

The EDRMS is not the only way to manage corporate information, and many organisations use different systems. These include Enterprise Resource Planning (ERP), Electronic Medical Records Systems (EMRS) and Internet or Intranets. The EMRS is similar to EDRMS, but only manages records and is restricted to the medical or health care industry. ERP software or enterprise systems are defined as "commercial software packages that enable the integration of transactions-oriented data and business processes throughout an organisation" (Markus & Tanis, 2000, p. 176). The key functionality offered by enterprise systems is a "seamless integration of all the information flowing through a company, such as financial and accounting, human resource information, supply chain information, and customer information" (KPMG Management Consulting, 1998). ERP products are available from several vendors, including SAP AG, PeopleSoft and Oracle. Among the benefits cited for ERPs are reduced operating and maintenance costs for information systems, reduced administrative expenses and more efficient business processes, better quality information for decision making and increased capacity to handle growth (Markus & Tanis, 2000; Parr, Shanks, & Darke, 1999). The benefits claimed for ERP implementations can also be linked to EDRMS, EMRs and other information systems implementation. However, failures of ERP system implementation projects have been known to lead to organisational bankruptcy (Bulkeley, 1996; Davenport, 1998; Markus & Tanis, 2000).

Organisations tend to apply different definitions of *success* with these information systems. Some define success as implementation of the system – did the organisation get the system up and running within some reasonable budget and schedule? (KPMG Management Consulting, 1998). Alternatively it may refer to achieving business results – did the company succeed in realising its business goals for the project? (KPMG Management Consulting, 1998). For the purposes of this research, success is defined by user acceptance and ease of use of the enterprise system implemented in the organisation (Delone & McLean, 2004).

A large body of literature in the information systems discipline addresses such components of success as user satisfaction (Bondarouk, 2006; Scheepers, Scheepers, & Ngwenyama, 2006), user acceptance (Brown et al., 2002; Davis, 1989; Lim et al., 2005; Wilson & Lankton, 2004), user perceptions and attitudes (Doherty, Coombs, & Loan-Clarke, 2006; Lin & Silva, 2005; Van der Heijden, Verhagen, & Creemers, 2003) and user engagement and user resistance (Ferneley & Sobreperez, 2006; Irani, Sharif, & Love, 2001). The Technology Acceptance Model (TAM) devised by Davis (1989) is the dominant model used in information systems research to discuss user perceptions of and attitudes toward information technology (IT) systems. In the TAM literature, two determinants of user acceptance are presented. First is *perceived usefulness*, which relates to the extent to which users understand and accept that the use of an enterprise system will enhance their job performance (Davis, 1989). The second is *perceived ease of use,* which relates to the level of effort required to use an information system (Davis, 1989).

The literature review reveals that user acceptance and adoption of EMR systems that manage health records and information of patients by professional staff like surgeons, radiologists, and radiographers are positive as long as the EMRs provided them with direct clinical benefits in doing their work and easing their work practices (Jensen & Aanestad, 2007; Van Akkeren & Rowlands, 2007). This applies to the administrative staff's acceptance of the ERMS as well (Van Akkeren & Rowlands, 2007). However, the professional groups showed hostile reactions towards the ERMS when it applied new mechanisms for administrative control of their work practices or imposed new work tasks that had previously been performed by others like the administrative staff (Jensen & Aanestad, 2007; Van Akkeren & Rowlands, 2007). Jensen and Aanestad's (2007) study revealed that users needed to be consulted and engaged in the decision making processes leading up to the selection and implementation of an Electronic Patient Record System (EPRS). The lack of consultation and the resultant compulsory use of a system resulted in negative reactions towards accepting the system (Jensen & Aanestad, 2007; Van Akkeren & Rowlands, 2007). Additionally, lack of technical support and training for the systems led to frustration, anxiety, depression – and even to staff resigning from the organisation, in the case of the study by Van Akkeren & Rowlands (2007).

Similar observations have been made in case studies of ERP implementations and their adoption by users (Al-Sehali, 2000; Ngai, Law, & Wat, 2008; Shanks et al., 2000, July 3 - 5). Ngai et al. (2008; Ngai et al., 2008) conducted a literature review of the critical success factors (CSFs) in the implementation of enterprise resource planning (ERP) across 10 different countries and regions, and identified 18 critical success factors with more than 80 sub-factors. They report that the most frequently cited factors for the successful implementation of ERP systems across the study are top management support, training and education (Ngai et al., 2008). These observations are also reported in studies by Al-Sehali (2000) and Shanks et al. (2000).

The importance of ERP training is affirmed by Bradley and Lee (2007), who surveyed 143 employees on the relation between training and satisfaction of users in ERP system implementation in a mid-sized university. They conclude that the satisfaction derived from training is a factor leading to the user's perception of the usefulness of the system and thus their perception of the ease of use of the system

(Bradley & Lee, 2007). Both these factors had been identified as determinants of user acceptance of an information system in Davis' (1989) TAM.

2.5 Conclusion

This chapter has illustrated the use of ISO 15489 as the industry standard for records management principles and practices. Including how organisational and information culture influences user acceptance of information systems. As an internationally accepted standard, ISO 15489 enables records managers to implement and benchmark their organisations' RM practices. Chapter 2 presents the eight pillar RM principles in ISO 15489 and identifies the four key principles used in the design structure of the EDRMS: 1) metadata, 2) classification schemes, 3) retention and disposition schedules and 4) security permissions. The remaining four principles, 1) policies, 2) procedures, 3) training and 4) monitoring and auditing, support the efficient implementation and use of EDRMS in an organisation.

The first research question to be tested in the sample organisations is therefore:

> *SQ_1: How have the sampled four organisations implemented records management principles and practices in the EDRMS as outlined in ISO 15489?*

The next chapter completes the theoretical framework for this research, focusing on the search behaviour of EDRMS users as they employ EDRM systems to achieve efficient management and use of their corporate records.

3 Literature Review: EDRMS Search Behaviour

3.1 Introduction

Although the ISO 15489 principles and the other standards, specifications and tools reviewed in Chapter 2 establish how organisations should manage their records and adopt appropriate records management practices, they do not directly consider how knowledge workers search for or work with records within an organisation. Rather, their guidance is aimed at trained professionals working at the records management program level. For instance, the ISO 15489 calls for each organisation to create its own functional classification scheme. It is not concerned with ensuring that the scheme is logical or reflective of how users seek and retrieve information, but focuses upon aligning the classification scheme to the retention schedules. Likewise, the ISO 15489 standard recommends that organisations develop their own functional metadata standards, specifying the metadata elements to be captured for registering records in the EDRMS. It does not consider the conscientiousness required of users entering metadata whilst registering their records. This lack of direction can lead to difficulties in information search and retrieval (Borgman, 1986, 1996; Browne, Pitts, & Wetherbe, 2005, 2007; Gigerenzer & Goldstein, 1996; Mansourian, 2007; Nickles, Curley, & Benson, 1995; Prabha, Connaway, Olszewski, & Jenkins, 2007; Schmidtz, 2004; Simon, 1971a).

EDRMS users' search behaviour is largely unrecognised in the records management literature, as well. However, given the similarities of records management to library and information management, the considerable research conducted in the latter two disciplines can be drawn upon to bridge the gap in understanding EDRMS users' search behaviour. In particular, extensive research has been conducted on how library users seek information from paper and/or online public access catalogues (OPAC) (Borgman, 1986, p. 15, 1996; Debowski, 1997, 2001; Ellis, 1989; Kuhlthau, 2005; Marchionini, 1995; Meho & Tibbo, 2003) or via Internet and web technologies (Cothey, 2002; Fu, 2010; Hodkinson & Kiel, 2003; Kellar, Watters, & Shepherd, 2007; Mansourian, 2007; Tauscher & Greenberg, 1997). Given that the EDRMS is an electronic information source like the OPAC and web technologies, it can be expected that insights on information seeking behaviour from these sources will offer valuable insight into EDRMS users.

This chapter makes use of research in these parallel fields to understand the search environment in which users (knowledge workers) of EDRMS operate.

3.2 EDRMS search environment

As Chapter 1 outlined, the work context has changed significantly as organisational structures, communication technologies and expectations of workers, employers and governments have evolved. Legislation from the Australian Commonwealth Government (Commonwealth of Australia, 1982, 1983), various Australian State Records Offices (Government of South Australia, 1997; Government of Western Australia, 2000; Queensland Government, 2002) and internationally (United Kingdom, 1998, 2000; United States Congress, 2003a, 2003b) require knowledge workers to "make, manage and keep full and accurate records" (Thomson, 2008, p. 116). Consequently, the control of information[26] and its management has devolved from trained records managers to knowledge workers across each organisation. The individual is required to manage the identification, manipulation and presentation of relevant work records regardless of format (Thomson, 2008, p. 123). All knowledge workers in the 21st century have recordkeeping responsibilities that must be met.

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[26] Especially electronic and born digital corporate information.

EDRMS are intended to manage an organisation's corporate information. However, these systems are designed according to specialised best practice standards (International Organisation for Standardisation, 2002a, 2002b) which assume the knowledge worker can assign accurate metadata and classification when registering information in the EDRMS. Any subsequent search and retrieval of corporate information from the EDRMS relies upon the meaningful and timely recording of this information. This indicates the importance of training knowledge workers dealing with information systems such as the EDRMS (Dennis, Pootheri, & Natarajan, 1998; Farwell, Kuramto, Lee, Trauth, & Winslow, 1992; Fjermestad & Hiltz, 2000/2001).

The success of business computing systems relies on user acceptance of the system (Brown, Massey, Montoya-Weiss, & Burkman, 2002; Davis, 1989; Lim, Ling, & Wee, 2005; Wilson & Lankton, 2004); this is no different for EDRMS (Johnston & Bowen, 2005; Maguire, 2005; Williams, 2005). Users are more likely to accept EDRMS if they understand the benefits in using them to manage, search and retrieve the information they require: that is, knowledge workers need to see "what the system could do for them rather than having the records management function forced on them" (Williams, 2005, p. 166); they need to know the "what's in it for me?" factor for using EDRMS (Cutts, 2009, p. 28). Knowledge workers must be shown the benefits of RM and the EDRMS in their required recordkeeping role.

Although the user has been given more responsibility and has legal requirements to be met, the preparation and guidance of users to achieve more effective outcomes has been largely ignored (Cutts, 2009; Thomson, 2008). This has resulted in highly variable standards and approaches even within an organisation. A user may, for example, receive little or no training on the systems. They may be inexperienced in using the system and daunted by it; or unmotivated to learn or apply the necessary principles. Further, their knowledge of a required search task may be highly dependent on their work role

(Leckie, Pettigrew, & Sylvain, 1996), expertise and other environmental factors. There is a critical need to understand how users approach their records management responsibilities and how factors such as their tasks (Bystrom, 1999, 2002, 2005; Bystrom & Hansen, 2005; Bystrom & Jarvelin, 1995; Hackos & Redish, 1998; Hansen, 2005; Vakkari, 1999, 2003) and the training they receive (Branch, 2002; D'Alessandro, Kreiter, & Peterson, 2004; Debowski, Wood, & Bandura, 2001a) affect their search behaviours.

The EDRMS is similar to a *Decision Support System* in that it "provides computer-based assistance to a human decision maker" rapidly and accurately by "combining the best capabilities of both human and computers" to search and retrieve large quantities of corporate information, including manipulation and presentation of information in modes that meet the users' requirements (Silver, 1991, pp. 8-9). As Silver (1991, p. 11) explains, decision support systems help "human decision makers to exercise judgement", but the "system does not make the decision": this is how EDRMS operate. They are one of a number of decision support systems accessible by knowledge workers to assist with tasks-related decision making processes. However, for systems like EDRMS to serve as "superhuman information-processing assistants to decision makers" (Silver, 1991, p. 11) in a timely, accurate and cost effective manner, knowledge workers must first register information in a timely and accurate manner.

Given the importance of EDRMS training for knowledge workers whose decision making will be affected by their ability to use the system effectively, two elements are explored in this chapter. Firstly, the literature relating to the search behaviour[27] of users of information systems is examined to explore its applicability to

[27] *Information seeking behaviour* instead of *search behaviour* is the terminology widely used in the literature reviewed; the former term is used when citing relevant literature and the latter term is used in the thesis.

EDRMS practice. Secondly, research on the effect of tasks and training on user search behaviour is reviewed.

3.3 Information seeking behaviour

There are many theories and models of search behaviour based on library systems (Bates, 1979, 1984, 1989a; Branch, 2002; Ingwersen, 1982, 1992, 1996, 2001, 2005; Krikelas, 1983; Kuhlthau, 1988, 1993, 1999, 2004, 2005; Leckie, 2005; Leckie et al., 1996; Wilson, 1999) and web technology information sources (Bates, 1979; Bhatnagar & Ghose, 2004; Cothey, 2002; Debowski, 1997; Fu, 2010; Hodkinson & Kiel, 2003; Kellar et al., 2007; Kulviwat, Guo, & Engchanil, 2004; Lucas & Topi, 2004; Lueg, Moore, & Warkentin, 2003; Mansourian, 2007; Tauscher & Greenberg, 1997), but there is no theory or model on EDRMS search behaviours in the records management discipline.

There are various definitions of information seeking behaviour in the literature, generally related to "how people need, seek, give and use information in different contexts" (Pettigrew & McKechnie, 2001, p. 44). Fisher, Erdekez and McKechnie (2005) suggest *manage* could be added to this definition (p. xix). There has been considerable research conducted by scholars and information scientists on the subject of general information seeking behaviour, ranging from Wilson's (2005) information behaviour model[28] and Krikelas'(1983) theory of information seeking behaviour to Kuhlthau's (1988, 1993, 1999, 2005) information search process model. Not all of these are applicable to EDRMS contexts.

Wilson's 1981 and 1999 (2005) and Krikelas' (1983) models are described as general models on information seeking behaviour (Case, 2002; Fisher et al., 2005). Wilson's (2005) models emphasise the context of information seeking: for instance,

[28] Wilson's (2005) models are described as *Problem Solving Models* as they "presents information seeking as a problem and/or presentation of the resolution as the goal" (Spink, Wilson, Ford, Foster, & Ellis, 2002a, p. 697).

what drives the information need of a user? Similar to Wilson's models, Krikelas states that "information seeking is a response to what the individual perceives as an immediate need" (Henefer & Fulton, 2005, p. 226). Henefer and Fulton (2005) identify three activities as foundations of Krikelas' information seeking behaviour model: 1) information gathering, 2) information giving, and 3) information seeking. While the behavioural models of Wilson (2005) and Krikelas (2005) provide some indication of a knowledge worker's general information seeking behaviour, the factors that may influence those actions and the information seeking activities, they tell us little about the actual processes in which users engage. Nor do they address the types of information seeking activities users might perform whilst searching electronic information sources.

Unlike Wilson and Krikelas' generic information seeking behaviour models, Kuhlthau's (1988, 1993, 1999, 2004, 2005) model is commonly referred to as the task-based information search processes model in libraries (Fisher et al., 2005; Spink et al., 2002a). Kuhlthau's model depicts information seeking as a process of construction (Kuhlthau, 2005, p. 230). Her model describes the steps taken by a student from commencing research for an assignment to the end when the student has gathered sufficient information to write the assignment. The information seeking process in Kuhlthau's model has seven steps: task initiation; topic selection; pre-focus exploration; focus formulation; information collection; search closure; and start writing (Kuhlthau, 2004, p. 82). The focus on a learning task limits the applicability in a professional business context.

3.3.1 Ellis (1989), Meho and Tibbo (2003), and Marchionini's (1995) information seeking behaviour models

The information seeking behaviour models described by Ellis (1989), Meho and Tibbo (2003) and Marchionini (1995) have much stronger bearing on a possible EDRMS search model. Their information seeking behaviour models have been widely cited as best describing the ways users search for information; they have been applied to a range of disciplines including computer science, information systems and information science, electronic information seeking and library science (Brine & Feather, 2010; Choo, Detlor, & Turnbull, 2000; Ellis, 1993; Ellis, Cox, & Hall, 1993; Ellis & Haugan, 1997; Komlodi, Marchionini, & Soergel, 2007; Marchionini, 1995, 2000, 2008; Marchionini & White, 2007; Robins, Marchionini, Rosenfeld, & Spink, 2002; Salajegheh & Hayati, 2009; Shneiderman, 1997; Spink et al., 2002a; Spink, Wilson, Ford, Foster, & Ellis, 2002b; Vakkari, 2003; van Deursen & van Dijk, 2009; White, 2007; Wilson, Ford, Ellis, Foster, & Spink, 2002a, 2002b). Table 3.1 presents the number of citations recorded from the Web of Science library database and Google Scholar for Ellis' (1989), Meho and Tibbo's (2003) and Marchionini's (1995) information seeking behaviour models, demonstrating the wide impact these models have had on research.

Table 3.1: Citation records for Ellis' (1989), Meho and Tibbo's (2003) and Marchionini's (1995) information seeking behaviour models, as accessed on 12 March, 2010

Sources:	**Ellis**	**Meho and Tibbo**	**Marchionini**	**Total**
Web of Science	192	25	192	409
Google Scholar	430	71	1,209	1,710

Ellis (1989) examined the search behaviours of 60 academic social scientists at the University of Sheffield seeking information in a library setting. Ellis based his research on observation of the behaviour of users seeking information, instead of using a cognitive approach to model information seeking behaviour (Ellis, 2005). His model documents six information seeking processes and information seeking activities (Ellis, 1989), presented in Table 3.2. Ellis does not define these processes, simply documenting them as *behaviour patterns* and *behavioural characteristics* (Ellis, 1989).

Table 3.2: Six common information seeking activities of social scientists (Ellis, 1989)

Information Seeking Processes and Information Seeking Activities	Description
1. Starting	Identifying a key source to commence a search.
2. Browsing	Identifying relevant sources.
3. Differentiating	Using differences in the nature of the source materials to filter material.
4. Chaining	Following up references provided in an identified source.
5. Monitoring	Maintaining awareness of developments in an area through regularly following particular sources.
6. Extracting	Working through material in relevant sources.

The information seeking activities described in his model were subsequently applied to other information seeking models developed for academics, physicists, chemists and engineers (Brine & Feather, 2010; Ellis, 1993; Ellis et al., 1993; Ellis & Haugan, 1997; Salajegheh & Hayati, 2009). Ellis' (1989) general information seeking behaviour model was one of the few models used in a joint longitudinal project between scholars in the United Kingdom and the United States of America to investigate users' mediated information search and retrieval processes (Ellis, Wilson, & al., 2002; Spink et al., 2002a, 2002b; Wilson et al., 2002a, 2002b). Ellis' (1989) model has been employed in a number of disciplines but not within the EDRMS context.

The second information seeking behaviour model relevant to this study is the research conducted by Meho and Tibbo (2003) which expands on Ellis' (1989). Whilst Meho and Tibbo's (2003) study re-affirmed the applicability of Ellis' model, they found that a fuller description of the social scientists' information seeking behaviour should include a distinction between information seeking processes and information seeking activities. Hence, Meho and Tibbo's (2003) new model usefully identifies different stages in the information seeking processes and groups the relevant activities under them, as presented in Table 3.3.

The four inter-related stages they identify in library users' information seeking processes are searching, processing, accessing and ending (Meho & Tibbo, 2003). Four additional information seeking activities are added to those observed by Ellis (1989): accessing, networking, verifying and information managing (Meho & Tibbo, 2003).

Table 3.3: Revised information seeking behaviour model of social scientists (Meho & Tibbo, 2003)

Information Seeking Processes	**Information Seeking Activities**
1. Searching	starting, chaining, browsing, monitoring, differentiating, extracting, networking
2. Processing	chaining, extracting, differentiating, verifying, information managing, synthesising, analysing, writing
3. Accessing	decision making
4. Ending	–

The research on the information seeking behaviour model developed by Ellis (1989, 2005) is based on information seeking in library environments using paper based information sources and not electronic or online library catalogues. Meho and Tibbo (2003) reviewed the applicability of Ellis' information seeking behaviour model for computing based library environments where library users have access to online library catalogues and the Internet. In spite of differences in the format or medium of the information sources used, it is interesting to note the broad transferability of Ellis'

(1989, 2005) model. Meho and Tibbo (2003) confirm the relevance of Ellis' model in electronic contexts.

Marchionini (1995) developed a more integrated model entitled the *Information Seeking Process Model* or ISP model, to better capture the processes users apply in an electronic search. Marchionini's ISP model is relevant because the EDRMS is an electronic information system and Marchionini's model is a generic ISP model depicting the information seeking processes users employ when seeking information from any electronic information source.

Unlike the information seeking behaviour models of Ellis, Meho and Tibbo discussed earlier, Marchionini's ISP model is restricted to the information seeking processes of electronic system users, so his ISP model is focused on the processes users employ, and is limited to the their actual information seeking activities. Given that the EDRMS is an electronic system, this study anticipated that there would be some commonalities between these models and that of EDRMS users. Marchionini's ISP model has been widely cited in studies on search behaviour and search queries (Komlodi et al., 2007; Vakkari, 2003; White, 2007); particularly in human computer interactions and user studies especially related to the Internet (Choo et al., 2000; Marchionini, 2008; Robins et al., 2002; Shneiderman, 1997; van Deursen & van Dijk, 2009).

Marchionini (1995) describes his model as employing the "information seeking processes of electronic system users", describing the information seeking process as being "composed of a set of subprocesses" (p. 49). Marchionini (1995) categorises the ISP into three classes of sub-processes: 1) understanding; 2) planning and execution; and 3) evaluation and use. As indicated in Table 3.4, he evaluates the information seeking processes of electronic system users as dynamic and action-oriented, explaining that the sub-processes of understanding are mental activities performed by the electronic system user, while the sub-processes of planning and execution, and evaluation and use, are both mental and behavioural (p. 59).

Table 3.4: Marchionini's (1995) information seeking processes of electronic system users

Information seeking processes	Information seeking sub-processes
Understand	▪ Recognise Problem or Need ▪ Accept Problem ▪ Define Problem
Plan and Execution	▪ Select Search System ▪ Formulate Query / Determine Entry Point ▪ Execute ▪ Examine
Evaluation and Use	▪ Examine ▪ Extract ▪ Reflect / Iterate / Stop

Based on the information seeking behaviour models of Ellis (1989), Meho and Tibbo (2003) and Marchionini (1995), a second secondary research question was therefore identified:

SQ_2: What is the search behaviour of EDRMS users?

The research by Ellis (1989), Meho and Tibbo (2003) and Marchionini (1995) offers a useful scaffold on which to build the definition and hypothesised search behaviour model of EDRMS users specifically. The value of these models lies in their resemblance to the hypothesised search behaviour of EDRMS users. Other models that were reviewed focus on less pertinent aspects (Krikelas, 1983; Kuhlthau, 1988, 1993, 1999, 2004, 2005; Leckie, 2005; Leckie et al., 1996; Wilson, 2005). Further, the vocabulary used in the selected models more accurately describes the hypothesised search behaviour model for EDRMS users. Ellis' (1989) information seeking behaviour model was developed to design online library systems, and so has relevance to this study. Meho and Tibbo's (2003) and Marchionini's (1995) models were developed for information seeking using an electronic information source similar to the EDRMS context; their relevance is obvious.

3.3.2 EDRMS search behaviour

For the purposes of this study, EDRMS search behaviour is defined as the information search process and activities that EDRMS users employ to identify or access corporate information. Search behaviour starts from the time an EDRMS user commences their search and retrieval using the EDRMS, to when they decide to stop (Ellis, 1989, p. 10; Kuhlthau, 2005; Marchionini, 1995; Meho & Tibbo, 2003).[29]

The two aspects involved in understanding an EDRMS user's search behaviour are search processes and search activities.

Search *processes* comprise a number of sequential but iterative stages of search behaviour in EDRMS (Ellis, 1989, 2005; Henefer & Fulton, 2005; Kuhlthau, 1988, 2005; Leckie, 2005; Leckie et al., 1996; Marchionini, 1995; Marchionini & White, 2007; Meho & Tibbo, 2003; Wilson, 2005). Drawing on the Ellis (1989), Meho and Tibbo (2003), and Marchionini (1995) models, it seems reasonable to suggest that EDRMS users' search processes include the following stages: starting a search; formulating a search strategy; executing the search; and repeating this sequence until they eventually end their search.[30]

Search *activities* refer to the behaviours in which EDRMS users engage, such as browsing, navigating, refining searches or extracting information. As such, search activities comprise both search and retrieval: they are a subset of information search and retrieval activities. Information retrieval "involves finding some desired information in

[29] As mentioned in Chapter 2, EDRMS users may start their search using the search window (Figure 2.3) or by navigating the tree view (Figure 2.2) of how the organisation's information is classified.

[30] More detailed explanation and description of the hypothesised different stages in the information seeking processes of EDRMS users is provided later in Table 3.5.

a store of information or a database," in this case EDRMS (Meadow, Boyce, Kraft, & Barry, 2007, p. 2). A combination of both information search processes and search activities form the EDRMS search behaviour, as illustrated in Figure 3.1.

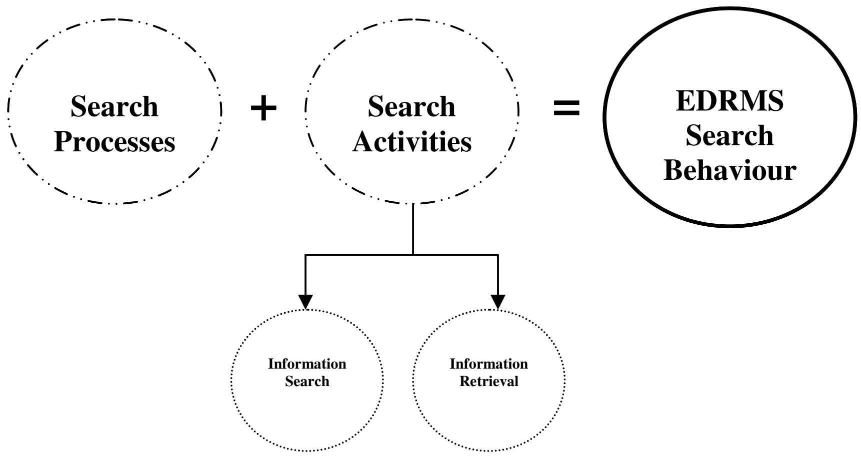

Figure 3.1: The relationship between EDRMS search behaviour, search processes and search activities.

Adapted from Ellis (1989), Meho and Tibbo (2003), and Marchionini's (1995) models.

It is expected that some of the search processes and search activities described above will be observed in EDRMS users. From the literature cited earlier, it is thus hypothesised that a number of sequential information search processes encompassing different types of search activities will take place from the time an EDRMS user starts a search to when they end (Ellis, 1989; Marchionini, 1995; Meho & Tibbo, 2003).

From here on, the term search behaviour will be used instead of information seeking behaviour in the thesis, reflecting the current terminology employed in research on information search.

3.4 Hypothesised EDRMS search model

This section revisits the information seeking behaviour models described by Ellis (1989), Marchionini (1995) and Meho and Tibbo (2003), to present a snapshot of the hypothesised EDRMS search behaviour model (Table 3.5). It provides a detailed description of each of the hypothesised search processes, as well as details of the expected search activities used in each process. A combination of these two activities will form the search behaviour model of EDRMS users.

Table 3.5 provides a comparison of the hypothesised search behaviour model for EDRMS users against the information seeking processes (ISPs) outlined by Marchionini (1995), and Meho and Tibbo's (2003) information seeking behaviour models, presented in Tables 3.3 and 3.4. The seven hypothesised search process stages and search activities for an EDRMS search model are presented in Column One of Table 3.6.

The hypothesised EDRMS search behaviour model is expected to provide a detailed description of the search processes and search activities of users, their task assessment processes, and how they ended their searching compared to Ellis' (1989), Marchionini's (1995), and Meho and Tibbo's (2003) models. The model also offers the capacity to identify differences in search behaviours when simple and difficult searches are performed.

Table 3.5: Hypothesised EDRMS search behaviour model

Source:	**Search Processes**	**Search Activities**
(Ellis, 1989, 2005; Meho & Tibbo, 2003)	Stage 1: Start	▪ **Be aware** of information being sought from the EDRMS
(Marchionini, 1995)	Stage 2: Formulate Search Strategy	▪ **Metadata** search ▪ **Retrieve** information from search shortcut options like saved searches ▪ **Navigate** up or down the tree view or **Browse** through the classification scheme
(Marchionini, 1995)	Stage 3: Execute Search	
(Ellis, 1989; Marchionini, 1995; Meho & Tibbo, 2003)	Stage 4: Process and Evaluate Search Results	▪ **Browse** through search results ▪ **Refine** search results by **changing** or **varying** search criteria ▪ **Refine** search results by **filtering** and/or **sorting** search results
(Marchionini, 1995; Meho & Tibbo, 2003)	Stage 5: Access Search Results	▪ **Launch** open documents and records from search results window
(Ellis, 1989; Marchionini, 1995; Meho & Tibbo, 2003)	Stage 6: Decision Making about Search Results	▪ **Scan** and **verify** contents of documents and records ▪ **Confirm** finding search item and **extract** item from EDRMS
(Ellis, 1989; Marchionini, 1995; Meho & Tibbo, 2003)	Stage 7: End Search	▪ **Extract** contents and **close** search ▪ **Stop** the search and decide whether to seek **help** or to **check** other information sources ▪ **Retry** the search if leads from the **help** or if **checking** other information sources suggests information is stored in the EDRMS

Table 3.6: Comparison of hypothesised EDRMS search behaviour model with Marchionini (1995) and Meho and Tibbo's (Meho & Tibbo, 2003) models

Hypothesised **EDRMS Search Behaviour Model**	**Marchionini's (1995)** **Information Seeking Processes Model of Electronic System Users**	**Meho & Tibbo's (2003)** **Revised Information Seeking Behaviour Model of Social Scientists**
Stage 1: Start *(awareness)*	Understand *(recognise problem or need, accept problem, define problem, select search system)* Plan and Execution *(select search system)*	Searching *(starting)*
Stage 2: Formulate Search Strategy *(metadata search, retrieval, navigation)*	Plan and Execution *(formulate query / determine entry point)*	Searching *(starting)*
Stage 3: Execute Search	Plan and Execution *(execute)*	Searching *(starting)*
Stage 4: Process and Evaluate Search Results *(browse, refine, filter, sort)*	Plan and Execution *(examine)* Evaluation and Use *(examine)*	Searching *(browsing)* Processing
Stage 5: Access Search Results *(launch)*	Evaluation and Use *(examine)*	Processing
Stage 6: Decision Making about Search Results *(scan, verify, confirm, extract)*	Evaluation and Use *(examine, extract)*	Processing *(extracting, verifying)* Accessing *(decision making)*
Stage 7: End Search *(extract, close, stop, seek help, check, retry)*	Evaluation and Use *(iterate, stop)*	Ending

The main difference between this research and that of Ellis (1998), Meho and Tibbo (2003) and Marchionini (1995) is that while they studied library systems use, the search behaviour studied in this research is in relation to a records system. The earlier researchers focused on seeking information from a myriad of library-based information sources, while this research examines search behaviour in a single online electronic system or information source. Additionally, the final goal is the retrieval of a single record, as opposed to library or Internet searches where a range of records may be retrieved.

This research does not consider other information sources used by EDRMS users' such as the library, library-related information sources, different core business applications stored in other databases, or online applications. The search behaviour vocabulary identified by Ellis (1989), Meho and Tibbo (2003), and Marchionini (1995) is used to describe the search behaviour observed in this study. This study will examine the similarities in information seeking behaviour hypothesised by Ellis' (1989) and Meho and Tibbo's (2003) seminal research, and Marchionini's (1995) information seeking process model with that of EDRMS users' search behaviour. The identification of similarities and differences between the search behaviour of EDRMS users and that of library and electronic system users are an expected outcome of this research.

3.4.1 Stage 1: Start search

A range of factors may lead an EDRMS user to start a search. Examples of these factors cited in the literature include: an information need[31] (Wilson, 2005), an information

[31] Information Need is defined by Krikelas as the "state of uncertainty recognised by the individual user" (Henefer & Fulton, 2005, p. 226).

gap[32] (Dervin, 1992b) or the user's "anomalous state of knowledge"[33] (Belkin, 1980). Wilson's information seeking model states that when a user's information need cannot be satisfied with their existing state of knowledge it will become the driver for their search behaviour (2005). From this, a task that an EDRMS user needs to perform is hypothesised as the driver that initiates their information need and stimulates the start of their search. The task may originate from the user's own professional information needs or from their professional recordkeeping obligations. The goal of the search may be to source information generated by another contributor, or to retrieve a record that was previously generated: the motivations and determinants of the need to start a search are generated in a number of ways. The perceived need to commence a search process is therefore a conscious state of mind that signals an intention to proceed.

There is extensive research exploring how the nature of a task affects search behaviour (Bystrom, 1999, 2002, 2005; Bystrom & Hansen, 2005; Bystrom & Jarvelin, 1995; Hackos & Redish, 1998; Hansen, 2005; Vakkari, 1999, 2003). In an EDRMS context this issue is identified as a variable for investigation and will be addressed in detail later.

The social scientists in Ellis (1989), Meho and Tibbo's (2003) research, who were conducting research in a library environment, very likely entered the initial research stages with some uncertainty about the specific information they sought. EDRMS users, however, are expected to have strong **awareness** of what information they wish to retrieve. This awareness is derived from three factors: firstly, they possess

[32] Information Gap refers to a state in which a person perceives a gap in their existing knowledge structure in order to make sense of the situation, problem or task at hand. This concept is derived from Dervin's 'sense-making' theory (Dervin, 1992a; Dervin & Foreman-Wernet, 2003).

[33] Anomalous state of knowledge (ASK) is defined by Belkin as an inadequacy in the user's state of knowledge with respect to a problem or task that prevents them from resolving the problem or task at hand (Belkin, 1980; Belkin, Brooks, & Oddy, 1982).

considerable domain knowledge[34] of the search task at hand; secondly, they are likely to be experts in the work tasks they need to perform; and thirdly, they will be normally seeking one specific outcome: a single record. It therefore is hypothesised that EDRMS users will have at least one specific piece of information or metadata associated with the search at the **starting** stage of the process. Ellis describes this awareness as a *starter reference*, noting that library users use them to assist with **starting** a search (1989, p. 179). He reports that social scientists use starter references such as previously collected information, information recommended by formal and informal contacts and similar research conducted by peers as starting points (1989, p. 179). It is anticipated that an awareness of what information users are seeking will provide the impetus for EDRMS users to move to the next stage, where they decide how to formulate their search strategy.

3.4.2 Stage 2: Formulate search strategy

The formulation of a search strategy is the second stage of the EDRMS users' search process. After becoming aware of the specific information being sought, users will decide how best to formulate their search strategy. If they understand how EDRMS are designed, there are be four possible ways they may formulate a search strategy:

- conduct a **metadata** search using the different metadata fields;
- **retrieve** a search conducted previously by accessing the **shortcut** functionalities available from the EDRMS;
- **recall** where the document or record was filed and **navigate/browse** through the **classification schema** to access the information; or

[34] Domain knowledge refers to the users' knowledge of the search subject or topic (Wildermuth, 2004, p. 247).

- conduct a **free text** search for specific keywords or phrases within the content of the document or record using the EDRMS' search engine.

3.4.3 Stage 3: Execute Search

At Stage three, users will **execute** their formulated search strategy in the EDRMS by clicking on the 'enter' button on the keyboard. This will be similar to Marchionini's (1995) *Execute Search* in Stage 3. This presents search results, and users move into Stage 4 of their EDRMS search process.

3.4.4 Stage 4: Process and evaluate search results

A number of search activities may be performed by EDRMS users as they process and evaluate their search results. Marchionini's (1995) *Evaluation and Use* in his information seeking process model is similar to Stage 4 in this research.

At this point, **browsing** becomes the key activity. Ellis describes browsing as "semi-directed searching in an area of potential interest" (1989, p. 178). Chang[35] describes browsing as "the process of exposing oneself to a resource space by scanning its content (objects or representations) and/or structure, possibly resulting in awareness of unexpected or new content or paths in that resource space" (Chang & Rice, 1993, p. 258). In Meho and Tibbo's (2003) information seeking behaviour model, browsing is described as an information seeking activity. They place it in the *Searching* stage rather than the *Processing* stage of their model.

In this research, browsing is considered to be the information search activity of scanning the search results to see if the information being sought is displayed or found. An EDRMS user's browsing will be informed by their reason for starting their search in

[35] Chang developed a conceptual model for studying **browsing** by, firstly analysing the literature and then developing a model which he later modified after conducting empirical research (via observation and interviews) with 33 users from three different library settings (special, public and academic) (Chang, 2005).

Stage 1. Browsing in a virtual view design, for example, might focus on reviewing snippets of summaries or metadata relating to the document or record.

Navigation of the tree view of the EDRMS is another search activity that is hypothesised in Stage 3. The search activities of both navigating and browsing are likely to be performed together as users process and evaluate the information displayed in the EDRMS.

Whilst browsing and navigating in Stage 3, users may decide they need to **refine** their search. This will vary depending on the design view of the EDRMS. Refining the search results displayed in a search window is likely to lead to sub-search activities such as **filtering** or **sorting** the search results. If this option fails to find the required information, then users are likely to change their metadata search terms or the metadata fields being searched: for instance, users navigating the tree view may decide to refine their searching by navigating and browsing under different classification schemes in the folder structure.

3.4.5 Stage 5: Access search results

In Stage 5, it is hypothesised that EDRMS users will review the documents and records displayed in their search results window, select the best match for their search criteria and click on it to **launch** it.

3.4.6 Stage 6: Decision making about search results

In Stage 6 it is hypothesised that EDRMS users will take actions based on their search results. Their likely EDRMS search activities are **scanning** the contents or thumbnails representations of the items found and **verifying** their contents. Such activities are expected to **confirm** to users that they have found the item they are searching for.

3.4.7 Stage 7: End search

In the final stage of the EDRMS search process, users are expected to end their search. Three activities are likely to occur at this stage: they may **close** their search, if they have successfully found the item they were seeking **stop** their search if they are unable to find the information sought; or **retry** the search by returning to Stage 2 to **reformulate** their search strategy.

How EDRMS users decide to stop their search is of interest in this research, as this understanding will enable records managers to improve delivery of their records management services. This will then enable EDRMS users to close instead of stop their search. Previous research on user exploration of the Internet and online library catalogues and databases offer three reasons why users stop an information search: 1) they apply *cognitive stopping* rules; the 2) they follow the *satisficing rule*[36]*;* and/or 3) they encounter search difficulty (Borgman, 1986, 1996; Browne et al., 2005, 2007; Gigerenzer & Goldstein, 1996; Mansourian, 2007; Nickles et al., 1995; Prabha et al., 2007; Schmidtz, 2004; Simon, 1971a).

Browne, Pitts and Wetherbe (2005) and Nickles, Curley and Benson (1995) identify five cognitive stopping rules that Internet users might use to gauge the sufficiency of the information that they have found, and hence terminate their search.

1) Mental list – "person has a mental list of items that must be satisfied before he will stop collecting information";

2) Representational stability – "person searches for information until his mental model, or representation, stops shifting and stabilises. The focus is on the stability of the representation";

[36] Satisficing is defined by Simon (1971b) as a decision making process "through which an individual decides when an alternative approach or solution is sufficient to meet the individuals' desired goals rather than pursue the perfect approach" (p. 71).

3) Difference threshold – “person sets an a priori difference level to gauge when he is not learning anything new. When he stops learning new information, he stops his information search”;

4) Magnitude threshold – “person has a cumulative amount of information that he needs before he will stop searching. The focus is on having ‘enough’ information”; and

5) Single criterion – “person decides to search for information related to a single criterion and stops when he has enough information about that criterion”. (Adapted from Browne et al., (2007, p. 92).

For example, using the *mental list* cognitive stopping rule, if an Internet user is searching for information concerning the purchase of a house, they will continue searching until they are satisfied that they have all the information that relates to the elements on their mental list, such as the number of bedrooms, the size of the backyard or the quality of the schools in the area (Browne et al., 2007, p. 92).

Further research in 2007 by Browne et al. on why users stop searching for information online is of interest to this study. They found that when tasks are well structured and participants have prior experience of performing the task, they use the mental list and *single criterion* rules to decide when to stop their search. On the other hand, when tasks are poorly structured and participants have no prior experience, they tend to stop searching using the *magnitude threshold* and *representational stability* rules. These findings suggest there is value in monitoring the search behaviour of EDRMS users and their decision to cease a search process.

The second reason cited in the literature for why users decide to stop their information seeking is when they decide to apply the satisficing rule. Gigerenzer and

Goldstein (1996) describe satisficing as a blend of *sufficing*[37] and satisfying (p. 651), as users compare the benefits of obtaining more information against the additional cost and effort (both physical and temporal) of continuing their search (Mansourian, 2007; Prabha et al., 2007; Schmidtz, 2004).

Search difficulty is the last reason cited for users' decisions to stop their search. For the purposes of the current research, search difficulty is defined as searches performed by EDRMS users which they are unable to close; they decide to stop searching in the system. The literature reveals articles by Borgman (1986, 1996) pertaining to search difficulty using online library catalogues and by Debowski et al (2001a) on complex searches, but there is little published on search difficulty using Internet or records information sources. Borgman's (1986, 1996) research shows that stopping occurs when the design of online catalogues is not aligned to the information searching behaviour of library users who are familiar with searching using card catalogues, when there is a lack of ease of use or functionality in online catalogues, or when untrained library users cannot efficiently search online catalogues (Borgman, 1986, 1996). Debowski et al, (2001a, p. 1130) report that complex search tasks demand greater search effort, requiring searching across different information sources and better sequencing of the search process, thereby suggesting that failure in these areas may lead to stopping the search. Additionally, they report that trained users perform better in complex searches (Debowski et al., 2001a, p. 1139). The current research will explore if EDRMS users decide to stop their searches for any of the reasons reviewed above.

Another search behaviour that is of interest is what EDRMS users do after they decide to stop their search. Do they turn to other external information sources, like a person, seek for **help** or **check** other information systems? From whom do they seek

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[37] Sufficing means when users decide the information they have gathered for their search is 'good enough' or is 'as good as it gets' (Mansourian, 2007; Prabha et al., 2007).

help, and how? Krikelas (1983) cites user studies which report that when users turn to external information sources there is a strong preference to go "directly to an individual who knows": for human (face-to-face) contact (p. 15). The current research will assess whether users return to retry their search in the EDRMS. It is expected that users will retry if the sources they approach for help suggest that the information is indeed stored in the EDRMS.

3.5 Tasks – work task, search task and task knowledge

There is no strict operational definition of a task in the literature, for there is a lack of distinction regarding which elements constitute a task and which are sub-tasks (Bystrom, 1999; Hackos & Redish, 1998; McCormick, 1979; Vakkari, 2003). As Vakkari (2003) points out, given the characterisation of what elements constitute the task versus its sub-tasks, it is best left to the researcher to define what constitutes a task as well as its sub-tasks.

Hackos and Redish (1998) describe a task as what one does in order to achieve a goal (p. 56). In the current research, a task is viewed from a functional perspective as a series of actions undertaken by a knowledge worker in pursuit of a goal (Vakkari, 2003). The goal of information searching is to find information that supports task performance (including physical as well as cognitive actions) when a user has insufficient knowledge (Vakkari, 2003). This study therefore adopts Bystrom and Hansen's (2005) definition of task:

> A task focuses on a particular item of work, has a practical goal and normally a meaningful purpose; therefore a task when performed has a recognisable beginning and end. Also, a task may have a number of subtasks within it such as

the work task and the information seeking task. The information seeking task is a subset of the work task (p. 1051 to 1052).

Bystrom and Hansen's (2005) divide information seeking tasks into three hierarchical stages: 1) task construction; 2) task performance; and 3) task completion. Both the information search task and information retrieval task are subtasks of the information seeking task. The information search task is the formulation of the search method and execution of the search query in the electronic information source. The information retrieval task is the retrieval of information from the electronic information source. Figure 3.2 provides a diagrammatic view of Bystrom and Hansen's (2005) perception of the relationship between tasks, work tasks, information seeking, information search and information retrieval.

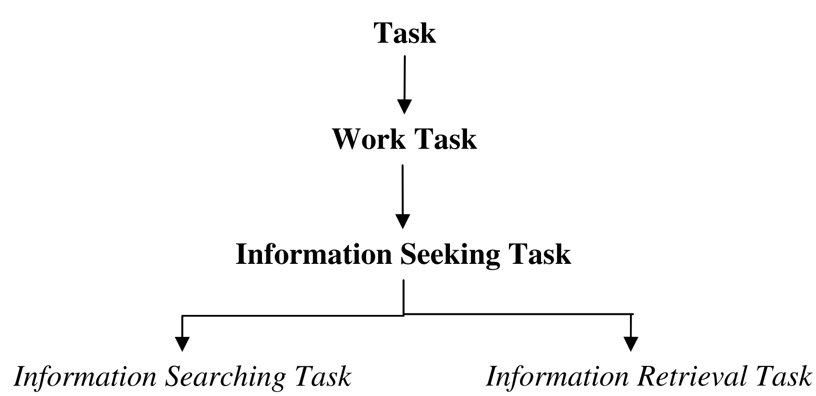

Figure 3.2: The inter-relationship of work tasks, information seeking task, information searching and information retrieval based on Bystrom and Hansen's 2005 research

For the purposes of this research, the information search task is defined as a task focused on searching and retrieving specific information from the EDRMS in order to assist users to complete a work task or fulfil an information need. For ease of reference and readability, in this thesis, the term *information seeking task* used in Bystrom and Hansen's (2005) research will be referred to as *search task*, and will comprise the two sub-tasks: information search and information retrieval (Figure 3.3) .

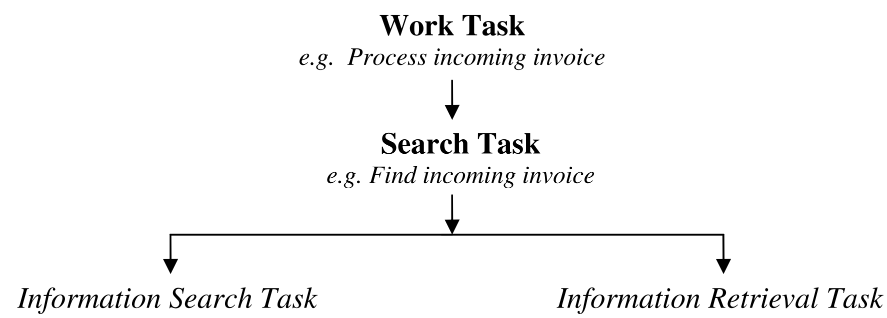

Figure 3.3: Modified inter-relationship of work tasks, search task, information searching and information retrieval based on Bystrom and Hansen's 2005 research

Closely related to the concepts of work task and search task is task knowledge. This term refers to awareness about specific *information cues* (Wood, 1986) pertaining to the overall work tasks, that the user or his/her colleagues know about and that aid in the execution and completion of the search task.

In an EDRMS context, a work task could be approving a specific invoice, the search task finding the invoice from a supplier in the EDRMS, and the task knowledge knowing the supplier's name or the invoice number. Based on the task knowledge, the user may conduct the search task in the EDRMS using any of three options:

1) search using the supplier name as the metadata field;

2) search using the invoice number as the metadata field; or

3) carry out a combination search using both the name of the supplier and the invoice number metadata fields.

It is accepted in the pre-1990 literature that information needs and information seeking processes depend on the worker's tasks (Belkin et al., 1982; Ingwersen, 1992; Mick, Lindsey, & Callahan, 1980). Later research from both Vakkari's (2003) literature review and from empirical research conducted by Ingwersen (1996), Bystrom (1999), Bystrom and Jarvelin (1995) and Kuhlthau (1999) offers evidence that task does indeed affect search behaviour. Leckie, Pettigrew and Sylvain have studied the effect of work roles on search behaviour (2005; 1996), and Vakkari (1999, 2003) has examined the influence of tasks and sub-tasks on search behaviour. Bystrom and her colleagues, Hansen and Jarvelin, conducted empirical research and developed conceptual frameworks on how tasks and search tasks affect search behaviour (Bystrom, 1999, 2002, 2005; Bystrom & Hansen, 2005; Bystrom & Jarvelin, 1995; Hansen, 2005). Kuhlthau's (1988, 1993, 1999, 2005) longitudinal research has also demonstrated that tasks impact upon students' information search processes. A brief review on the pertinent aspects of some of these researchers' work will clarify their relevance to this thesis.

3.5.1 Work roles affect task

Leckie, Pettigrew and Sylvain's (1996) model, commonly referred to as the *Leckie model*,[38] was clearly intended to feature *work-related processes*, and although it does not cover searching in electronic systems, it is useful in explaining how work roles and tasks affect search need, which consequently may influence search behaviour. The following five key findings emerge from their literature review, and led to the model:

[38] The Leckie model is the result of an extensive review of the library and information science (LIS) literature, and the literature of other professional fields about common patterns and trends in the information seeking behaviour of professionals. As the target sample for the study was professionals such as doctors, lawyers and engineers, "it is not surprising that 'work roles' and 'tasks' are thought to be the prime motivators for information seeking" (Case, 2002, p. 126).

1) office professionals perform a number of different work roles that are not specific to their qualifications and trainings;
2) these work roles have a collection of associated tasks;
3) the task requirements of each of these roles are likely to influence the professionals' information need and/or information seeking;
4) variable factors either facilitate or inhibit the finding of information required to accomplish the specific tasks; and
5) it is unlikely that the information being sought will be found on the user's first attempt. (Leckie, 2005, p. 159 to 160)

The Leckie model is relevant to the present study as it implies that the work roles of the office worker dictate the tasks they need to perform, which in turn determine the type of information they seek and retrieve, thereby leading to the types of information sources they will use. The Leckie model depicts flows from the top to the bottom, with the causal process beginning at the top with work roles, which in turn influence tasks (Case, 2002). The task predicts the information focus of the knowledge worker, with the outcome dependent upon the user's awareness of information requirements and information sources.

3.5.2 Task affects search behaviour

While the work task drives the tasks undertaken, we also need to understand how the user then defines those task requirements as a search task. Vakkari's comprehensive review of the post-1990 literature[39] on the relationship between task performance and information searching by end users of electronic systems suggests that the task is the

[39] Comprises a wide body of literature reviewed from 1990 to 2000 by Vakkari (2003), providing evidence of how task affects information search.

primary factor affecting information searching. By task performance, Vakkari refers to the search goal of a task, concluding that the literature review "suggests that various aspects of information searching are deeply rooted in the process of task performance" (Vakkari, 2003, p. 452).

Vakkari (2003) points out that the search terms and tactics used to seek information, and the manner in which the search results are analysed, are all influenced by the task to be performed. However, he states that "our understandings of the mechanisms that link characteristics of task to search activities are both tentative and limited" (Vakkari, 2003, p. 452). He deduces from his literature review that most research does not view task performance as a complete process, instead tending to focus upon certain aspects. Searching is centred upon this narrower task and not the overall task completion process.

Having identified this limitation, Vakkari (2003) admits that longitudinal research is required for a deeper understanding of the mechanics that link characteristics of tasks to search methods. Without this understanding, it is "impossible to show which components of the task co-vary with features of searching" (Vakkari, 2003, p. 452). He observes that most studies have subjects from the academic environment, and that the tasks studied relate to the academic research process and are not indicative of tasks in other environments such as a corporate setting.

For the purposes of this research it suffices to note that Vakkari's (2003) review confirms that task-based information searching affects users' search behaviour. What is unclear from his work is *which* aspects of a task affect search behaviour. This gap is addressed by other research on the influence of task complexity on search behaviour (Bystrom, 1999, 2002; Bystrom & Jarvelin, 1995; Wood, 1986; Wood, Mento, & Locke, 1987).

3.5.3 Task complexity

A shift in focus on task and information seeking behaviour in work or office environments, away from an academic setting, provides a much-needed understanding of how work tasks affect search behaviour in organisations. Bystrom and Jarvelin explore "how task complexity affects information seeking both in terms of the types of information sought and the channels and sources of this information" (p. 193). They find that the more complex a task, the more workers will explore information sources outside their comfort zones in order to fulfil their information needs. This is a phenomenon the present study aimed to observe, to see if EDRMS users would venture out to check other information sources if they failed to find the information in the EDRMS. In studies by Bystrom (1999), Bystrom and Jarvelin (1995) and Tiamiyu (1998), task complexity is defined as the "a priori determinability of a task", meaning that a task is deemed to be complex if the user does not have prior knowledge of how to perform the task or determine the task's processes, or what the results or output of the task will be. The tasks performed by EDRMS users are not expected to be complex because a large number of their tasks are process based or repetitive. For instance, a contracts officer will routinely work with and handle contract related tasks, and for that reason will repeatedly conduct searches in the EDRMS using metadata fields such as the contract number or by the supplier's organisation.

Wood (1986) identifies three dimensions of task complexity. The first is component complexity, which he defines as "a direct function of the number of distinct acts that need to be executed in the performance of the tasks and the number of information cues that must be processed in the performance of those acts" (Wood, 1986, p. 66). The second, co-ordinative complexity, "refers to the nature of the relationships between task inputs and task products" (Wood, 1986, p. 68), while the third, dynamic complexity, considers “the changes in either any or all the task components of products, acts and information clues over the time of the task” (Wood, 1986, p. 71).

From the hypothesised search behaviour model presented earlier, it is possible to deduce that component complexity may arise when EDRMS users juggle information cues from their search task and task knowledge against the seven information search process stages and information seeking activities they need to perform to find their information from the EDRMS. They may encounter co-ordinative complexity as they manipulate the relationships between their search query and search results to find their target information. Dynamic complexity may be evident in searches where task knowledge is insufficient to generate the required information, so that users may stop and seek assistance that may change their search task and task knowledge.

In summary, this research has adopted Bystrom and Hansen’s (2005) definition of task: that it is work related and has a definite start and end. A task incorporates sub-tasks comprising information search tasks and information retrieval tasks (Bystrom & Jarvelin, 1995). The search task is of interest in the current study; it is defined as a task focused on retrieving specific information from the EDRMS in order to assist users to complete a work task or fulfil an information need. Closely aligned to the search task is task knowledge, the information cues about the work task that assists users’ performance of the search task (Wood, 1986). The literature review indicates that a knowledge worker’s search behaviour is affected by their tasks (Bystrom, 1999; Bystrom & Jarvelin, 1995; Ingwersen, 1996; Kuhlthau, 1999); sub-tasks (Vakkari, 1999, 2003); work tasks (Belkin et al., 1982; Ingwersen, 1992; Mick et al., 1980) and work roles (Leckie et al., 1996), and that not only task but task complexity affect a knowledge worker’s search behaviour. Task complexity may drive users to search using search methods and information sources they rarely utilise.

Research by Vakkari (1999, 2003) and others (Belkin, 1980, 2000; Belkin et al., 1982; Bystrom, 1999; Bystrom & Jarvelin, 1995; Ingwersen, 1982, 1992, 1996, 2001, 2005; Kuhlthau, 1999; Leckie et al., 1996; Mick et al., 1980) indicates that work roles and task affect search behaviour. The missing gap in this literature concerns how the search task affects a user's search behaviour.

3.5.4 Search task

The literature review reveals only limited research into how the search task that a user needs to perform affects their search behaviour (Debowski, 2001; Vakkari, 2003). Bystrom and Hansen's conceptual framework for task in information studies, which theorised the effect of search task on search behaviour, highlights this gap, which certainly appears to be the case in the records management discipline, and specifically among EDRMS users. However, since 2000 a considerable amount of research on search behaviour and search tasks using web technology has been reported (Cothey, 2002, p. 68). Kellar, Watters, & Shepherd (2007) review research on web based search behaviour and the user's intent or task. They investigate how users navigate and interact with their web browsers across different search tasks. Kellar et al's (2007) findings categorise of web usage into fact finding, information gathering, browsing and transactions. These categories may be applied in the current study, to the information seeking tasks of EDRMS users. More recent literature (Cothey, 2002; Kellar et al., 2007) confirm that search task affects search behaviour in web based information sources.

This research on web technologies may address the gap on the effect of search tasks on web search behaviour, but the current study aims to close the gap in the literature on how search tasks affect search behaviour in corporate electronic information sources, especially the EDRMS. It is also designed to clarify the differences between work tasks and search tasks, to provide a better understanding of the different types of search tasks in which EDRMS users engage, and to identify the reasons why users find some search tasks to be difficult. This information will enable records management professionals to better understand EDRMS users' search behaviour and therefore take steps to simplify the information seeking experience. The research undertaken for this thesis will certainly fill some of the gap in the theory of EDRMS based search behaviour.

3.5.5 Task knowledge

This research aims, in part, to explore how task knowledge affects search behaviour. In a practical work setting, users may have knowledge of specific information cues pertaining to their search task that can influence the formulation of their EDRMS search. This area has been little addressed in the literature. The gaps in the literature on the influence of search task and task knowledge on search behaviour therefore, prompted a third secondary research question:

> *SQ_3: How do search task and task knowledge affect the search behaviour of EDRMS users?*

3.6 Training on search methods

As noted in Chapter 2, understanding and working with records, classification schemes, thesauri and EDRMS can seem complex to a general user who is not trained as a records manager. The explosion of computing technology has empowered employees to create and receive corporate information at their desktops, leading to a point where records management is no longer performed only by records management professionals but is expected of individual employees. Legislation enacted locally, such as the various State Records Acts in Australia (Government of South Australia, 1997; Government of

Western Australia, 2000; Queensland Government, 2002), and internationally (United Kingdom, 1998, 2000; United States Congress, 2003a, 2003b) mandate that government employees are responsible for the records they create and receive; consequently, there is a need to ensure that records are registered and captured by the organisation's records management or EDRMS. Enterprise-wide records management and EDRMS training is now essential if employees, given their newly legislated role as recordkeepers, are to correctly manage, control and protect corporate information (Patterson & Sprehe, 2002; Swartz, 2007; Thomson, 2008).

The need for training becomes urgent now that the international standard on records management (ISO 15489) requires organisations implementing a records management program to train users in compliance with the standard:

> An organisation seeking to conform to this part of ISO 15489 should establish an ongoing programme of records training. Programmes for training in requirements for records management and specific practices should encompass the roles and responsibilities of, and be addressed to, all members of management, employees, contractors, volunteers and any other individual responsible for the whole or part of a business activity of an organisation in making records during their work and in capturing those records in record keeping systems. (International Organisation for Standardisation, 2002a, p. 17)

ISO 15489 states that the training program "should ensure that the functions and benefits of managing records are widely understood in an organisation", and should explain "policies, and place procedures and processes in a context that gives staff an appreciation of why they are required" (International Organisation for Standardisation, 2002b, p. 23). It notes that training will be "most effective when it is tailored to the needs of particular groups of staff or, in some cases, individual staff members" (International Organisation for Standardisation, 2002b, p. 23).

In summary, information growth, compliance to legislation and standards in an increasingly 'e-permeated' 21st century workforce have highlighted the importance of information and digital literacy training for knowledge workers (Martin, 2005, p.130). This is because knowledge workers need to know where to find the right information to perform their tasks and fulfil their information needs (Highton and Newton, 2005). Therefore, training on information and digital literacy for knowledge workers would ensure the success of records management and EDRMS implementations.

Information literacy is defined as the ability "to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (Association of College and Research Libraries, 1989). It is closely aligned with Information and Communications Technology (ICT) or digital literacy which is defined as the "ability to use digital technology, communication tools, and/or networks to define an information need, access, manage, integrate and evaluate information, create new information or knowledge and be able to communicate this information to others" (International ICT Literacy Panel, 2001, p.2). However, both information and digital literacy skill sets are required to work effectively in the 21st century office environment as summarised in the appended quote:

> information literate people are those who have learned how to learn. They know how to learn because they know how knowledge is organized, how to find information, and how to use information in such a way that others can learn from them. They are people prepared for lifelong learning, because they can always find the information needed for any task or decision at hand. (Association of College and Research Libraries, 1989).

Through the provision of records management and EDRMS training organisations are able to equip their knowledge workers with both information and digital literacy skills. For the purposes of this research, training refers to both records management and EDRMS training the user receives from the current organisation.

Records management training commonly focuses on an understanding of records management concepts; how documents and records differ; defining the scope of the organisation's records; why it is necessary to capture and register records; exposure to the classification scheme used in the organisations; and generic records management understanding by the user regarding his/her role and responsibilities as a creator, recipient and/or owner of corporate information (McLeod et al., 2004, p. 3; Patterson & Sprehe, 2002, p. 311; Thomson, 2008, p. 122).

EDRMS training for users includes how to register and classify information in the EDRMS; search for information in the EDRMS using different search methods; customise settings to enable ease of working with the EDRMS; and integrate the EDRMS with office applications that interface with it (Microsoft Word, Excel, PowerPoint and email) (Calabria, 2004; Gunnlaugsdottir, 2006, 2008; Smyth, 2005; Thomson, 2008). It is important to emphasise here that in the current study the training provided on different search methods in the EDRMS is the main type of training envisaged to affect the search behaviour of EDRMS users.

In the records management practitioner literature, case studies on the implementation of records management programs and EDRMS emphasise the importance of training (Cutts, 2009; Govan, 2006; Knudsen, 2003; Maguire, 2005; Murphy, 1999). Training approaches for RM and EDRMS training generally include train-the-trainer, computer-based training and refresher training (Patterson & Sprehe, 2002, p. 311). Knudsen[40] (2003) and Thomson[41] (2008) regard training programs as the best approach to inform ACT and Queensland government employees of their duties and responsibilities (Knudsen, 2003, p. 15; Thomson, 2008, p. 122). Knudsen (2003) and Thomson (2008) write that the training programs delivered to staff by the records management team should focus upon providing a generic awareness of basic records management concepts and purpose, plus introductory training on working with the KAAA functional thesaurus that they use. Likewise, Murphy[42] (1999) reports in her case study that developing a training program that caters to staff with differing levels of skills and acceptance is an important aspect of EDRMS implementation. Cutts[43] (2009) and Williams (2005) report designing "one-on-one training sessions aligned to the way people work" instead of generic training (Cutts, 2009, p. 28; Thomson, 2008, p. 129). Govan[44] (2006) emphasises the need to conduct ad hoc training at users' desks as part of the implementation. Thomson (2008) cites Patterson and Sprehe (2002) in deducing the training required for knowledge workers to perform their recordkeeping responsibility efficiently:

> In the simplest terms, for electronic records management 'to work', the end-user sitting at a computer with a document or email 'in hand' must be able to decide that it is a record, assign the appropriate metadata, file it in the appropriate location according to the business classification scheme or corporate file plan, and be able to find and retrieve it when required. (Thomson, 2008, p. 117)

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[40] Knudsen (2003) is a records management professional in the ACT (Australian Capital Territory) government.

[41] Thomson (2008) is a Manager, TRIM Support Services at the Department of Premier and Cabinet (Queensland).

[42] Murphy (1999) is a records manager at the St Vincent's Private Hospital in Sydney
.
[43] Cutts (2009) is the Business Information Manager for the Fremantle Ports in Western Australia.

[44] Govan (2006) is an EDRMS project manager for PowerWater Corporation in the Northern Territory.

Both Murphy (1999) and Govan (2006; 1999) warn that training will be one of the highest costs associated with EDRMS implementation, as all new employees require training.

In summary, the records management practitioners' case studies confirm the importance of training and identify the aspects of record management training that need to be provided for successful implementation of EDRMS. Although it affirms that EDRMS training needs to be provided (Cutts, 2009; Govan, 2006; Knudsen, 2003; Murphy, 2005; Murphy, 1999; Thomson, 2008), the literature does not pinpoint what aspects of EDRMS training are best offered or how training should be managed. Moreover, the literature does not address gaps such as which aspects of training affect search behaviour, whether the training provided to users actually improves their information search experience, or how the provided training affects users' EDRMS search behaviour.

Given the dearth of RM or EDRMS user-focused research, allied studies relating to library and information science offer useful cues to guide this study. In addition, given the similarities between online library catalogues and computing systems and EDRMS, it is envisaged that the findings in that field may be applied to the current study.

Of the empirical research into information seeking behaviour models (Ellis, 1989, 2005; Leckie, 2005; Leckie et al., 1996; Marchionini, 1995; Meho & Tibbo, 2003; Wilson, 1999), only Kuhlthau[45] (1988) finds that improvements in the provision of training to library users (students) need to be considered. She suggests a "fresh

[45] Kuhlthau (1988, 1993, 1999, 2005) developed the information seeking process model of library users in her longitudinal study on students' perceptions of the information search process over four years.

perspective on user education" as one of the implications of her research. Three of her key recommendations for user education programs to train individuals for library use are to create awareness of different information sources available for information seeking, to emphasise the information search process and to promote the sequence of the commonly expressed feelings, thoughts, and actions during the search process. Like records management practitioners, Kuhlthau (1988) stresses the importance of training as well as which aspects of training need to be delivered in order to improve the information seeking experience of users.

But how does training provided to users affect their actual information seeking experience? Other empirical research proves that training provided to a user (based on how to use and formulate search queries in an information source such as online library catalogues or the web) improves the information searching experience of the user. For instance, D'Alessandro, Kreiter and Peterson (2004) studied the effect of training on general paediatricians in their usage of library catalogues; Branch (2002) studied the effect of training on middle school students in searching CD-ROM encyclopaedias; Debowski (2001) studied the effect of training on university students in searching CD-ROM information databases; and Lucas and Topi (2004) investigated how training in structuring search queries using Boolean operators improved users' performance of search tasks on the Intranet.

Debowski (1997), Branch (2002) and D'Alessandro et al. (2004) investigated the effect of training on users' search behaviour both before and after training was provided. D'Alessandro et al. (2004) show that after training higher rates of paediatricians' questions were pursued and answered, and there were higher rates of computer use. Further, after training, users' search behaviour was observed to be effective and more time efficient (taking an average of 6.6 minutes) in comparison to using other information sources like people and paper references (taking an average of 28.8 minutes) (D'Alessandro et al., 2004, p. 68). Likewise, Branch (2002) reports an improvement in students' information seeking skills using two different types of CD-ROM (Microsoft Encarta 2000 and 1999 World Book) after individual training sessions. Debowski (1997) also reports that training improved users' search accuracy, perseverance levels, success and speed of search. This is evidence that training in different search methods in the relevant information source improves users' information seeking experience, thus improving their search behaviour (Branch, 2002; D'Alessandro et al., 2004; Debowski, 1997, 2001; Debowski et al., 2001a; Lucas & Topi, 2004). Based on this evidence, it is clear that relevant training will influence users' search behaviour. However, the translation of this into an EDRMS context remains minimal. This research therefore aims to review the type and impact of training on EDRMS users' search behaviour.

More specifically, it is helpful to consider how training affects users' search behaviour in terms of the hypothesised EDRMS information search processes and activities outlined in Table 3.5. The current research therefore aims to address these issues via a fourth secondary research question:

SQ_4: How does training on EDRMS search methods affect the search behaviour of EDRMS users?

It is expected that the findings will reveal that training affects how users formulate their search strategy, evaluate and process their search results and develop the confidence to end their information seeking in the EDRMS. Research question SQ_4 may also provide some insight into why only some, rather than all of the search methods EDRMS users are trained in are deployed.

3.7 The development of a theoretical framework for the research

In Chapter 1 the research problem was identified, and the theoretical framework developed for the study was presented in Figure 1.1. A revised version of the framework is now presented in Figure 3.4, providing a more comprehensive view of the organisational context:

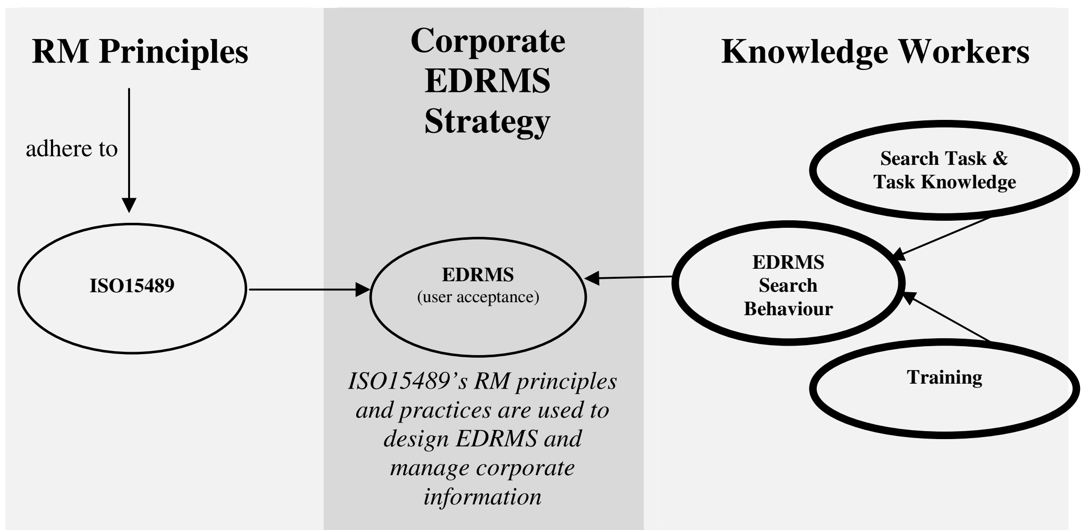

Figure 3.4: Revised theoretical framework for research

The primary research question identified in Chapter 1 aimed to investigate if the management of corporate documents and records in the EDRMS supports the search behaviour of EDRMS users (Column 2 of Figure 3.4).

Chapter 2 explained how the principles and practices in records management are used to manage an organisation's corporate information (Column 1 of Figure 3.4). Hence the secondary research question, SQ_1 is intended to investigate how the sampled organisations implemented the records management principles and practices outlined in ISO 15489 in the EDRMS. As mentioned in Chapter 2, this research assumes that records management principles and practices based on the ISO 15489 standard are used by records management professionals in order to manage corporate information in the EDRMS. Subsequently, knowledge workers who are EDRMS users search and retrieve information from the EDRMS. The first and second columns of the theoretical framework were introduced in Chapter 2.

Chapter 3 has identified the dependent variable identified as search behaviour and notes its relationship to the two independent variables, 1) search task and task knowledge and 2) training (Column 3 of Figure 3.4).

Three additional secondary research questions have been introduced in this chapter, as follows:

SQ_2: What is the search behaviour of EDRMS users?

SQ_3: How do search task and task knowledge affect the search behaviour of EDRMS users?

SQ_4: How does training on EDRMS search methods affect the search behaviour of EDRMS users?

3.8 Scope of the research

This study explores one system and two user-focused issues. First, it reviews the implementation of EDRMS in real organisational contexts. Second, it tests the hypothesised EDRMS search behaviour model to determine its suitability. Third, it examines the impact of training and other antecedent variables on the successful execution of an EDRMS search.

This research does not set out to study the influence of affective behaviour on search behaviour. Nahl (2005) describes affective behaviour as the “social-behavioural perspective on the thoughts and feelings of individuals while engaged in information behaviour” (2005, p39); such emotional responses to search are beyond the scope of this study. Similarly, the self efficacy effects of information searching, considered for example by Bandura (2001) and Debowski et al (2001a), are not examined. The study focuses instead on the technical skills and processes employed.

Marchionini and White (2007) cite a number of researchers who have developed different types of search strategies or search methods to formulate search queries in web based electronic information sources such as the Internet.[46] Although the current research includes some aspects of search methods used by EDRMS users when they formulate their search strategies, as well as of the training provided to users on different search methods, it is not the aim of this research to investigate specific search query formulation, search sequences, search tactics, search term selection, the use of correct syntax rules (for instance Boolean logic) or search execution strategies used by EDRMS users (Bates, 1979, 1989a; Komlodi et al., 2007). It is envisaged that EDRMS searching will entail more linear search practices and less search exploration or complexity (Wood, 1986; Wood et al., 1987). What this research does aim to explore is what makes information searching in the EDRMS difficult for users.

3.9 Conclusion

This chapter argues that the information seeking behaviour models of Ellis (1989), Meho and Tibbo (2003) and Marchionini (1995) are most appropriate for investigating the search behaviour of EDRMS users when compared with more generic models on information seeking behaviour (Krikelas, 1983; Kuhlthau, 1988, 1993, 1999, 2004, 2005; Leckie, 2005; Leckie et al., 1996; Wilson, 2005). The search behaviour of EDRMS users has been defined as the articulation of the **behavioural characteristics** of the **information search activities** EDRMS users engage in during their **search**

[46] Examples of these search methods include typed queries, interactive queries, collaboration and query formulation (Marchionini & White, 2007).

process. Task-based information searching affects users' search behaviour, but a research gap exists on how search task and task knowledge affect search behaviour (Bystrom & Hansen, 2005; Vakkari, 2003).

Chapter 3 also demonstrates that task knowledge is a subset of search task, which itself is a subset of work task. Search task is defined as act of searching and/or retrieving specific information from the EDRMS to assist users to complete a work task or fulfil an information need. Task knowledge refers to the specific information cues pertaining to the overall work tasks that the user or his/her colleagues know about, and that aid in the execution and completion of the search task.

Training on different search methods affects EDRMS users' search behaviour. Prior research provides evidence on the positive relationship between training on different search methods and users' subsequent search behaviours using online systems (Branch, 2002; D'Alessandro et al., 2004; Debowski, 1997, 2001; Debowski et al., 2001a; Lucas & Topi, 2004). However, a research gap exists on how training affects EDRMS users' search behaviour in the hypothesised EDRMS search behaviour model of the current research. This model is based on those of Ellis (1989), Meho and Tibbo (2003) and Marchionini (1995).

The theoretical framework of the research presented in Figure 3.4 provides the rationale for the three secondary research questions focusing on the EDRMS users' search behaviour, and how search task, task knowledge and training on search methods affect search behaviour.

4 Research Methodology

4.1 Introduction

This chapter begins by stating this researcher's epistemological and ontological research paradigms adopted using the qualitative research strategy to find answers to the research questions. It then outlines the research methodology employed for data collection and measurement of the eight variables identified in the study. It consolidates the research questions identified in Chapters 2 and 3. It then outlines the case study research strategy and methodology using multiple research tools such as semi-structured interview questions, questionnaires and protocol analysis. The procedure for selecting the research participants and the method used to collect the data at the premises of the selected organisations is described, followed by an explanation of how the ethical concerns of the research were addressed. Finally, the chapter describes the operationalisation of the eight research variables and the analyses undertaken.

4.2 Research questions

Chapters 1 to 3 identified, and provided the justification for, the research questions in the current study. One primary and four secondary research questions were developed. In order to answer the primary research question (PQ):

> *PQ: Does the management of corporate documents and records in the EDRMS support the search behaviour of EDRMS users?*

It was decided to find answers to the following secondary research questions:

> *SQ_1: How have the sampled four organisations implemented records management principles and practices in the EDRMS as outlined in ISO 15489?*
>
> *SQ_2: What is the search behaviour of EDRMS users?*

Having identified the search behaviour of EDRMS users via SQ_2, the study explores how two additional factors affect search behaviour, as outlined in two more secondary research questions:

> *SQ_3: How do search task and task knowledge affect the search behaviour of EDRMS users?*
>
> *SQ_4: How does training on EDRMS search methods affect the search behaviour of EDRMS users?*

Having developed these questions, the research's epistemological and ontological paradigms and research method using multiple case studies were then determined (Richards and Morse, 2007, p.26).

4.3 Research approach

This research's epistemological and ontological paradigms and interpretative frameworks are outlined in this section. A qualitative instead of quantitative research approach was decided as the current research paradigm met the definition of qualitative research stated below.

> Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them (Denzin & Lincoln, 2005, p. 3).

Merriam (1998) also states that qualitative research fulfils the quest for understanding the meaning constructed by people, that is, how they make sense of and experience their world (p. 1). Gorman and Clayton (2005, p. 14) advocate the use of qualitative research paradigms in information research as it helps to explore issues that cannot be quantified. They also advocate qualitative approaches in information research for the reasons cited by Merriam (1998) and Denzin and Lincoln (2005) regarding the greater understanding of meaning qualitative research allows -

> "complexities to be elucidated by those who are directly involved, rather than studied from a distance by remote researchers who may not be aware of the subtle nuances and hidden currents in a particular situation" (Gorman & Clayton, 2005, p.14).

The other reasons for selecting the qualitative research approach are that it offered the ability to: capture the individual EDRMS user's point of view about their search behaviours; examine the constraints of their everyday life working with the EDRMS at their work premise; and secure rich description of EDRMS users search behaviour (Denzin and Lincoln, 2005, p.12). Likewise, the qualitative research approach enabled the capture of the individual records manager's accounts and description of how the ISO 15489 standard was implemented in their respective organisations. Guba and Lincoln (2000) note that qualitative research uncovers emic (insider) views that better depicts human behaviour through its interaction with human actors and their activities (p. 106).

4.3.1 Theoretical paradigms and perspectives – constructivist and interpretivist

Denzin and Lincoln (2005, p.22) state that qualitative researchers are philosophers who are "guided by highly abstract principles" (Bateson, 1972, p. 320). Denzin and Lincoln (2005) explain,

> these principles combine beliefs about **ontology** (What kind of being is the human being? What is the nature of reality?), **epistemology** (What is the relationship between the inquirer and the known?), and **methodology** (How do we know the world, or gain knowledge of it?) (p.22).

Given this understanding of guiding research principles, a constructivist research paradigm and perspective as described by Denzin and Lincoln (2005) below was adopted for this research.

> The constructivist paradigm assumes a **relativist ontology** (there are multiple realities), a **subjectivist epistemology** (knower and respondent cocreate understandings), and a **naturalistic** (in the natural world) set of methodological procedures (Denzin & Lincoln, 2005, p.24).

Kayrooz and Trevitt (2005) explain that constructivism is derived from the Latin term construere, which means "to interpret or analyse" (p.117). They explain that constructivism holds that there is a knowable world and we come to know it imperfectly because of our interactions (p.117). Crotty (1998) clearly defines constructivism as:

> the view that all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context (p.42).

The constructivist paradigm is closely allied to the interpretivist paradigm. Briefly, interpretivism holds that there is no single universal reality as reality belongs to an individual at a particular context and time (Crotty, 1998, p. 70). Hence, as Pickard (2007) points out, there are multiple complex realities that are constantly changing as 'a product of the interaction of the known and the knower', therefore "interpretivism can offer understanding of the meanings behind the actions of individuals" (p.12).

The constructivist paradigm was selected in this research as it places knowledge, meaning and understanding at the point where it enables this researcher to interact with the world in order to know about the world being studied (Kayrooz and Trevitt, 2005, p.117). Likewise, the interpretivist paradigm was selected, as it would enable this researcher to analyse and interpret the meanings behind individuals' actions in their world.

In order to answer the primary and secondary research questions outlined in section 4.2 in this study, it was necessary for this researcher to interact with the four organisation's records managers and 40 EDRMS users at their premises to understand how the records management system implemented adhering to ISO 15489 supports their knowledge workers EDRMS search behaviour. Then the interpretativist paradigm enabled the analysis of the findings about EDRMS users' search behaviour and the results to be interpreted to understand the implications for records management principles and practices.

4.3.2 Metatheory, theory and models

To begin, the definition of the terms metatheory, theory and models is necessary as these concepts are often used interchangeably. The definition from Bates (2005) for these terms are appended.

> Metatheory: A theory concerned with the investigation, analysis, or description of theory itself.
>
> Theory: (a) The body of generalizations and principles developed in association with practice in a field of activity (as medicine, music) and forming its content as an intellectual discipline .... (b) A system of assumptions, accepted principles, and rules of procedure devised to analyse, predict, or otherwise explain the nature or behaviour of a specified set of phenomena.
>
> Model: A tentative ideational structure used as a testing device ... (p. 2).

A theory is "centered around the idea of a developed understanding, an explanation, for some phenomenon"; metatheory is a "philosophy behind the theory, the fundamental set of ideas about how phenomena of interest in a particular field should be thought about and researched"; and "models are a great value in the development of theory" (Bates, 2005, p.2 and 3). Hence, from Bates' (2005) definition, it is concluded that both metatheory and models are subsets of theory.

This research has adopted the classic process of 1) description, 2) prediction and 3) explanation, for the development of theory used in the science discipline (Bates, 2005, p.3). That is, the first task in studying a phenomenon is to describe the phenomena, which for this research is to describe EDRMS users' search behaviour. Secondly, upon understanding the phenomena, it would be possible to "predict relationships, processes, or sequences associated with the phenomena" (Bates, 2005, p.3). In this research, it would be the ability to predict EDRMS users' search behaviour in simple versus difficult searches and how the variables identified affect this behaviour. Thirdly, from the prediction it would be possible to explain the phenomenon, that is, in this research explain why users perceived the searches to be simple or difficult in the EDRMS.

Therefore in this research, these three steps would enable the development of the theory on EDRMS search behaviour derived from the EDRMS search behaviour model and using the metatheories by Ellis (1989), Meho and Tibbo (2003) and Marchionini (1995). Bates' (2005) quote confirms this approach to theory development:

> "models are most useful at the description and prediction stages of understanding a phenomenon. Only when we develop an explanation for a phenomenon can we properly say we have a theory" (p. 3).

4.3.3 Research orienting strategies – nomothetic and idiographic

Both nomothetic and idiographic research orienting strategies were employed in this research. Bates (2005) defines these orienting strategies citing dictionaries as follows:

> "Nomothetic – Relating to or concerned with the study or discovery of the general laws underlying something.
>
> Idiographic – Concerned with the individual, pertaining to or descriptive of single and unique facts and processes" (Bates, 2002, p. 9).

This research firstly employed the idiographic research orientating strategy using the case study tool to find out about each of the 40 EDRMS users' search behaviour and how records management systems were implemented in the four organisations. Secondly, from these four individual case studies it was possible to use the nomothetic research orientating strategy to discover EDRMS users' search behaviours, to subsequently develop the EDRMS search behaviour model and then generalise the search behaviour of EDRMS users.

4.4 Research strategy and method

In light of the research questions, identified for this study it was decided to employ the multiple case studies as the research strategy and method to explore the ways in which EDRMS and users interact in actual corporate environments. Four organisations were selected for participation after a rigorous selection process. A range of data sources was accessed, including systems reviews, interviews, modelled searches and protocol analyses.

4.4.1 Case studies of four organisations

Case study methods are helpful for researchers who are interested in a single research object and wish to gather extensive data so that the relationships among variables associated with the observed phenomena can be identified (Busha & Harter, 1980b, p. 151; Merriam, 2009, p. 49). As stated in the primary research question (PQ), this research explores a single research objective: to examine how EDRMS are managed according to records management principles and practices to support the search behaviour of their users. In each of the four organisations studied, the multiple or collective case study method allowed a concentrated focus upon this single phenomenon (Creswell, 2007, p. 75; Stake, 2005, p. 445).

This study follow similar research by Ellis (1989) and Meho and Tibbo (2003) and utilises semi-structured interview questions and a case study methodology to investigate user behaviour within a real-life context (Yin, 1984, p. 13). However, Ellis (1989) and Meho and Tibbo (2003) did not use protocol analysis and the literature does not show what research tools were used in Marchionini's (1995) research to gather data on search behaviour of electronic information source users.

Creswell (2007, p. 73) defines a case study as an exploration of a *bounded system* or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in context but focused on a specific object of study: the case (Merriam, 2009, p. 40). In this study, multiple case studies were employed to strengthen the findings of the research and to reduce the impact of environmental influences (Creswell, 2007, p. 74; Yin, 2009, p. 258). The outcomes of multiple studies were intended to be generalisable to the search behaviour of most EDRMS users (Yin, 2003). Within each case, a range of methods was employed. Rows Three to Five in Table 4.1 provide an overview of the research methodologies selected for data collection from the two groups of participants.

Table 4.1: Snapshot of research methodology

Case study of four organisations that have implemented records management principles and practices adhering to ISO 15489 standards in their EDRMS.

Research Questions	**Research Participants** *from each of the 4 organisations studied*	**Research Tools**
PQ	As stated in the rows below	....
SQ_1	4 Records Managers from each organisation	1. Semi-structured interview questions 2. Review of internal records management and training documentation 3. Review of EDRMS implemented
SQ_2 to SQ_4	10 EDRMS users from each organisation	1. Short questionnaire 2. Semi-structured interview questions 3. Protocol analysis

4.4.2 Semi-structured interview questions

Semi-structured interview questions were employed with both participant groups: records managers and EDRMS users. Different sets of semi-structured interview questions were designed for each group. Those developed for the records managers were modelled after the eight pillar records management principles and practices specified in ISO 15489 records management standard. They were intended to clarify how these principles were reflected in each organisation's records management system. The questions posed to EDRMS users contained questions similar to those employed in previous search behaviour analyses (Ellis, 1989; Meho & Tibbo, 2003). In line with Lee's (1999, p. 62) comment that semi-structured interview questions "usually have an overarching topic, general themes, targeted issues, and specific questions, with a predetermined sequence for their occurrence", the questions were designed around topical segments to assist the flow of the discussion.

Knowing what information was required from the records managers and the EDRMS users made it possible to prepare "a list of predetermined, standardised questions carefully ordered and worded in a detailed interview schedule" (Cavana, Delahaye, & Sekaran, 2001, p. 148). Each participant was asked the same questions in the same order (Cavana et al., 2001, p. 148), but their semi-structured nature gave the researcher the freedom to "pursue emergent themes and to probe more deeply than … planned questions" (Lee, 1999, p. 62). Ultimately a combination of open-ended and closed questions, supplemented by the probing technique, was used during the course of the interviews.

4.4.3 Observations and protocol analysis

Protocol analysis was used in order to observe the search behaviour of each EDRMS user. Protocol analysis is a *think aloud* research method whereby participants verbalise their thought processes and actions as they perform a task (Ericsson & Simon, 1993). It has been used in similar information search studies, of students searching for information using CD-ROM encyclopaedias and library users formulating their information needs, conducting their information search activities and interacting with the librarian to verbalise their information needs (Branch, 2002; Ingwersen, 1982).

Protocol analysis made it possible to obtain insight into users' thought processes and actions as they undertook simple and difficult searches during this research. A simple search was one that required minimum effort by the user to retrieve the required information to fulfil their search task. A difficult search was one that required more time and effort from the user.

4.4.4 Short questionnaire

The last research tool employed with the EDRMS users in this current study was a short questionnaire that asked for background information on each respondent. This was filled out prior to the interview and the protocol analysis. Participants provided their name, department and job title, a brief description of their job function, and details of any other information sources they utilised in the performance of their role.

4.5 Procedure for selecting participating organisations, systems and users

A combination of factors led to the selection of the four organisations explored in this study. The selection of the organisation and EDRMS subsequently determined the selection of the users from these organisations. In total, four different organisations using three different EDRMS and 40 users (10 in each organisation) were sampled.

4.5.1 Selection of organisations

When selecting organisations for participation in this research, various sources of guidance were consulted, including different EDRMS user group forums, personal networks of records managers and EDRMS vendors, and the RM professional listservs in Australia.

Four main criteria were used in selecting the organisations. Firstly, the organisation had to have an established records management program that adhered to the records management best practices as set out in ISO 15489 (International Organisation for Standardisation, 2002a, 2002b). Specifically, this meant that each organisation had a records management program where there were:

- recordkeeping policies and procedures in place;
- a form of classification such as a taxonomy or thesaurus to classify the organisation's corporate documents and records; and
- retention and disposal schedules that authorised the disposition of records in accordance with legislation or other regulations affecting the organisation.

Secondly, at least one qualified or experienced records management staff member managed the records. Thirdly, the organisation had been using EDRMS for a minimum of one-and-a-half years. Fourthly, the EDRMS managed electronic documents and was integrated with the Microsoft Office suite of applications (Word, Excel, PowerPoint, email management or the equivalent such as Microsoft Exchange or Lotus) or similar to Microsoft.

It was essential that the organisations had implemented EDRMS successfully, so that it was possible to study the search behaviour of EDRMS users. To ensure a balanced representation of the search behaviour of EDRMS users, efforts were made to select organisations representing different industries.

Three private sector and ten government organisations were shortlisted. Contact was made with these organisations to ascertain their accessibility and willingness to participate. Nine consented to participate in the research, and from them a final pool of four was confirmed. Only four Australian government organisations satisfied the eligibility criteria. The other five organisations, private and government, did not fulfil the requirements. The identities of the selected sites are withheld to ensure privacy.

4.5.2 Selection of EDRMS

The organisations selected for this research had implemented EDRMS developed by three different vendors: Hewlett Packard, Objective Corporation and Open Text Corporation. Each of the three EDRMS selected for the current study met the required system functionality (Joseph, 2008a).

Two factors were considered as possible biases to the findings on the search behaviour of EDRMS users: 1) system functionalities and 2) design of the user interface of the EDRMS.

It was considered that system functionalities available in the EDRMS developed by different vendors might affect the design and search functionalities of the EDRMS, which in turn might affect the search behaviour of users working with different EDRMS. In order to minimise the effect of system functionalities, at least two organisations that implemented identical EDRM software (TRIM) were selected. The user interface design of the EDRMS might also affect the search behaviour of EDRMS users. There are two possible interface designs. One design presents a graphical *tree view* hierarchy of the folders within the network drives (similar to Microsoft Windows Explorer). The other is the *virtual database* view of the EDRMS. In the latter design, similar to searching on the Internet, users rely upon search screens to register and retrieve information but do not see the actual stored location of the information they seek.

To counter this possible bias, the researcher ensured that at least three different EDRMS interfaces, that offered both a tree and a virtual database view of their contents were selected. This bias was further countered by selecting a fourth organisation (Organisation B) that used the same EDRMS as Organisation D but with a different system design interface. By selecting Organisations B and D, both of which use TRIM by Hewlett Packard, this study could examine whether system design affected search behaviour. Both Organisations B and D used TRIM to provide different user interfaces for information retrieval, but in Organisation B TRIM provided only a virtual database view, while in Organisation D TRIM provided users with both a virtual database view and tree view. The sampling provided an opportunity to investigate if users in Organisation D (who were able to navigate using both the virtual database view and the tree view method) reflected a different approach to users in Organisation B, who were limited to the virtual database view. Most importantly, this provided an opportunity to observe if the interface system design affected search behaviour.

4.5.2.1 Contact with selected organisations

Initial contact was made with the records managers of each nominated organisation by telephone or email, to determine if the organisation met the selection criteria. Once it was established that the organisation met these requirements, an email was sent to the records manager to formalise the request for their participation.

A letter (Appendix 4.4) was attached to the email, providing background to the research, explaining how the data would be gathered and the level of participation required by the organisation, and outlining the benefits to the organisation from participating in the research. Participants were offered a written report of the findings on search behaviour of EDRMS users in their organisation. The letter explained that the study required interviews with 10 active EDRMS users identified by the records manager plus an interview with the records manager. The formal process for organising the interview sessions was initiated when consent forms were received from each participating organisation.

Subsequently, the records managers were sent an email requesting that they identify key EDRMS users across various departments, to provide a cross-section of participants from different professional and administrative backgrounds. The records managers were emailed an interview schedule template to complete, with a listing of the names of each nominated user, their work role and their department name.

4.5.3 Selection of EDRMS users

Records managers were provided with criteria for the nomination of candidates, based on their knowledge of who used the EDRMS. It was requested that a sample of users ranging from power/super users to average users be selected. Both users who were positive about working with the EDRMS, as well as those who had reservations, were requested. The records managers were also asked to ensure that the sample represented a cross-section from various Business Units in the organisation, to enable the observation of the search behaviour of diverse groups of knowledge workers performing different types of work tasks and search tasks.

The researcher reviewed the position descriptions of the nominated EDRMS users provided in the completed interview schedule and user nominations to ensure that there was a cross-section of participants from different positions and Business Units. One of the organisations initially did not provide a cross-section of users because the records manager selected only users located at the head office. To ensure that a cross-section of participants was selected it was decided that the researcher would travel to the three remote country sites as well, where users in different Business Units and of different professional backgrounds worked. The final set of users for this particular organisation was modified so that they represented a cross-section from different Business Units.

Table 4.2 reports the professional roles of the participants. Generally, the participant's work roles can be split into administrative[47] or professional[48] roles.

[47] Examples of the administrative roles are: secretaries, personal assistants, and administrative assistants.

Similarly, the departments of the participants can be split into corporate management[49] and core business functions.[50]

Table 4.2: Demographic characteristics of the EDRMS users' work roles

	Administrative	Professional	Total
Work Roles:	12	28	40
	Corporate Management	**Core Business Functions**	**Total**
Departments:	18	22	40

The participants selected were primarily professionals or administrative staff in support roles and middle and senior managers. Whereas more senior management may assign their personal assistant or administrative assistant to seek information on their behalf, other professionals regularly access the EDRMS to prepare reports and provide advice to management. Administrative staff are often assigned the task of seeking information on behalf of their managers. The search activities these groups of workers engaged in made them ideal participants for this research.

4.5.3.1 Contact with selected EDRMS users

Initial contact with each of the 40 users was made by the respective records managers in each of the four organisations via email or telephone call, to find out if they would be willing to participate in the research. Whichever the approach, the records manager briefly explained the research to the user and the benefits of their participation for the

[48] Examples of the professional roles are: draftsman, urban designers, company secretary, project managers, directors in Human Resources, Information Management, managers in IT, Corporate Services.

[49] Examples of departments in corporate management are: human resources, information technology, information management, corporate services, finance, and contracts.

[50] Examples of departments in core business functions are: environment, safety, drawing, property, urban development, land tax, note issue, and payments policy.

organisation. Those who agreed to participate had their names entered in the interview schedule template by the records manager.

Once the researcher approved the EDRMS users nominated by the records manager, an email was prepared by the researcher and a template sent to the records managers, who forwarded it to each participant to formally enlist their participation. An attachment to the emails, also prepared by the researcher, provided an introduction to the research and its benefits to the organisation: the Participant's Information Sheet and Consent Form (Appendix 4.5).

The Participant's Information Sheet and Consent Form achieved a number of important objectives. It introduced the research topic and the researcher, and outlined the research methods to be used, the amount of time required, and the fact that data gathering would take place at the premises of the participant's organisation. It also offered participants the option to contact the researcher if they had any questions. In the absence of any enquiry by the potential participant, the consent form was completed and returned to the researcher. Nine of the 40 consent forms were received by fax. Most participants verbally informed the records managers of their consent to participate and handed the completed form to the researcher when they attended the interview.

4.5.4 Characteristics of participants sampled

Four organisations from four different industry backgrounds located in Australia were selected for this study. Two of these organisations used the same EDRMS, whilst the other two employed different systems. Background details of each of these four organisations are presented in Table 4.3.

In each organisation, data was collected from a records manager and 10 EDRMS users. In total, four records managers (3 males and 1 female) and 40 EDRMS users (15 males and 25 females) participated (Table 4.4).

In all cases the EDRMS was but one of a number of corporate systems, as shown in Table 4.5 and Figure 4.1. Examples of the *other business applications* included core applications pertaining to human resource or financial management like SAP[51], asset management and land information management systems, and drawing applications like AutoCAD. Figure 4.1 provides a breakdown of the aggregated percentage usage of the different information sources by all four organisations, as indicated by the sampled users.

Given that EDRMS users were identified for this study, the high percentage usage (30%) of the EDRMS in comparison to the other information sources is not surprising.

High usage of the network drives and email systems was observed in all the organisations.

[51] Systems Applications and Products (SAP) that define "business software as comprising enterprise resource planning and related applications such as supply chain management, customer relationship management, product life-cycle management, and supplier relationship management" (SAP Australia Pty Ltd, n.d.).

Table 4.3: Participating organisations and their EDRMS

Organisation	Industry	EDRMS	EDRMS Design
Organisation A (New South Wales)	▪ State Government ▪ Utility ▪ Size: 758 employees	Objective by Objective Corporation	Tree view and virtual database view
Organisation B (Western Australia)	▪ Local Town Council ▪ Property and rates management ▪ Size: 515 employees	TRIM by Hewlett Packard	Virtual database view
Organisation C (Western Australia)	▪ State Government ▪ Finance ▪ Size: 934 employees	e-Docs by Open Text Corporation	Tree view and virtual database view
Organisation D (New South Wales)	▪ Commonwealth Government ▪ Banking ▪ Size: 860 employees	TRIM by Hewlett Packard	Tree view and virtual database view

Table 4.4: Demographic characteristics of the participants (n=40)

	Organisations:				
	A	**B**	**C**	**D**	**Total**
No. of EDRMS Users:	10	10	10	10	40
No. of Records Managers:	1	1	1	1	4
	Males			**Females**	
Gender – EDRMS Users:	15			25	
Gender – Records Managers:	3			1	
	20 - 29	**30 - 39**	**40 - 49**	**50 - 59**	**60 - 69**
Age – EDRMS Users:	2	10	16	11	1
Age – Records Managers:	1	1	0	1	1

Table 4.5: Usage of office information sources by EDRMS users

	EDRMS (%)	Paper Records (%)	Email System (%)	Network Drives (%)	Intranet (%)	Internet (%)	Library Mgt System (%)	Other Bus Apps. (%)
Org A	34.8	8.2	22.7	13	5.1	1.45	0	14.75
Org B	23	21	16.3	16.5	5.1	10.9	0.8	6.4
Org C	33.3	10.7	25.3	13.9	7.5	6.2	0.5	2.6
Org D	31.5	10.5	20.6	11.7	5	8	0.5	12.2
Total	122.6	50.4	84.9	55.1	22.7	26.55	1.8	35.95
%	**30**	**13**	**21**	**14**	**6**	**7**	**0**	**9**

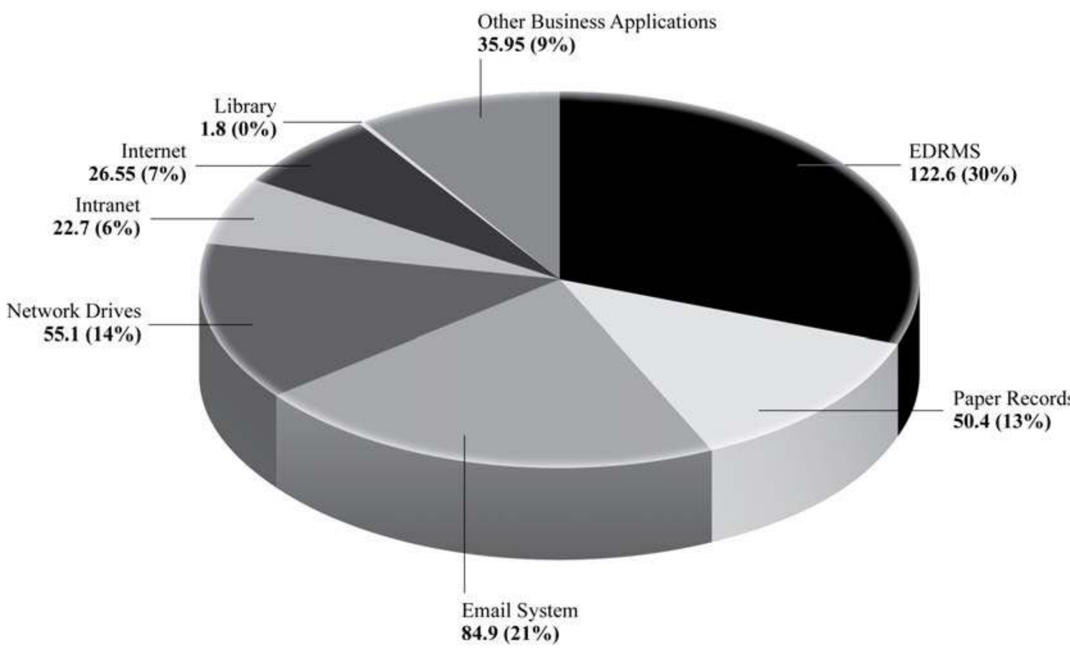

Figure 4.1: Aggregated usage of different information sources by EDRMS users

4.6 Procedure for data collection

For data collection, site visits were arranged with each of the four organisations. The researcher spent a total of four days at each site, engaged data collection activities.

Day One:

- the internal records management documentation was reviewed;
- a demonstration of the EDRMS was provided, to indicate how the organisation's records management program was implemented; and
- an interview session with the records managers was conducted using semi-structured interview questions.

Days Two to Four:

- hour-long interview sessions were conducted with each of the 10 EDRMS users;
- each user was asked to complete a short questionnaire that provided background information about them;
- individual semi-structured interviews were conducted; and
- a protocol analysis research tool was employed as each participant described and demonstrated how they conducted their last simple and difficult searches using the EDRMS.

4.6.1 Records managers - records management principles and practices

The research tools used to gather the required data to measure this variable included semi-structured interview questions, a review of internal corporate documentation on records management and a demonstration of the EDRMS as implemented in the organisation.

Prior to the arrival of the researcher. the records manager of each organisation was requested to email screen shots of the record registration and search screens of the EDRMS, and internal documentation on their records management program such as retention and disposition schedules (RDS), classification schemes, thesauri, policies, procedures, guidelines and EDRMS training information. Apart from the screen shots, the documentation could not be emailed owing to their large file sizes or original formats.

Where possible these primary information sources were reviewed prior to the scheduled on-site interview session with the records manager. This enabled valuable insights to be gained into the implementation of the organisation's records management program. These documents proved useful in directing the researcher to probe different topics, as well as providing further background information. They also helped to clarify the interview responses from the records managers, which were recorded on the template of semi-structured interview questions developed by the researcher (Appendix 4.1).

The interview with each records manager was scheduled a day in advance of the interviews with the EDRMS users. This was a vital step in gaining understanding of, and background to, the records management practices of the organisation. It also provided an opportunity to view a demonstration of the EDRMS before conducting the interview sessions with the users.

On the first day at the organisation, prior to the interview with the records manager, the researcher reviewed any additional records management documentation produced by the organisation to identify and confirm evidence of the records management implementation. This was followed by a demonstration of the EDRMS implemented, by either the records manager or the system administrator of the EDRMS, which usually lasted 30 minutes.

The review of the internal records management documentation and the EDRMS demonstration, assisted in directing some of the italicised questions on the semi-structured interview form (Appendix 4.1). Examples are:

Q1) Is there an IM/RM Policy in the organisation?

Q8) What are the procedures, standards, guidelines on IM/RM in the organisation? and

Q23) How many layers does the classification scheme go to?

If these could not be answered from the documentation, they and the questions in regular font in Appendix 4.1 were asked at the scheduled interview session with the records manager. The demonstration of the EDRMS helped to confirm and verify the answers in bold (Appendix 4.1).

The hour-long interview session scheduled with the records manager was conducted using the semi-structured interview questions. An interview template was used to record each records manager's responses. To simplify the process, the records managers were only asked those questions that could not be answered from the demonstration of the EDRMS or the review of internal corporate documentation. This helped limit the interviews to one hour. With the permission of the records managers, the interview sessions were recorded and transcribed.

4.6.2 EDRMS users' search behaviour

From days Two to Four, the short questionnaire was administered and face-to-face interviews with the EDRMS users were conducted in dedicated meeting rooms. In three organisations, each participant was accompanied back to their office or work desk to administer the protocol analysis of how they conducted their last simple and difficult searches. In one organisation, where access to parts of the office building was restricted to employees only, a networked computer was made available in the meeting room for participants to log in and carry out the protocol analysis.

All of the sessions were conducted in the same way. Each participant was greeted and thanked for their time and participation in the research. The researcher then introduced herself and the research topic, gave a quick overview of the research and explained the procedure. The participants were asked if they had any questions about the information presented in the consent form for participation in the research. Having read the background information previously provided, all participants were well informed about the research. The three research tools developed for data collection with the EDRMS users were administered sequentially.

4.6.2.1 Short questionnaire

Participants were first requested to complete a short questionnaire (Appendix 4.2) covering their background and information sources they relied upon for their information needs apart from the EDRMS. The researcher performed a quick review of the completed questionnaire on the spot, mainly noting the position title and which department the participant was from, the participant’s main job functions and areas of responsibilities in the organisation, and what information sources the participant primarily used. Any information sources listed that were not familiar to the researcher were clarified with the participants. This enabled better understanding of the type of information stored in the EDRMS as well as ascertaining how other sources conflicted with, were different from or supplemented the EDRMS. When they duplicated the EDRMS (in the sense that they captured documents and records also captured in the EDRMS), users were asked why they used these information sources rather than the EDRMS. A discussion was also conducted on the job function of the participant, in order to clarify or confirm the points they documented in the questionnaire. This was followed by the in-depth interview using the semi-structured interview questions (Appendix 4.3).

4.6.2.2 Semi-structured interview questions

Before beginning the interview session, it was explained to participants that the second part of the meeting involved an interview using a list of questions, and permission to tape and transcribe the interview was obtained. Participants were also informed that there would be different segments to the interview questions, and at the beginning of each segment they would be informed of the segment's title. The researcher offered prompts such as "The next set of questions will be on the training you have received on the EDRMS". This prompt prepared users for the topic of the next set of questions.

As per Denzin and Lincoln's (2000, p. 648) recommendation, all participants were asked the same set of questions in the same order. Quick field notes of responses were made beside the specific question. If some responses were applicable to questions further down the list, reminders to probe further were jotted down. Depending on the responses, the researcher used additional questions to encourage participants to elaborate upon or clarify their answers.

4.6.2.3 Protocol analysis

Protocol analysis was used to observe how EDRMS users conducted performed search task in the EDRMS and to record their thought processes as they conducted the search. The participants were asked to think aloud as they showed how they conducted their last simple and difficult searches using the EDRMS.

The protocol analysis was initiated by informing each participant that they would be asked to describe and demonstrate how they conducted their last simple and difficult searches. The participant was then instructed to recollect the search and describe what they had to search for, then to reproduce the search and provide a commentary of their thought processes as they went about it. Most users understood what was required of them. For the few who were unsure, the researcher demonstrated by providing a commentary of how she would search for the last Microsoft Word document she had worked on, stored on the computer desktop. This enabled the unsure participants to understand what was expected of them in the protocol analysis. When they were ready, their commentaries on their last simple and difficult searches were tape-recorded as they demonstrated the searches.

With the user sitting in front of the computer, the researcher observed and took field notes on what the user was doing as they conducted their searches.[52] In a few instances, following completion of the protocol analysis, the researcher spent a few minutes with the user to take selected screen shots of their search screen and search results screen as reminders of how they formulated their search strategy and processed their results.

4.6.3 Triangulation of data collection methods

To ensure robustness a few different methods for triangulation were used in this study. These adhered to Yin's (1984) recommendation that construct validity be supported by the use of multiple data collection methods. Firstly, multiple data research tools and sources were used to collect the data. The use of the interview questions and the protocol analysis (Ericsson & Simon, 1993) to investigate the search behaviour of EDRMS users enabled a triangulation of how users said they sought information with

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[52] It was not possible to observe what the user was doing, follow their mouse clicks, listen to their commentary and take detailed field notes at the same time; so only rough field notes were possible. The option of using software that logs users' interaction (or key strokes) was considered. However, the practicality of installing the software into each organisation's computing infrastructure to create a controlled laboratory environment militated against its use.

seeing what they actually did when seeking that information. Additionally, the data collected from the records managers on how records management principles and practices were implemented in their organisations were triangulated using the structured interview data, internal documentation and the demonstration of the EDRMS. Triangulation was also undertaken by repeating some questions from the interview questionnaire targeted at users, but phrasing them in a slightly different way (Cavana et al., 2001, p. 148). This was achieved by paraphrasing or repeating the participant's responses to verify the researcher understood them.

4.6.4 Data transcription

In order to measure the research variables identified in this study, both the interview and protocol analysis data gathered was transcribed. The interview and protocol analysis data from the 40 EDRMS users and the four records managers were outsourced to a transcription services provider. The semi-structured interview questionnaires were made available to the service provider, with instructions to transcribe the participant responses for each interview question using Microsoft Word. A test run arranged with the first two transcripts to test the quality of the transcription service proved satisfactory when compared with the researcher's duplicated efforts.

The transcribed interview and the protocol analysis data for each participant averaged 7,620 and 950 words respectively. In total, the interview and protocol analysis data gathered for each participant averaged 8,570 words or 28 pages. The transcribed interview data for each of the four records managers averaged 7,000 words per interview.

Information from the transcription data was coded and analysed using Microsoft Excel in order to create matrices, flowcharts and graphs to measure the various research variables identified in the study. Values were then inserted into the matrices and coded against the respective findings.

The use of Nvivo (version 7) to interpret the data was also considered. However it was decided that Nvivo was not suitable for the data analysis, given that semi-structured interview questions were used to group and analyse the data. The benefit of Nvivo lies in the coding functionality that it offers in grouping themes generated by unstructured interviews (Richards, 1999a, p. 413, 1999b). However, the interview questions asked in this study were already mapped into themes using topical segments. Interview responses were transcribed under the relevant interview question headings for each participant, which enabled automatic coding by theme and comparison of responses since there was no issue with the structure of the questions posed.

This section has provided an overview of the procedures by which data was collected, triangulated and transcribed from the two participant groups, records managers and EDRMS users.

Given that this research involved interviewing human subjects and determining their personal experiences in relation to how they managed and sought information, approval from the University of Western Australia's Faculty of Human Research Ethics Sub-Committee was gained prior to commencing the study.

4.7 Measures and data analysis

From the research questions, eight variables were identified for investigation in this study (Table 4.6).

Table 4.6: Research questions used for measure of eight variables

Variables Measured:	**Research Questions**
1) Records management principles and practices implemented	*SQ_1: How have the sampled four organisations implemented records management principles and practices outlined in ISO 15489 in the organisations?*
2) Search behaviour of the 40 EDRMS users	*SQ_2: What is the search behaviour of EDRMS users?*
3) Individual search behaviour of the 40 EDRMS users	
4) Work task of the 40 EDRMS users	*SQ_3: How does search task and task knowledge affect the search behaviour of EDRMS users?*
5) Search task of the 40 EDRMS users	
6) Task knowledge of the 40 EDRMS users	
7) Training provided by the organisation to the 40 EDRMS users	*SQ_4: How does training on EDRMS search methods affect the search behaviour of EDRMS users?*
8) Training received, reported by the 40 EDRMS users	

The variables measured in the four organisations sampled are:

V1) how *records management principles and practices* are implemented;

V2) what is the *search behaviour* of EDRMS users;

V3) what is the *individual search behaviour* of the 40 EDRMS users;

V4) what is the *work task* of the 40 users;

V5) what is the *search task* of the 40 users;

V6) what is the *task knowledge* of the 40 users;

V7) what is the *training provided* by the organisation to the 40 users; and

V8) what is the *training received* reported by the 40 users.

The procedure undertaken to measure each of these eight research variables is described next.

4.7.1 Variable 1 - Records management principles and practices implemented

The eight pillar records management principles and practices (Table 4.7, Column 1) were identified from the records management standard, ISO 15489 (International Organisation for Standardisation, 2002a). Each of these principles was defined and its relevance to the implementation of the EDRMS described (Table 2.1, Chapter 2). The ISO 15489 was used as a benchmark to measure the records management implementation variable by investigating how the pillar records management principles and practices were implemented to manage corporate documents and records in each of the four organisations.

ISO 15489 enabled formulating the interview questions for the record managers around the RM principles. Each principle was presented as a topical segment in order to identify the extent to which the managers used them to manage records in the EDRMS (Appendix 4.1). Table 4.7 maps the interview questions in Appendix 4.1 against each of the eight RM variables outlined in Column 1. Additional information sources such as RM documentation and demonstration of the EDRMS were reviewed to enrich the information gained through interviews.

To code the information gathered for the measure, *Matrix* SQ_1 *– RM Principles and Practices* (hereafter referred to as Matrix SQ_1) was developed using Microsoft Excel. Table 4.8 presents a snapshot of the matrix using the first of the eight pillar RM principles and practices. In Column 1, the eight pillar RM principles and practices from ISO 15489 were listed. In Column 2, the interview questions developed to address how the organisations implemented RM policies in their organisations were listed. The responses from each of the four organisations were analysed using the transcribed interview data from the records managers and coded into the next four columns.

Table 4.7: Measurement of V1 - RM principles - records managers

V1 - Semi-structured Topical Segments	Purpose and Description	Questions to Measure V1	Source	Measured using:
(a) RM Policies	To investigate and gain an understanding how each of these eight records management principles had been implemented in each of the organisations studied.	Q1 to Q7	ISO 15489	*Matrix SQ_1 – RM Principles and Practices*
(b) RM Procedures		Q8 to Q15		
(c) Recordkeeping metadata		Q16 to Q20		
(d) Classification schemes		Q21 to Q29		
(e) Retention and Disposition schedule		Q30 to Q34		
(f) Security permissions		Q35 to Q38		
(g) Training		Q39 to Q43		
(h) Monitoring and auditing		Q44 to Q47		

Responses from the transcribed interview data for each records manager were analysed to find out whether RM policies, procedures, classification schemes, retention schedules and training, for example, were adopted, which ones were developed, and how they were implemented in each organisation. These findings were coded in Matrix SQ_1 by either listing the specific tool or indicating a *Yes* or *No* response against each question. These findings are discussed in Chapter 5.

Table 4.8: Snapshot of Matrix SQ1 – RM Principles and Practices

Interview questions for records managers	Organisations			
	A	B	C	D
1. Is there an IM/RM policy in the organisation?				
2. What is the IM/RM policy of the organisation?				
3. Is it endorsed and supported by senior management?				
4. Does the policy state that the EDRMS is the corporate information repository for the organisation?				
5. How is the policy implemented in the organisation?				
6. How do you perceive the usage of the EDRMS in the organisation?				

4.7.2 Variable 2 - EDRMS Search Behaviour

Each individual's EDRMS search behaviour was measured using the hypothesised EDRMS search behaviour model (Ellis, 1989; Marchionini, 1995; Meho & Tibbo, 2003). Thus the individual search behaviour variable measured was the actual staged sequence of the search processes and activities performed in each information search process by each of the 40 EDRMS users. For example, each user's individual search behaviour was observed to see if they sequentially performed each search process stage in Column 2 and, importantly, in which search activities in Column 3 (Table 3.5, Chapter 3) they engaged.

The vocabulary used to describe, code and measure the individual search behaviour of EDRMS users was drawn from the hypothesised model (Table 3.5).

The steps taken to measure the two variables, search behaviour and individual search behaviour, are summarised in Figure 4.2.

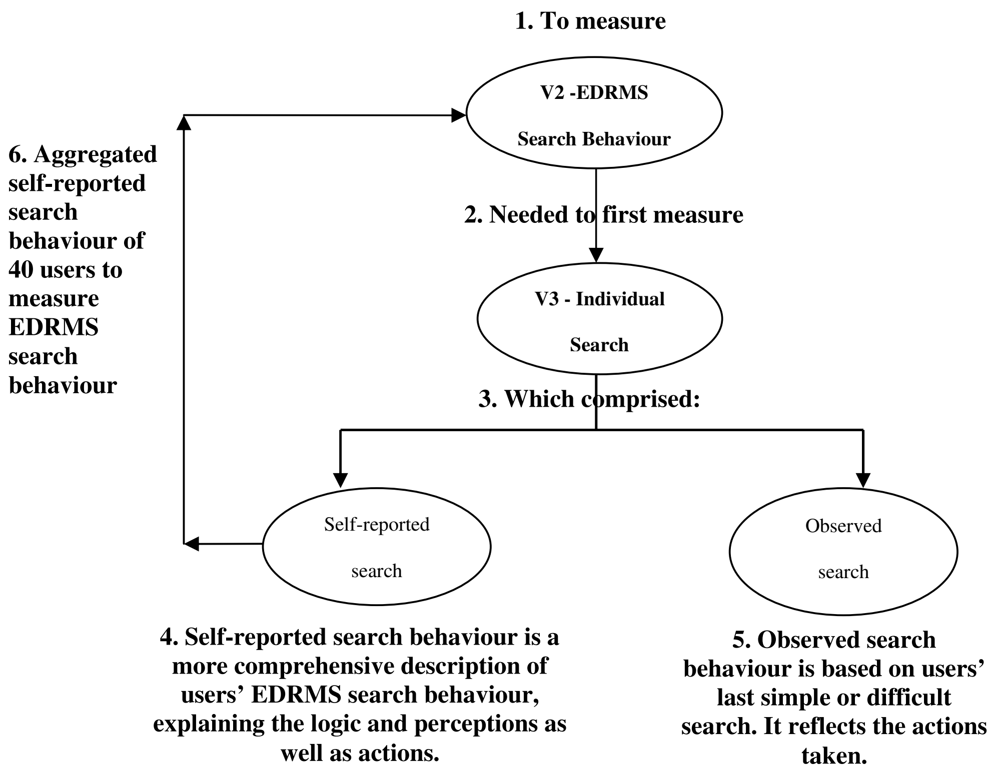


Figure 4.2: Measurement of final aggregated EDRMS search behaviour

The individual search behaviour variable was measured first. Individual search behaviour is defined as the preferred search processes and search activities the individual reported when undertaking EDRMS search. The variable was captured by analysing the different steps and search activity behaviour an individual reported they undertook during the search. Each step and search behaviour was recorded in a flowchart to track the sequence of actions taken. Having measured the individual search behaviour variable, it was then possible to measure the EDRMS search behaviour variable, which is defined as an aggregation of each of the 40 individuals' reported preferred search processes and search activities. The variable was captured by analysing all 40 individuals' different steps and search activity behaviours as they reported them, and aggregating them to derive the final EDRMS search behaviour variable.

4.7.2.1 Variable 3 - Individual search behaviour of each of the 40 EDRMS users

Using a semi-structured interview questionnaire in the interview sessions, each participant was asked to describe and report their preferred individual search behaviour when searching and retrieving corporate documents and records from the EDRMS. This will be referred to as the *self-reported search behaviour* of the individual user from now on.

Ellis (1989) and Meho and Tibbo (2003) employed semi-structured interview questions as the primary research methodology in their seminal research investigating the search behaviour of social scientists. This methodology was thus selected as one of the three used in this study. The semi-structured interview questions used by both Ellis (1989) and Meho and Tibbo (2003) were extensively reviewed and used as a guide to develop the interview questions for the EDRMS users. As Ellis (1989) and Meho and Tibbo (2003) studied multiple information sources, their questions concerning what information sources the participant used and why they chose them were omitted in the current study.

Thirty semi-structured interview questions (Appendix 4.3) were grouped into six broad topical segments (Table 4.9, Column 1) to measure each user's individual search

Table 4.9: Mapping of semi-structured interview questions to measure search behaviour – EDRMS users

Semi-structured Topical Segments	Purpose and Description	Questions	Source
(a) Usage	– why use the EDRMS and what types of information were sought?	Q1 to Q2	Ellis (1989) and Meho & Tibbo (2003)
(b) Searching patterns in the EDRMS	– what search methods were used, what were the preferred search methods, how were search results followed, how and when a decision to stop search is made, what are the difficulties when searching?	Q3 to Q20	
(c) Classification scheme	– is user familiar with and do they understand the scheme used, how do they find the scheme?	Q21 to Q23	Unique to this study
(d) Situational and time factors	– does time affect searching and is a time limit is applied when searching?	Q24 to Q25	
(e) Training	– what training has user received and how they found it?	Q26 to Q29	
(f) Design of the EDRMS	– what are user's view of the current design and what changes would they like made?	Q30	

behaviour. The first 20 questions from the topics of a) usage and b) searching patterns in the EDRMS were based on the questions developed by Ellis' (1989) and Meho and Tibbo's (2003) research. Additional research questions were formulated in order to address the EDRMS and the other objectives of the research, such as how the variable factors identified in the study affected the search behaviour of EDRMS users.

Questions 3, 5, 8, 9, 13, 14, 15, 17, 18, 20, 24 and 25 in Appendix 4.3 were designed to measure each user's self-reported search behaviour. A component of searching includes using the classification schemes implemented in the EDRMS; questions 21 to 23 were designed to provide an understanding of the extent of user familiarity with the classification scheme, and how much use is made of the classification scheme when seeking information.

Additionally, participants were asked to describe what information they sought and what activities they performed to gather information in recent searches. Users were asked to recall their last simple and difficult searches, and to demonstrate their search process. Protocol analysis was employed to capture their replicated searches. The researcher found it was not possible to devise a consistent test for all participants without in-depth understanding of the user, the work involved, and the information sought or registered within the EDRMS. The protocol analysis tool tested whether users actually exhibited the behaviour they claimed to apply at the interview sessions when seeking information from the EDRMS.

From the transcribed interview and protocol analysis data, three separate flowcharts were drawn. Using the hypothesised vocabulary (Table 3.5), each user's search behaviour, processes and activities were plotted in three flowcharts and described. The *self-reported flowchart* was plotted from the transcribed interview data records in which each user described their common or preferred search behaviour. The two flowcharts generated from two demonstrated searches are referred to as the *observed flowcharts*. Textual commentary of the self-reported and observed processes relating to the individual user's search behaviour was included in the data capture. Table 4.10 summarises the steps described to measure the search behaviour of each individual EDRMS user.

Table 4.10: Measurement of the individual search behaviour of users

Variables measured:	Research method used:	Information sources:	Resources developed:
Individual search behaviour of 40 EDRMS users	Semi-structured interview questions for users (Q3, Q5, Q8, Q9, Q13, Q14, Q15, Q17, Q18, Q20, Q24, and Q25)	Transcribed semi-structured interview data from users	Self-reported flowchart
	Protocol analysis	Transcribed protocol analysis data from users	Observed flowchart for simple search Observed flowchart for difficult search

The measurements described above were gathered from all 40 participants, resulting in 40 self-reported flowcharts from the interview data and 67 observed flowcharts from the protocol analysis data. Of the observed flowcharts, 38 were from simple searches and only 29 from difficult searches. There were 38 and not 40 observed flowcharts, as two users' descriptions of simple searches were actually descriptions of their difficult searches (based on the need to reframe and adapt the search method). It was not possible to obtain all 40 observed flowcharts for the difficult searches as 11 users stated that they had not or did not encounter difficult searches, or that it had been so long since their last difficult search that they were unable to recall the details.

With the initial intention of merging all searches to form one aggregated flowchart for each user, a comparison was then made of the different flowcharts for each participant. However, in-depth data analysis indicated that this was not necessary because the interview data provided a comprehensive view of each participant's individual search behaviour: specifically, identifying all the different search behaviours the participants reported that they engaged in when seeking information using the EDRMS. In contrast, the data from the protocol analysis illustrated that the search behaviour observed in specific searches was more selective. For example, the user's self-reported flowchart might indicate that the user was able to conduct a search using three different search formulation strategies, but if the task they had to perform in their last simple search was to find a document with a known record number, then the user might formulate the search using just the record number. For reasons like this, the self-reported flowcharts were taken as the most definitive source when capturing the final aggregated search behaviour of EDRMS users (Figure 4.2). They were found to capture the wider repertoire used by each participant, while the observed searches reflected more targeted approaches to address a specific search problem.

4.7.2.2 Aggregation of 40 Self-reported flowcharts to measure EDRMS Search

The self-reported flowcharts for all 10 users in the same organisation were mapped onto a single flowchart. The aggregated measure was determined by visual comparison of each of the 10 self-reported flowcharts, observing similarities and differences in search behaviour from one flowchart to the other. These steps were repeated to aggregate the EDRMS search behaviour model for each of the four organisations. The final aggregated measurement of the search behaviour flowchart drawn for each organisation incorporated all the search processes and activities, collated by visual observation of all 10 self-reported flowcharts.

4.7.3 Variables 4, 5 and 6 - Work Task, Search Task and Task Knowledge

Three research variables, work task, search task and task knowledge, were measured to explore their impact on search behaviour. *Work task* was the task an individual had to perform as part of their core or routine work role in the organisation. A work task that required information from the EDRMS determined the *search task* the individual performed. *Task knowledge* relates to the information cues that individual possesses to formulate a strategy to complete the search task. These cues might relate to the metadata specific to the sought record.

These variables were captured using the protocol analysis tool when each of the 40 users described what their work task was and what task knowledge they possessed to formulate their search strategy, then demonstrated how they had performed their search task in their last simple and difficult searches. Flowcharts were developed of their observed search behaviour, capturing the search steps and search activities each of the 40 users engaged in and demonstrated for their simple and difficult searches.

A Task Matrix SQ_3 was then developed to code observations of each user's work task, search task and task knowledge analysed for the last reported simple and difficult searches they had to perform, using the transcribed protocol analysis data and the observed flowcharts developed for each user. To illustrate, a condensed version of the Task Matrix SQ_3 for participant P32 is presented in Table 4.11. Columns 2 to 7 are examples of P32's work tasks, search tasks and task knowledge when she performed her last simple and difficult searches.

Table 4.12 summarises the three research variables in Column 1 that were measured, using the protocol research method (Column 2) and the information sources used to analyse these three variables (Column 3) using the Task Matrix SQ_3 stated in Column 4 developed to code the measurements.

Table 4.11: Condensed version of the Task Matrix SQ_3

What was the last **simple search** you had to do?

	Description of simple work task	**Search Task**	**Task Knowledge**
P32	P32 has to create a new reconciliation document to process today's reconciliation. She has to find the reconciliation document that she checked into the EDRMS the day before.	Find reconciliation document created the day before, so that she can create a super copy of the document to do today's reconciliation.	Awareness of the metadata such as title, creation date etc., of the document, as it was worked on yesterday.

What was the last **difficult search** you had to do?

	Description of difficult work task	**Search Task**	**Task Knowledge**
P32	Process invoice for a VCR and CTTC purchase.	Find background information re requests and approval for the purchase of VCR and CTTC to process incoming invoice.	P32 recalled that the purchase occurred in Oct '05, and that she titled the documents being searched for using the terms *VCR* and *CTTC*.

Table 4.12: Research methodology for measuring work task, search task and task knowledge variables

Research variables measured:	**Research method used:**	**Information sources:**	**Matrixes developed to measure:**
1. Work Task 2. Search Task 3. Task Knowledge	Protocol Analysis	1. Transcribed protocol analysis for each user. 2. Observed flowcharts developed for each user.	Task Matrix SQ_3

4.7.4 Variables 7 and 8 – Training provided and training received by EDRMS users under study

Two different training research variables were measured to investigate the secondary research question SQ_4 on how training affects the search behaviour of EDRMS users. Table 4.13 summarises these variables, the research methods and the information sources used to collect the data for analysis of the measurement.

Table 4.13: Research methodology for measuring training variables

Research variables measured:	**Research method used:**	**Information sources:**	**Measured by:**
1. Training provided variable (V7)	Semi-structured interview questions for records managers Case study method	4 Records Managers: • Transcribed semi-structured interview questions for each records manager. • Review of internal records management and EDRMS training materials. • Demonstrations of the four EDRMS.	Listing of : • search methods users could access; and • RM training provided. Training Matrix SQ_4
2. Training received variable (V8)	Semi-structured interview questions for EDRMS users	40 EDRMS Users: • Transcribed semi-structured interview questions for each user. • Self-reported and observed flowcharts developed for each user.	Training Matrix SQ_4

Two training variables, namely 1) the training provided and 2) the training received were measured. The training provided variable measured what records management and EDRMS training was provided to EDRMS users in each organisation. This measure included training on the possible search methods that could be performed in the EDRMS within that organisation. The training received variable measured what records management and EDRMS training users actually recalled receiving, and were observed using when searching from the EDRMS.

Evidence of *training provided* was drawn from data reviewed on site, and the transcribed responses to the semi-structured interview questions from each of the four records managers. Training evidence data reviewed on site included training manuals and materials developed by the organisations. Semi-structured interview questions, Q25 to Q26 and Q39 to Q43, were designed to find out what records management and EDRMS training was provided to staff by the records management team. Training on relevant classification schemes (Table 4.14) was also included in the analysis.

Table 4.14: Snapshot of training questions asked of records managers

Training on Classification Scheme implemented:

25. What training on the usage of the classification scheme did users receive?
26. What is the general feedback or acceptance of the classification scheme from EDRMS users?

Training on Records Management and EDRMS implemented:

39. What IM/RM training and awareness raising is provided to staff?
40. What training is provided on the usage of the EDRMS to users?
41. Is training on IM/RM and the EDRMS part of the induction process?
42. Describe the above training:
    - Training materials
    - How the training is conducted?
    - Frequency of the training
    - EDRMS training split for beginners and advanced users?
43. For the EDRMS training is training provided on:
    - how to access the classification scheme?
    - how to create shortcuts to frequently used folders, documents, and searches.

From these information sources and the demonstration of the EDRMS implemented by the organisation, lists were prepared describing the likely search methods users would access in each of the four of the EDRMS (Table 2.7, Chapter 2) and the types of records management training that was provided. A Training Matrix SQ_4 was then developed to code the different forms of training provided to users, based on the information gathered earlier. The training matrix listed possible search methods on the x-axis and EDRMS users on the y-axis. A snapshot of SQ_4 is presented in Figure 4.3.

The training that was provided by the organisation to its users was coded in black, whilst the training that was not provided was coded in white. Ticks and crosses were used to code the training that users either reported or demonstrated. The expertise that users reported and demonstrated in their search activities, but that was not fully provided through training, was also captured. From these data analyses a measurement of the types of the records management and EDRMS training provided by each organisation's records manager to their users was derived.

The *training received* variable was measured using data transcribed from interview sessions held with each user. Interview questions Q1, Q2, Q11, Q19 to Q23 and Q26 to Q29 were designed to measure the training received variable (Table 4.15).

Table 4.15: Snapshot of questions relating to training received asked of EDRMS Users

Classification Scheme:

21. Are you familiar with the classification scheme used in the EDRMS? Can you describe how the classification scheme works in your organisation?
22. Do you use the classification scheme in the EDRMS? If so how? If not why?
23. If I asked you to evaluate the Classification Scheme in the EDRMS, how would you describe it?

Training:

26. Have you had training on the EDRMS?
27. Please describe the training you received.
28. When was the training conducted?
29. If I asked you to evaluate the training you have received, how would you describe it?

Participants	EDRMS Search Behaviour Model								
	Stage 2 : Formulate Search Strategy						**Stage 4 : Process & Evaluate Search**		
	Metadata Search using Boolean	**Navigating Tree Structure of Classification Scheme**	**Both Metadata & Navigation**	**Retrieve Search from Shortcuts**	**Metadata Search using 1st or 2nd level terms in Classification Scheme**	**Using Terms in the Thesaurus Module**	**Sorting Search Results**	**View Related Documents / Containers**	**Refining Search using Boolean or by Varying Metadata**
P1 - SRSB	✓	✓	✓	X	X	X	X	X	✓
OSB - SS		✓							
OSB - DS									
P2 - SRSB	✓	✓	✓	X	X	X	X	X	✓
OSB - SS		✓							
OSB - DS	✓								
P3 - SRSB	✓	✓	✓	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS	✓	✓							✓
P4 - SRSB	X	✓	X	X	X	X	X	X	X
OSB - SS		✓							
OSB - DS									

Training provided by organisation | Training not provided by organisation | ✓ Search methods user reported or demonstrated | X Search methods user did not report or demonstrate

Figure 4.3: Sample of condensed version of the Training Matrix SQ_4

The self-reported and observed flowcharts developed earlier to measure the individual search behaviour variable were also used in reviewing the efficacy of the training received. These flowcharts verified the search methods used by individual users when searching in the EDRMS. If a user demonstrated a search method they had not reported being trained in, it was still recorded that they demonstrated the search method.

The training received variable was coded using the Training Matrix SQ_4. Using the flowcharts developed for each of the 40 users from their interview and protocol analysis data, first a tick was placed against all the search methods that users reported they used or were observed using. Next, a cross was placed against the search methods users did not display. Each of the search methods listed in the Training Matrix SQ_4 was then totalled to quantify the number of users who were trained to use these search methods and the number of users who said they used, or were observed to use, these methods. Using Microsoft Excel, bar graphs were plotted from the data on the possible search methods, the training provided on different search methods and the training users reported and exhibited they received in each organisation.

4.8 Conclusion

In this chapter the case study research methodology is described and its emulation of similar research (Ellis, 1989; Meho & Tibbo, 2003) acknowledged. The study incorporates eight variables to investigate the one primary and four secondary research questions. This chapter outlines the approach taken to select the four organisations, three different types of EDRMS, four records managers and the 40 EDRMS users who participated in the study. It also describes how the semi-structured interview questions for the records managers and EDRMS users were developed, including the short questionnaire used with the EDRMS users; and how the protocol analysis was conducted with the 40 EDRMS users to observe their search behaviours when they performed their last simple and difficult searches. The chapter concludes with details of the steps taken to measure the eight variables identified in the research.

There are a number of strengths in the research methodology adopted for this research. Firstly, this is empirical research set in an office context exploring how records managers put into practice the principles outlined in ISO 15489, and how knowledge workers search and retrieve information from the EDRMS. Secondly, the case study method allowed effective triangulation of data to confirm findings from multiple sources. The use of protocol analysis enriched the data through observations of users' search behaviour, instead of simply relying on reports of their searches.

Chapter 5 will present findings on how each of the four organisations implemented the eight RM principles outlined in ISO 15489, and Chapter 6 will report on the findings which make it possible to describe the EDRMS search behaviour of the 40 users, and on how tasks and training have affected their search behaviour.

5 Results:
Organisational Records Management Strategies

5.1 Introduction

Research question SQ_1 explores EDRMS practice at an organisational level.

> *SQ_1: How have the sampled four organisations implemented records management principles and practices in the EDRMS as outlined in ISO 15489?*

This chapter analyses the responses from records managers and users on how the four sampled organisations implemented the eight pillar records management principles and practices.

5.2 Policies

The ISO 15489 standard states that records management policies set and communicate the framework in which the organisation's corporate information is managed (International Organisation for Standardisation, 2002a).

Each of the four organisations had published a records management policy that was agreed to and approved by senior management. Three of the organisations had a policy document of 3 to 5 pages; none had a specific records management policy statement.[53]

Generally, the policies of the organisations outlined the objectives and scope of the organisation's records management program. They explored how records would be created, captured, managed, protected, made accessible to authorised personnel, appraised and disposed. The legislation the organisation needed to comply with was

[53] Such as – Records are to be created, maintained and disposed of in an efficient and effective manner to ensure that the business of the organisation is appropriately documented, that information is both retrievable and protected and that records disposal is in accordance with legislative requirements (Kennedy & Schauder, 1998; Saffady, 2004; Shepherd & Yeo, 2003).

recorded. The policies further specified the recordkeeping roles and responsibilities of management, responsible officers, and the records management section.

Although none of the policies explicitly stated that the EDRMS was the corporate information repository, this message was implied in each document. Organisation A stated in the Corporate Standard for Records Management that "Organisation A uses Objective as the corporate repository to create, capture, classify, index, store and maintain all physical files, engineering drawings and electronic records".[54] Organisation B's policy document stated that business records need to be captured into the "appropriate record keeping and business systems that are managed in accordance with sound record keeping principles".[55] In similar vein, Organisation C's introduction section of the Retention and Disposition Manual stated that the EDRMS was the corporate repository. Since Organisation D adopted the National Archives of Australia's (NAA) policy as a global policy for all its agencies, and as not all agencies would be using an EDRMS as some could still be using paper based records systems, the repository was not defined explicitly. Despite this, the EDRMS was promoted and used as the corporate information repository. All four records managers pointed out that in induction and training sessions staff were told that the EDRMS was the corporate information repository. This was further evident in the EDRMS being accessible via the Intranet and on all desktops.

The policies were communicated to relevant staff through campaigns during the launch of the policies, and to new staff as part of the records management induction programs. Additionally, the records management policies were published on the corporate Intranets. In general, the records management professionals reported they believed the EDRMS was generally embraced positively by the organisation, although

[54] The citation is withheld to maintain confidentiality of the organisation for ethics reasons, and may be made available upon request.

[55] The citation is withheld to maintain confidentiality of the organisation for ethics reasons, and may be made available upon request.

they noted resistance from some users. For example, Organisation A's records manager reported sporadic use by some staff. Some engineers, for example, used the EDRMS only occasionally and were not familiar with the location of information stored in it. They used the EDRMS mainly during mission critical times when there was an outage and they needed to view the engineering drawings to get information. The records manager's awareness that not all users were actively using the EDRMS was shared by Organisation C's records manager, who commented that EDRMS usage "is getting better, slowly increasing." She added, "there is resistance from some pockets and this is mainly because people don't know how to use the system properly or because they have not set up the defaults properly to make working with the system easy." Organisation B's records manager reported that recent records management audits "indicate an increasing trend in the usage" of the EDRMS. Organisation D's records manager perceived the usage of the EDRMS in the organisation to be good, and that "having over 100,000 documents a year registered in the EDRMS is an indication of how the system is used." He added that the process and manner in which the EDRMS was introduced contributed to the usage of the system:

> It's the way we implement it: we implemented it very gradually over a long period of time and it was done on a department by department basis and we went to a great deal of effort to train our customer base to get them to appreciate the benefits of what we are doing and to get them used to actually doing it. It was an evolutionary thing, it wasn't a big bang approach. (Records Manager, Organisation D)

The main differences in the implementation of records management principles and practices between the four organisations was that Organisation D, a federal government agency, adhered to directives from the federal government, namely the

National Archives of Australia, on how records management principles and practices should be implemented. The remaining three organisations, state and local government agencies, adopted directives from their respective state records offices (SRO) on how to implement specific records management principles and practices in their organisations.

Table 5.1 provides a snapshot of the four records manager's responses to how records management policies were implemented and their perception of the usage of the EDRMS.

Table 5.1: Implementation of records management policy in sampled organisations

Organisations			
A	**B**	**C**	**D**
Q2) What is the IM/RM policy of the organisation?			
No specific policy statement but a number of bullet points make up the policy.	No specific policy statement but a 3-page policy document exists.	No specific policy statement but a policy document exists.	Adopted NAA's policy. There was a specific policy statement by NAA.
Q7) How do you perceive the usage of the EDRMS in the organisation?			
Good But not all the users were using the EDRMS actively.	Good as indicated by the recent recordkeeping audit conducted.	Moderate Usage improving but there was resistance from some users.	Good Judging by the number of items registered into the system.

The findings indicate that although senior management approved the records management policy documentation, thereby indicating their support for the implementation of the RM program, this was not sufficient to enforce users' adherence to these policies. It is notable that although the policy documentation confirmed that the EDRMS was the corporate information repository, the organisation's information culture still permitted the use of network drives for storage of corporate documents and records. In addition, responsibilities for records management stated in these policies were neither documented in employment contracts nor tracked during employees' performance appraisals. This allowed users to bypass the EDRMS and store corporate information in non-corporate information repositories. This is turn, worked against the EDRMS implementation and use.

5.3 Procedures and standards

Using the ISO 15489 Standard (International Organisation for Standardisation, 2002a, 2002b) to implement records management best practices requires organisations to have documented procedures, standards and guidelines directing how to manage the life cycle process of records received and created. The intended audience for such documentation is all employees of the organisation. However, there is also specific documentation targeted at records management staff and end users of the records management program. All four organisations had developed procedures and standards for these different groups. Table 5.2 summarises some of the questions and responses that reveal what procedures, standards and guidelines were made available to users to guide and train them in using the records management program and systems implemented.

Each organisation had developed a document such as a "records management corporate procedure manual" or "standard operating procedures for the management of electronic records in the EDRMS" aimed at describing to records management staff how various tasks and processes for managing the lifecycle of records should be performed.

Table 5.2: Implementation of records management procedures and standards targeted at users in sampled organisations

Interview Questions for Records Managers	**Organisations**			
	A	**B**	**C**	**D**
Q9) How are these procedures, standards, guidelines communicated and implemented in the organisation? Are these published on the Intranet?	Induction Road Shows Intranet	Induction Intranet Meeting with new staff at the end of their three-month probation period by Records Manager.	Induction Road Shows Intranet	Induction Intranet
Q10) Does this documentation state what records need to be captured into the EDRMS?	No	No However, there is specific documentation that states what records need to be captured by each Business Unit	No However, there is specific documentation that states what records need to be captured by each Business Unit	No
Q11) Are staff aware of what records they need to capture into the EDRMS? How is this message communicated to staff?	Yes Induction	Yes Induction + Listing prepared of the record types that have to be captured by each Business Unit.	Yes Induction + Listing prepared of the record types that have to be captured by each Business Unit.	Yes Induction
Q14) Are there standards on document titling in the EDRMS? Is this widely known by staff?	No	Yes “Record Title Conventions” handout	No	Yes “TRIM Context Help Card – Document Titling”
Q15) Do staff apply document titling standards when titling documents in the EDRMS?	No	Not always	No	No

Examples of the procedures outlined in these manuals included managing incoming and outgoing mail, registering, indexing and scanning records into the EDRMS implemented, creating paper files, processing requests for *bring-ups*, searching for information requests and applying retention periods to records. Additionally, the organisations had numerous other documentation addressing specific topics such as freedom of information, using thesauri to title records, processing ministerial records and working with retention and disposition schedules.

Comprehensive records management documentation aimed at end users of the records management program and EDRMS was observed in each organisation. Various brochures, flyers, user manuals and standards had been developed to train and provide guidance to users. This documentation defined a record, discussed the information to be created and captured into the EDRMS, and explained how information should be stored and managed in the EDRMS. A range of specific tip sheets and guides was available on topics such as configuring, registering, searching and retrieving records from the EDRMS. This documentation guided users on the characteristics of records and explained the business reasons for capturing them into the EDRMS which are critical but challenging to achieve. Organisations B and C had established specific documentation that listed record types that had to be captured by each business unit. Each organisation reported capturing email records into the EDRMS.

Each of the four organisations alerted their users to the importance of assigning meaningful document and record titling. Organisations B and D both provided record titling guidelines. Organisation B's *"Record Title Conventions"* was distributed in staff induction programs and included as a handout in the induction pack provided to new staff. Organisation D's *"TRIM Help Card – Document Titling*" was available to all users via the TRIM system, and staff were made aware of it during training sessions. Organisations A and C included guidelines on titling in their training slides,, although the records managers reported that few staff adhered to them. The subsequent interviews and protocol data confirmed that not all staff followed these standards consistently. About 27 users (67.5%) stated that their information seeking experience in the EDRMS was difficult, primarily owing to poor document titling by their colleagues or the Records Section.

The records management documentation developed for users of the program was promoted and communicated to all staff via road shows when it was initially implemented, and subsequently through induction programs for all new starters. Each organisation provided records management induction training in addition to training on the EDRMS. As part of the records management induction, staff were trained on what is a record, were made aware of their responsibilities to save records and informed that email records needed to be captured into the EDRMS. Organisation B's records manager reported meeting with new staff at the end of their three-month probation period to find out if they needed assistance with their records management responsibilities or had questions.

A review of records management documentation and induction materials confirmed that users were provided with awareness training and guidance on the concept of a record and their responsibility to save records into the EDRMS. There was also awareness in all organisations that, apart from the EDRMS (the corporate information repository), there were other information management (IM) systems implemented for capturing records and non-records apart from the EDRMS. For instance, Organisation B uses the ISYS, an approved system for storing business records such as council and committee agendas, minutes and supporting documentation (including tenders awarded).

As Table 5.2 illustrates, the records managers in each organisation had prepared and communicated to their users and records management staff the reasons for and benefits of a records management program. Assistance in the form of various guidelines was also made available to help users meaningfully title their information in the EDRMS. None of these methods was particularly successful and the effectiveness of these methods will be discussed in Chapter 7.

5.4 Metadata

Recordkeeping metadata standards provide the contextual framework for records (Cumming, 2005; Jones & Skelton, 2008; Reed, 2003). These standards specify the mandatory and optional metadata elements that need to be captured for records stored in the EDRMS. Pick lists[56] are used in some fields in the EDRMS to restrict data entry options and ensure accurate metadata are captured. As outlined in Chapter 2, the proper implementation of metadata results in "better information accessibility, maintenance of corporate memory and greater accountability in business operations", which are the objectives of record management (Cumming, 2005, p. 34). The function of metadata in facilitating efficient information search and retrieval (Cumming, 2005, p. 35) is of special interest to this research.

Table 5.3: Q16) Is there a recordkeeping metadata standard?

Organisations			
A	**B**	**C**	**D**
NSW Recordkeeping Metadata Standard (*NRKMS)* applied loosely as basis	No	Used the ISO 15489 as basis	No

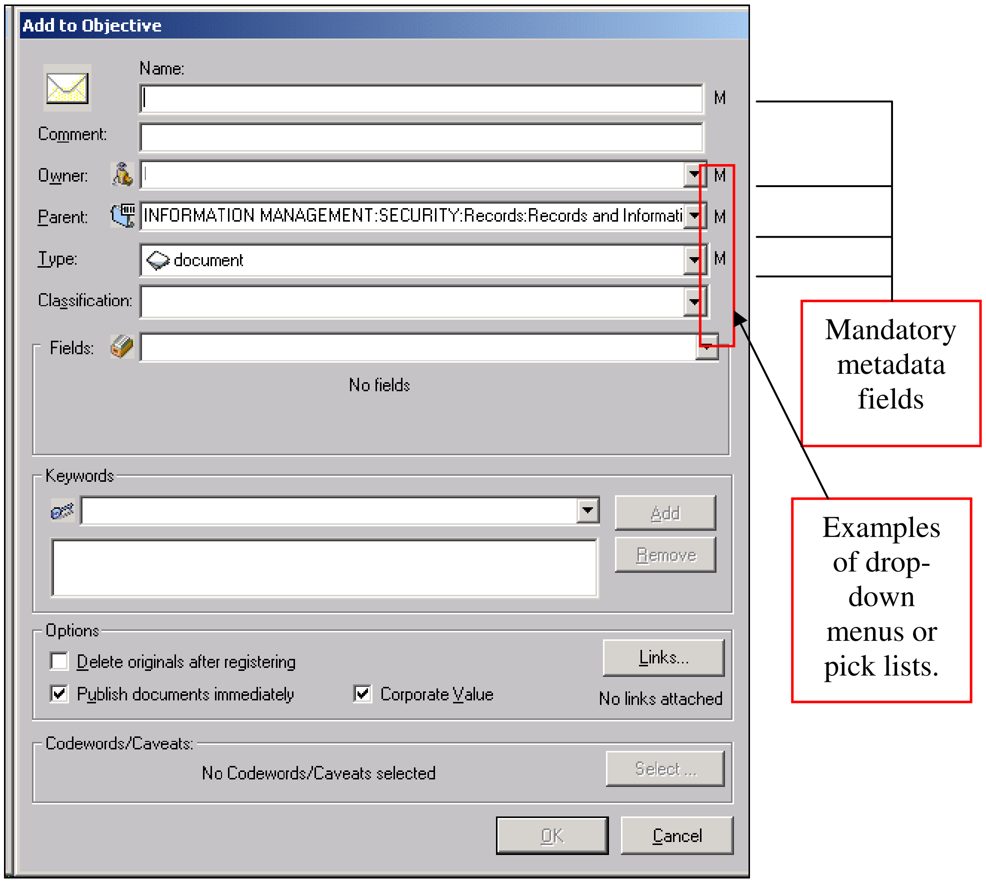
Although metadata elements were employed in all four EDRMS, none of the organisations had a written metadata standard to which they adhered, as is shown by the records managers' responses to Q16, depicted in Table 5.3. Organisation A stated that the NRKMS was "applied loosely as a basis" to develop the desired metadata.

[56] A picklist is similar to a drop-down menu in computing applications; it lists controlled data for selection by the user.

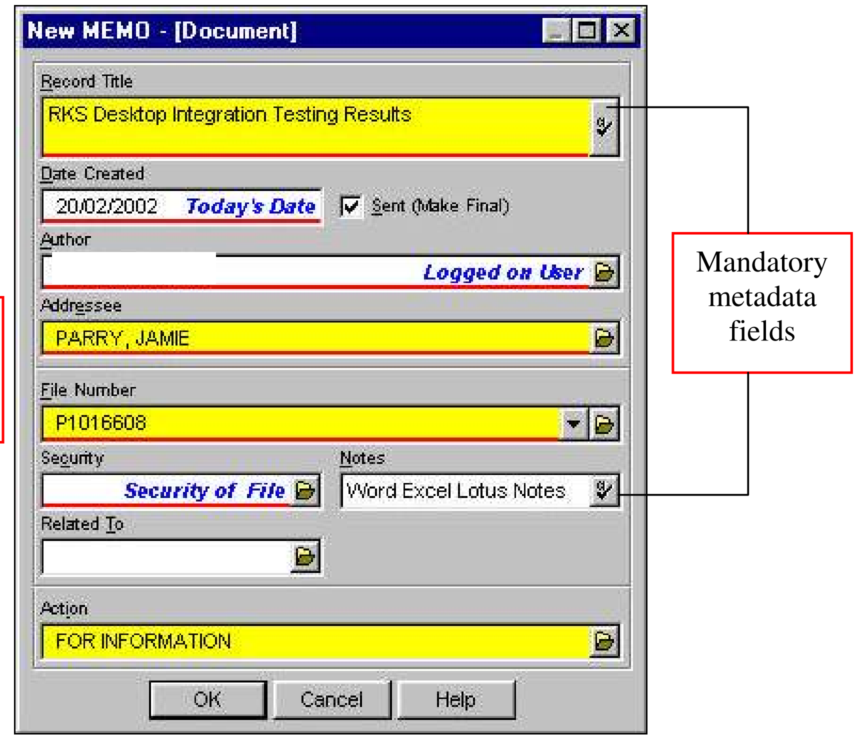
Organisation C stated the ISO15489 standard was referenced when considering metadata implementation in their program. It was observed that the records managers did not refer to existing metadata standards such as the: *NSW Recordkeeping Metadata Standard* (*NRKMS)* (State Records Authority of New South Wales, 2001b) or the National Archives' *Australian Government Recordkeeping Metadata Standard for Commonwealth Agencies* (National Archives of Australia, 1999). Given that all four organisations had implemented their EDRMS prior to 2006 it is understandable that they had not referenced *ISO 23081-1:2006 Metadata for records (Parts 1 and 2)* which was published in that year. Figure 5.1 presents screen shots of the registration screens for a particular record type in each of the organisations as examples of the types of metadata fields implemented.

Each of the organisations designed their EDRMS using multiple record types so that appropriate metadata for each record type could be captured into the EDRMS. The implementation of this design assisted users in retrieving specific records by limiting their search to a record type, then using a combination of metadata fields for that record type to conduct their search. For instance, when registering the record type *contracts*, users are required to complete metadata on the contract number, date created, supplier details, and so on. When later searching under *contracts,* these fields can be used in combination to find a specific record. Table 5.4 lists the mandatory and optional metadata elements implemented in the organisations' EDRMS.

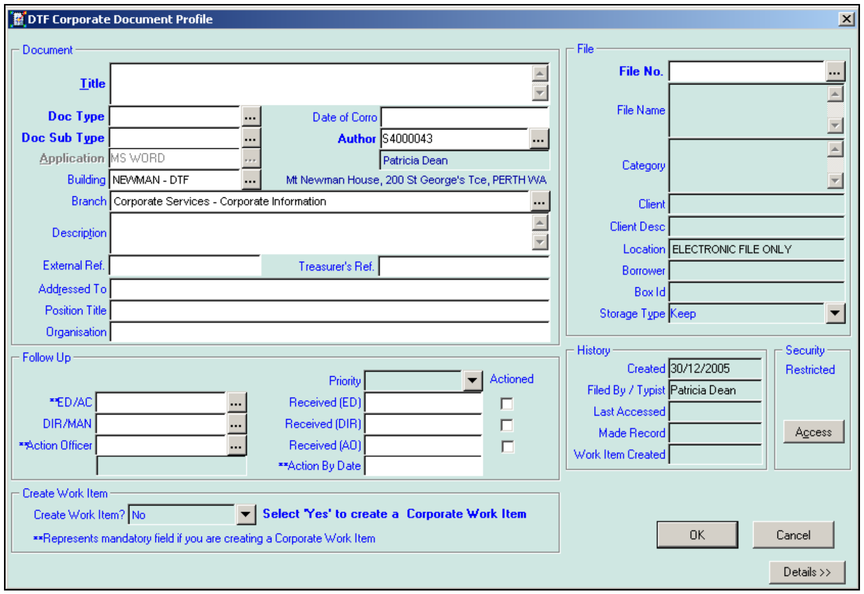
Organisation A – Email Registration Screen



Organisation B – Memo Registration Screen

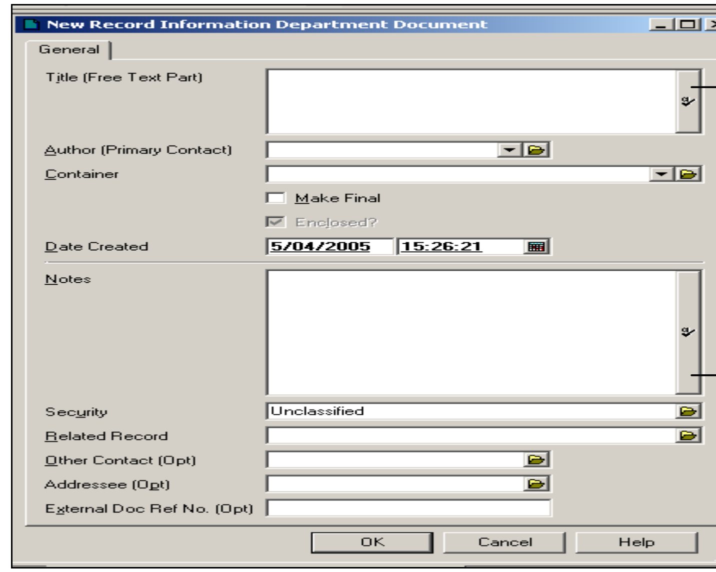


Organisation C – Corporate Document Registration Screen



Mandatory metadata fields are indicated in bold font.

Organisation D – New Record Registration Screen



Mandatory metadata fields

Figure 5.1: Basic record registration screens in the four sampled organisations

Table 5.4: Mandatory and optional metadata elements

	Organisations			
	A	**B**	**C**	**D**
Mandatory	Title Author Date File Number Record Type	Title Author Date File Number	Title Author Date File Number Doc Type Doc Sub Type	Title Author Date File Number
Optional	Notes Security Classification Keywords **Publish Document Immediately** Corporate Value	**Make Final** Addressee Notes Security Access Action Related Record	Description External Reference Number Addressed To Position Title Building Branch	**Make Final** Notes Security Classification Related Record Other Contact Addressee External Document Reference Enclosed

All the EDRMS were designed to capture a few of the mandatory metadata elements automatically: these included such items as the name of the person registering the item into the system, the registration date and the application type (MS Word, Excel, email). Additionally, these EDRMS had functions that enabled individual users to default the capture of frequently used and static metadata. For instance, Organisation C defaulted to capture the name of the typist registering the item, the name of building where the user was located and the name of the business unit (branch) the user belonged to (Figure 5.1). Similarly, the EDRMS was designed to manually capture mandatory metadata elements including title, creation date and the file number the item should be classified under. Either the user or the dedicated records staff could enter this information when registering the item.

Of the optional metadata presented in Table 5.4, the *Make Final* or *Publish Document Immediately* fields offer an indication as to whether the document is ready to become a record. For instance, a signed letter or report sent from the organisation to a third party, that has been scanned and converted into PDF format, must be marked as a final record using one of these two options.

Metadata was observed to be crucial for search and retrieval across all four organisations. This is because a successful search and retrieval is reliant upon the accuracy of metadata captured by indexers, whether users or records staff. Thirty-nine users (98%) in this research reported using metadata as the preferred search and retrieval option in the EDRMS. Although a lack of metadata can be overcome by using search strategies like browsing, navigation or full-text searching in the EDRMS, these lack the precision searching possible in a metadata-based search (Saffady, 2004, p. 194). As will be shown Chapter 6, the success of information seeking in the EDRMS is strongly dependent on indexers' diligence and accuracy when assigning metadata.

The design of the EDRMS in Organisation B did not provide a tree view of how information was organised. This hampered users' navigation as they could not map their search and retrieval options. In this organisation, metadata fields were the only options available for searching and retrieving information; consequently, the accuracy of metadata capture was of especial importance for Organisation B.

When records managers were asked *What is the reaction or feedback from EDRMS users about the need to capture metadata when registering items into the EDRMS?* (Q20), They generally responded that users found capturing metadata easy when registering their records and did not perceive any issues. Similarly, users responded that entering the mandatory metadata fields was not an issue. However, 11 users (28%) noted that when registering records the most difficult field to complete was *File Number*, which required them to nominate the electronic file into which their record would be classified. Users felt they lacked understanding of the classification scheme; some asked if this metadata field could be removed. Three users admitted taking the easy option of registering records into the EDRMS by classifying their records into *recently used folders,* displayed in the pick list. For instance, one professional user, P38, commented, “I don’t (search for folders or containers) any more. I just use the ones that I use all the time”. Another professional user, P24 remarked that his colleagues did not file information for a particular government agency by different business functions, but picked one business function and filed all information regarding the agency into that one folder in the EDRMS:

> Analysts are not, if they do work for a particular agency, they are not filing it by whether it’s ADVICE agency, whether it’s BUDGET agency, whether it’s CAPITAL WORKS, OPERATING EXPENSES agency? They tend to just pick one area, maybe ADVICE and put even the BUDGET there? (Administrative Personnel, P24)

Another user explained:

> Look, the most difficult is not so much searching for information, it’s again going back to just trying to find the right file to put it on. Sometimes it’s relatively easy, other times, as I say, it can be painful and difficult, and again there has been more than one occasion where there’s just, it just doesn’t quite fit the File Plan, and you say, oh, no, this is, you’ve got to add something or something, or you’ll put it somewhere where it looks like it will fit, knowing full well if you don’t find this thing in the future, you’re going to struggle, but you just sort of hope it’s never, you never have to come back to it. (Professional, P22)

These comments verify the difficulty users have in identifying where to file their corporate information because of ambiguity in the classification scheme and their lack of understanding about how it works.

5.5 Business classification schemes / thesauri

Corporate business classification schemes are implemented to enable consistent grouping of an organisation's related records by business function, activity and subject. These schemes, or thesauri, are uploaded into the EDRMS to enable accurate classification of the registered documents and records. Table 5.5 provides a snapshot of the business classification schemes implemented in each organisation.

Table 5.5: Business classification schemes implementation in sampled organisations

Organisations			
A	**B**	**C**	**D**
Q22) Describe the classification scheme.			
KAAA	KFC	KAAA	KAAA (Commonwealth version)
Q23) How many layers does the classification scheme go to?			
First 3 levels controlled 4th level optional & is the Free Text	1st & 2nd levels controlled 3rd level optional	1st & 2nd levels controlled 3rd & 4th levels optional	First 3 levels controlled 4th level optional & is the Free Text

Three of the four organisations had implemented the Keyword AAA (Accuracy, Accessibility, and Accountability; KAAA) thesaurus developed in 1995 by the State Records Office of New South Wales (NSW). Organisation B used the Keyword for Councils (KFC), a version of KAAA adapted for local government councils. Like the KAAA, the KFC is a thesaurus designed for use in classifying, titling and indexing all council records in all technological environments (State Records New South Wales, n.d.).

All records managers reported engaging their users during the development of the thesauri. Organisations A and C hired consultants to develop their functional thesauri. These consultants worked with users via interviews and workshop sessions to gain their input. Organisation C had a dedicated project team for a full year to develop the thesaurus. Organisation D's records manager, when asked *Q24), Were users engaged in the development of the classification scheme?* responded,

> Most definitely, at great length in one case. In one policy area it took a year to develop the classification plan, and that involved people agreeing on definitions and there're all sorts of bun fights in relation to what particular terms mean.

All organisations implemented four levels of classification hierarchy in the thesaurus by Function – Activity – Subject – Free Text. Organisations A and D controlled the first three levels, whilst Organisations B and C controlled the first two levels of the classification hierarchy.

Table 5.6 provides a snapshot of how the classification schemes were displayed and made accessible to EDRMS users in the organisations.

Table 5.6: Display and accessibility of classification schemes in the EDRMS

Organisations			
A	**B**	**C**	**D**
Tree view + Drop Down Menu + Thesaurus View (integration to a.k.a. via EDRMS)	Drop Down Menu + Thesaurus View (integration to TRIM thesaurus module)	Tree view via the File Plan + Drop Down Menu + Thesaurus View (integration to a.k.a. via Intranet)	Tree view via TRIM Record Classification + Drop Down Menu

In Organisations B and D the functional KAAA thesauri were uploaded using the thesaurus modules built into the EDRMS. In Organisations A and C the thesauri were uploaded using third party software.[57] In Organisation A, the thesaurus was integrated with the EDRMS, whilst in Organisation C it was not: users had to access it outside the EDRMS, via the Intranet.

In Organisations A, C and D it was possible to view and access the classification scheme in the EDRMS via the tree view, enabling users to search by navigation to view the contents classified together. Only a thesaurus and not a classification scheme was implemented in Organisation B, so the thesaurus could only be viewed using the drop down menu in the EDRMS. The scheme could not be viewed in a tree view, and navigation by classification scheme was not possible.

Table 5.7 provides a snapshot of the training provided to users on the classification scheme, and how the records managers perceived users' acceptance of the schemes.

Table 5.7: Training and user feedback on usage of classification schemes

Organisations			
A	**B**	**C**	**D**
Q25) What training on the usage of the classification schema did users receive?			
Training not provided Only the Records Coordinators are trained	Training not provided	Brief training during 1hour RM induction	Brief training during 1.5 hours TRIM induction
Q26) What is the general feedback or acceptance of the classification schema from EDRMS users?			
None from users	Users do not search using KFC. When new file requests are made only the Free Text part of the file is referred to by users	Users not interested in scheme; they only want to know the File Number	Question not answered. Interviews with users indicated lack of understanding on how scheme works

[57] Referred to as a.k.a.® Classification Software by Synercon Management Consulting Pty Ltd.

Records managers from Organisations A and B responded that users were not provided with training on the RM classification scheme or thesaurus. Both Organisations C and D reported providing brief training on the scheme and thesaurus as part of users' records management induction. In Organisation D, a TRIM help card on how to search using the classification scheme was made available to users, but was neither promoted nor incorporated into training sessions. The records managers felt that training users in the use of the classification scheme was not necessary, providing various reasons:

1) the classification scheme is a RM tool to group records for destruction, something that users are not interested in knowing about;

2) users only want to know the file number into which they should be filing their information and are not interested in gaining an understanding of the classification scheme;

3) users only search using the metadata fields, not the classification scheme; and

4) users are aware of the Free Text part of the classification scheme, and these are the terms they are likely to use when searching.

These findings, indicated diagrammatically in Figure 5.2, explain the search tools users (knowledge workers) and RM professionals have at their disposal for information seeking in the EDRMS. It shows how users only have one search and retrieval tool made available to them – that is, metadata. In comparison, RM professionals have both metadata and the classification scheme at their service.

All four records managers indicated that they did not perceive the classification scheme as a tool to organise and group similar information, to link interdisciplinary records to enable sharing of information within the organisation or to provide improved

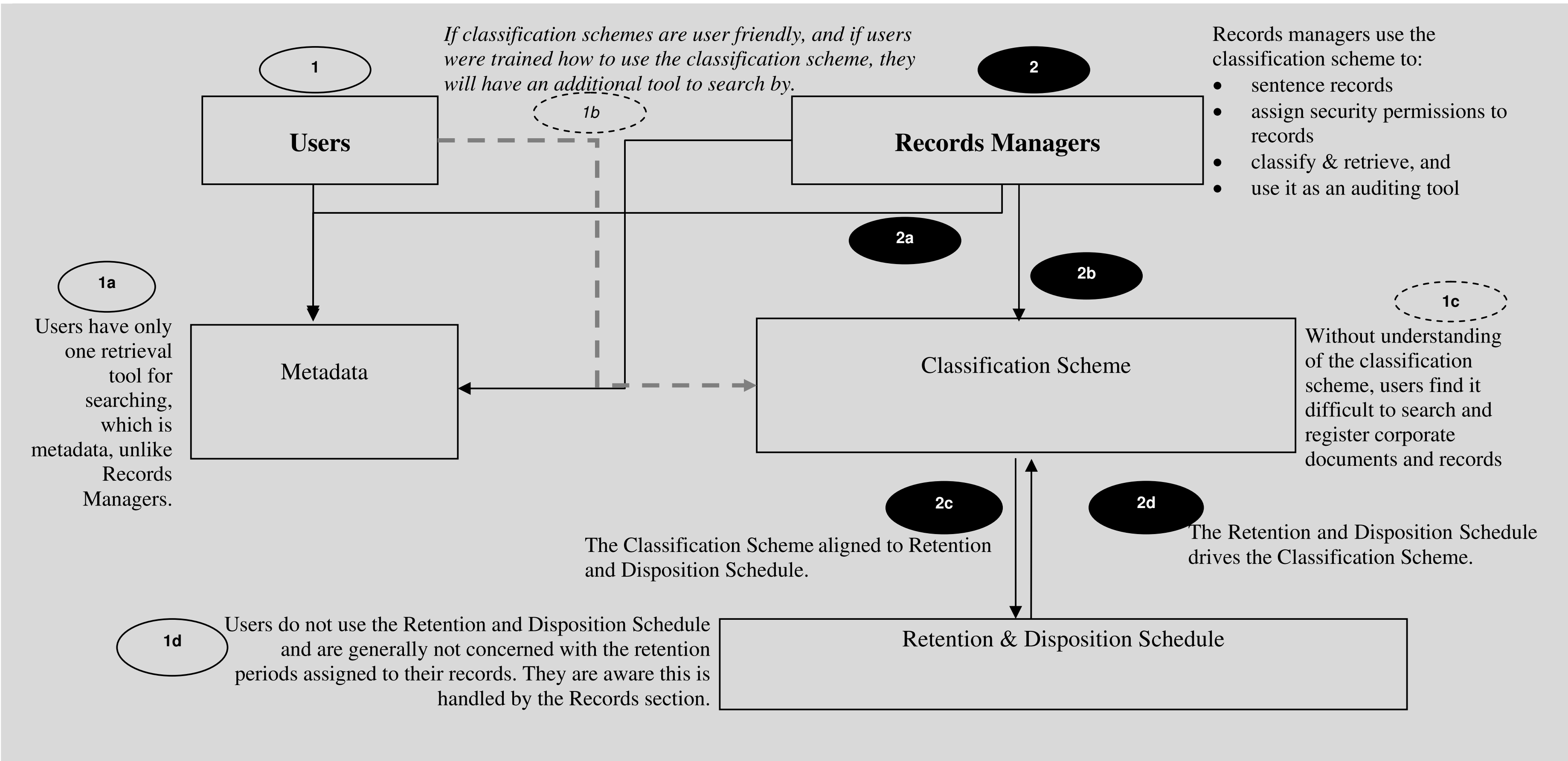


Figure 5.2: Usage of search and retrieval tools available to users and records managers

access, retrieval, and use of records in the organisation, all mentioned in Section 4.2.2 of ISO 15489-2 (International Organisation for Standardisation, 2002a). Exon (1997) points out that the "major purpose of a thesaurus has always been as an aid to efficient retrieval" (p. 19). Although in all four organisations the thesaurus and classification scheme were implemented in the EDRMS in compliance with records management principles and practices, training on how to use it was provided to users in only one. Users had little exposure to using these sources for search and retrieval in the EDRMS.

Even though Organisation C provided training, users still found it hard to comprehend the logic used to classify information. Various comments from Organisation C's users verify their views and work experience using the KAAA classification scheme:

> Cumbersome, unclear to the novice, complex when it could be much simpler. (Administrative Personnel, P21)

> I kind of, I don't know, I neither like it nor dislike it in the sense of it's a Classification system … I don't find it intuitive but I guess I've grown to accept that it must have some sort of logic. (Professional, P23)

> I mean it's Keyword AAA, which I don't know if it's one of the great classification schemes that are around, but it makes sense I think to the person that put it together. Sometimes it doesn't really make sense to me. (Professional, P22)

> Look, I can understand the logic, I guess it's different to how we used to file things, and there are occasions where putting stuff on particular files doesn't seem logical in EDRMS of how the structure's been arrived at. And also there

> are situations where stuff doesn't quite fit and you're almost, you try and find EDRMS that are close to what you think is the right term, and you put stuff there**.** And again, you know, there is the concern that you know, its fine today probably fine in a week, but in 12 months' time if you had to find the same document, you may struggle. Look, again, you can always search on the document title if you can remember a particular term that related to the document, but if you knew not a lot, and you know, sometimes you might, I think you might struggle to find particular things. (Professional, P22)

> I know there might be an article in *The West Australian* about the prices of land increasing, this sort of thing, do you put it under *valuer general*, do you put it under *land tax*, do you put it under *advice*, do you put it under *media*? … And you know, depending on what perspective you're approaching it from I might look at it from a different perspective as someone else but we could possibly both be right, you know what I mean. (Professional, P25)

The thesaurus module was integrated in the EDRMS for three of these organisations. However, they did not promote it, and no organisation promoted the classification scheme as a search and retrieval tool. Users relied heavily on metadata for searching, but this is not always the most effective or efficient method. When using metadata, successful retrievals are dependent on the user having accurate knowledge of the metadata terms for the information being sought, which is not always possible. This perhaps explains why only 27 users (68%) relied on searching by the document or record title metadata field. It also explains users' frustration when documents and records were not titled meaningfully:

> Searching for other people's documents. … Because they don't title them correctly. … So brief titles, abbreviations, just titles that I wouldn't call something, so I find it hard to find others. (Professional, P36)

> People haven't put the right information in the Title Word. That they've used acronyms, or they've used their interpretation of what it is. They haven't, they've omitted information. A good example of that is that I've just recently been given access to search for some of these electronic, the scanning of bills that I get, but they haven't put the account number in the search, so I can't search on the account number. So it's usually the information in which it was recorded was poorly, inconsistent. (Professional, P38)

> People aren't consistent in their titling, nor are they thoughtful in their titling. I don't believe that they give it enough thought and don't use the principle that in ten years' time when this is no longer current nor relevant in the workplace will somebody be able to find this by the title that I've described. (Administrative Personnel, P34)

As Figure 5.2 indicates, classification schemes were aligned to the Retention and Disposition Schedule, so the retention periods of records came to determine how records were classified and how the classification scheme was ordered. This approach can lead to classification schemes that fragment the grouping of records by retention periods, using the activity descriptors in KAAA and KFC, instead of grouping like records by subject. This approach can make the classification scheme less intuitive for users. Working with the classification scheme was the least preferred search option of EDRMS users:

> the classification structure is probably one of the last ways I'd use of finding things. As I said before you know, going to that File Plan, tree structure to find things, I'd use that after I've tried a couple of other different ways of finding things. (Professional, P23)

Such reluctance may be attributed to a lack of awareness.

The comments above indicate that users would benefit from greater awareness of the classification scheme, not only for searching information in the EDRMS but also for registering information. During the registration process, users have to decide where they are going to file their records. If they lack an understanding of the classification scheme they may misclassify records, as reported in Section 5.4. This leads to difficulties or even failures when seeking to retrieve information later.

5.6 Retention and disposition schedule

Failure to understand the classification system opens the way to misclassification, and perhaps the premature destruction of records. Table 5.8 provides a snapshot of the retention and disposition schedules implemented in the records management programs and EDRMS to sentence corporate records for disposal or archival purposes.

Table 5.8: Retention schedules implemented in sampled organisations

Organisations			
A	**B**	**C**	**D**
General Disposal Authorities by SRO + Functional Retention & Disposal Schedule	General Disposal Authorities by SRO + Functional Retention & Disposal Schedule	General Disposal Authorities by SRO + Functional Retention & Disposal Schedule	Administrative Functions Disposal Authority (AFDA)

Each organisation had developed, approved and implemented corporate retention and disposal schedules to sentence records stored in the EDRMS. The General Disposal Authority (GDA) schedules applicable to the organisation's jurisdiction and functional retention schedules were approved by their State Records Office before being implemented. Retention periods are assigned at a folder level: when a new folder is created, this retention period is cascaded to all the contents filed within it. The same applies to contents filed in paper files. The four records managers reported that records stored in the EDRMS had not been moved to near line or offline storage at that time.

Thirty-eight users (95%) stated that they were not interested in the retention periods for records when seeking information in the EDRMS. They were satisfied with knowing that retention periods existed, and that they would be consulted by the Records Section prior to the destruction of a record. Two of the 40 users stated that the retention period was important to them, as they handled sensitive information that needed to be retained for a longer than usual period of time. In addition, they usually searched for historical information and needed assurance that such information would be retained for a long time. These two users stated that they checked the retention periods assigned to some records whilst seeking information in the EDRMS.

5.7 Security

Security permissions are set on records to ensure access to authorised personnel and to protect records. These measures ensure the integrity and security of the organisation's corporate records.

Table 5.9 lists responses from the records managers on how security models or parameter settings were implemented in the EDRMS.

Table 5.9: Implementation of security model in sampled organisations

Organisations			
A	**B**	**C**	**D**
Access by users & groups. Possible to grant access at document level.	Different layers of security applied, from users & groups, caveats, levels.	Access by users & groups. Possible to grant access at document level.	Different layers of security applied, from users & groups, caveats, record types, doc types, etc.

Each organisation had comprehensive security models implemented in their EDRMS. Apart from Organisation B, their security model was not documented. The common security model of granting access by *user and group* parameters was implemented across each organisation. This model ensured access was granted to users belonging to a particular group only. Access was designed to be granted at individual document/record and folder levels in all organisations. Additional security was in place to ensure that information stored in the EDRMS could be deleted only by authorised staff in the Records Section and not by general personnel.

Organisations B and D implemented HP TRIM as their EDRMS, thus allowing for multiple security settings. In addition to the *user and group* security parameters, four additional security settings relating to levels, caveats, record type and document type were implemented. Record and document type security parameters operate similarly. Record type or document type security was applied at the respective level. Each business unit was assigned its own record or document types, which were restricted to members within the business unit. For instance, personnel record type and document type could be created and accessed by the human resources business unit only.

Organisations B and D applied two extra, related mechanisms: security levels and security caveats. Examples of security levels (L) are: L1) Public; L2) Restricted; L3) Confidential; L4) Highly confidential; and L5) Sensitive. These levels are hierarchical, with each level building on the next. Users or groups are assigned to each of these security levels: staff with level 4 access, for instance, has access to levels 1, 2 and 3, but not to level 5.

Each user is assigned a security level and made a member of one or more security caveats according to their position in the organisational structure and their need for information access: examples of security caveats are *Personnel* and *Health*. Each record is registered at a security level commensurate with the level of confidentiality of the record, and security caveats according to the subject and sensitivity of the record might also be attached. The dual application of security levels and security caveats to both system users and records protects access to confidential information in the EDRMS.

Three of the records managers considered that their users understood how the security settings were implemented in the EDRMS. The fourth records manager, however, commented that users did not really understand how the model worked, but had a general understanding that they had access to information that belonged to their immediate Business Units and the projects or committees with which they were involved. Interviews and observations with users confirmed the latter view across the four organisations: there was little general understanding on how security settings using caveats, levels, record type or document type worked.

5.8 Training

The records managers provided training to their employees either as part of the EDRMS implementation or via induction. Records managers of Organisations A, B and D reported that as part of the EDRMS implementation process, training was conducted on EDRMS functionalities in presentation styles using screen shots of the functionalities. In Organisation C, the records manager reported that hands-on training with access to computers, in classroom style, was delivered during implementation itself. The records managers reported that the training provided by them during the EDRMS implementation to employees was generic rather than targeted at individual business groups within the organisation. Logistically, this is an understandable approach during implementation of the EDRMS organisation-wide.

Table 5.10 outlines the training and awareness raising programs provided to new employees as part of the sampled organisation's induction program.

Table 5.10: Training provided to knowledge workers in sampled organisations

Organisations			
A	**B**	**C**	**D**
2.5hrs RM Training + 1/2 day EDRMS Training	2hrs RM Training + 1hr EDRMS Training	1hr RM Training + 4.5hrs EDRMS Training	1.5 to 2 hrs of both RM and EDRMS Training + Followed by 1-on-1 training at individual user's desk

Both RM and EDRMS training was provided to knowledge workers in the sampled organisations to equip them with skills to perform their roles as recordkeepers working with these systems. The duration of the training varied between organisations, from two to five hours. Organisations A, B and C provided the EDRMS training through face-to-face, hands-on training sessions in classroom-style settings, with users having access to individual personal computers. Organisation B used screen shots of the EDRMS instead of hands-on training. Organisation A's records manager reported work was in progress to replace face-to-face training programs to induct new staff on both RM and EDRMS with online training systems accessible from its Intranet.

The content of training on EDRMS varied slightly, as each organisation trained its users in the search methods they determined most essential for both user and organisation.[58] The EDRMS training programs covered a range of topics including configuring the EDRMS, registering documents via check-in/check-out functions, workflow processes, searching and working generally with the EDRMS.

Training for employees on record management concepts as part of the EDRMS implementation was provided by each of the four organisations and continued as part of their staff induction programs. Reasons for and benefits of the records management program and EDRMS implemented in the organisation were covered. Key concepts such as what is a record were also addressed. Only Organisation C's records manager reported that training on the file plan implemented in the EDRMS was provided to users; but this was brief, and there was no training on the thesaurus itself. This training was aimed at assisting users with requests for new electronic or paper files.

None of the organisations promoted or provided training on the use of the classification scheme or the thesaurus for searching and retrieving information from the EDRMS. Nor was training specifically targeted at senior management to create awareness of their legal custodian responsibilities in RM provided (McLeod et al., 2004, p. 3).

5.9 Monitoring and auditing

Table 5.11 presents responses from the records managers on how they monitored and audited the effectiveness of the records management program and EDRMS implemented in their organisations.

The sampled organisations had monitoring and auditing processes in place to ensure the records management strategies established were followed and met the business requirements of the organisation. Monitoring in the form of quality assurance (QA) checks were reported by Organisations A, C and D. Organisation B reported that

[58] Individual training provided on search methods by each organisation is described later in Chapter 6.

records management audits of two Business Units were conducted annually; "These audits would rotate through each unit at least once during a five year period".[59] Organisation D had a dedicated Quality Assurance Team of two staff members as part of the Records Section; they performed QA checks on a daily basis on both paper and electronic records. In Organisations A and C, the Records Section shared tasks on QA activities; no staff were specifically assigned these tasks.

Table 5.11: Monitoring and auditing of records management practices in sampled organisations

Organisations			
A	**B**	**C**	**D**
Q44) How are the organisation's IM/RM practices monitored and audited?			
A few levels of QA performed by archivists, system administrator, record coordinators & records manager.	6-monthly internal records management audit of 2 Business Units performed by records manager.	QA performed by Records Section & Team Leaders in Business Units.	Quality Assurance Team which was part of the Records Section performs QA on daily basis.
Q47) What steps have been taken in the past to remedy inefficient practices?			
Email notification sent to user informing them of the changes or QA performed to create awareness of where mistakes occurred for prevention in future. As part of the QA process the corrections are performed.	Audit Action List is prepared & followed up until business unit remediates. Then unit manager or CEO notified for action.	Records section informs Team Leaders & users to take remedial actions.	Records section informs Business Units to take remedial actions. If this fails, the internal Audit & Risk Management Teams are notified.

Examples of the QA checks performed in the EDRMS include the titling of records, the scope of corporate documents and records captured into the EDRMS, the

[59] The citation is withheld to maintain confidentiality of the organisation for ethics reasons, and may be made available upon request.

correct classification of records, the frequency of security breaches and the effective use of the EDRMS.

In Organisations A, C and D, where QA checks were performed regularly, misclassification or inappropriate document titling were followed up for remediation. If users did not adhere to the remediation actions, the situation escalated to their line managers for action. In Organisation D, if this failed the issue was flagged to the Audit and Risk Management Team for follow-up, whilst Organisation B reported to the Chief Executive Officer.

All four organisations had implemented various performance indicators to monitor the use and performance of their records management program and EDRMS. Examples of the types of statistics gathered included the number of electronic records registered per business unit a daily, weekly and monthly, the use of electronic versus paper based files by business unit, the number of new files created per keyword and the percentage of new staff attending records management training inductions.

5.10 System design functionalities of the EDRMS

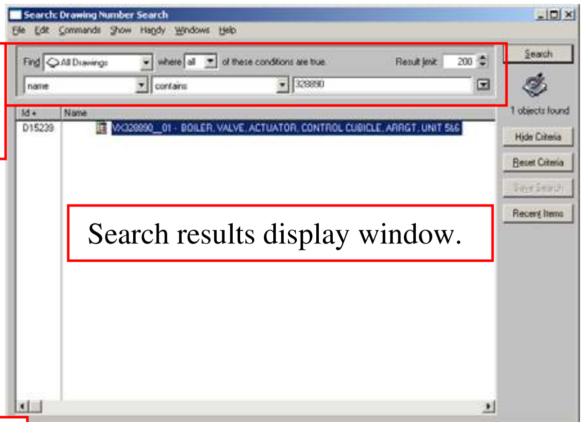
While three different types of EDRMS were implemented in the four organisations, all four systems had the generic EDRMS functionalities described in Table 2.6. The search methods described in Table 2.7 were implemented in all four organisations' EDRMS. However, navigation was not a search option in Organisation B because of the EDRMS design, which is explained later. All four organisations' EDRMS maintained a history log of recent search terms entered by individual users.

HP TRIM was implemented in Organisations B and D, whilst Objective and e-Docs were implemented in Organisations A and C respectively (Table 4.3). Three of these organisations had designed their EDRMS with both a tree view and a virtual database view. Figure 5.3 presents the search screens available to users.

Organisation A

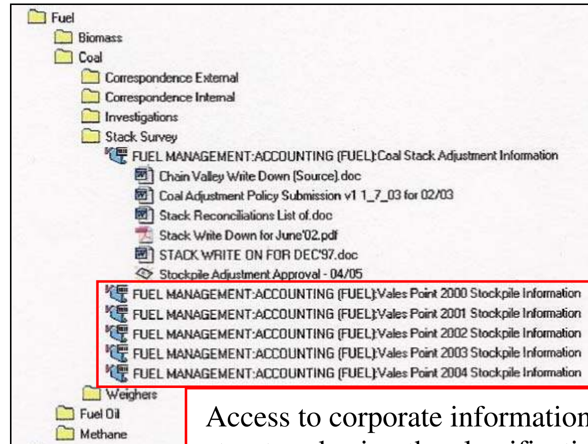
Virtual Database View

Search formulation window.



Search results display window.

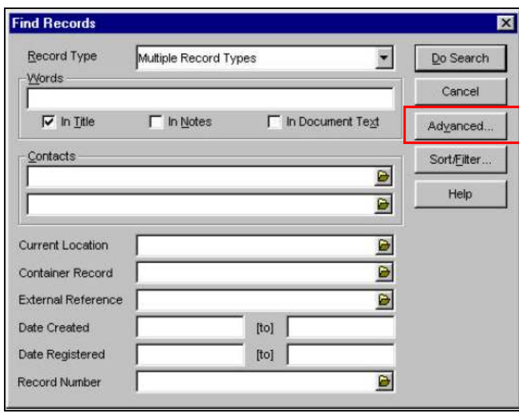
Tree Folder Structure View



Access to corporate information structured using the classification scheme by Function – Activity – Subject.

Organisation B

Basic search screen designed to enable frequently used searches. Using the different metadata fields allow easy combination of any search criteria.



The 'advanced' button provides access to advanced search options which offer a greater number of search options and has a better flexible interface.

Not implemented

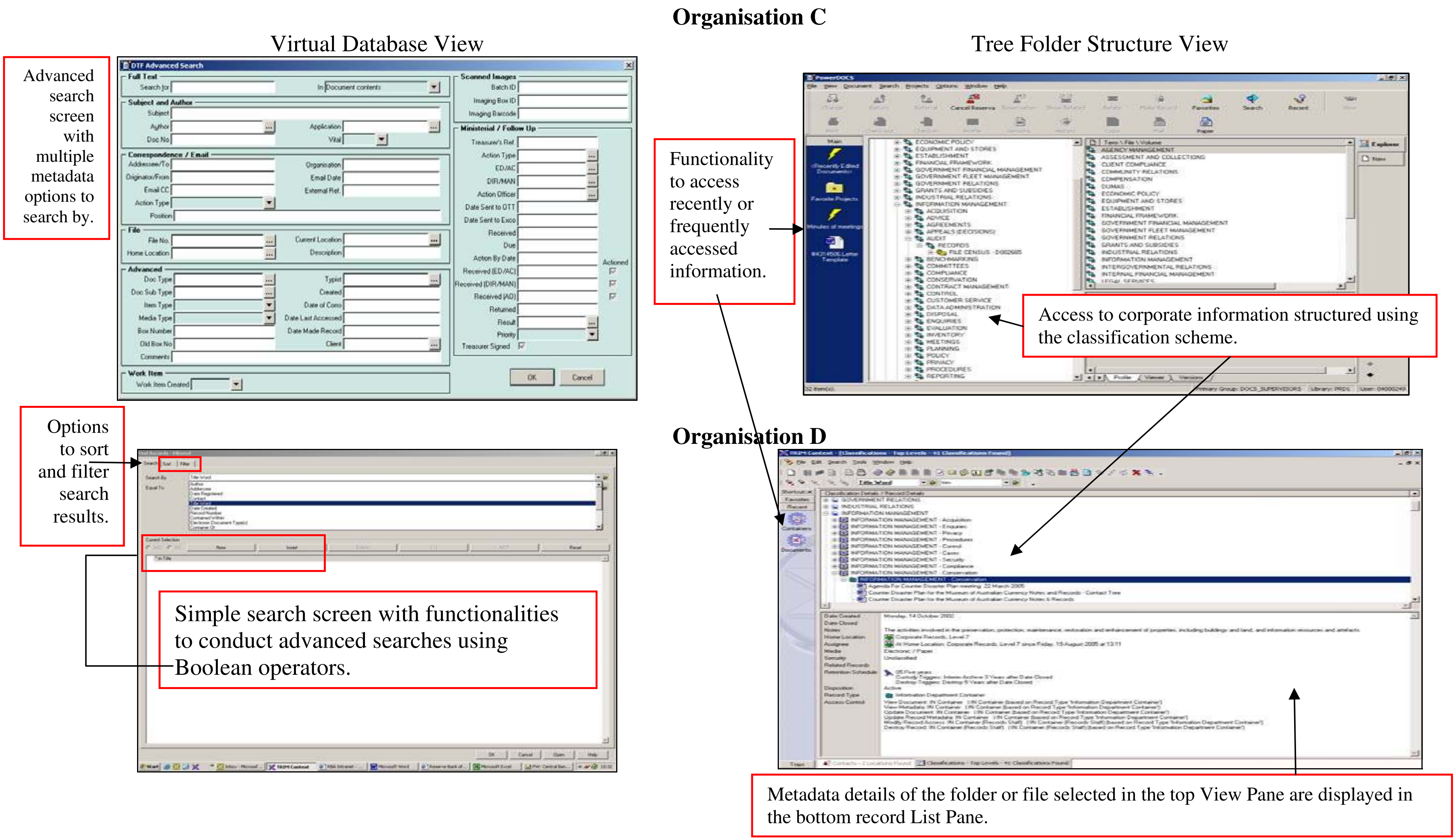


Figure 5.3: Screen shots of the EDRMS search screens implemented in the sampled four organisations

5.11 Conclusion

Findings on the ways in which the sampled organisations had implemented the eight pillar records management principles outlined in ISO 15489 indicate that the records managers had generally implemented them all. However, although records management policies and procedures were in place and were endorsed by management, the organisational culture did not enforce effective adherence to these records management practices. For instance, network drives were not made *read only* or restricted to enforce capturing corporate documents and records into the EDRMS, the specified corporate information repository. Nor were the records management responsibilities of management and employees were specified in their employment contracts or performance appraisals. Not all employees had changed their work behaviours to embrace good records management practices. This led to an organisational culture where not everyone was using the EDRMS as the corporate information repository. Consequently, work productivity levels were affected when searching in the EDRMS. Better acceptance and adoption of these principles may be possible in organisational cultures where senior management lead by example, exhibiting the desired records management practices and behaviours. The findings of this study highlight areas where records managers could improve RM practices, such as in the implementation of metadata capture, better use of the classification scheme, and user training, all of which will be discussed in detail in Chapter 7.

The next chapter reports on the search behaviour of the 40 EDRMS users and how search task, task knowledge and training affected their search behaviour.

6 Results:
EDRMS Search Behaviour

6.1 Introduction

Focusing on the seven distinctive EDRMS search processes and activities previously hypothesised in Chapter 3, this chapter reports research findings on the search behaviour of EDRMS users. The differences between the simple and difficult searches users demonstrated during the protocol analysis are described and explained, along with the characteristics of the search tasks and task knowledge that were reported and observed during the protocol analysis. This chapter also reports findings on how search tasks, task knowledge and training affect EDRMS users' search behaviours.

6.2 Individual EDRMS search behaviour

Individual EDRMS search behaviour, defined in Chapter 3 as the primary activities the individual user prefers to engage in when searching and retrieving information from the EDRMS, reflects the preferred approach of individual users engaged in a search as well as the search methods they have learnt in training. Individual EDRMS search behaviour may also be influenced by experience with other information systems, the use of EDRMS in previous jobs, or using search engines such as Google to search the Internet or Intranet. However, this observation could not be affirmed through the extracted literature. Individual EDRMS search behaviour may also be a result of the training provided to the user on induction or of training provided on EDRMS in other organisations.

Based on users' self-reports at the interviews, individual EDRMS search behaviour is influenced by information search processes and activities (Figure 6.1).

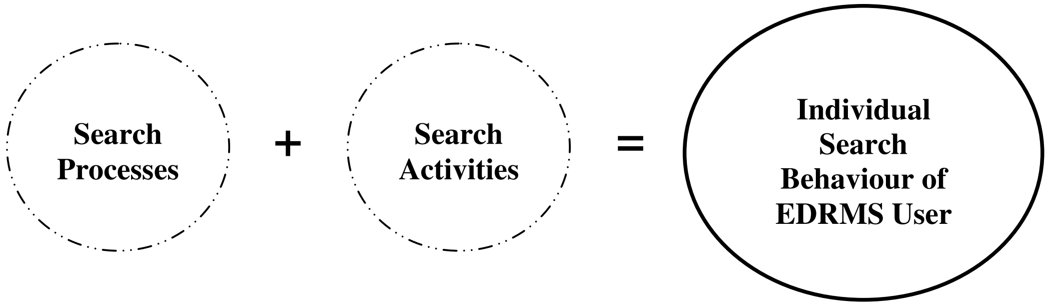


Figure 6.1: Individual EDRMS search behaviour comprises search processes and activities

Search processes reflect the seven stages of the EDRMS search model, from start to when end of a search. Search activities encompass the various information seeking activities users engage in, such as how they formulate their search strategies (navigate, metadata search) evaluate their search results (sort, filter, refine), and decide to do when they stop their search.

6.3 EDRMS search behaviour model

As noted in Chapter 4, each individual user was asked to describe their preferred individual EDRMS search behaviour: their self-reported search behaviour. These reports form the basis of the search behaviour of EDRMS users presented in Figure 6.2.

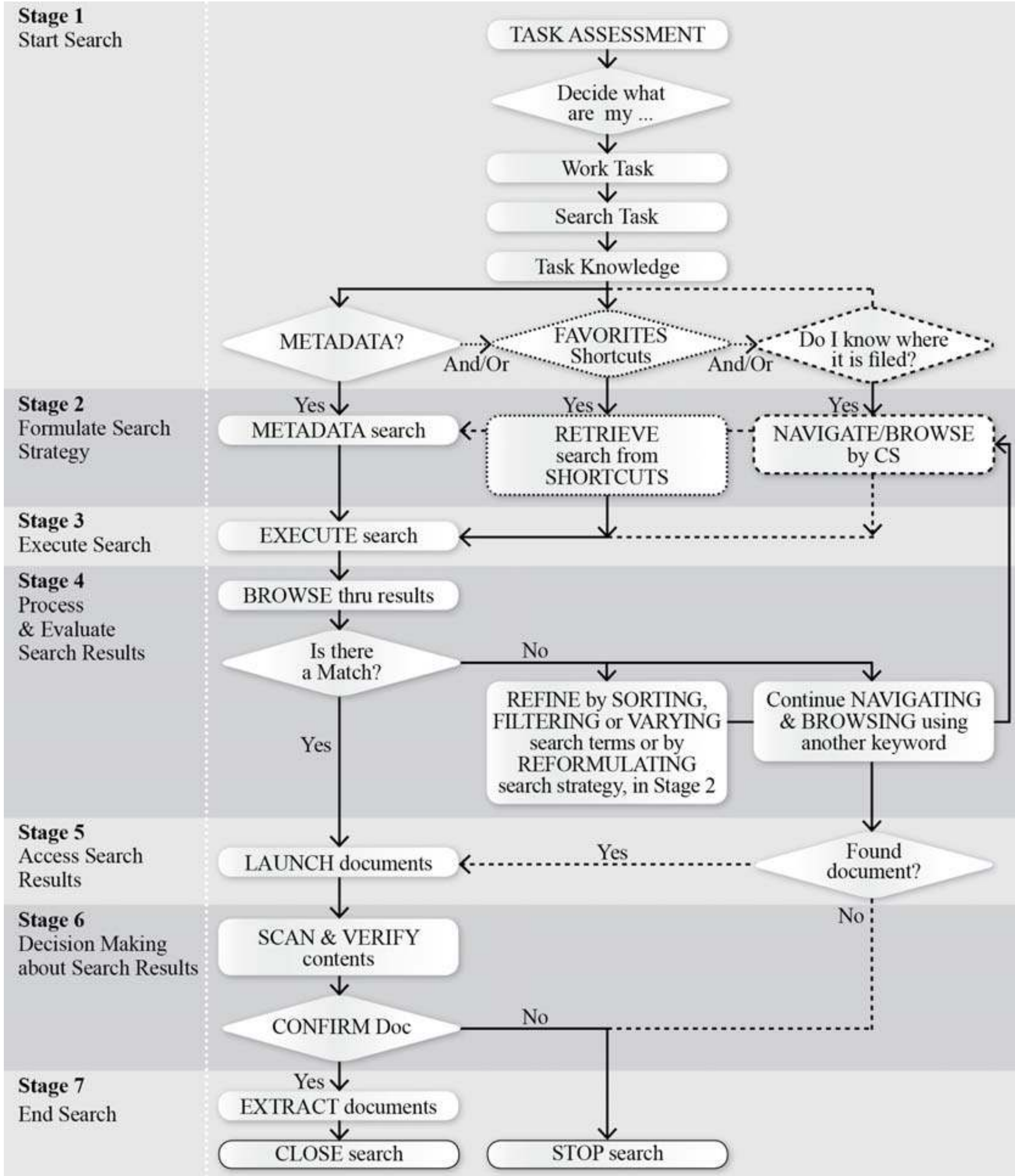


Figure 6.2: EDRMS search behaviour model derived from users' self-reported data

All 40 EDRMS users reported performing a linear sequence of search processes from the time they started a search to when they ended it (Figure 6.2). These conformed to seven stages:

Stage 1: Start Search;

Stage 2: Formulate Search Strategy;

Stage 3: Execute Search;

Stage 4: Process and Evaluate Search Results;

Stage 5: Access Search Results;

Stage 6: Decision Making about Search Results; and

Stage 7: End Search.

The search process Stages 1 to 7, as well as the search activities presented in each stage, was confirmed by the self-reported patterns disclosed during the interviews (see Figure 4.2 in Chapter 4). Figure 6.2 is an aggregate[60] of all 40 self-reported flowcharts developed from users' descriptions of their EDRMS search behaviours, gathered during the interviews.

The following paragraphs describe EDRMS users' reported search behaviour from the interviews in each stage of their information search process. A summary is presented in Figure 6.2.

6.3.1 Stage 1: Start Search

All 40 users reported they searched the EDRMS because they had a **work task** that required information from the EDRMS to complete it. These users were observed **starting** their search by conducting a **task assessment**[61] activity, where they clarified the **work task** and identified their **search task**, by which they confirmed their **task knowledge**. If their subsequent **task assessment** led them to conclude their information need[62] (Wilson, 2005) could not be satisfied with their existing state of knowledge, this

[60] The self-reported flowcharts for all 10 users in the same organisation were first mapped onto a single flowchart. This aggregated measure was performed by visual comparison of each of the 10 self-reported flowcharts observing for similarities and differences in search behaviour from one flowchart to the other. These steps were repeated to aggregate the EDRMS search model for each of the four organisations.

[61] EDRMS users' task assessment resonates with Wood's (1986) component task complexity as users juggle the different cues from their work task, search task and task knowledge to start their search.

[62] See Chapter 3, footnote 31 for definition.

initiated a search in the EDRMS to fill the information gap[63] (Dervin, 1992b) or "anomalous state of knowledge"[64] (Belkin, 1980). As hypothesised, a user's **work task**, **search task** and **task knowledge** together triggered the **start** of a search process in the EDRMS in Stage 1 (Figure 6.3) (Bystrom, 1999, 2002, 2005; Bystrom & Hansen, 2005; Bystrom & Jarvelin, 1995; Hackos & Redish, 1998; Hansen, 2005; Vakkari, 1999, 2003).

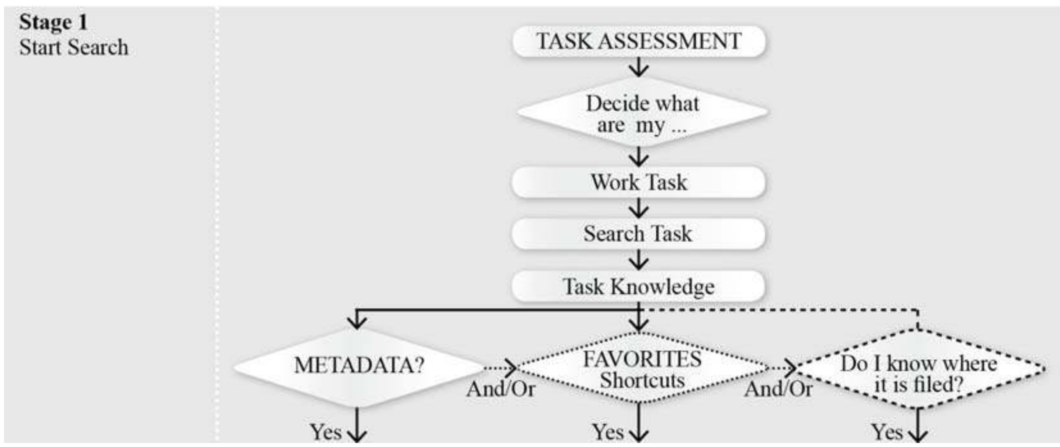


Figure 6.3: Stage 1: Start Search

Each user's **work task** generated their **search task**. Based on their knowledge of the **work task** and **search task**, users reported a clear understanding and awareness of what information was sought: that is, their **task knowledge** (Ellis, 1989, p. 179; Wildermuth, 2004, p. 247). Typical **task knowledge** included:

- who authored the information and whether the information was authored by the user;

[63] See Chapter 3, footnote 32 for definition.

[64] See Chapter 3, footnote 33 for definition.

- some words in the title of the document or record that they recalled or were referred to by colleagues;
- possible date ranges when the information was created or registered into the EDRMS; or
- an invoice number, contact details of the organisation, document number.

Having confirmed their existing **task knowledge** users reported that they then **started** to formulate a search strategy. Based on their task **knowledge**, they determined whether they authored or filed the sought information, or knew where it was stored in the EDRMS. Thirty percent (30 users) with access to a tree view reported they **navigated** to search for the items if they had authored or filed them, or knew where they were filed. Users reported that they **recalled** the search conducted previously and whether it had been **saved** into their **favourites** shortcuts, or if it was possible to access the information from their **recent** items folder. They then moved to Stage 2, where they formulated their search strategy. This series of cognitive coordination acts engaged in by users as they decided on the best search formulation strategy for their task are reflective of Wood's (1986) coordinative complexity of task.

In Stage 1, users' **task assessment**, which comprised their work task, search task and task knowledge, prompted their search behaviour in the EDRMS. As such, Stage 1 is a crucial stage in the EDRMS search model as it determines the search approach and thus the subsequent behaviours or strategies the user may engage in.

6.3.2 Stage 2: Formulate Search Strategy

Figure 6.4 provides a snapshot of the three different methods users reported employing to formulate their search strategies in Stage 2. Sixty percent (24 users) had awareness of one search formulation strategy, 35% (14 users) had awareness of two different strategies and 5% (2 users) had awareness of all three strategies.

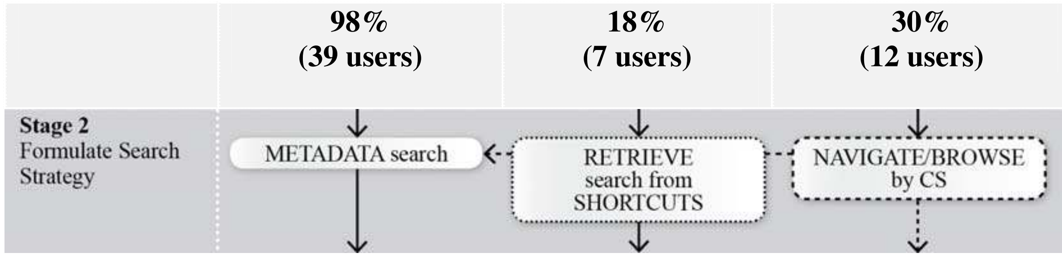


Figure 6.4: Stage 2: Formulate Search Strategy

An impressive 98% (39 users) reported that they formulated their search strategies using metadata fields. Users who had awareness of more than one search formulation strategy selected their preferred strategy based on their task knowledge and the nature of their search task. Eighteen percent (7 users) reported they formulated their search strategy by **retrieving** from their shortcuts.[65] Users reported that if they had previously conducted the search, they used the **shortcut** function to retrieve their search results, either from their recent search history or from their stored saved searches. This confirms findings on “successive searching” by Spink (1996) and Spink, Griesdorf, and Bateman (1999), where users of information retrieval systems like the EDRMS were observed engaging in a “process of repeated searches over time in relation to a given, possibly evolving, information problem” (Spink et al., 1999, p. 478). This capacity to tap into previous searches confirms that current information retrieval systems and interfaces assist users in successive search episodes, in contrast to the lack of system functionalities reported in earlier research[66] by Spink et al. (2002b, p. 726).

Thirty percent (12 users) reported that they **navigated** or **browsed** through the classification scheme presented via the tree view if they remembered where the record was filed or if they had filed the record themselves using the folder structure. In

[65] Shortcuts included saved searches, recent edits and items stored using the favorites function in the EDRMS.

[66] Such functionality may not have been available at the time Spink et al (2002). conducted their research.

Organisation B, **navigation** was not possible given the virtual *database* design of the EDRMS. In Organisation D both **navigation** and **browsing** were possible, but users, not trained in them, were not aware of these search strategies.

In their interviews users were asked, "What is your preferred way of searching for information in the ERMS?" They could list a number of preferred metadata fields in their response. Table 6.1 reports the preferred metadata fields for seeking information from the EDRMS. A tick was made in the metadata field each time it was mentioned as a preferred field. An aggregate of the ticks for each metadata field gave the total for each organisation, as shown in Columns 2 to 5. An aggregate of the responses of all four organisations is presented in Column 6. The three most preferred metadata fields for searching were Title (68%, 27 users), Document or Application Type[67] (30%, 12 users), and Author (18%, 7 users). These findings vary from Gunnlaugsdottir's (2006, p. 205) PhD research, which reported that the most commonly reported searched metadata fields by users was the name of the sender or receiver, date (received or created) and the free text search option.

When search results were displayed, users frequently browsed the following metadata elements: Title (98%, 39 users), Date (33%, 13 users) and Author (10%, 4 users). Given that Title metadata are a key element in the search and retrieval of EDRMS records, it is essential that entries into this field are as accurate and meaningful as possible. None of the 40 users reported using the free text search function to formulate searches in the EDRMS: it produced too many results not specific to the search query, which caused them to trawl through the results unproductively.

[67] Application Type refers to what application was used to create the document or record; for example, MS Word, Excel, PowerPoint or MS Outlook for emails.

Table 6.1: Preferred metadata for searching in the EDRMS

Metadata Fields Frequently Searched	**Organisations:**				
	A	**B**	**C**	**D**	**% of Total Users (n=40)**
Title Word	10	9	0	8	**68** (27 users)
Document / Application Type	10	0	2	0	**30** (12 users)
Author	0	0	7	0	**18** (7 users)
Record Type	0	5	0	0	**13** (5 users)
Object ID / Record or Document Number	1	1	2	1	**13** (5 users)
Date	0	0	5	0	**13** (5 users)
File Number	0	0	4	0	**10** (4 users)
Contact	0	3	0	0	**8** (3 users)
Treasurer's Number[68]	0	0	2	0	**5** (2 users)
Any Word[69]	0	0	0	2	**5** (2 users)
Typist[70]	0	0	1	0	**3** (1 user)

The self-reports show that Stage 2 is another crucial stage in the EDRMS search model. This is the point at which users determine which search strategy to take, based on their interpretation of the search task and their task knowledge. Stage 2 reveals the effect of the variable factors, search task, task knowledge and training, on users' subsequent behaviour patterns as they refine their search.

[68] Treasurer's Number metadata refers to the unique correspondence number assigned to correspondence generated by the Treasurer's Department.

[69] *Any Word* is a search option that enables users to search data entered in either the document title or notes metadata fields.

[70] *Typist metadata* refers to the person registering content authored by someone else into the EDRMS.

6.3.3 Stage 3: Execute Search

Figure 6.5 provides a snapshot of the act of **executing** the search formulated in Stage 2 by hitting the enter button on the keyboard or using the mouse to navigate the tree folder structure. Each of the 40 users reported they **executed** their search in Stage 3 using these options.

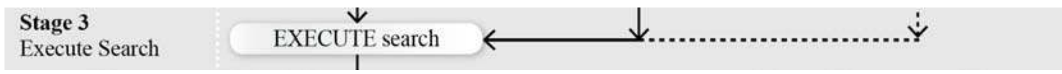


Figure 6.5: Stage 3: Execute Search

6.3.4 Stage 4: Process and Evaluate Search Results

In Stage 4, users processed and evaluated their search strategies as presented in Figure 6.6. Each of the 40 users reported they reviewed the search results by **browsing** the document title/parent folders of documents, date, and document/file numbers to make their selection.

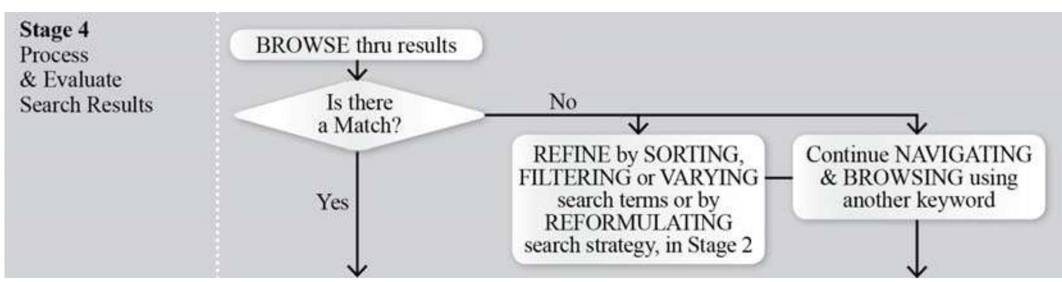


Figure 6.6: Stage 4: Process and Evaluate Search Results

Whilst **browsing**, users indicated that they **evaluated** the search results against their search criteria in Stage 2 to see if the outcome matched their search requirements. If there were no matches, they continued **browsing** through the remaining search results. If users did not find what they were searching for, or if there were too many search results, they either **reformulated** their search strategy in Stage 2 or used a **refined** search criterion. Thirty-nine users (98%) **refined** their search criterion by **filtering** (50%, 20 users) and/or **sorting** (23%, 9 users) their search results. Users were also observed **refining** their search by **changing** their selection of metadata fields and **varying** the search criteria terms in the metadata fields. These latter search activities exhibited the *trace*[71] and *vary*[72] search tactics reported by Bates (1979, p. 208).

In EDRMS with a tree view option, users reported that they **refined** their **navigation** by selecting different keywords in the classification scheme to **navigate** by.

To summarise, in Stage 4 users reported they **browsed** through the search results to evaluate and ascertain if they had found the information they sought. They **refined** their search criteria either to reduce the number of search results to a manageable few or to focus on finding the sought records. Common sub-information seeking activities reported by the users were:

- **changing** (98%, 39 users) the selection of metadata fields (by document title, date created/registered, author) and **varying** the search terms in the metadata fields;
- **sorting** (23%, 9 users) search results to display information in a preferred order. Most frequently, users **sorted** metadata by date created, author or document title, displayed chronologically or alphabetically;
- **filtering** (50%, 20 users) search results (in Organisation B and D's EDRMS[73] only); or

[71] Bates (1979) defines the 'trace' search tactic as "to examine information already found in the search in order to find additional terms to be used in furthering the search" (p. 208).

[72] Bates (1979) defines the 'vary' search tactic as "to alter or substitute one's search terms in any of the several ways" (p. 208).

[73] These EDRMS were designed to enable users to **filter** their search results by particular record types created by their departments or groups only. Although users had the functionality to **filter** their search

- **navigating and browsing** (30%, 12 users) the classification scheme folder structure using a hierarchical (tree) view to locate the document or record.

Stage 4 is also crucial in the EDRMS search model, as it demonstrates the effect of the variable factors search task, task knowledge, and training on users' subsequent search behaviour patterns.

6.3.5 Stage 5: Access Search Results

In Stage 5, each of the 40 users reported they **accessed** the documents or records matching their search criteria and **launched** (opened) the document, as presented in Figure 6.7.

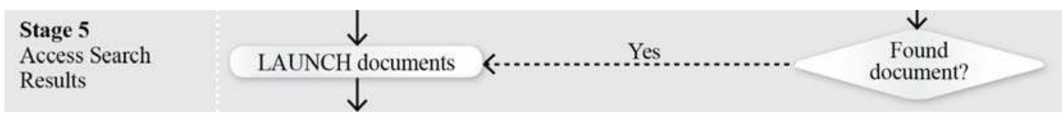


Figure 6.7: Stage 5: Access Search Results

Users indicated a preference to **launch** items that matched the search criteria to assist in their decision making in Stage 6. Depending on the design of the EDRMS, it was sometimes possible to **scan** and **verify** items before **launching** them. All 40 users were observed displaying these search activities.

6.3.6 Stage 6: Decision Making about Search Results

In Stage 6, if users were successful in **launching** their document or record, they reported that they **scanned** it and **verified** its contents, as presented in Figure 6.8. Depending on the design of the EDRMS, it was sometimes possible to **scan** and **verify**

results to display only records relevant to their department each time they executed their search, automatic **filtration** to match the search criteria was defaulted in each user's EDRMS and all 20 users in organisations B and D reported **filtering** as the automatic default.

items before **launching**. In Organisation C, where the EDRMS was designed with a *viewer* tab at the bottom of the search results window, users reported they performed Stage 6 before Stage 5.

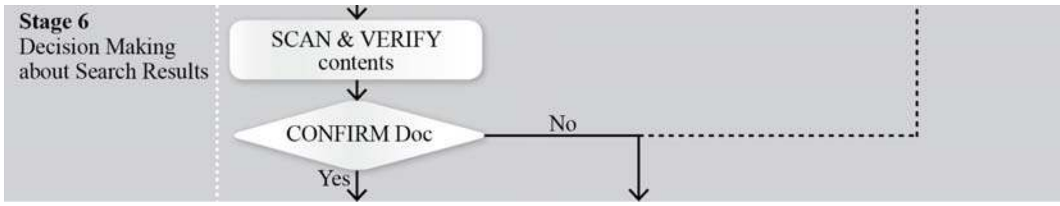


Figure 6.8: Stage 6: Decision Making about Search Results

Users reported that the activities of **launching**, **scanning** and **verifying** a document enabled them to **confirm** that the contents matched the search criteria.

6.3.7 Stage 7: End Search

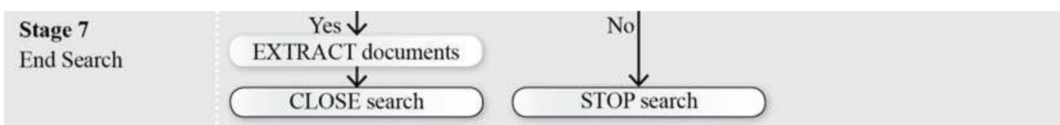


Figure 6.9: Stage 7: End Search from self-reported individual search behaviour data

Figure 6.9 provides a snapshot of how users reported they decided to end their searching in Stage 7. When users **extracted** the required document or record, they **closed** the search. This is a reflection of Browne et al's *Single Criterion Cognitive Stopping Rule* whereby users decide to **stop** (or in the case of this study close their search) when they have found the required information (Browne et al., 2005, p. 92). These activities represent successful searching in the EDRMS. Otherwise, users decide to **stop** their search, citing a number of causes that trigger the decision.

All 40 users stated that a common cause for **stopping** their search was that possible options at their disposal had been exhausted without finding the required information. These exhaustive search options included using preferred search methods to seek information from the EDRMS or accessing their task knowledge to **refine** their searches by varying the words in the document title or other metadata fields. After this initial phase of searching, users reported they were usually satisfied with their attempt to find the information even though they were unsuccessful. Their confidence in their searching skills enabled them to conclude that if they were unable to find what they were seeking it was time to **stop** the search. Their view was that the information was most likely poorly titled, misclassified or not registered in the EDRMS at all. A similar reason for deciding to **stop** a search was given by the social scientists studied in Ellis' (1989) research.

Users reported that past information seeking experiences in the EDRMS contributed to their decision to **stop** searching further in the EDRMS. Previous experience suggested that the information could not be found because there were spelling errors, abbreviations or acronyms used when titling the documents or records for registration in the EDRMS. They also decided to **stop** their searching if they realised the information sought was not filed into a folder they would logically file into or seek information from. Users reported the logic used for selecting folders for filing information differed from that used by others or by the Records Section, implying that the classification schemes were ambiguous and/or subjective. Users were aware that if the document was not found using their preferred search methods, then it was likely that the information was not registered in the EDRMS, but stored elsewhere.

A sample of the responses to Q17[74] from users illustrates some of the reasons that determined their decision to **stop** their search.

> I normally make that decision after I'm satisfied that I've had a reasonable attempt to locate the document. (Professional, P1)
>
> I suppose when I've exhausted all the techniques that I've described to you I'll give up, ask somebody or assume it's not there. (Professional, P2)
>
> When I can't find it, I guess. I try as many criteria as I can, and if I still can't find that file, then I usually give up… (Administrative Personnel, P5)
>
> When I get very frustrated and I can't find it… (Professional, P11)
>
> If I've refined it and I still can't find it and I've done multiple kinds of searches and I've changed the keywords etc, I've got a pile that needs to be TRIMed still, so if I can't find it after doing that I'll flick through the file. (Administrative Personnel, P35)

Thirty-nine (98%) of the 40 users mentioned that the time available to search in the EDRMS did not affect their searching. Likewise, they confirmed that they did not apply a time limit when deciding when to **stop** searching further in the EDRMS. Rather, the importance of the information determined whether they continued searching or **stopped** the search, whether within or without the EDRMS. When presented with a work task and search task, they generally used their preferred search methods based on their task

[74] Q17) How do you decide when to stop searching further in the EDRMS?

knowledge. If these preferred search methods did not find the information they were after then they **stopped** their search. The selection of answers in response to Q24[75] and Q25[76] verify users' reported search behaviours:

> if it was an important document, I would spend more than 10 minutes. Yeah, yeah. I mean I would go through the search, through the tree, go through the search engine, I would go and talk to people, I would try and find the paper copy. And you know, make an effort. (Professional, P1)

> how I value the information I was looking for. That would be another thing that would, you know, define the breadth of time. (Professional, P8)

> Time doesn't really enter into it. It's just the way I do it. If I've got to find it in a hurry then I'll ask someone who knows where it should be to tell me where it is. (Professional, P2)

> I won't spend more than you know, seconds, minutes, trying to find something. If I can't find it, I'll get up from my seat and go and ask somebody where they put it. (Professional, P38)

> It really depends on what I'm looking for and how important it is. (Professional, P23)

[75] Q24) How does the time available to you to conduct a search affect the way that you search?

[76] Q25) Do you apply a time limit on your time spent searching for information in the EDRMS?

> I basically search the same way each time, whether I'm stopped for time or I'm in a hurry. (Professional, P30)

> I don't use a time limit, no… it's more the technique. (Professional, P2)

> I'd probably give about five minutes to find it. If I can't find it within five minutes then I'll try some alternatives like asking whether anybody knows where this document might be held. (Professional, P11)

> Until I get what I want, I wouldn't stop.[77] (Administrative Personnel, P21)

> I don't apply a time limit, that's a simple answer. But you know, you can be affected by what you're trying to do and how important it is that you find the piece of information. So if it's highly important information, I'll put a lot more time into looking for it. (Professional, P17)

> Normally it doesn't take five minutes anyway to find something. And if it's going to take five minutes I know it's not in [EDRMS]. (Administrative Personnel, P34)

Users who performed the role of personal assistant or Record Focal Point often conducted searches in the EDRMS on behalf of their managers. This group stated that if they were to conduct searches for their managers, then the time available for searching could affect the way they searched. This was especially so if their managers had

[77] The user meant that she would stop searching in the EDRMS but not stop searching elsewhere for her information.

imposed time sensitive deadlines for them to find the information. They mentioned that this request for information searching might sometimes be time sensitive. However, they also mentioned that time did not affect their personal searching in the EDRMS:

> If someone said "Oh I need this straight away", then I'd probably do a really, really narrow one, trying to kind of narrow it down to the shortest list possible and just hope that the keywords that I've picked will bring it up…. Or I'll just straight away phone HelpDesk. (Administrative Personnel, P37)

One participant stated strongly that he had very little time for searching and hence applied a time limit for all his searching:

> Very little time to do a search or to do the very basics. If I can't find it, I ask for help…. The least time possible, if I'm really busy, I'll just ring up straightaway and get them to sort it out and tell me. (Administrative Personnel, P13)

Users reported a decision to **stop** searching in the EDRMS was also influenced by the following:

- they had exhausted all possible search options known to them and were confident they had been sufficiently thorough with their search methods, but the item still could not be found (100%), thereby influencing their perceived self-efficacy[78] (Bandura, 1986; Debowski, 1997). Often this occurred when users realised their task knowledge was either inaccurate or insufficient for searching;
- they simply could not find the information sought in the search results displayed in the EDRMS (100%);

[78] Debowski (1997) described "perceived self-efficacy" as the "judgment that individuals make about their capabilities and capacity to perform particular tasks or actions" (p. 47).

- they had spent between two to thirty minutes searching (30%, 12 users);[79] or
- they suspected the information could be stored elsewhere in other information repositories such as network drives, email systems and other business applications (8%).

Interestingly, EDRMS users did not use the *satisficing*[80] or *sufficing*[81] rules for their decision to **stop** their search (Gigerenzer & Goldstein, 1996; Mansourian, 2007). However, their search self-efficacy did influence their decision to **stop** (Bandura, 1986; Debowski, 1997).

Users were observed using two of the five cognitive stopping rules (*mental list* and *difference threshold*) observed in Internet users when they decided to **stop** a search (Browne et al., 2005). These users were aware of the search task and the information they needed to find. They monitored their outcomes (mental list) in order to satisfy their search task before deciding to **stop** the search (Browne et al., 2005, p. 92). In the same way, when EDRMS users had exhausted all their search options and were not learning anything new from their search experience, they decided to **stop** the search, reflecting the *Difference Threshold* Stopping Rule (Browne et al., 2005, p. 92).

6.4 Observations of search behaviour when simple and difficult searches were performed

The previous section explores how users describe a *typical* or *model* search. However, preferred styles may alter when a real search is undertaken. This section reviews users' actual simple and difficult search strategies as they demonstrated their last simple and

[79] These users stated that they did not consciously time themselves when seeking information from the EDRMS but generally estimated spending 2 to 30 minutes before deciding to stop their search.

[80] See Chapter 3 footnote 36 for definition.

[81] See Chapter 3 footnote 37 for definition.

difficult searches during protocol analysis. A detailed description of users' search behaviour when they **stopped** their difficult search is also explained in this section.

6.4.1 Simple searches

The 40 sampled users perceived a simple EDRMS search as one that required minimum effort to search and retrieve the sought information to fulfil their search task and, thus, their work task. In all the observed flowcharts for simple searches, users were successful in finding and retrieving the required information and were able to **close** their searches. This was because their search task and knowledge task matched the search formulation strategy they decided upon. Further, there was a match between their search terms and the data entered into the metadata fields. For instance, if their task knowledge was the invoice number and they entered the invoice number into the invoice metadata field, the EDRMS immediately retrieved the relevant invoice. Likewise, when users formulated their search strategy by **navigation** using the tree view structure, they found their sought information filed or classified into the folder where they thought it should be. Searches were considered simple because they matched the users' cognitive thinking and the way information was registered and classified in the EDRMS.

6.4.2 Difficult searches

Out of the 40 users, only 27 (67.5%) reported a difficult search experience. The remaining 13 (32.5%) had not undertaken difficult searches or were unable to recall them. Users perceived a search to be difficult when they had to spend more than five minutes and considerable effort to retrieve the sought information. In difficult searches, users were not able to successfully **close** the search. Instead, they had to **stop** and decide how best to acquire the information. Thirty percent (eight users) **retried** the search in the EDRMS if required. During the performance of the simple searches in Stage 4, no user was observed returning to Stage 2 to **reformulate** a search strategy, but 37% (10 users) exhibited this behaviour during a difficult search. The **reformulate** search activity observed in difficult searches is similar to the *bit-at-a-time* retrieval of information mentioned in Bates' berrypicking information search model, where library users' information seeking was not satisfied with a single query but was achieved by modifying a series of queries based on information gathered in previous stages of their search (Bates, 1989b, p. 410). Sixty-seven percent (18 users) who engaged in a difficult search were able to find the required information in a second attempt, and then **closed** the search. However, 33% (9 users) could not find the required information and had to **stop** their difficult searches. Figure 6.10 describes users' search behaviour once they decided to **stop** their difficult searches.

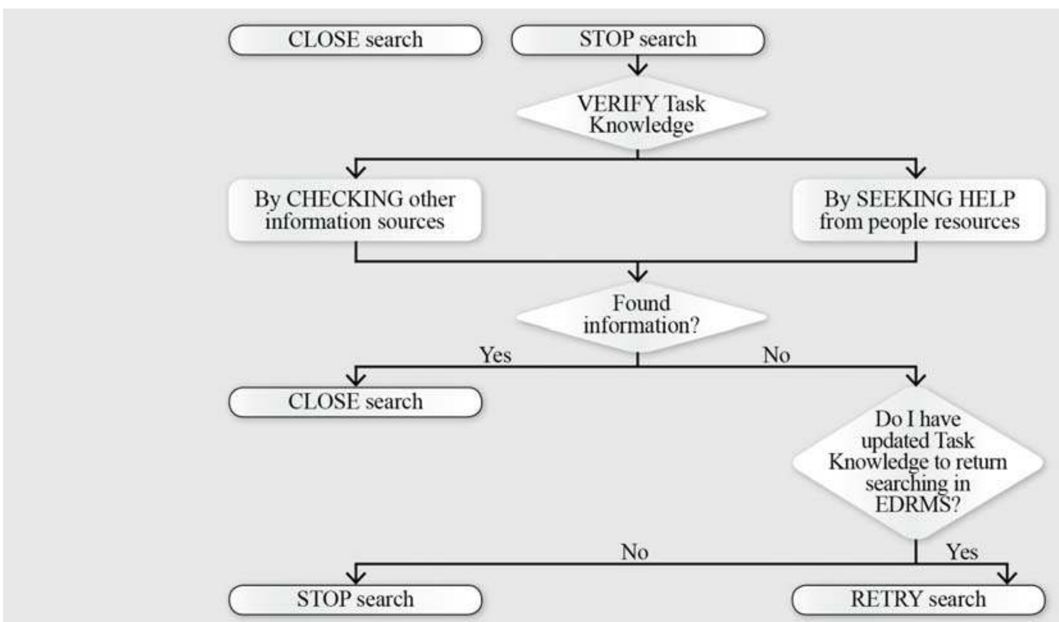


Figure 6.10: Search behaviour of users when they stopped their difficult search

Figure 6.10 shows that when users **stopped** their difficult search, they **verified** their current task knowledge by **checking** other information sources and/or by **seeking help**. They **checked** other information repositories in the organisation to **verify** the information was not stored elsewhere, or **sought help** from people resources such as their colleagues, the Records Section or the HelpDesk for **help** with searching for the information. Users then determined if the sought information had indeed been found.[82] If it was found, they **closed** the search. If not, they assessed whether their updated task knowledge would enable them to **retry** their search in the EDRMS. If yes, they **retried** their search formulation strategy by returning to Stage 2 of the information search process. Otherwise, they **stopped** the search. These search activities, where users **check** other information sources, are also similar to Bates' berrypicking information search model, where library users were reported to berrypick and gather information from different information sources (Bates, 1989b, p. 410).

The simple and difficult searches performed by users both validated the search behaviour of EDRMS users depicted in Figure 6.2 and enabled other insightful observations of their search behaviour. For instance, the interviews with users did not make it possible to verify search behaviour once a search was **stopped**. However, when users demonstrated difficult searches it was possible to observe additional search activities such as how they sought **help** from people resources and/or **checked** other information sources and persevered to complete their search or to **retry** it in the EDRMS if they felt confident about finding the information the second time around. These additional search behaviours observed after users **stopped** their search are incorporated into the EDRMS search model presented in Figure 6.11. Thus, Figure 6.11 is an enhanced model building on Figure 6.2 and Figure 6.10, illustrating users' behaviour in Stage 7 once they decided to **stop** their search and derived from observations of their difficult searches. Figure 6.11 is the final EDRMS search

[82] For example, the sought information was stored in the network drive and not registered in the EDRMS. Or the sought information was held as a paper copy or CD-ROM that was not registered in the EDRMS.

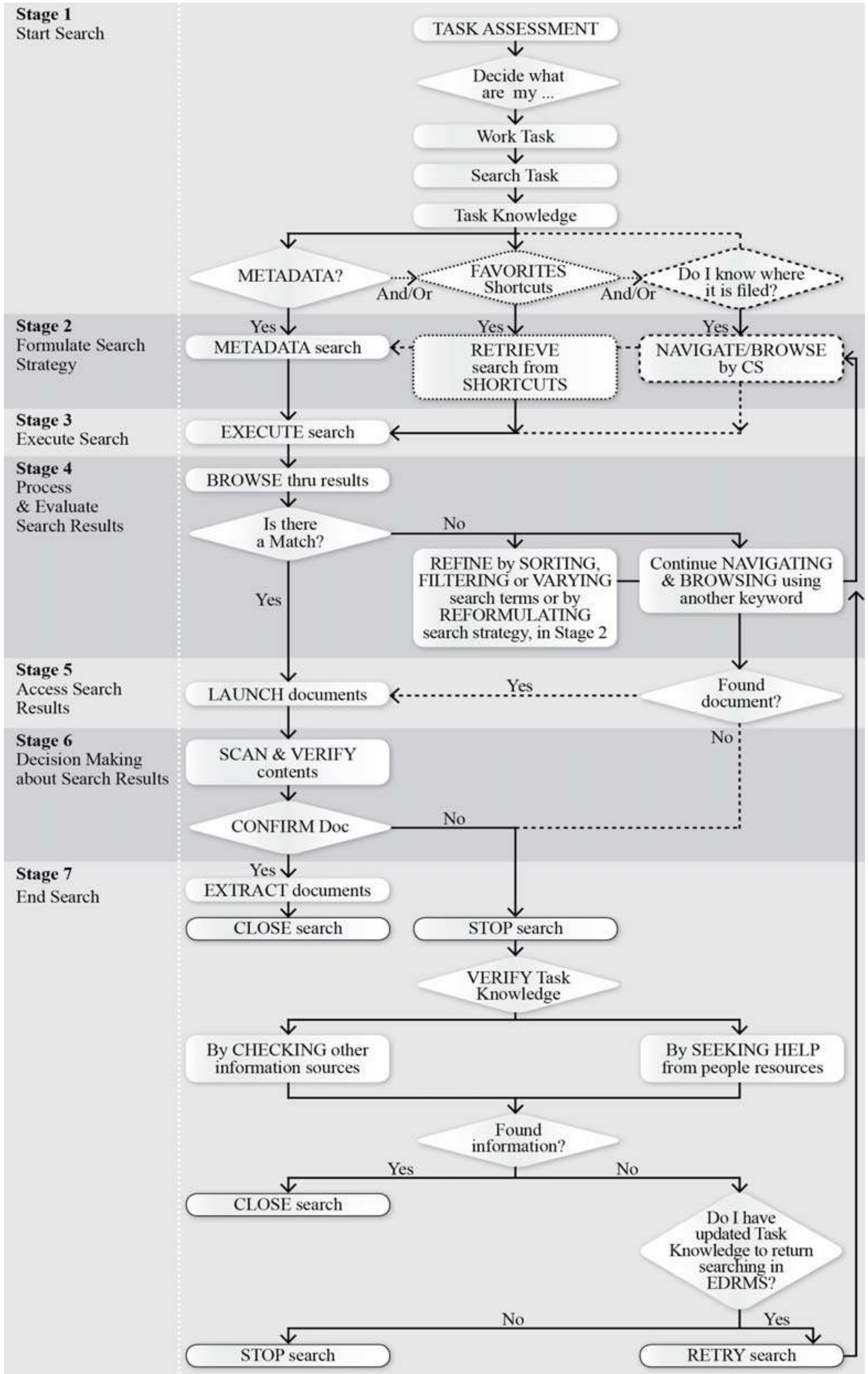


Figure 6.11: EDRMS search behaviour model

behaviour model derived from this research. The results confirm the hypothesised search behaviour model derived from the models by Ellis (1989), Marchionini (1995), and Meho and Tibbo (2003), presented in Chapter 3 at Table 3.5; and they answer *SQ_2: What is the search behaviour of EDRMS users*?

6.4.3 Reasons why searches were difficult

The eight reasons why searches were difficult are summarised in Table 6.2, Column 1, whilst Column 2 states the percentage of users who cited this reason.

Table 6.2: Reasons for search difficulty

Why search was difficult?	**% of Total Users** (n=27 users)
1. Lack of meaningful titling of documents and records	**22** (6 users)
2. Lack of understanding or familiarity using the classification schema for searching.	**19** (5 users)
3. Document searched for, not registered in EDRMS	**19** (5 users)
4. Lack security access to documents and records	**15** (4 users)
5. Incomplete or inconsistent entry of metadata fields in EDRMS by Records Section.	**7** (2 users)
6. Too many search results to browse through to find documents and records sought.	**7** (2 users)
7. Requestor for documents and records provided inaccurate background details to search assistants.	**7** (2 users)
8. Not sure if documents and records was made *FINAL* in EDRMS.	**4** (1 user)
	100

Twenty-two percent (6 users) reported the lack of meaningful titling of documents or records registered into the EDRMS by colleagues or the Records Section as the main cause of search difficulty. In each of the four organisations, incoming correspondence was registered into the EDRMS by the Records Section or a Records

Focal Point. P38, for example, reported invoices were titled "Accounts payable ST – Optus – Date – Amount", but that the invoice number was not part of the title. In another example, P36 used the title metadata field and typed in the words "Graduate Booklet" to search for a document authored by a colleague. The search was difficult because the colleague who registered the document titled it "Staff Appraisal Handout", words P36 would not have used to title the document. Additionally, the use of idiosyncratic abbreviations and acronyms in titling corporate documents and records caused difficulties. For example, P32 used abbreviations when titling her documents into the EDRMS and months later, when she had to search for these documents, she had difficulty as she searched using the full words and not the abbreviations:

> I realised I had spelled out the title in full when I titled the documents and months later forgot about it and when I used the abbreviations VCR and CTT I can't find them. Now I title all my documents by spelling out the full title plus the abbreviations so that I will find them in future. (Professional, P32)

Likewise, P6 reported how his last search was difficult because colleagues titled corporate documents and records using abbreviations.

> I've put in the word *valve* but they've actually got *vves*, they've abbreviated valves, so that could be my problem there, why I haven't had a match. (Professional, P6)

Nineteen percent (5 users) reported that their search difficulty was related to the classification scheme. A lack of understanding or familiarity using the classification scheme for searching meant these users instead relied on metadata fields for searching. In cases where users had insufficient metadata to conduct the search, they turned to other information sources to obtain their metadata and then returned to the EDRMS. These extra steps could have been eliminated if they had an understanding of the scheme and how information was classified. Searching was also reported to be difficult because of differences in thinking as to where corporate documents and records on the same subject should be filed using the classification scheme. This led to users searching folders where they would file corporate information, which were not always where their colleagues or the Records Section filed. These conflicts in the selection of folders to file corporate information made searching using the classification scheme difficult as well.

Another 19% (5 users) reported their search was difficult because (they eventually realised) the information they had spent their time and effort searching for was never registered in the EDRMS in the first place, for a number of reasons. For example, other information repositories like network drives were also used to store corporate information, and not everyone in the organisation diligently registered corporate information into the EDRMS. User P26 noted she was not always sure where to search, as she stored information in both the network drives and the EDRMS. She reported how she would spend time searching for the latest version in the EDRMS and, after working on the document for some time, would realise it was not the version she last edited. She then searched for the document in the network drives and reworked the document. The existence of multiple information repositories for corporate documents and records, or the lack of communication on how network drives were to be used, was observed by the researcher to affect users' work productivity in three of the organisations.

Fifteen percent (4 users) reported that lack of access to the information they were searching for in the EDRMS made their search experience difficult. They were not aware whilst searching that their access was restricted, but instead assumed they were searching poorly. Seven percent (2 users) reported their searches were difficult because the metadata they used to conduct their search were unregistered or inaccurately registered in the EDRMS. An example cited was the *Contact* metadata field, where the name of the organisation from whom the document/record was received was not registered. In the absence of this piece of metadata, users' searches could not be completed as their task knowledge was not aligned with their search formulation strategy. Their search therefore required more time and effort, using alternative metadata or search methods.

Another seven percent (2 users) reported their search was difficult because they had to browse through too many search results to find the sought information. Having to look through more than 15 search results was perceived by these users to be too difficult to find what they were seeking. A further seven percent (2 users) reported their last searches were difficult because the requestor of the information provided inaccurate background details regarding the required information. These users assisted their colleagues to search for information from the EDRMS in their role as Record Focal Point. Examples of inaccurate background information provided were inaccurate authors for documents and records, or file numbers.

A final form of difficulty was caused by failure to identify the final form of a document. P29 commented that searching for a letter which had been signed off by the Treasurer and scanned into the EDRMS was made complicated because "People generally don't actively return to their documents to make them FINAL" (Professional, P29). Because colleagues had not conscientiously ticked the check box *MADE FINAL*, P29 had difficulty searching for the final record of this letter.

The findings in Table 6.2 reveal that 59% (16 users) encountered search difficulties caused by user error. Strategies for overcoming these search difficulties by records management professionals are discussed in Chapter 7.

Another critical research finding was that a simple search query may become difficult if the search environment in the EDRMS is not aligned to users' search expectations. For instance, searches became difficult when users' task knowledge was **not aligned** with how the sought information was **registered** into the EDRMS, whether by the users themselves or by other users, or how it was **managed** by records management professionals. This finding emphasises how the search environment in the EDRMS affects users' task knowledge. There is also a possible moderating influence of the task knowledge variable on users' search task and search behaviour.

6.5 Categories of search task and task knowledge

During observations of users' simple and difficult searches, their search task and task knowledge were most evident. In depth description of the sub-categories of search task and task knowledge observed are explained in the following sub-section. The occurrences of sub-categories of search task and task knowledge were derived from a total of 38 users' simple searches and 27 users' difficult searches.

6.5.1 Categories of search task

Data analysis of the Task Matrix SQ3 in Appendix 6.1 indicated grouping of search tasks into three categories (Table 6.3). These categories were: 1) information classification; 2) search assistance; and 3) information searching. The same three search task categories were observed for simple and difficult searches.

In the *information classification* search task category, 6 users (in 3 simple searches and 3 difficult searches), either alone or with colleagues, searched for suitable electronic or paper folders where they could classify newly created or received information into the EDRMS,. In the *search assistance* search task category, 14 users (in 7 simple searches and 7 difficult searches) assisted colleagues or supervisors to search and retrieve information from the EDRMS. The users' *search assistance* was performed by either Record Focal Points servicing the team or colleagues perceived by users to know where information was stored in the EDRMS. The reason for this perception was because the user was the author, registrant, or owner of the sought information.

Table 6.3: Observed occurrences of sub-categories of search tasks in simple and difficult searches

Sub-categories of Search Tasks	Users: Simple Searches (n=38)	Users: Difficult Searches (n=27)
1. Information Classification Search folders for registration of new information.	**3**	**3**
2. Search Assistance Assist colleagues or supervisors to search and retrieve information stored in the EDRMS.	**7**	**7**
3. Information Searching Search for documents registered in EDRMS by user or colleagues to complete work tasks.	**28**	**17**
* complete administrative work task;	9	1
* complete professional work task;	13	12
* action work processes via workflow modules; or	3	1
* fill gaps in existing knowledge related to work task.	3	3

The *information searching* search task category was observed when users searched for information that had been registered in the EDRMS by themselves or their colleagues, in order to complete work tasks. This was the most common search task, and 45 users' search tasks (in 28 simple searches and 17 difficult searches) fell into this category. Examples of work tasks included actioning an invoice, writing minutes or reports on specific subject matter, and conducting analysis of past policies on a topic in order to develop new policies or revise existing ones. It was possible to further classify work tasks into sub-categories of:

(a) completing administrative or professional work tasks assigned manually;

(b) actioning work tasks that arrived via the work flow module of the EDRMS requiring action; or

(c) checking on content registered in the EDRMS to fill gaps in existing knowledge that enabled users to complete their work tasks.

Observations of task knowledge in the observed flowcharts of users' simple and difficult searches; these were similar to observations recorded previously of search task. Observations of task knowledge are described next.

6.5.2 Categories of task knowledge

As in the case of search task, data analysis was conducted for task knowledge by analysing the task knowledge Columns in the Task Matrix SQ3 (Appendix 6.1).

Different categories of task knowledge, based on the sources of knowledge the user possessed from the given search task, were identified. In most cases, a single information cue was known. However, in a number of searches the user knew two or more cues to assist with the search task. These categories of task knowledge were similar across both the simple and difficult searches, as depicted in Table 6.4.

Table 6.4: Categories of task knowledge

Information Cues for Task Knowledge	**Users**	
	Simple Searches (n=38)	**Difficult Searches (n=27)**
1 information cue known:	**31**	**16**
* knew where the information was filed	8	2
* Record Number Metadata	4	1
* some words in the Document Title metadata	10	9
* File Title metadata	0	3
* Contact metadata	4	1
* Folder Number metadata	2	0
* Ministerial Number metadata	1	0
* Treasurer's Reference Number metadata	1	0
* Claim Number metadata	1	0
2 or more information cues known: * metadata fields like document title and where information is filed	**7**	**11**

The most common information task knowledge cue was metadata fields, mainly structured[83] rather than unstructured.[84] Structured metadata information enabled accurate searching, leading to success in retrieving the required information from the EDRMS. Thirty-one users (in simple searches) and 16 users (in difficult searches) had awareness of at least one information cue to perform or assist in the search task. Seven users (in simple searches) and 11 users (in difficult searches) were aware of two or more information cues.

Six users had no known information cue when they initially started the search task. When users had no task knowledge of their own, they sought assistance to obtain whatever information cue they could, from colleagues or other information sources. Six users with no task knowledge obtained it in various ways: by contacting colleagues, using other aids like another computing system, referring to handwritten notes or email messages that had links to files or folders referenced by colleagues and relying on the shortcut function in the EDRMS to view recently accessed information or to retrieve information from their saved searches. A key observation was that these users eventually used at least one known information cue or task knowledge to conduct their search task.

6.6 Effect of search task and task knowledge on search behaviour

The analysis of the difficult search processes undertaken by users illustrated the strong inter-relationship between search task and task knowledge. The users selected particular search formulation strategies based on their task knowledge information cues derived

[83] Structured metadata include: exact numbers of a record or folder; name of company or author; other unique numbers that identify specific records like the treasurer's reference number, ministerial number or claim number; date of creation or registration of the record.

[84] In many cases unstructured metadata related to an awareness of some words in the title of the file or folder.

from their search task. This section illustrates the strong inter-dependencies between these two factors on their subsequent search behaviour.

The effect of search task and task knowledge on a user's search behaviour was evident all stages of the task, but particularly in four of the seven stages of the EDRMS search behaviour model (Figure 6.11). Table 6.5 outlines these four stages (Column 1) and the different data analysis tools that were utilised (Column 2). Justifications for these findings were analysed, using data from the Task Matrix SQ_3 (Appendix 6.1) and the flowcharts developed for each of the 40 users.

Table 6.5: Analysis of the joint effect of search task and task knowledge on EDRMS search behaviour

EDRMS Search Behaviour Stages	**Data Analysis Tools**
Stage 1: Start Search	1. Task Matrix SQ_3 2. Flowcharts (self-reported and observed)
Stage 2: Formulation of search strategy Stage 4: Process and evaluate search results	1. Search Task and Task Knowledge Matrix 2. Task Matrix SQ_3 3. Flowcharts (self-reported and observed)
Stage 7: End Search	1. Flowcharts (self-reported and observed)

In Stage 1, the joint effect of search task and task knowledge on search behaviour was collated using the Task Matrix SQ_3 (Appendix 6.1) and the flowcharts prepared for each user for their self-reported and observed behaviours (Figure 6.12 is an example, from participant P5[85]). The data from Task Matrix SQ_3 indicated the uniqueness of each user's work task, search task and task knowledge. How they decided on their search formulation strategy in Stage 2 depended on their task assessment in Stage 1. Examination of the differences in each user's search behaviour activities in

[85] Using participant P5 as an example, an explanation of how her search task and task knowledge affected her search behaviour in Stages 1, 2, 4 and 7 is provided (Appendix 6.2).

Stages 2, 4, and 7 were based on their situational assessments of work task, search task and task knowledge in Stage 1. Using participant P12 as an example, an explanation of how work task, search task and task knowledge affected search behaviour in Stages 1, 2, 4 and 7 is provided (Appendix 6.3).

To demonstrate the joint effect of search task and task knowledge on search behaviour in each of Stages 2, 4 and 7, a Search Task and Task Knowledge Matrix (Appendix 6.4) was developed to compare users' search behaviour activities with their self-reported and observed flowcharts. The search behaviour flowcharts (Table 6.6 and Figure 6.13) demonstrate the joint effect of search task and task knowledge on each user's search behaviour activities when they performed their last simple and difficult searches. The observed occurrences of users' search activities presented in percentages were derived from a total of 38 users' simple searches and 27 users' difficult searches out of the 40 users studied (Figure 6.11 is an example).

In Stage 2, although 39 users (98%) reported a preference for and knowledge of formulating their search strategy using **metadata** fields in their self-reported search behaviour, only 30 users (78% simple searches) and 25 users (93% difficult searches) were actually observed formulating their search using this strategy (Figure 6.13). Likewise, 12 users (30%) reported a preference and knowledge of formulating their search strategy by **navigation**, but only 6 users (16% simple searches) and 3 users (11% difficult searches) were observed formulating their search strategy by navigation. Similarly, 7 users (18%) reported a preference for and knowledge of formulating a search using **favourite shortcuts**, but only 3 users (8% simple searches) and 1 user (4% difficult searches) were observed using this strategy. The differences in percentages seem to indicate that search task and task knowledge jointly influence users' decisions on how to formulate their search strategies.

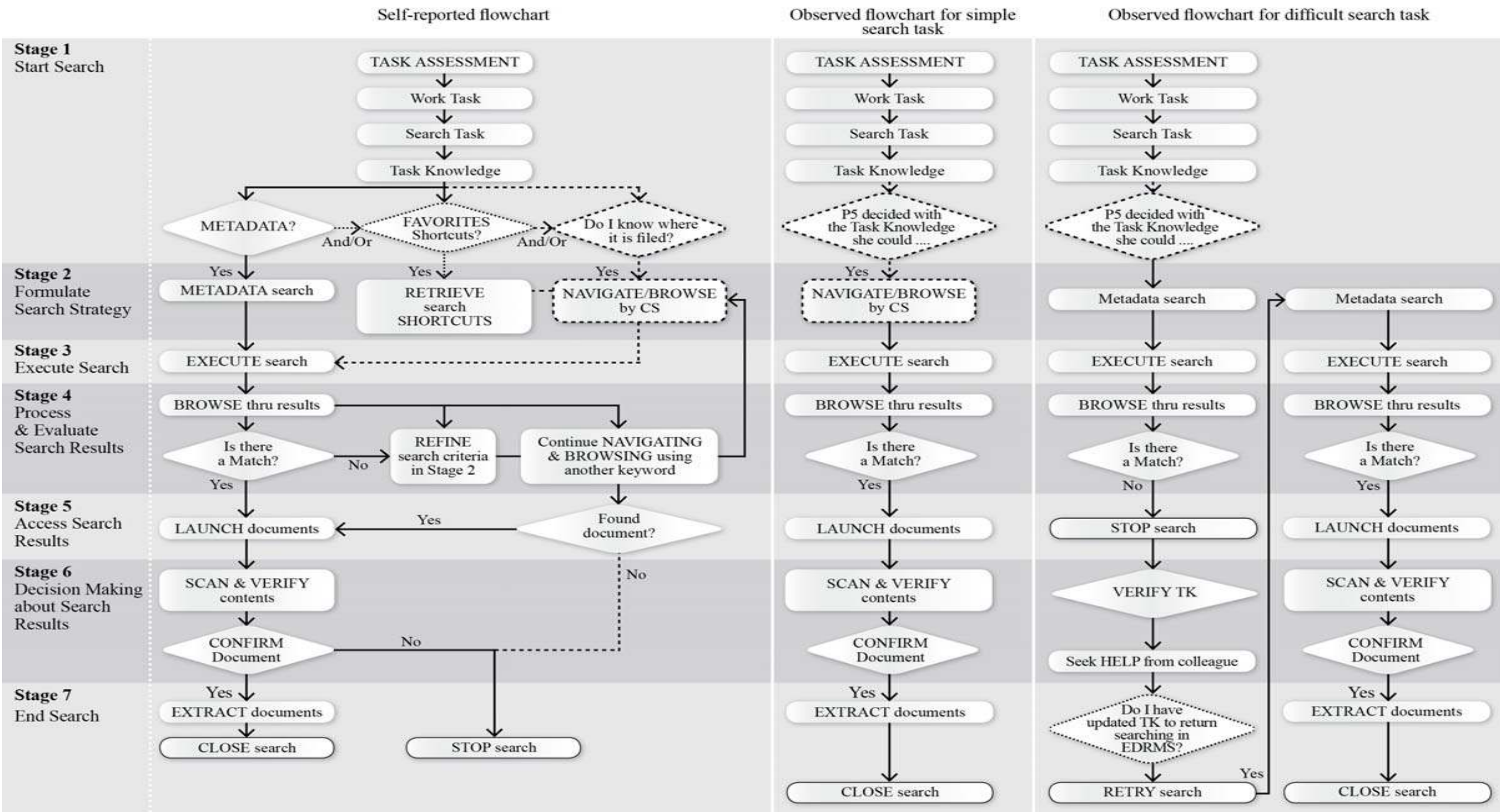


Figure 6.12: Screen shots of self-reported and observed flowcharts for user P5

Table 6.6: ST and TK Matrix – comparison of the effect of search task and task knowledge on EDRMS search behaviour

%	Stage 2: Formulate Search Strategy			Stage 4: Process & Evaluate Search				Stage 7: End Search		
	Metadata	**Shortcuts**	**Navigate**	**Browse**	**Refine**	**Sort**	**Filter**	**Close**	**Stop**	**Retry**
Self-reported search behaviour % (n=40)	**39** (98%)	**7** (18%)	**12** (30%)	**39** (98%)	**39** (98%)	**9** (23%)	**20** (50%)	**40** (100%)	**40** (100%)	**0** (0%)[86]
Observed simple search behaviour % (n=38)	**30** (78%)	**3** (8%)	**6** (16%)	**38** (100%)	**3** (8%)	**6** (16%)	**0** (0%)	**38** (100%)	**0** (0%)	**0** (0%)[87]
Observed difficult search behaviour % (n=27)	**25** (93%)	**1** (4%)	**3** (11%)	**27** (100%)	**12** (44%)	**4** (15%)	**0** (0%)	**18** (67%)	**17** (63%)	**7** (26%)

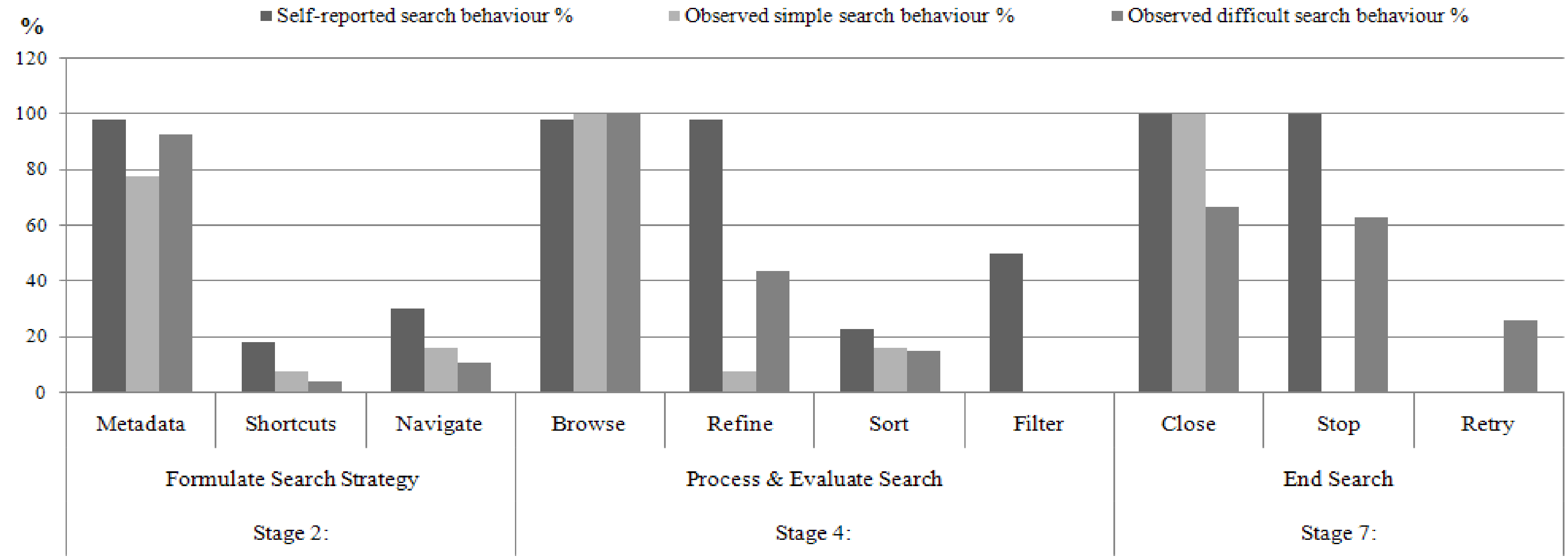


Figure 6.13: Comparison of the effect of search task and task knowledge on the search behaviour of EDRMS users

[86] In their self-reported search behaviour users did not report that they returned to retry difficult searches after they had sought help from their colleagues and were confident the updated task knowledge would assist them in their search, but their observed search behaviour demonstrated this retry search activity.

[87] As users were able to complete and close their search successfully, they were not observed retrying their search in their simple searches.

In Stage 4, users evaluated their search results by **browsing**, **refining**, **sorting** or **filtering**. Although 39 users (98%) reported awareness of **refining** their search, only 3 users (8% simple searches) and 12 users (44% difficult searches) actually refined their search results in their simple and difficult searches. Likewise, although 9 users (23%) reported knowing how to **sort** their results, only 6 users (16% simple searches) and 4 users (15% difficult searches) actually sorted their search results during their simple and difficult searches. Although **filtering** was automatically defaulted in Organisations B and D's EDRMS, and all 20 users (50%) were aware their search was filtered to documents and records within their department or work groups, none of these users were observed filtering their search results. **Browsing** was a more common search activity exhibited by all users but was observed to have a lesser influence on search behaviour based on their search task and task knowledge.

In *Stage 7: End Search*, all users drew on their search task and task knowledge to determine if they had been successful in their search, enabling them either to **close** or to **stop** their search (Figure 6.13). On one hand, all users were observed to close their simple searches successfully; no user was observed to stop or retry a simple search. On the other hand, 17 users (63%) initially stopped their difficult searches. Seven users (26%) returned to **retry** if the help they sought provided updated task knowledge that they believed would enable them to close their search. Once again, the percentage variations of users' search behaviour characteristics between self-reported and observed search behaviour in Stage 7 demonstrate the effect of search task and task knowledge on how users decide to end their searches.

To summarise, the data analysis illustrates the joint effect of search task and task knowledge on users' search behaviour in Stages 2, 4 and 7. The findings confirm that together, rather than individually, task knowledge and search task affected EDRMS search behaviour. These findings answer *SQ_3: How do search task and task knowledge affect the search behaviour of EDRMS users?*

6.7 Users' comments on EDRMS training received

Chapter 5 outlined the records management and EDRMS training provided to users by records managers. Thirty-five users (87.5%) commented that the EDRMS training they received equipped them with sufficient skills and confidence to work with the system and they were satisfied with the training. The training provided to employees by the records managers during EDRMS implementation was generic rather than targeted at the requirements of groups or users within the organisation. Although this is an understandable logistic approach during implementation of any system organisation-wide, five users (12.5%) from three organisations did not consider it an effective training strategy:

> Well it was thorough, but I think just a bit too broad, perhaps not tailored to my requirements, really. Perhaps it needed to be a bit more specific to what I do. Not just me but to other people as well. (Professional, P15)

> Woefully inadequate and as I said before, overhead projector or a computer screen, you press this, this and this, you enter name in there, you go to the next screen, the next screen, the next screen…. Too fast, too much information, the person with it is familiar with it, they didn't break it down to the bare essentials, once you get, you didn't have any time to absorb the bare essentials before you moved on, you move on you've forgotten the bare essentials, so… (Administrative Personnel, P13)

> But also break it down into certain components. I don't want to know how the whole system works. All I want to know is how to register a document in TRIM, which I know, and how to find a document. That's it, that's all I'm interested in so I've got my preferred one with the contact but I'm not familiar with finding an advanced one with times, dates and things like that which would save me ringing up records but that's all I'm interested in…. Smaller groups but also a smaller timeframe so you can take the information in so you can maybe be more familiar with it parrot fashion. You know: we show you how to do something once or twice, show you again, show you again, so you're familiar with it. Right, here's an exercise, here's five persons' names, find them. (Administrative Personnel, P13)

> Useless! … I think probably it was because the limited hands-on training we had wasn't like in the environment, in our like the services, it was more a general, too general. (Administrative Personnel, P37)

> I'd like to see these little half hour things: I'm just going to show you how to create a file… (Professional, P8)

One respondent (P9) commented that since the training was not targeted to the computer literacy levels of the trainees it led to confusion:

> The EDRMS training was aimed at people that were… a certain amount of assumed knowledge and people just turned off because they didn't have any idea of what they [the trainer] were talking about with the navigating and the creating of files and folders, a lot of people do not even use the computer for that much generally so it was confusing from that perspective. (Professional, P9)

P9 also commented that the implementation of the records management system and its practices were “a big move” in the organisation, and some background training on the records management concepts and the State Records Act should have been provided so that staff had an understanding of why the EDRMS was being implemented:

> And there was an enormous jump, it wasn’t, there really wasn’t a records management system of any description within [the organisation]… (Professional, P9)

6.8 The effect of training provided in search methods on users’ search behaviour

The objective of research question SQ_4 was to investigate the influence of training on different EDRMS search methods on users’ search behaviour. The results indicate a positive influence of training on the search behaviour of EDRMS users. Described in the sub-sections are the different types of training provided to users on EDRMS search formulation strategies, and findings on how training influenced users’ search behaviour.

Table 2.7 in Chapter 2 listed and described each of the search methods available to users given the design of the EDRMS in the organisations studied. Using the Training Matrix SQ_4 (Appendix 6.5) bar graphs were prepared for each organisation to indicate the training provided (black bars), the search methods reported by users that they used to formulate their search strategies (white bars), and the observed search methods used by users when they demonstrated their last simple and difficult searches in the EDRMS (grey bars).

6.8.1 Organisation A

The search methods in which the ten users in Organisation A were trained in and which they reported in the interviews and exhibited during the protocol analysis are presented in Figure 6.14.

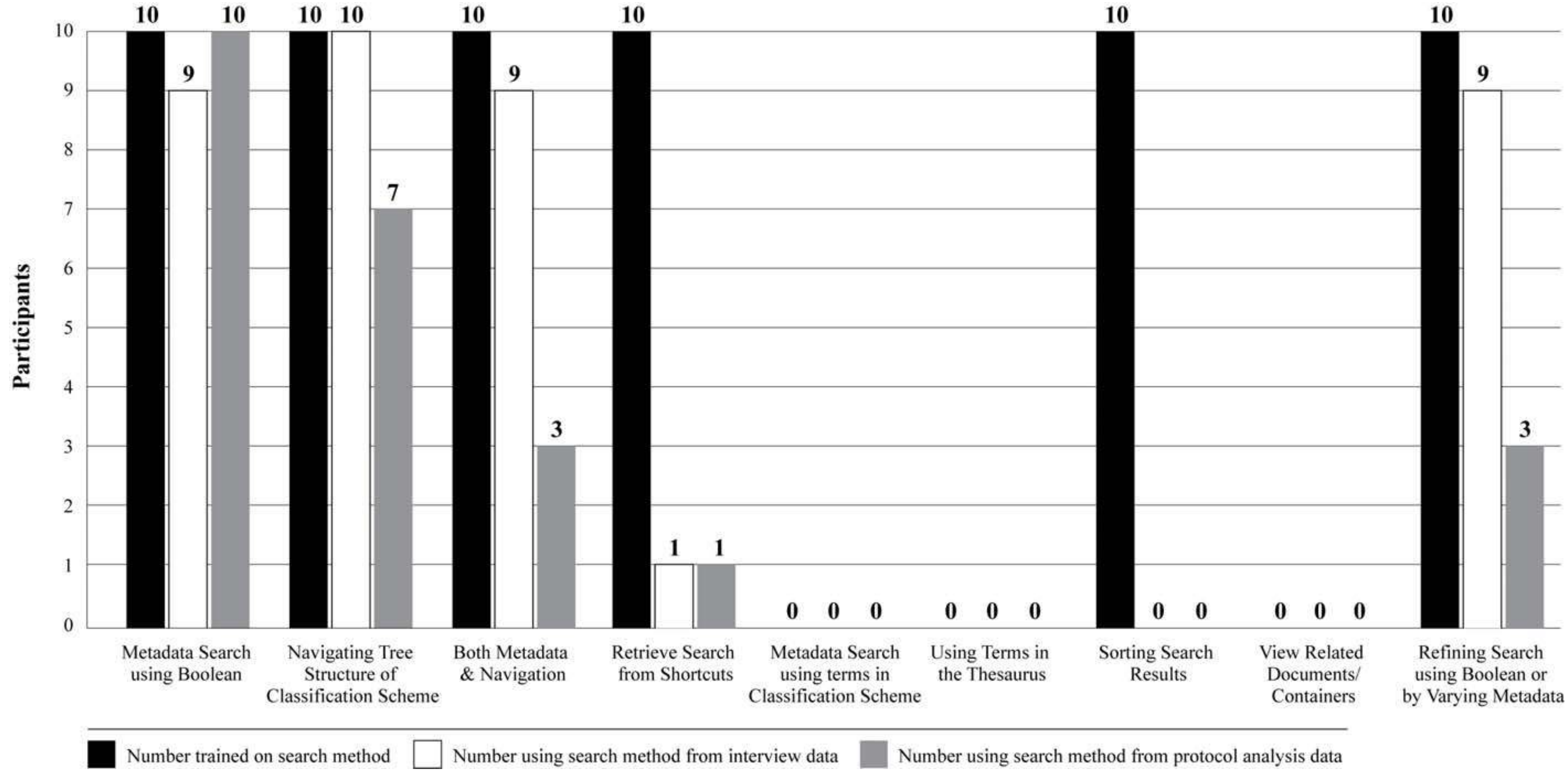


Figure 6.14: Organisation A – Search methods used in relation to training received

Nine out of ten users in Organisation A reported or exhibited using both metadata and navigation to formulate their search strategies. One user (P4) reported and was observed using navigation via the tree view structure as the only strategy in formulating her searches.

P4 explained that she used only this search strategy because all her information was classified under the folder titled with the keyword "Human Resource Management". She also stated that she was familiar with where her frequently accessed information was filed within this folder structure. Only three of the ten users trained in using shortcut functionalities used them. None of the users in Organisation A reported or exhibited using keyword or activity terms from the KAAA thesaurus to conduct their searches. Although each of the ten users was trained in how to sort search results, none of the users reported or were observed doing this. This could be because the search results were defaulted to list the most recent document or record by chronological order in their individual computer profiles. Additionally, none of the ten users reported or were observed viewing related documents, records or folders in the EDRMS. Each of the users apart from P4 reported they refined their searches by varying the metadata entered into the search screen. P4 did not use metadata fields when searching, and reported not refining her searches.

6.8.2 Organisation B

Figure 6.15 presents the search methods in which the ten users in Organisation B were trained and the search behaviour which they reported and exhibited.

The design of the EDRMS in Organisation B provided users with only a virtual database view of their EDRMS. It was thus only possible to formulate searches using metadata fields, not by navigating a tree view structure. As shown in Figure 6.15, users in Organisation B were trained solely in one search method: to formulate searches using

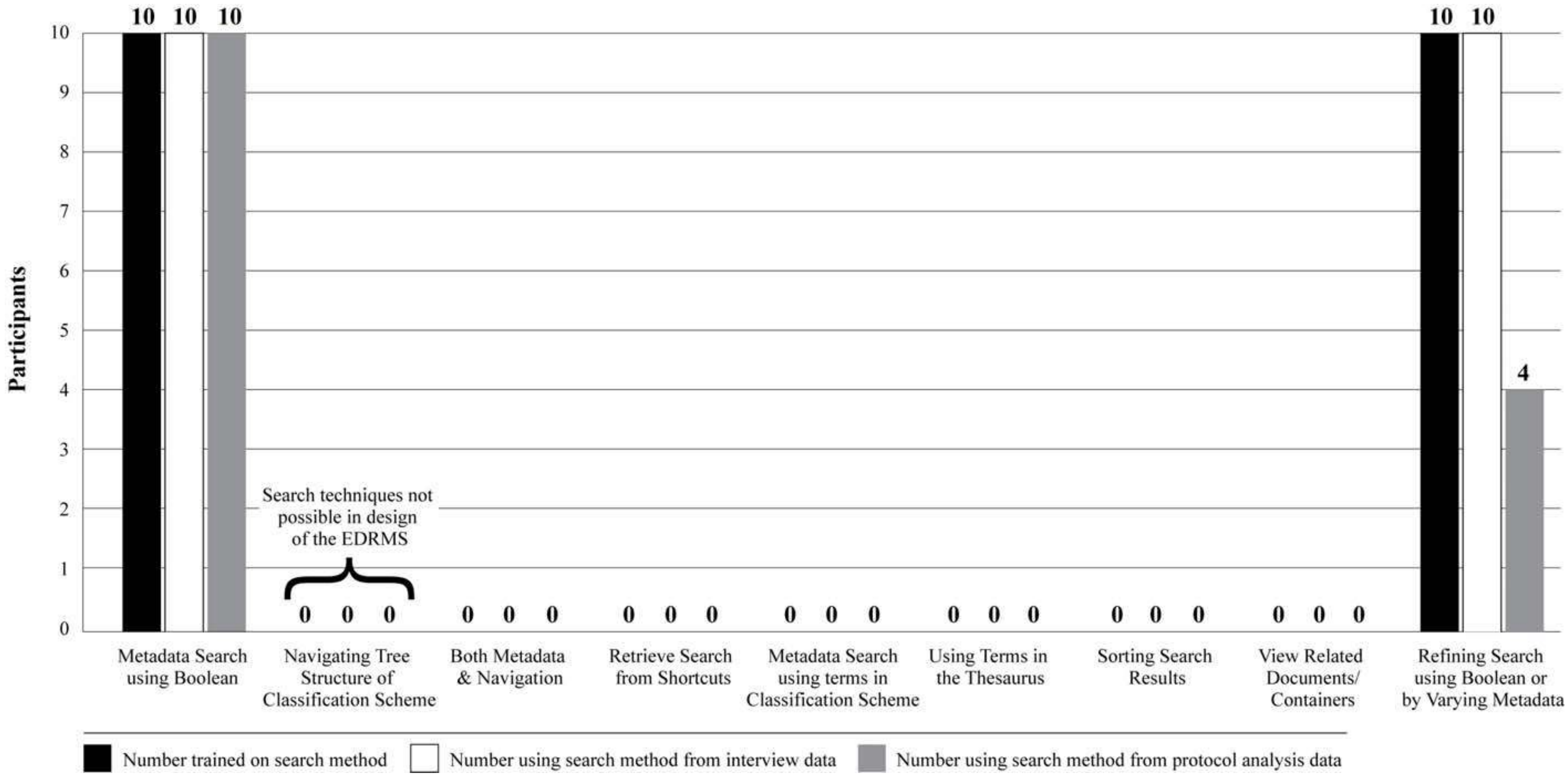


Figure 6.15: Organisation B – Search methods used in relation to training received

metadata fields. Consequently, users did not report or exhibit other search methods such as using terms in the classification scheme or shortcut functions. Nor did they report or show awareness of search activities such as **sorting** or **filtering** when evaluating their search results. The lack of training, and of awareness of other search methods available, explains why two of the six searches were reported by Organisation B's users to be difficult. P16's and P19's difficult searches could have been simple if they had had a better understanding of the scheme and had been able to use keywords or activity descriptors from the KFC thesaurus to conduct their searches.

6.8.3 Organisation C

As indicated in Figure 6.16, users in Organisation C were trained in a number of search methods, and reported and demonstrated six of the eight methods. The most common search method used the metadata fields, with the searches refined via Boolean logic or by varying the search terms in the metadata fields.

Only two users stated that they searched by navigation of the tree view of the classification structure. This suggests either a lack of understanding of the classification scheme by the remaining eight users, or a preference to avoid navigation as a search method. As in Organisation A, out of the ten users trained in using shortcut functions, only three users noted them and only one demonstrated the technique.

The KAAA thesaurus was uploaded into a separate system referred to as the *a.k.a. ® Classification Software,* and was not integrated to the EDRMS. One user reported consulting the *a.k.a. ® Classification Software* occasionally to request new folders be created, but not to use the thesaurus terms for searching. None of the users in Organisation C reported or exhibited using keyword or activity terms from the KAAA thesaurus to conduct their searches.

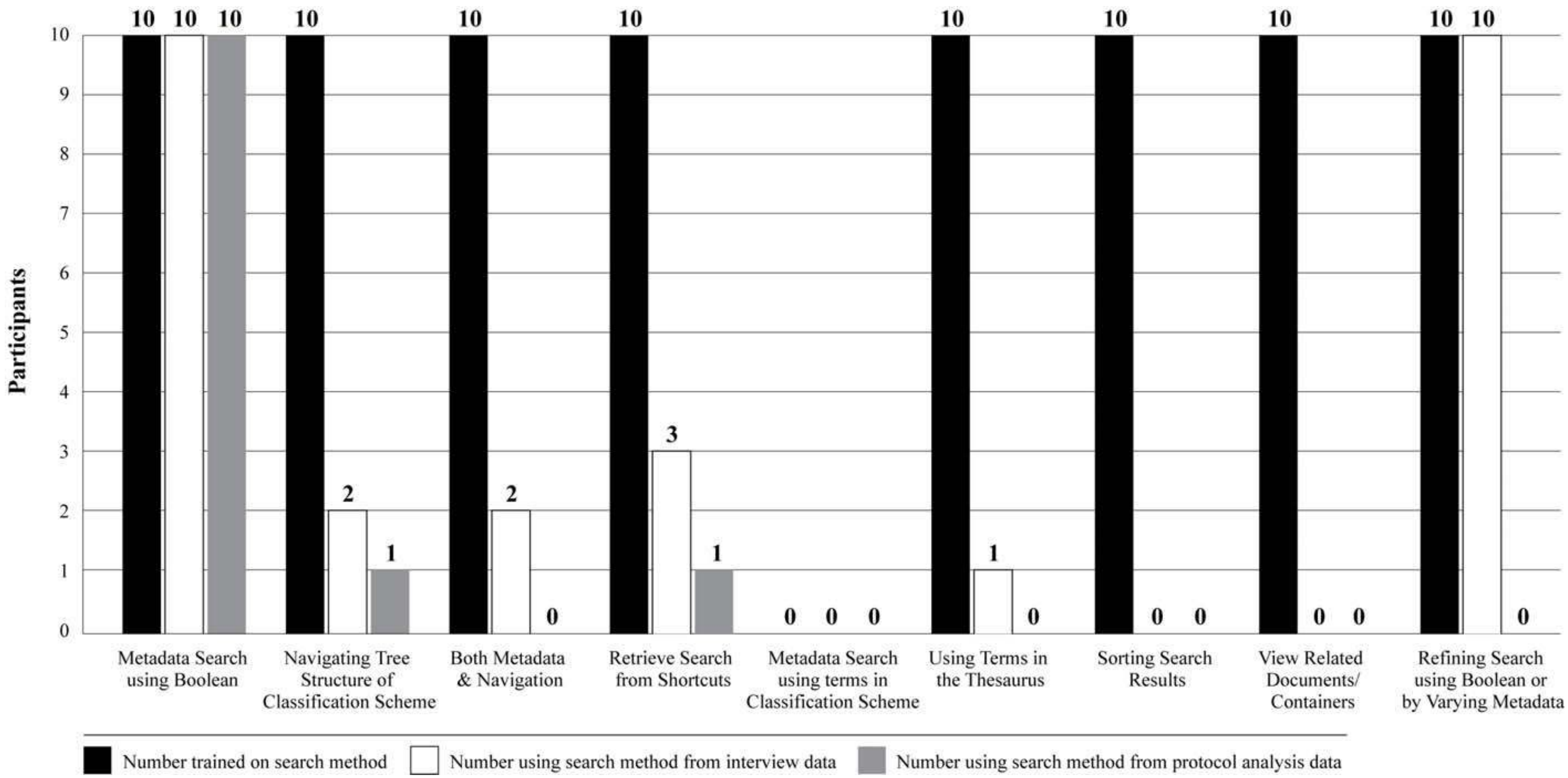


Figure 6.16: Organisation C – Search methods used in relation to training received

Although all ten users were trained on how to **sort** their search results, none applied this knowledge. This may be because the search results were defaulted to list the most recent document or record by chronological order, as occurred in Organisation A. Unlike Organisation A, users in Organisation C were trained to search by viewing related documents, records or folders in the EDRMS. However, none of the ten users employed this method at any time.

6.8.4 Organisation D

Both the tree view and virtual database design views were implemented in Organisation D's EDRMS. However, as indicated in Figure 6.17, training on navigating down the tree view was not provided to users, who conducted their searching using only metadata fields (as in Organisation B). Consequently, all ten users refined their searches by varying terms entered in the metadata fields or through Boolean logic.

Organisation D did not provide training on the classification scheme to its users. Neither keywords nor activity descriptor terms from the KAAA thesaurus were accessed by any user. Only three individuals reported searching using shortcut functions. Although all users were trained in viewing related documents, records or folders in the EDRMS, only one reported or was observed using this search method.

6.8.5 Conclusions on the relationship between training and EDRMS users' search behaviours

Figure 6.18 summarises the relationship between the training provided and the search methods used by the study participants in the four organisations. Figure 6.18 reflects an aggregation of the training provided to users (black bars) and the search methods users stated in the interviews that they used (white bars). The x-axis lists all the different search methods available to users in the EDRMS.

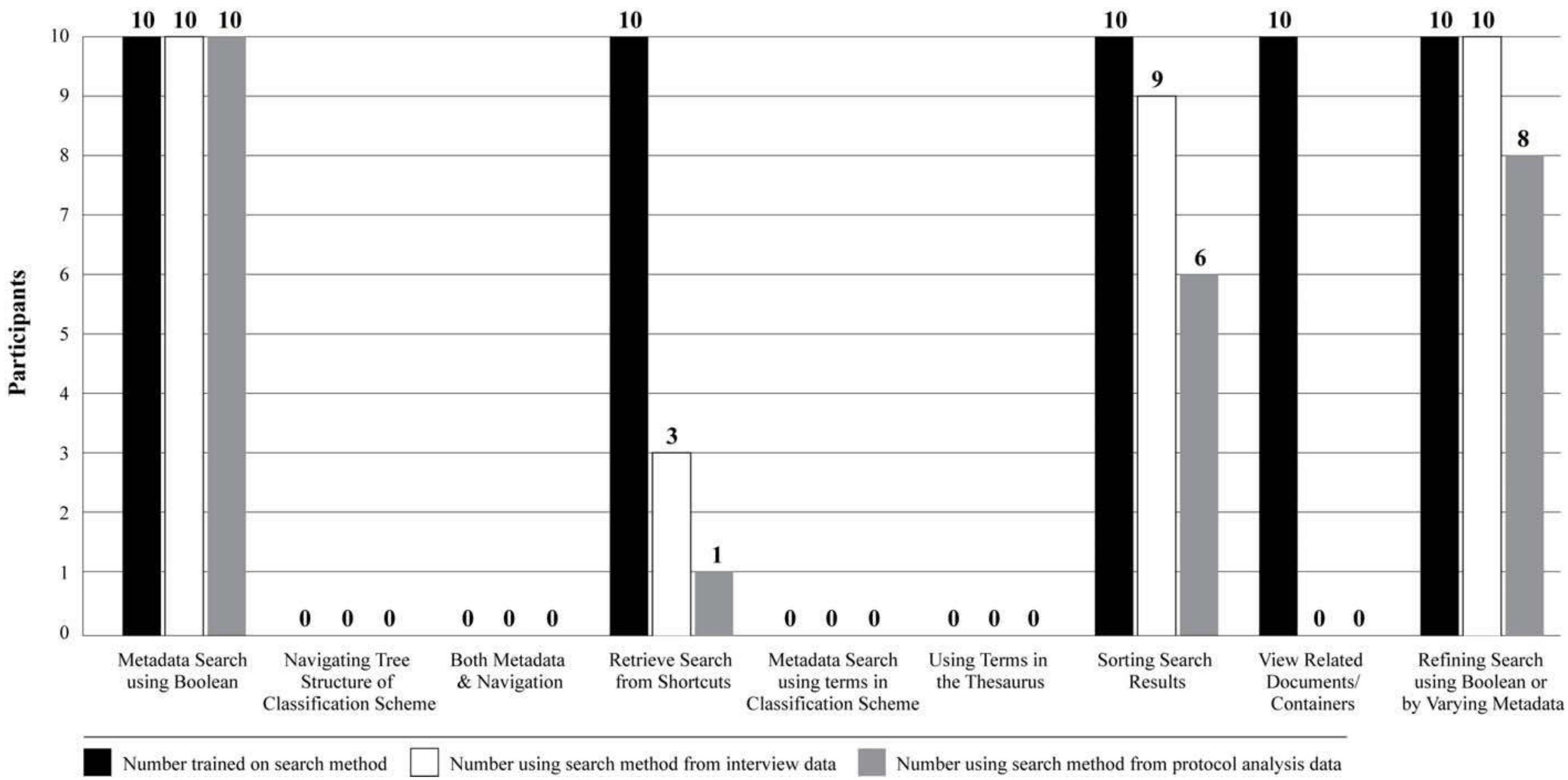


Figure 6.17: Organisation D – Search methods used in relation to training received

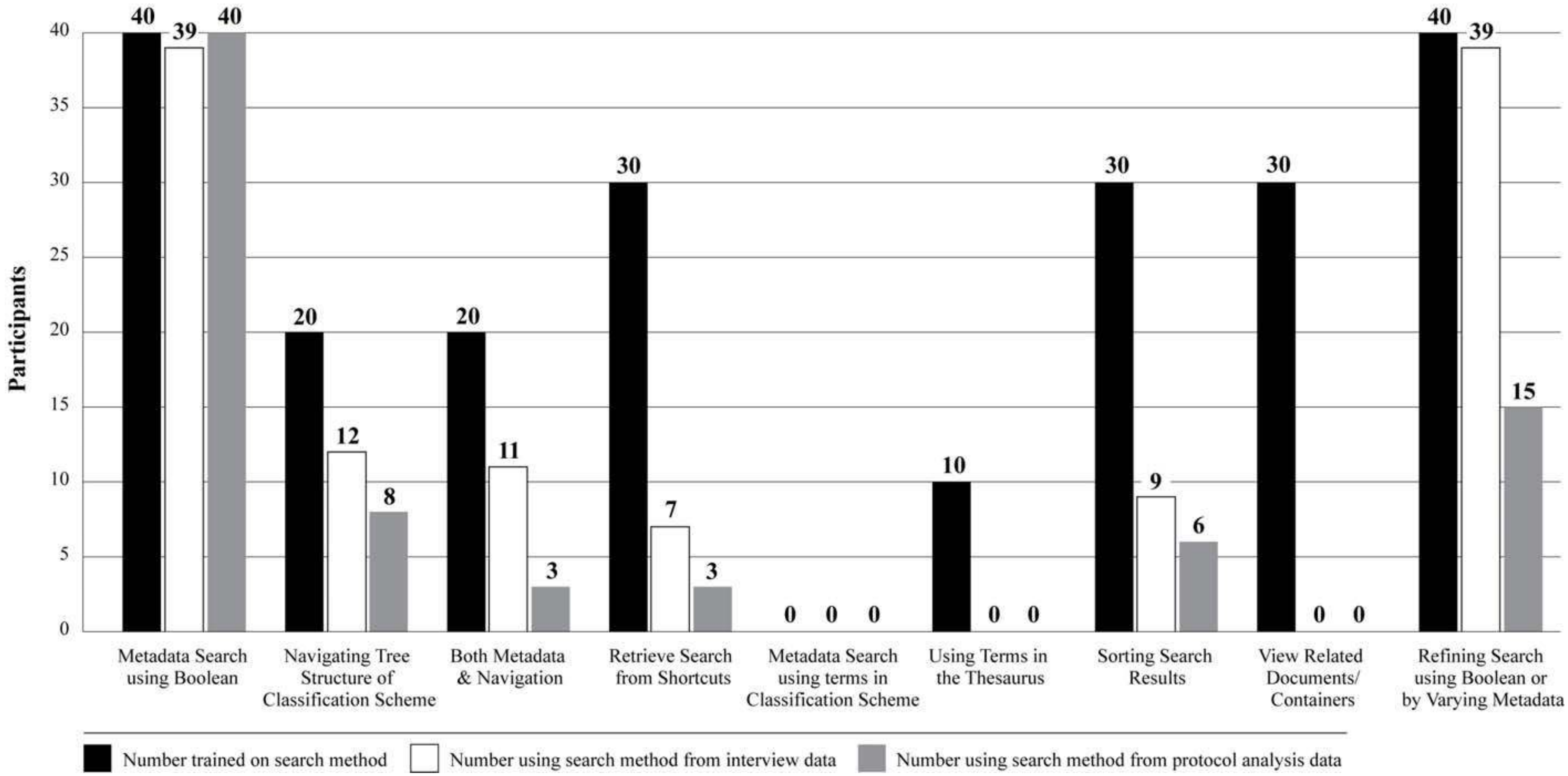


Figure 6.18: Search methods used in relation to training received

The following observations are made from the results presented in Figure 6.18. The organisations provided training on search methods that the records managers perceived as either sufficient or suitable for their organisations.

Consequently, users applied only the techniques in which they were trained. For instance, Organisation B only provided training on two search methods and users in this organisation only reported and were observed using these methods. No user employed a search technique they were not trained in using. Some search techniques proved to be more popular than others: 98% (39 users) formulated and refined their search using metadata fields. It was evident that users had developed particular search preferences. For instance, instead of searching using metadata fields one user (P4) reported using only the navigation search method to seek information from the EDRMS. Only seven of the 30 users trained in using shortcuts did so. While three organisations provided training on viewing related documents or folders, no user reported or was observed using this approach.

In reviewing the training programs of the four organisations and the interview data of the records management professionals, it was observed that none of the organisations provided training on how to search by using the metadata associated with the first or second level terms in the classification scheme or the thesaurus embedded in the EDRMS. In Organisations A, B and D, where the thesaurus was integrated[88] with the EDRMS, this was possible. Organisation C's thesaurus was uploaded using a third party thesaurus application and was not integrated into the EDRMS. It was not possible for users to browse the thesaurus or select terms to view records classified against the thesaurus terms. Training was provided to all of Organisation C's participants on how to search the thesaurus, so users were aware how to request new folder titles from the Records Section; however, training was not provided on how to consult the thesaurus

[88] Refers to the thesaurus module in the EDRMS being part of the EDRMS suite.

application and type thesaurus terms into the classification metadata fields of the EDRMS in order to search for records classified against these terms.

Training programs in different search methods appear to play an important role in guiding users toward effective search strategies. Providing more focused training on the search skills that are most relevant to the type of tasks users perform would enable better adoption of suitable search methods.

These findings support previous studies that illustrate a positive relationship between search methods used and the training provided to users (Branch, 2002; D'Alessandro et al., 2004; Debowski, Wood, & Bandura, 2001b; Lucas & Topi, 2004). The qualitative data analyses indicate a positive relationship between employed search methods and those introduced through user training. While users both reported and were observed to display the search methods they were trained in (Figure 6.18), the findings indicate that the individual search style of the user also influenced their search methods. This was evident, for instance, in P4's preference for only using the navigation search method, even though she had received training on metadata and shortcut search methods.

These results indicate that training is most likely to affect the EDRMS users' search behaviours in two of the seven stages, namely, *Stage 2: Formulate Search Strategies* and *Stage 4: Process and Evaluate Search*. These findings answer *SQ_4): How does training on EDRMS search methods affect the search behaviour of EDRMS users?*

6.9 Conclusion

The results reported in this chapter confirm the hypothesised EDRMS search model (Figure 6.11) thereby answering secondary research question $SQ_{2;}$

SQ_2: What is the search behaviour of EDRMS users?

This subsequently answered SQ_3 and SQ_4 in the study:

SQ_3: How do search task and task knowledge affect the search behaviour of EDRMS users?

SQ_4: How does training on EDRMS search methods affect the search behaviour of EDRMS users?

The EDRMS search model identifies seven stages through which users progress (some of them repeated) in information seeking activities designed to search for and retrieve information.

Further, the EDRMS search model depicts the aggregated self-reported individual EDRMS search behaviour for each of the 40 users in both virtual *database* and *tree view* designs of the EDRMS. It incorporates observations of users' search behaviour when they decide to stop difficult searches in the EDRMS. The data reveals that users continue their search by turning for assistance to people or other information resources. They return to the EDRMS to retry their search once they obtain updated or new task knowledge and can reformulate their search.

The data confirms that both search task and task knowledge affect the search behaviour of EDRMS users in four of the seven information search process stages, thereby answering SQ_3. These are:

Stage 1: Start Search;

Stage 2: Formulation of Search Strategy;

Stage 4: Process and Evaluate Search Results; and

Stage 7: End Search.

From the EDRMS search model it is also possible to answer secondary research question SQ_4 regarding how search training affects users' search behaviour. A positive relationship is observed between the training provided on search methods and the search behaviour displayed by users. The findings show that users formulate their search strategy to match their task knowledge, by using either personally preferred search methods or the search methods in which they were trained. This indicates that training on a number of search methods equips users to select appropriate search methods based on the task knowledge they have at the time of seeking information. Further, the findings show a need to provide training focused on search skills related to users' task and computer literacy levels.

The next chapter discusses a comparison of the EDRMS search behaviour model with the information seeking behaviour models of library users (Ellis, 1989; Marchionini, 1995; Meho & Tibbo, 2003). It then discusses the answer to the primary research question:

> *PQ: Does the management of corporate documents and records in the EDRMS support the search behaviour of EDRMS users?*

7 Discussion

7.1 Introduction

This research investigated three key factors that determined the efficacy of an EDRMS strategy: 1) the adoption of RM principles outlined in ISO 15489 to design EDRMS, 2) the implementation of an effective corporate EDRMS strategy using ISO 15489 and 3) the competence of EDRMS users interacting with their corporate information management system. Figure 7.1 depicts the explored relationships.

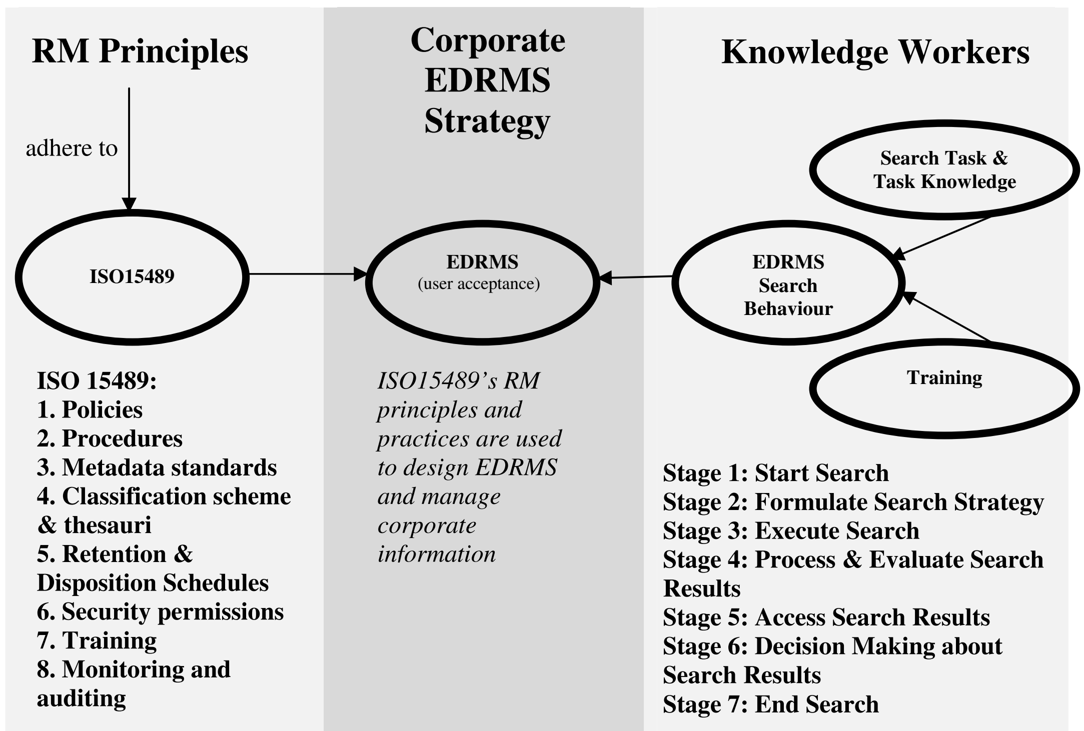


Figure 7.1: Revisiting theoretical framework from research findings

Column 1 relates to the RM principles and to the degree to which they are implemented in an organisation, particularly in terms of policies, procedures, metadata elements, classification schemes, and training and auditing. Column 2 relates to the ways in which the organisation implements the EDRMS and its associated RM services and infrastructure. Column 3 relates to the capacity of the community (knowledge workers) to interpret and interrogate the knowledge system appropriately. This chapter will discuss how the integration of these is essential for the successful implementation of an EDRMS and for user acceptance of the system.

Chapters 5 and 6 reported on the findings of two key aspects of this research. Chapter 5 provided evidence of how the four sampled organisations had implemented the eight pillar records management principles and practices in their organisations. Chapter 6 reviewed the search behaviour of EDRMS users, drawing on 40 users' self-reported and observed search behaviours gathered in interview sessions. The findings substantiated the theory that users' assessment of their work task, search task, and task knowledge influence their subsequent search behaviours. Further, the findings in Chapter 6 revealed the importance of user training in different search methods and showed how training affected subsequent search behaviours in the EDRMS.

The findings reported in Chapters 5 and 6 indicate that in general, implementation of the eight records management principles outlined in the ISO 15489 standard (International Organisation for Standardisation, 2002a, 2002b) were insufficient[89] for effectively enabling EDRMS users to search and retrieve information. These findings suggest that an organisational focus on guiding users toward desirable information management practice, with visible reinforcement and support from senior management, is necessary to reduce inconsistencies between user practice and the system (EDRMS) used.

This chapter reviews the posited EDRMS search behaviour model, comparing it with the search behaviour models of library users (Ellis, 1989; Marchionini, 1995; Meho & Tibbo, 2003). The answers to the primary research question are examined and reviewed, and the implications of the research findings for records management practices are explored.

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[89] Such as RM principles on metadata, classification schemes, auditing and monitoring, and training.

Figure 7.2 summarises the results of the search behaviour of EDRMS users as initially presented in Figure 6.11 (Chapter 6). As hypothesised, the research variables search task, task knowledge, and training affected the search behaviour of EDRMS users.

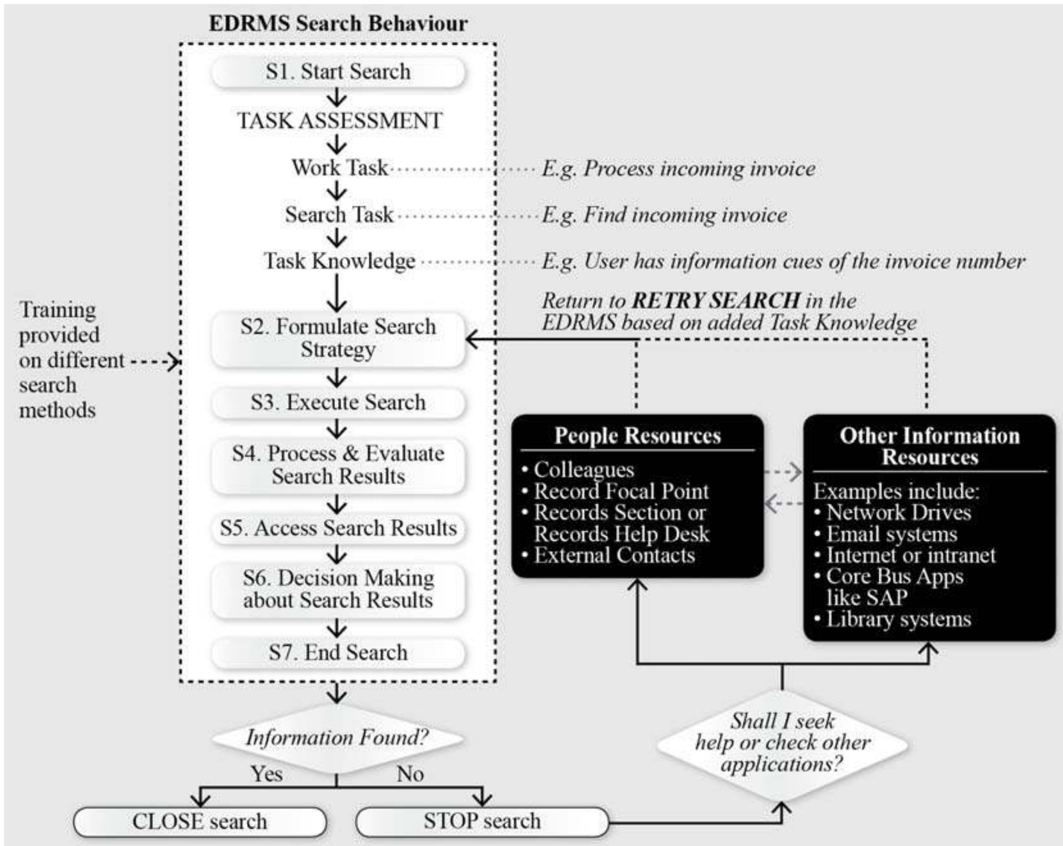

Figure 7.2: Summarised EDRMS search behaviour model

As shown in Figure 7.2, the work task informs the search task, which then provides users with the required information cues in the form of task knowledge to decide how best to formulate a search strategy in the EDRMS. The italicised examples illustrate typical task assessment activities from the participants in this study. All users engaged in the same seven stages of a linear search process, although with some variation in the search activities at each stage. Their training in the different search methods and their preferred search styles influenced these variations. When users found the information they sought they successfully **closed** their search in the EDRMS. If their search was unsuccessful, users decided to **stop** the search in the EDRMS and pursue their information seeking by consulting people or other information sources. They were observed returning to the EDRMS to **retry** their search formulation strategy if they obtained updated or new task knowledge that might assist in retrieving the sought information.

7.2 Comparison of the EDRMS search behaviour model with other search models, processes and concepts

The initial search model proposed for this research drew on the prior work of Ellis (1989), Marchionini (1995) and Meho and Tibbo (2003), leading to the hypothesised EDRMS search behaviour model depicted in Figure 6.11 (Chapter 6). This research has demonstrated some similarities and differences between the previous models and this EDRMS context, highlighting the importance of positioning search behaviour within a task context.

7.2.1 Ellis (1989), Meho and Tibbo (2003) research

There were a number of differences between this tested model and those of Ellis' (1989) and Meho and Tibbo's (2003) research. The differences are primarily attributable to the different groups of people surveyed, their information sources and the purposes of their search tasks.

Ellis (1989) and Meho and Tibbo (2003) studied library users, whereas this research explored EDRMS usage. Both user groups sought information to address their information need, information gap and/or anomalous state of knowledge (Belkin, 1980; Dervin, 1992a; Wilson, 2005). The library users in Ellis (1989), Meho and Tibbo's (2003) study were using a variety of sources to seek required information. This research focused on how knowledge workers sought information from one particular organisational source: the EDRMS. The reasons for seeking information were also different. Library users were seeking information to address a research question, with the goal of obtaining a set of responses to be evaluated, whilst EDRMS users required a discrete information source either to complete a work task or to fulfil an information need.

In addition, the reasons for studying the search behaviour of users differed between these studies. To assist in designing online library catalogues, Ellis (1989) wanted to explore the search behaviour of academics in the social sciences, psychology and education faculties working in a paper based library environment. Meho and Tibbo (2003) applied Ellis' (1989) theories to social scientists seeking information through online library catalogues, the Internet and other electronic information sources. The purpose of this study was to assess the search behaviour of EDRMS users and their alignment with the EDRMS.

7.2.1.1 Similarities

7.2.1.1.1 Starting

This study uncovered a number of similarities and differences between the library search behaviours and the EDRMS context. The search processes employed by the participants demonstrated a number of features common to those identified in library researchers. Ellis (1989) describes **starting** search behaviour as "activities characteristic of the initial search for information" by a researcher commencing work on a new topic or area (p. 178). Examples of these **starting** characteristics include making use of informal contacts for guidance to starter references in the new area, relying on previous experience using library resource materials to make a start in researching a new topic and referring to citations in articles in the new area as well as following up citations to further their research (Ellis, 1989, p. 179).

Ellis' (1989) concept of **starting** was evidenced during the interviews and protocol analysis sessions with the EDRMS users, who reported searching the system for the following reasons:

1) they had a task to do and required information from the EDRMS to complete the task;

2) they needed to action a task by responding to action items via the EDRM workflow; or

3) they required information in the EDRMS as reference material or to recollect what was communicated or performed previously on the same or similar subject.

Given these reasons, it is evident that, unlike the library researchers studied by Ellis (1989), the EDRMS users were more aware of how to **start** their search in the EDRMS. This was primarily because the information required was not in a new topic area but part of their work task roles. Often they already had background information relating to the information being sought, from being on the job. Therefore, when **starting** a search, EDRMS users had a better idea of what they were searching for. They were aware of at least one piece of metadata associated with the search or knew where the information was filed. This clarity in their **task assessment** enabled users to decide on a search strategy based on whether they had authored or filed the item, or knew where the item was stored in the EDRMS; and then to **navigate** to the folder or item. Unlike Ellis' (1989) subjects, EDRMS users could also consider whether they had conducted the search previously or had saved the search into their favourite shortcuts.

Like Ellis' (1989) participants, who sought assistance from their contacts for starter references for their search, EDRMS users used their colleagues as contacts to find out background information that would assist in searching for information. These colleagues often were contacted because they had either created or registered the required information into the EDRMS. All the organisations studied had nominated

Record Focal Points[90] who were provided with extra training and could be contacted for assistance if required. If assistance from colleagues was not solicited during the **starting** stage, it was usually done at the **end** stage if users failed to find the information they were seeking.

7.2.1.1.2 Browsing

Ellis describes **browsing** as “semi-directed searching in an area of potential interest” (1989, p. 178) such as recently published journals or current contents, contents pages of journals, library shelves, or indexing and abstracting sources. EDRMS users exhibited a more contained form of **browsing** at three stages of their search behaviour processes:

- Stage 2: Formulate search strategy;
- Stage 4: Process and evaluate search results; and
- Stage 6: Decision making about search results.

At the *formulate search strategy* stage, EDRMS users who decided to search by **navigating** the tree view displayed **browsing** characteristics as they worked their way through the folder structure. At the *process and evaluate search results* stage, users **browsed** the metadata fields presented in the search results displayed. They **scanned** the contents of the documents to **verify** the required information at the *decision making about search results* stage.

7.2.1.1.3 Closure

In his research Ellis (1989) discusses **closure**. He does not identify it as a search behaviour characteristic, describing it as “the feeling of confidence that a search had been sufficiently thorough” (Ellis, 1989, p. 185). The marking of sufficient citations signalled the **closure** of search activities by the library users. Ellis notes that

[90] Record focal points are trained power users of the EDRMS and of the records management program implemented in the organisation. Usually secretaries, administrative staff or personal assistants are assigned the additional responsibility of being the Record Focal Point for their department.

“sometimes a point was reached where the citations seem to be becoming more and more peripheral to the main subject of interest, or start dealing with increasingly minute aspects of it” (1989, p. 184). It was at this point, according to Ellis, that library users decided to **close** their search, as chasing up citations yielded the same references again or the new information added little value to that already gathered. Thus, in Ellis’ research, the user **closed** their search once sufficient responses were obtained.

The **closure** search behaviour observed in the current research is described as part of *ending the search* in Stage 7 of the EDRMS search model. In this research, the search goal was to achieve a single accurate record capture that matched the task requirements. The EDRMS users reached a point in their searching that led them to either **close** their search if they found what they were seeking or to **stop** the search if they felt they had exhausted all possible search strategies and still could not find the information. As stated in Chapter 6, **stopping** the search for the EDRMS users did not mean that they ended the search: it marked the **stopping** of their initial search efforts. Users then sought assistance from their colleagues or the Records Section and either returned to **retry** the search in the EDRMS or found the information elsewhere.

7.2.1.1.4 Grouping of search activities into four inter-related stages

Unlike Ellis (1989), Meho and Tibbo (2003) group the different search activities they identify in their research into four inter-related stages (Table 7.1). The search activities in bold font (Column 2) represent new characteristics observed by Meho and Tibbo (2003).

Table 7.1: Revised Search Behaviour Model (Meho & Tibbo, 2003)

4 Inter-related stages of search activities	Specific Search Activities
Searching	starting, chaining, browsing, monitoring, differentiating, extracting, **networking**
Processing	chaining, extracting, differentiating, **verifying, information managing, synthesising, analysing, writing**
Accessing	**decision making**
Ending	

Similar to Ellis' (1989) findings, Meho and Tibbo's (2003) research finds that there is no hierarchical sequence to the search activities performed by social scientists. They report that researchers moved from one search activity to another based on their momentary or changing needs.

In the current research, as in Meho and Tibbo's (2003), the search behaviours of EDRMS users are grouped, but into seven hierarchical sequential search process stages (Figure 6.11 in Chapter 6).

7.2.1.2 Differences

7.2.1.2.1 Hierarchical sequential stages

Unlike Ellis' (1989) and Meho and Tibbo's (2003) models, the search behaviour model of EDRMS users reflects a hierarchical sequence of search activities. Within each search process stage, EDRMS users were observed to engage in various search behaviours. Given EDRMS users were seeking information from a computer system, there was a definite sequence of stages they engaged in until they **ended** their search in the EDRMS. However, the stages users went through were iterative. For instance, from Stage 4 users could return to Stage 2 to **refine** their search by reformulating their search strategy; or decide to **retry** their search in Stage 7 and return to Stage 2 to reformulate their search strategy. However, it was not possible to repeat specific search activity once the user moved to the next search process stage. As an example, scanning and verifying content could not be done in *Stage 2: Formulating Search Strategy* but only in *Stage 6: Decision Making about Search Results*. EDRMS users were still able to repeat some search behaviours within Stages 4, 6 and 7 in the EDRMS search model. For instance, in Stage 4 users could switch between search behaviours such as **browse** search results and **sort** results, return to **browse** results, then decide to **filter** results and **browse** again.

7.2.1.2.2 Monitoring

Ellis describes **monitoring** as "maintaining awareness of developments in a field through the **monitoring** of particular sources" (1989, p. 178). EDRMS users neither reported nor were observed in any **monitoring** activity within the EDRMS. Instead, they relied on information sources such as their peers or line managers to keep them informed, via emails links to documentation in the EDRMS or via meetings, workshops or seminars. In Organisations B and C incoming correspondences were work flowed to the relevant knowledge workers, which provided the users with a mechanism to **monitor** and maintain awareness of what was happening in their line of work, which is closest to Ellis' description of **monitoring**. None used it.

EDRMS such as LiveLink by Open Text provide automatic **monitoring** functionality in their EDRMS. Users can set automatic notifications to be sent to them at both folder and document/record level, concerning information they intend to **monitor** in the EDRMS. If notification is set at a folder level, new content additions or changes are notified by email. In this way the user is able to **monitor** changes happening in the subject of interest. However, the versions of TRIM, e-Docs and Objective systems studied in this research did not provide automatic notification. Only one (P17) of the 40 users reported a benefit from the automatic email notification as a way of **monitoring** new information on work tasks of relevance that sometimes are not readily shared by fellow colleagues. The remaining 39 users stated that they preferred not to clutter their already unmanageable email systems with such notifications. They indicated their current **monitoring** practices were sufficient.

7.2.1.2.3 Chaining

Chaining was a search behaviour characteristic that EDRMS users did not exhibit in their self-reported and observed flowcharts, unlike library users in Ellis' (1989) and Meho and Tibbo's (2003) studies. Ellis describes **chaining** as "following chains of citations or other forms of referential connection between material" (1989, p. 178). He notes that **chaining** takes two separate forms; backward **chaining** and forward **chaining**. Backward **chaining** is "following up references or sources cited in material consulted" (1989, p. 183), and forward **chaining** is "identifying citations to material consulted or known" (1989, p. 183).

There are two possible ways that **chaining** could be performed when using an EDRMS. Firstly, backward **chaining** is possible using the EDRMS' *related to* linking functionality, which enables related information to be grouped together and linked. However, user effort is required to establish links, in order to realise the benefit in backward **chaining** later.

In some EDRMS, it is possible to perform manual or electronic forward **chaining**. To perform manual forward **chaining**, users need to take note of the details of the reference document and conduct a search by the document's title or number in the EDRMS. It is also possible to create *related to* links. In EDRMS that offer electronic forward **chaining** functionality, it is possible to create hyperlinks (similar to links in the web technology) to individual references listed in a document registered in the EDRMS as long as the linked documents are also registered in the EDRMS. The versions of TRIM studied in this research did not allow the creation of hyperlinks; however, Objective and Open Text's e-Docs now offer this functionality.

Two organisations with hyperlink functionality reported not using this option for references or citation within their documents. This was primarily because the documents that used hyperlinks were corporate policy or procedural documentation, published on the Intranet and not in the EDRMS. Forward **chaining** was flexibly performed using the Intranet hyperlinks but none of the users reported using this.

In Question 13 of the structured interview questions for EDRMS users, users were asked: *Do you follow up references cited in material consulted in the EDRMS?* to find out if users applied **chaining**. It was explained to users that by "references" the researcher meant the listing of documents usually found at the end of a report. Generally, users responded that they did not follow up these references, primarily because most of the information required was present in the document itself. However, they reported that if there was a need, they would search for the reference document in the EDRMS or other information sources; but their jobs generally did not require chaining.

While users were aware that the EDRMS had **chaining** they did not employ this option when searching and it was omitted from the EDRMS search model. However, it is a possible search behaviour of EDRMS users and may be observed in future research if users are trained in working with this option and benefit from it.

7.2.1.2.4 Differentiating and Extracting

Ellis describes **differentiating** as "using differences between sources as filters on the nature and quality of the material examined" (1989, p. 178) and **extracting** as "systematically working through a particular source to locate material of interest" (1989, p. 178). Both these search behaviour characteristics are relevant to library users who are searching for multiple sources and tend to check a variety of indexing and abstracting tools and other information sources (Ellis, 1989; Meho & Tibbo, 2003). This study focuses on only one information source, the EDRMS. It is not surprising that EDRMS users did not exhibit these two search behaviours.

7.2.2 Marchionini's (1995) information seeking processes (ISP) model

Marchionini's (1995) information seeking processes (ISP) model contains hierarchical sequential stages similar to the EDRMS search model developed for this study (Figure 6.11). However, the EDRMS search model has seven stages, whilst Marchionini's (1995) ISP model consists of only three: 1) understand; 2) plan and execute; and 3) evaluate and use. A comparison of the similarities and differences between Marchionini's (1995) three information seeking processes and sub-processes and those of the EDRMS search model (Table 7.2) is presented next.

7.2.2.1 Understand

The second row in Table 7.2 shows that Marchionini's (1995) information seeking sub-processes occur in the first stage of his ISP model, which is "understand." These sub-processes of **recognising the problem or need**, **accepting the problem** and **defining the problem** are similar to what EDRMS users were observed performing when they conducted their task assessment activity in *Stage 1: Start*. In the task assessment activity EDRMS users tried to **understand**, **accept** and **define** their work task, search task and subsequent task knowledge.

7.2.2.2 Plan and Execution

The third row in Table 7.2 presents the information seeking sub-processes that Marchionini (1995) states occur in the second stage of his ISP model, *plan and execute*. In Stage 2, Marchionini (1995) describes his users selecting a search system, formulating their search query, determining their entry point, executing their search and finally examining the search results.

Table 7.2: Comparison of Marchionini's (1995) information seeking processes of electronic system users with the EDRMS search model

Information seeking processes	Information seeking sub-processes	EDRMS search model parallels
Understand	Recognise Problem or Need	Stage 1: Start
	Accept Problem	
	Define Problem	
Plan and Execution	Select Search System	EDRMS is default system selected
	Formulate Query / Determine Entry Point	Stage 2: Formulate Search Strategy
	Execute	Stage 3: Execute Search
	Examine	Stage 4: Process and Evaluate Search Results
Evaluation and Use	Examine	Stage 4: Process and Evaluate Search Results Stage 5: Access Search Results Stage 6: Decision Making about Search Results
	Extract	Stage 7: End Search
	Reflect / Iterate / Stop	Stage 5: Access Search Results Stage 6: Decision Making about Search Results Stage 7: End Search

Given that the EDRMS is the default system under study in this research, the **select search system** in Marchionini's second stage is not observed in the EDRMS model (Marchionini, 1995, p. 59). On the other hand, Marchionini's **formulate query / determine entry point** is present in *Stage 2: Formulate Search Strategy* of the EDRMS search model. Similarly, Marchionini's **execute** sub-process appears in *Stage 3: Execute* of the EDRMS model, and Marchionini's **examine** sub-process has its parallel in *Stage 4: Process and Evaluate Search Results*.

7.2.2.3 Evaluation and Use

The last row in Table 7.2 presents the information seeking sub-processes that Marchionini (1995) states occur in his third stage, "evaluation and use". This time Marchionini's **examine** sub-process has it counterpart in several stages of the EDRMS model:

- Stage 4: Process and Evaluate Search Results;
- Stage 5: Access Search Results; and
- Stage 6: Decision Making about Search Results.

A variety of search activities such as browsing, filtering, sorting and launching information, were performed under each of the above stages in the EDRMS model, are not addressed in Marchionini's ISP model.

The **extract** and **stop** information seeking sub-process in Marchionini's (1995) model is similar to the **extract documents** and **stop search** activities observed in *Stage 7: End Search* in the EDRMS model. Likewise, the **reflect** sub-process in the ISP model is similar to the **launch documents** and **scan and verify contents** in Stages 5 and 6 respectively of the EDRMS model. It is unclear what Marchionini (1995) refers to in the **iterate** sub-process in his model; this researcher assumes he refers to the iteration of all three sub-processes in the "evaluation and use" stage. This being the case, it would be similar to EDRMS users iterating their search activities in each of the seven stages or deciding to reiterate from Stage 4 to 2 or from Stage 7 to 2.

Despite these variations, there are more similarities than differences between the EDRMS search model developed in this research and Marchionini's ISP model. However, the EDRMS search behaviour model provides a more specific and detailed description of search processes, behaviours and activities of EDRMS users than is possible using Marchionini's (1995) Information Seeking Processes of Electronic System Users model.

7.2.3 "Principle of Least Effort" (PLE) by Zipf

The results from the short interview questionnaire discussed in Table 4.5 in Chapter 4 indicate that rather than relying on just one information source for their searching, EDRMS users use other available sources. The "Principle of Least Effort" (PLE) articulated by George Zipf (1949) and cited by Case (2005) was observed in the search behaviour of EDRMS users as they decided which information source to select for their search.

Case states:

> a number of empirical studies have found that, as knowledge of a source, its potential contents and capabilities increases, the use of that source tends to increase; that is, humans tend to return to the sources that they used in the past in strong preference to trying out new sources of information" (p. 289).

The PLE "predicts that seekers will minimise the effort required to obtain information, even if it means accepting a lower quality or quantity of information" (Case, 2005, p. 291). Depending on their search task and their task knowledge, users assess and then decide on which information source is best to use and requires the least effort to produce the information required.

Potential information sources in the office environment were grouped into three categories: the EDRMS, assistance from colleagues, and other information applications. The order in which these information sources were used depended very much on the work task, search task and the task knowledge the user had, as well as their awareness of the information sources available. Users' preferred search styles came into play in the selection of information sources: "humans tend to return to the sources that they used in the past in strong preference to trying out new sources of information" (Case, c2005, p. 289). This indicates the need to provide training to new staff to create awareness of key potential information sources, so that they can select the information sources best suited to their search requirements. Further, it indicates the need to simplify the content and design of the EDRMS so that it is user friendly and is the preferred information source of knowledge workers.

7.2.4 Berrypicking and successive searching

Bates' berrypicking model refers to the "bit-at-a-time" retrieval of information from a number of search queries and then processing results, as opposed to a single final retrieved set of results (Bates, 1984, 1989a). Both the berrypicking model and successive searching refer to retrieval of information from different sources. Successive searching, described by Spink, Griesdorf and Bateman (1999, p. 485), refers to users repeating searches for an evolving information problem.

In all stages of the EDRMS search model users were observed berrypicking as they made decisions regarding which bits of information they required and what search activities they might engage in at each stage. Berrypicking and successive searching were observed when EDRMS users **refined** their searches in *Stage 4: Evaluate and Process Search Results* in both simple and difficult searches. They were also observed when users **stopped** difficult searches to consult other people or information sources, or when they returned to **retry** their search for the same information in the EDRMS (Bates, 1984, 1989a; Spink et al., 1999). In those simple searches where users entered search terms once and were able to find their sought information in a single query episode, neither berrypicking nor successive searching were observed.

Two of Spink et al.'s (1999, p. 481) findings on the reasons for successive searching are similar to those offered regarding search patterns in the EDRMS (Table 6.2, Chapter 6). These reasons are: 1) too many search results to browse through; and 2) original search terms not correct.

7.2.5 Task complexity by Wood

Wood's (1986) three types of task complexity, component, coordinative and dynamic characteristics, were observed in the EDRMS search model (Figure 6.11). Each characteristic of Wood's task complexity occurred from Stage 1 when EDRMS users started their search and juggled assessments of their work task, search task and task knowledge, until they ended their search in Stage 7. Component complexity was observed as users tried to coordinate the different information cues from their task knowledge in Stage 1 to perform their search task. In Stage 2 users were observed deciding how best to cognitively process the different component inputs of their work task, search task and task knowledge to formulate their search strategy. Similarly, in Stage 4 users were observed reviewing, processing and coordinating the dynamic search results to see how they matched with their work task, search task and task knowledge. Throughout the search stages, users were observed coordinating several distinct search behaviours at each of the seven search stages of the EDRMS search model.

Given that EDRMS users conduct search tasks that relate to their work, it is possible they repeat their searches regularly. Wood's (1986) component complexity was observed to be reduced to Naylor and Dickinson's (1969; 1969) "component redundancy" in EDRMS users' search behaviours. Component redundancy refers to the reduction of knowledge and skill requirements that results from component complexity when search tasks are repeated (Naylor & Carroll, 1969; Naylor & Dickinson, 1969; Wood, 1986). This is the case for EDRMS users, as they often conduct similar search tasks relating to their primary work roles.

There was most evident of Wood's three types of task complexity in difficult searches. This is because when users stopped their initial search they sought new, alternative paths, as shown in Stage 7 (Figure 6.11). These additional actions increased the component, coordinative and dynamic task complexities entailed in completing their search task (Wood, 1986).

7.2.6 Decision making concepts and processes

The OODA loop (observe, orient, decide and act) is a strategic decision making concept developed by military strategist and USAF Colonel John Boyd, and is applied at a strategic level in combat operation processes. The OODA loop strategy is intended to be used by soldiers to gain insight into their opponent's decision cycle and stay one step ahead of the opponent's thinking and action (Boyd, 1995; Mason, 2003). Like the OODA loop, Simon's decision making process comprises four sequential phases, intelligence, design, choice and review, undertaken by decision makers. At the intelligence phase, decision makers consider what decision they need to make, design the approach they would take to make the decision, considering the alternatives available to them, then analyse the choices they have and decide on the best, and finally review their decision (Simon, 1997, pp. 40-49).

EDRMS users were observed using Boyd's OODA loop and Simon's decision making strategy as they decided how best to move between each of the seven search behaviour process stages (Boyd, 1995; Mason, 2003; Simon, 1997). At each stage of the

EDRMS search model, users were observed continually adapting to changing situations to exploit them to their advantage; thus users engaged in a recurring cycle of "observe – orient – decide – act" and "intelligence – design – choice – review" at each stage, before moving to the next stage (Boyd, 1995; Simon, 1997). Knowledge workers' task assessment intelligence triggered the start stage when they chose to start their decision making process by searching in the EDRMS. The design phase of the decision making process (Simon, 1997) was observed in Stage 2 when they decided how to formulate their search strategy: should they start a new search or retrieve information from existing saved searches or other recent searches? In Stages 4 and 5, when EDRMS users were processing, evaluating and accessing their search results, they were making choices from their results and trying to decide if they had found their required information.

Having investigated how the sampled organisations implemented records management principles and practices to manage their corporate information in Chapter 5, and having found out about the search behaviour of EDRMS users in Chapter 6, it is now possible to answer the primary research question in this study.

7.3 Match between records management principles and practices used to manage records in the EDRMS with the search behaviour of EDRMS users

This section discusses the primary research question in the study stated below, based on the research findings reported in Chapters 5 and 6.

PQ: Does the management of corporate documents and records in the EDRMS support the search behaviour of EDRMS users?

The sub-sections discuss the match between the eight pillar records management principles and the search behaviour of EDRMS users at each of the seven search process stages (Figure 6.11). Table 7.3 presents a snapshot of similar findings, previously

Table 7.3: Is EDRMS search behaviour supported by ISO 15489's records management principles?

EDRMS Search Behaviour Model	8 Pillar Records Management Principles	Is it supportive?
Stage 1: Start	Policies Procedures & Standards Training	In principle but not in practice
Stage 2: Formulate Search Strategy	Metadata Standards Classification Schema Training	In principle but not in practice
Stage 3: Execute Search	Not applicable	Not applicable
Stage 4: Process and Evaluate Search Results	Metadata Standards Classification Schema Training Monitoring & Auditing	In principle but not in practice
Stage 5: Access Search Results	Training Security Permissions	Yes
Stage 6: Decision Making about Search Results	Training Security Permissions Monitoring and Auditing	Yes
Stage 7: End Search	Procedures & Standards Training Security Permissions Monitoring & Auditing	Yes

reported by Singh[91], Klobas, and Anderson (2007a, 2007b, 2008a, 2008b, 2008c, 2008d) and Singh (2007, April 16 - 19).

7.3.1 Stage 1: Starting Search

As reported in Chapter 6, each of the 40 users reported they started their search in the EDRMS because their task assessment indicated the information would be found there. This decision to search in the EDRMS was most likely due to the three records management principles: policies, procedures and training.

It was observed that records management policies set the precedents for the role and use of the EDRMS in the organisation. If there were policies in place that stated that the EDRMS was the corporate repository for records, then users were likely to use the EDRMS to register their records, knowing that this was the tool to use when searching for corporate documents and records: they were prompted to start their search in the EDRMS. Each of the 40 users stated that they used the EDRMS in their organisations because it was the mandated corporate repository for records, as outlined in the records management policies Similarly, the records management procedures, standards and guidelines were seen to provide the guiding principles for users on how to use the EDRMS and what to expect from the records management infrastructure in the organisation. The training materials on records management and use of the EDRMS formed part of the records management procedure. This documentation also established the framework for the search behaviour of EDRMS users.

7.3.2 Stage 2: Formulating Search Strategy

Three key records management principles were observed to affect Stage 2 of the search behaviour pattern: metadata standards, classification schemes and training. Findings

[91] Previous surname of researcher, now Joseph.

indicate that the most common and preferred search behaviour for EDRMS users was to use metadata elements.

While each of the four organisations had some metadata elements implemented in their EDRMS, they did not have formal standards or an overall formal implementation strategy. The KAAA or KFC thesauri were available for search and retrieval, but users were unaware of their applicability. Only seven of the 40 users acknowledged they understood how the classification scheme worked, but none used the thesaurus or classification scheme metadata fields to search.

7.3.3 Stage 3: Executing Search

Given that Stage 3 involved hitting the *enter* button on the keyboard to execute the search, it was not applicable to the eight records management principles.

7.3.4 Stage 4: Processing and Evaluating Search Results

The search behaviour activities reported in Stage 4 were affected by the records management principles of metadata standards, classification schemes and training. The training provided in using EDRMS functionalities such as **filtering**, **sorting** and **refining** search results was observed to enable users to process and evaluate their search results. Awareness training on the different record types and their associated metadata fields and classification schemes also enabled users to perform better at this stage of their search.

7.3.5 Stage 5: Accessing Search Results

Apart from training and security permissions, no other records management principles influenced search behaviours in Stage 5. Security permissions were important as they determined what records users were authorised to view and/or make changes to. Having access to a record enabled users to **launch** it and finalise decisions on the search results by **scanning** and **verifying** it. Lack of **access** prevented a user from launching a record, rendering impossible the next stage, *Making Decisions about Search Results*. Users were not asked how they handled the information once they found it in the EDRMS, but it is theorised that they would either **view** or **print** the item, **take a copy** of it, or **check-out** the item for editing.

7.3.6 Stage 6: Making Decisions about Search Results

The records management principles that influenced search behaviour patterns in Stage 6 were training, security permissions, and monitoring and auditing. Training provided the skills to **scan** and **verify** the contents of a record and decide if it matched the sought information. Security permissions enabled users to **access** a document and make decisions on search results. Without the right security permissions, users were not able to access the information they were seeking, and given their limited access to all the information that should have been available to them, they consequently made poor work tasks decisions. Monitoring and auditing records management practices ensured good content integrity in the EDRMS, enabling users to make efficient decisions about their search results.

7.3.7 Stage 7: Ending Search

In Stage 7, the four records management principles of procedures and standards, training, security permissions and monitoring and auditing influenced users' search behaviour patterns. Records management policies and/or procedure documentation provided an indication of what information should or should not be stored in the EDRMS. If information that should have been stored in the EDRMS was registered there, it was possible to retrieve it and **close** the search rather than **stop**. The delivery of training programs, implementation of security permissions, and regular monitoring and auditing by records managers could influence users' decisions to **stop**, **close** or **retry** their search.

Having answered the primary research question, how records managers can better align the six RM principles to users' search behaviours will be discussed, including the recommendations.

7.4 Implications of the research findings for records management professionals

The EDRMS was designed to support formal records management principles and practices, and the 40 users were able to adapt to the design as they searched for documents and records to support their day-to-day work. The data gathered from interviews with records managers and users, including the self-reported and observed flowcharts for simple and difficult searches, were used to derive and present implications and recommendations for records managers. They are discussed in the sub-sections below.

Table 7.4 builds upon (Table 6.2, Chapter 6 and conceptualises areas where RM principles do not align with users' search behaviours, moving on to suggest how records managers can address this misalignment. Twenty-seven users were able to describe their difficult searches. The eight reasons why searches were difficult are summarised in Table 7.4 Column 1; Column 2 gives the percentage of users who cited each reason.[92] Column 3 identifies the cause of the search difficulty: that is, was it user, system, records managers or organisational culture failure. Column 4 explores some possible

[92] Some of the data in these columns were previously presented in Table 6.2 in Chapter 6.

solutions records managers may benefit from in order to overcome each of the eight categories of search difficulties.

Based on Column 4 in Table 7.4 as well as on data gathered from the interviews with records managers on how RM principles were implemented in their organisations and the EDRMS, there are six managerial challenges of which records managers need to be aware. Recommendations on how these challenges can be addressed to improve information search and retrieval in the EDRMS by users relate to: 1) understanding user behaviour in different organisational contexts; 2) creating awareness of classification schemes to improve search and retrieval; 3) establishing processes for accurate capture of metadata; 4) providing appropriate training; 5) working effectively with stakeholders for successful usage of the EDRMS; and 6) establishing a quality assurance team as part of the Records Section (Joseph, 2009a, 2009b, 2010; Singh et al., 2008a, 2008b).

Table 7.4: Managerial solutions to barriers in search and retrieval in EDRMS

Why search was difficult	% of Total users (n=27 users)	Caused by:	Solution by records managers:
1. Lack of meaningful titling of documents and records	**22** (6 users)	User	1. Develop document titling guidelines and promote them in training sessions. 2. Encourage Business Units to develop their own standard document titling conventions for their core information. 3. Influence EDRMS vendors to research and build smart technologies to meaningfully title information registered.
2. Lack of understanding or familiarity using the classification schemes for searching	**19** (5 users)	Classification Scheme	1. Simplify schemes to make them user friendly. 2. Provide users with training on: a. how classification scheme works b. the handful of keywords relevant to individual Business Units or users.
		System	3. Influence EDRMS vendors to research and offer functionalities for automating classification of information registered so that the EDRM system automates this difficult process consistently for users.
3. Document searched for not registered in EDRMS	**19** (5 users)	User	1. Market the benefits of using the EDRMS as the single corporate repository instead of network drives. 2. Change user behaviour to store information using the EDRMS.
		Organisation focus	3. Seek management support to restrict or turn off access to network drives and other conflicting information repositories.

Table 7.4: Managerial Solutions to Barriers in Search and Retrieval in EDRMS (continued)

Why search was difficult	% of Total Users (n=27 users)	Caused by:	Solution by Records Managers:
4. No security access to documents and records	**15** (5 users)	System	1. Conduct periodic quality checks to update security status assigned to embargoed information.
5. Incomplete or inconsistent entry of metadata fields in EDRMS by Records Section.	**7** (2 users)	Records Section	2. Establish processes for accurate metadata capture using controlled authority pick lists. 3. Provide training for RM support staff registering information, in the importance of accurate and consistent metadata capture for search and retrieval.
6. Too many search results to browse through to find documents and records sought.	**7** (2 users)	User	1. Provide training on searching at subject levels using the classification scheme.
7. Requestor of documents and records provided inaccurate background details to search assistants.	**7** (2 users)	User	1. Provide awareness raising training for Record Focal Points to elicit more accurate information from the requestor, using librarian's *reference interview techniques*
8. Not sure if documents and records were made FINAL in EDRMS.	**4** (1 user)	User	1. Emphasise at training sessions that documents be finalised, as records need to be declared as records.
		Records Section	2. Perform periodic quality assurance checks.
	100		

7.4.1 Understanding users

The search behaviour model presented in Figure 6.11 in Chapter 6 illustrates common search behaviour processes in searching for documents and records in an EDRMS. At several stages, different users performed different activities. For instance, in *Stage 2: Formulate search strategy*, some used shortcuts while others searched by metadata. Among those who searched by metadata, some preferred title searches while others preferred to search using other metadata elements. Overall, the observations on how users search and retrieve information from the EDRMS suggest that they would prefer to browse by navigation down a tree view if they know where the record is filed or filed it themselves. When designing the EDRMS it is thus important to provide users with the option to browse visually to retrieve records via the tree view as well as to search by using the metadata search in a *virtual database* design.

The research demonstrates that the exact activities undertaken depend on the implemented EDRMS' functionality and design as well as a user's preferred search style, the training they have received, the task they need to perform and the trade-off between time spent using the EDRMS and the possibility of obtaining the information from another source. While users could benefit from using classification schemes for information retrieval, they rarely do so. The lack of searching using the classification scheme as metadata field or navigation down a tree view appears to reflect the failure of an organisation to train users in the classification scheme as a technique for information search and retrieval.

A complex web of factors therefore appears to influence how users search in the EDRMS, affecting the consequent effectiveness and efficiency of their search behaviour. The interplay between these influences is likely to vary from one user to another and from one organisation to another. Although the search model presents common search behaviour processes and activities, details of how users interact with the EDRMS in each organisation must be determined at an individual user as well as at an organisation level.

It is suggested that organisations use the EDRMS search behaviour model in Figure 6.11 as a template to find out how their users search and retrieve information from the organisation's EDRMS. It is recommended that records managers borrow the vocabulary used in this research to describe search behaviours. It should be possible for an analyst to sample five representative users from different sections of the organisation. Analysis of their activities will indicate if they are able to use the EDRMS effectively for the tasks they need to perform, and identify any aspects of EDRMS use that might be improved through training. Users could also be encouraged to use the model to diagnose their own search behaviour, as each user has a preferred search style that may not get the best out of the EDRMS. Periodic assessment of a user's search behaviour will indicate when the search is dominated by preference and habit rather than by the most appropriate techniques for formulating search strategies to retrieve the records required.

Having established an understanding of users' search behaviours it would be possible for records managers to decide on the type of training they need to provide for individual users, based on whether they are a novices or experts. This is discussed in sub-section 7.4.4 of Chapter 7.

7.4.2 Developing user friendly classification schemes and creating awareness of these schemes

Gunnlaugsdottir's (2006) research shows that the complexity of the classification scheme implemented in the EDRMS combined with users' lack of understanding of the scheme leads users to conclude that the EDRMS is not user friendly (p. 213). The 2009 Cohasset survey reports that 66% of RM professionals believe that with developments in search technologies, a friendly method to classify information would be an aggregated or “big bucket” approach (Williams & Ashley, 2009, p. 25).

Each of the four organisations studied had implemented classification schemes in their EDRMS, but only one made users aware of the scheme and none promoted it as a search and retrieval tool. Consequently, users relied heavily on searches using metadata fields. This is not always the most effective or efficient search method. The challenge for RM professionals is to design and implement classification schemes that are easy for knowledge workers to understand and use (Calabria, 2004; Gunnlaugsdottir, 2006, p. 237). As classification schemes are currently not being implemented as retrieval tools, to overcome this potential limitation it is recommended that records managers consider implementing strategies to simplify the schemes.

It is clear that classification schemes will benefit from modification to become more user friendly. This could be easily achieved by making the classification schemes intuitive to users’ ways of thinking by removing ambiguity from the terms and structure of the classification scheme and aligning them to reflect users’ work processes. Records managers may want to consider this comment:

> the use of activity descriptors as the second level in all file titles places in an important position in the file title terms which were often not helpful for retrieval purposes and which add very little to the total effective meaning of the file title as a description of the content of the file (Exon, 1997, p. 20).

Exon (1997) makes a valid comment on the need “to bring back into records management a commitment to precise retrieval at the level of the document”; this may be achieved by removing the activity descriptor (p. 21). Also warranted is her comment that the way classification schemes are structured with an "emphasis on functional analysis has been to the detriment of efficient retrieval" (Exon, 1997, p. 19), as users usually need to navigate to the fourth level, or free text level, of the classification scheme to find such information. Given that the current research findings indicate that search tasks are primarily driven by work tasks that knowledge workers need to perform, it seems logical to structure schemes by business function, to meet the requirements to be effective – to be *user friendly* and *intuitive* rather than ambiguous.

Whilst it is not the aim of this research to focus on the effectiveness of the KAAA or the KFC, the findings reveal that users have difficulties working with these tools. It is recommended that future research be conducted on how users retrieve records using these tools.

The findings recommend that records managers develop a separate EDRMS user friendly classification scheme that is intuitive and aligned to the users' work processes and thinking patterns. This could be aligned to the underlying RM classification scheme, the KAAA or the KFC, in order to work out the retention periods for records in the background. Alternatively, records managers may consider bypassing the KAAA and the KFC and just using the retention schedules to sentence records. If the latter approach is taken, then the user friendly classification scheme will need to be aligned to the retention schedules. Either way, the less user friendly version of the RM classification scheme would be hidden from users' view in the same way that retention schedules currently are. In this way, users can have a classification scheme they can relate to and work with when registering and retrieving information in the EDRMS.

7.4.3 Importance of accurate capture of metadata

Six users (22%) reported that poor record titling and other inconsistencies in the capture of metadata in the EDRMS created the greatest search difficulties for them. In particular, they complained about inconsistent or meaningless record titling and the use of non-standard abbreviations. One user (P31) could not find a record she had registered a few months ago, because she had used abbreviations. These findings emphasise the need to: 1) establish records management processes for the accurate capture of metadata; 2) enforce standards for titling records; and 3) investigate options for automating record titling in the EDRMS. Records managers should address these managerial challenges because accurate metadata capture is the essence of managing and searching electronic records (Cumming, 2005; Skelton & Jones, 2008).

7.4.3.1 Establish processes for accurate metadata capture

Two of the four organisations studied had implemented a contacts metadata field in their EDRMS to record the names of external organisations. Users could select an organisation already in the list or add a new one.

Allowing users to add to metadata pick lists raises concerns about the quality assurance of metadata values. Users in these organisations reported difficulty finding all records associated with a specific organisation because the person who registered the record had left the contacts field blank or the contact was registered inconsistently. For instance, there were two entries for one organisation: Sita Environmental Solutions Pty Ltd and Sita. Searches conducted using the pick list for the full name of the company did not find records captured using the abbreviated name, and vice versa. Users recovered only partial information unless they were aware of the double entries and conducted two searches. In this instance, information searching was not only difficult, but also ineffective.

The challenge for records managers is to ensure the accurate capture of metadata for pick lists, both to avoid duplication and to improve search outcomes. For metadata fields such as company names, it may be best to prepare lists from published authorities like company directories. Alternatively, users should be prevented from entering metadata into controlled pick lists, but should contact the records manager or the records management HelpDesk to create new entries. This process would ensure quality control checks on metadata pick lists, minimising search problems. Seven percent (3 users) stated that inaccurate and inconsistent capture of metadata was a barrier to searching in the EDRMS.

7.4.3.2 Enforce standards for titling records

Two of the four organisations had standards and guidelines for titling records. However, even in these two organisations problems with poor titling were evident. The guidelines of both organisations were generic and did not address commonly used records like contract variations, invoices, letters and so on.

The findings reported in Chapter 6 suggest that if they are not already in place, guidelines/standards on document titling should be prepared, and users constantly urged to follow them. Difficulties that arise from failure to follow guidelines can be emphasised, and best practice encouraged. It is recommended that guidelines for titling record types commonly used in the organisation be developed and communicated to all EDRMS users during induction and training on the EDRMS application (Records NI (Northern Ireland), 2006, p. 8). Records managers are encouraged to suggest to their Business Units that they develop additional record titling standards for specific record types created or received by them. The challenge lies in ensuring these standards are regularly communicated to members of relevant units. Enforcement of these standards can be achieved by records managers incorporating recurrent monitoring, via quality checks and auditing initiatives, into their RM programs.

7.4.3.3 Investigate options for automating record titling in the EDRMS

An alternate challenge for records managers is to investigate opportunities to automate the document or record titling process in the EDRMS. This would require pressuring EDRMS vendors to enhance the functionalities of their EDRMS to provide this capability, or at least to invest in research on technologies that would enable them to offer such functionality in the future.

7.4.4 Provision of training

Fundamental to the fabric of precise records management is satisfactory training for EDRMS users. Once an EDRMS is implemented in an organisation, records managers have to invest in training (Cutts, 2009; Govan, 2006; Knudsen, 2003; Maguire, 2005; Murphy, 1999; Records NI (Northern Ireland), 2006; Williams, 2005), not only during the implementation stage of the EDRMS, but also afterwards. A close look at what ongoing training programs need to be in place and what training components they need to address shows that records management and EDRMS training targeted at different user groups on a regular basis is critical. A key focus of the training should be selling to users the benefits of good RM practices and how the EDRMS will assist them to manage and search for information, rather than stressing legislative compliance requirements (Cutts, 2009; Johnston & Bowen, 2005; Records NI (Northern Ireland), 2006; Williams, 2005). Clearly, given that knowledge workers must learn to use a variety of information sources, the easier records managers can make their experience with the EDRMS the more they will encourage users to select it as their preferred information resource. There may also be value in records managers networking with peers to share training experiences and find better ways to provide RM and EDRMS training in their organisations.

7.4.4.1 Providing training for records senior management or custodians

The ISO 15489 explicitly states that "leadership responsibility and accountability for records management should be assigned to a person with appropriate authority within the organisation" and that "designations of the responsible individuals may be assigned by law" (International Organisation for Standardisation, 2002a, p. 5). This being so, senior management need to be provided specific training to create awareness of their custodial and leadership responsibilities for records management (McLeod et al., 2004, p. 3). However, awareness of the legal responsibilities of senior management needs to be balanced with the positive benefits of RM, such as assisting them to achieve the business goals and strategies of the organisation (Sprehe, 2005, p. 300).

This training was not evident in any of the four organisations studied, and its absence may have contributed to the lack of RM best practices implemented in the organisational cultures. Such training would have prepared senior management for their designated role and enabled them to lead by example and mandate in the use of the EDRMS as the corporate information repository (McLeod et al., 2004, p. 3; Records NI (Northern Ireland), 2006, pp. 6-7). Gunnlaugsdottir (2006) reports that when senior management supported and used the EDRMS implemented in their organisations, EDRMS usage (70%) was widespread among employees; this was crucial for successful EDRMS implementation (p. 119). In addition, senior management attendance at training encourages the cultural change required in their employee's information seeking behaviours (Gunnlaugsdottir, 2006, p. 119; McLeod et al., 2004, p. 3; Records NI (Northern Ireland), 2006, pp. 6-7).

7.4.4.2 Providing training for EDRMS users

This research has identified three different types of training that need to be provided to EDRMS users to enable them to efficiently and effectively work with the EDRMS to search and retrieve information.

7.4.4.2.1 Records management training

In order to interact with structured EDRMS, users benefit from understanding the concepts that lie behind data entry and search mechanisms. Providing users with RM training on basic concepts such as the characteristics of a record, as well as how the classification scheme works, is necessary for users to understand and work with the EDRMS (Calabria, 2004; Knudsen, 2003; Williams, 2005).

Section 7.2 in ISO 15489-1 outlines the characteristics of a record as being authentic and reliable, having integrity and being useable (International Organisation for Standardisation, 2002a). Knowing how to identify records and having an understanding of their importance will encourage users in several ways: to capture and accurately assign metadata when registering records, to meaningfully title records, to consciously and conscientiously declare records and to create relationships between records in the EDRMS. In turn this will assist users with information search and retrieval.

The managerial challenge for records managers, then, is to ensure users receive RM training as stated in Section 6 of ISO 15489-2 (International Organisation for Standardisation, 2002b). Users must know what constitutes a record, the benefits of registering records into the EDRMS, and how they need to be captured into the EDRMS to be meaningful. Thomson (2008) recommends including hands-on learning activities to follow up RM concepts training by instructing knowledge workers to tidy up both the electronic information stored in network drives and the paper documents and records in their work area. These exercises will enable knowledge workers to distinguish records from non-records and learn where to classify their information (Thomson, 2008, p. 122). Coaching in real office contexts can offer powerful consolidation of learning.

Records managers can purchase commercially available online training programs such as the Recordkeeping Awareness Training (RAT) program developed by Techniworks Action Learning, which is based in Australia. The RAT course is designed to create an awareness of the recordkeeping responsibilities of government employees to comply with legislative requirements (Techniworks Action Learning, 2009). They also have an online course, “Understanding the Business Classification Scheme (BCS)” relevant for improving users’ classification or filing skills (Techniworks Action Learning, 2009). Techniworks Action Learning also has online training programs such as TRIM systems training, which enables users to understand the functionalities of the EDRMS software and use it productively (Techniworks Action Learning, 2009).

7.4.4.2.2 Induction and refresher training on working with the EDRMS

Each of the four organisations studied provided hands-on training for their EDRMS users. However, this training was limited only to searching using metadata fields, and did not include the classification scheme. Users were, therefore, primarily made aware of searching using metadata fields, as shown in Figure 5.2 in Chapter 5. Furthermore, as reported in Chapter 6, the training programs placed little emphasis on search and retrieval skills compared to other general functionalities of the EDRMS.

Two of the organisations provided short refresher training focusing on specific functionalities in the EDRMS via half-hour training sessions. These refresher training courses were scheduled to provide novice and expert users with opportunities to refamiliarise themselves with the training provided during their induction. Expert users could select specific refresher sessions to develop their EDRMS skills and novice users could attend the same sessions over and over again to improve themselves.

EDRMS have design functionalities that give users fast and efficient ways to retrieve frequently or previously accessed records. However, the records managers acknowledged that there was a lot for users to absorb when they first joined the organisation. New starters were subjected to a number of new systems and induction programs in the organisation. The refresher training sessions were organised to provide EDRMS users with the opportunity to refresh their skills working with the EDRMS after having settled into their job functions and worked with the EDRMS for a while (Patterson & Sprehe, 2002, p. 312; Records NI (Northern Ireland), 2006, p. 65). Knowledge of design functionalities enables users to save their frequent search criteria, access their recently searched records, and store their favourite records in their favourites folders, thereby impoving their subsequent search and retrieval actions.

Other design functionalities enable refining, sorting and filtering search results in the EDRMS. However, only seven of the 30 users provided with this training reported using these functionalities to process their search results or to work more efficiently. This again highlights the importance of both providing refresher training on working with the EDRMS and assessing users' search behaviour characteristics periodically in order to improve their search and retrieval skills. Separate training sessions for novices and expert users will be beneficial in targeting content of relevance or interest to specific groups (Cutts, 2009; Thomson, 2008; Williams, 2005).

Records managers should also consider making available computer-based online training courses such as RAT, BCS and EDRMS (Techniworks Action Learning, 2009), mentioned earlier, as a means of refresher training users can access at their own pace (Patterson & Sprehe, 2002, p. 312). The EDRMS vendors offer customers generic online training for their systems (Hewlett-Packard Development Company, 2010), which records managers might consider implementing; however, customisation of these online courses may be required to tailor them for the organisation's RM program.

7.4.4.2.3 EDRMS training when major software upgrades were implemented

In one organisation, some users were initially trained when the EDRMS was implemented five years ago. These users did not attend the refresher training sessions offered when major upgrades to the EDRM software were made over the ensuing five-year period. They displayed search techniques appropriate for older versions of the EDRMS, but were not aware of the new functionalities available for conducting their searches more effectively and efficiently. These findings highlight the need to ensure widespread re-education when significant software upgrades are implemented. However, the expert learner will resist attending if a uniform approach is employed. Expert users require a more targeted "top-up" training.

Users need to be made aware of new functionalities in the system to enable efficient use of the new features in the EDRMS. There is a need to target training for both novice and expert users, as they have different learning requirements (Debowski, 2001; Marchionini, 1995; Michel, 1994).

7.4.4.2.4 Training and promotion of classification schemes

Equally important is the requirement to promote and train knowledge workers on the effective use of the classification scheme. The research findings in Chapter 6 reveal that five of the 27 users (19%) who experienced search difficulties reported that a lack of understanding of or familiarity with using the classification scheme was an issue. Given this finding, it is recommended that training in the classification scheme be provided to help users formulate their search strategy by either using the metadata from the classification scheme or by navigation and browsing through the classification scheme. Debowski, Wood and Bandura (2001a) report that users who were provided with training on searching using thesaurus terms in a library database were observed conducting better quality searches of greater depth “relying more heavily on the thesaurus for their keyword selection” in comparison to users who were untrained (p. 1135).

It is strongly recommended that as part of the EDRMS implementation, records managers ensure users are made aware of the classification scheme (Calabria, 2004; Delphi Group, 2004; Knudsen, 2003; Williams, 2005), have an understanding of how the classification scheme in the organisation works and how it is used to classify records stored in the EDRMS. A survey by the Delphi Group indicates that implementation of classification schemes reduces search time, increases knowledge sharing and improves productively levels of knowledge workers (Delphi Group, 2004, p. 27). RM training should include explanation of the structure behind the classification scheme, how it works by classifying from broad to specific and how the classification is structured: for instance, to classify by business function, then by business activity and then by subject matter or topic, and so on.

Twenty-eight percent (11 users) in this research stated that the most difficult aspect of registering records into the EDRMS was completing the metadata field to describe where to file the record. Given the research finding that task drives search behaviour in Stage 1 of the EDRMS search model, it is recommended that records managers highlight to users specific keywords in the scheme relevant to the work of their business unit. Users need to understand the classification scheme not only for searching for information in the EDRMS but also for deciding where to file records when they register them into it. This is in line with the Delphi survey's finding, which reports that 59% of respondents stated that they classified their information (Delphi Group, 2004, p. 26). If users do not have an understanding of the classification scheme they may misclassify records, leading to later difficulty or failure in information retrieval.

7.4.5 Automating classification of records

Automated indexing and classification technologies may assist in minimising misclassification errors and search difficulties. Another challenge for records managers concerns providing alternatives to traditional classification schemes. Instead of manually classifying information in the EDRMS, it may be preferable to use applications that automate the indexing or classification of information registered online. Available applications include Interwoven's MetaTagger Software and Autonomy's Taxonomy Generation. Autonomy's Taxonomy Generation feature can "automatically and consistently understand and create deep hierarchical contextual taxonomies of information based on conceptual understanding" (Autonomy, 2006a). Autonomy currently offers ready-made taxonomies in the following disciplines: pharmaceutical taxonomy, defence taxonomy and homeland security taxonomy; and enterprise taxonomies in human resources, information technology and sales and marketing (Autonomy, 2006b).

In a similar fashion, current developments in heuristics technology enable automatic capture of static metadata from structured documents and records into EDRMS, using specially developed common document templates. It is possible, using these heuristic or artificial intelligence technologies, to automate the accurate entry of metadata fields such as invoice number, data of invoice or name of supplier, to register incoming records into the EDRMS. These technologies enable the automatic classification of common record types such as forms and invoices. There are a number of vendors such as Kofax who provide software with heuristic functionalities and offer integration services to EDRM systems (Kofax Incorporated, 2009).

Such automation promises to reduce human intervention and error, avoid misclassification and ensure accurate and consistent classification to improve search and retrieval from the EDRMS. These developments challenge records managers to evaluate the suitability of automatic classification options and to persuade EDRMS vendors to incorporate these functionalities into their systems. Heuristic technology will improve automatic classification and data capture of structured information into the EDRMS. However, its ability to perform the same for unstructured information is yet to be seen.

7.4.6 Working with stakeholders to change the organisational and information culture

The research findings in Chapters 5 and 6 indicate that an organisational culture that is both appreciative of the benefits of information management and willing to take action to foster appropriate information management behaviours is essential for the success of both records management and EDRMS implementation. Easy access and high usage of network drives was observed in all the organisations. Organisation A was in the process of migrating existing information from the network drive and phasing out the option to save information there. Organisation B encouraged use of network drives as draft work areas for documents prior to publishing final records into the EDRMS. Organisations C and D lacked support from senior management and IT departments to turn off network drives and enforce usage of the EDRMS as the only corporate information repository.

These findings indicate that directives from senior management are required to change the organisational culture on the use of network drives, EDRMS and other information repositories. Where EDRMS are implemented, the use of network drives for storing corporate information should be scrutinised and where possible limited.

Although the RM policies were endorsed by senior management and employees were trained on their RM responsibilities, consistent best practice RM behaviours were not observed in all knowledge workers. The fact that 59% of search difficulties were caused by the user attests to this point. Reinforcing good RM behaviours by rewarding them seems obvious. The findings indicate that search and retrieval can be enhanced by improving users' information management behaviours and attitudes. In part this can be achieved by records managers improving the development and delivery of six of the eight RM principles as well as by senior management rewarding best practice RM behaviour by providing incentives in the form of financial or career progression. This research indicates the need for records managers to foster working relationships with different stakeholders such as EDRMS vendors, senior management and knowledge workers (who are the EDRMS users) to improve information searching experiences.

7.4.7 Establishing a quality assurance team within the Records Section

Each of the four organisations devolved the responsibility of registering their corporate documents and records into the EDRMS to their knowledge workers. Given this increasing devolution of records management responsibilities, it is necessary for records managers to consider resourcing staff to conduct quality assurance of the content and metadata being registered into the EDRMS. If the heuristics technology mentioned above were implemented to automate registration and classification of common record types into the EDRMS, there would be an increased need to perform quality assurance of samples of these records. These steps would ensure integrity of the content registered and aid efficient information search and retrieval in the future.

Only one of the four organisations was resourced with such a quality assurance team.

7.5 Conclusion

The answers to the four secondary questions in the research have enabled the primary research question to be answered. A brief overview of the research questions and the key findings from the research reported in Chapters 5, 6 and in this Chapter 7 are summarised before proceeding to the final chapter concluding the research.

> *SQ_1: How have the sampled four organisations implemented records management principles and practices in the EDRMS as outlined in ISO 15489?*

The four sampled organisations did implement the eight pillar RM principles outlined in ISO 15489, but variations in approach were evident. The policies and procedures that were developed were signed-off by senior management for implementation via publication on the Intranet and communication via RM induction programs. However, they were not strictly adhered to by knowledge workers as there was neither visible support nor enforcement, by such means as by restricting the use of conflicting information sources like the network drives. Further, sufficient championing of these policies and procedures by senior management using the EDRMS and ensuring their subordinates followed them was not evident. In short, senior management in the sampled organisations were not *leading by example* to promote an information culture (Oliver et al., 2009, 2010, p. 44) in which these policies and procedures came to be embedded in their organisation's focus on RM practices.

Metadata elements were implemented in the EDRMS. None of the organisations had written a metadata standard; nor had they implemented the published metadata standards. Although classification schemes were implemented in all four organisations, training about the scheme was provided only in one. In Organisation C, where training was provided, users reported that the classification was confusing, difficult to understand as well as to work with. None of the organisations provided training on how to register and search information using the schemes.

All organisations had developed and implemented retention schedules in the EDRMS. Although none of the organisations had developed a security model, they all had security permissions implemented in the EDRMS to ensure the integrity of the records. Varying levels of monitoring and auditing programs were implemented to ensure the quality of information registered and proper usage of the EDRMS. Although the eight pillar records management principles were implemented in the organisations, 27% (10 users) reported search difficulties using the EDRMS which were caused by the user, or by how the records management principles were implemented, or both.

SQ_2: What is the search behaviour of EDRMS users?

One of the research aims is to apply Ellis' (1989), Marchionini's (1995) and Meho and Tibbo's (2003) models as a scaffold to develop a profile of the EDRMS search behaviour model. Both similarities to and differences from the search behaviour characteristics noted in their research are observed in this current research. Consistent with the broad findings of the earlier studies, the EDRMS search model (Figure 6.11, Chapter 6) describes search behaviour as comprising seven sequential but iterative search process stages. In each of these stages, users engage in different types of search activities and behaviours.

SQ_3: How does the search task and task knowledge affect the search behaviour of EDRMS users?

The research findings indicate that search task and task knowledge jointly affect the search behaviour of EDRMS users. This is especially the case in four of the seven stages of the EDRMS search model: *Stage 1: Start Search*; *Stage 2: Formulation of search strategy*; *Stage 4: Process and evaluate search results*; and *Stage 7: End Search*.

SQ_4: How does training on EDRMS search methods affect the search behaviour of EDRMS users?

Each of the four organisations provided training on search methods that the records managers perceived as either sufficient or suitable for their organisations. Consequently, users were observed using the techniques in which they were trained, but which were not always effective for their search task or task knowledge. For example, none of the organisations provided training on search and retrieval using the classification schemes implemented in the EDRMS, and none of the 40 users were observed using this scheme when searching. This emphasises the need for tailoring training programs to tasks performed by knowledge workers, in addition to generic training on RM concepts, classification schemes and working with the EDRMS, and indicates a need for more tailored updates on new system features.

The findings illustrate that training on different search methods affects users' search behaviour when they formulate their search strategies. Being equipped with skills of different search methods enables users to select search formulation strategies that best meet their search task and task knowledge.

PQ: Does the management of corporate documents and records in the EDRMS support the search behaviour of EDRMS users?

The primary aim of this research is to find out if the records management principles used to manage corporate documents and records registered, stored and managed in the EDRMS are in line with the ways knowledge workers, who require access to this information, search for it.

The findings indicate that to a large extent, RM principles matched the search behaviours of the EDRMS users studied. EDRMS systems in the sampled organisations had been designed to adhere to records management principles stated in ISO 15489 in order to meet regulatory compliance, for evidentiary purposes and eventually for corporate governance. In theory, the RM best practices advocated in ISO 15489 are consistent with the search behaviour of EDRMS users. EDRMS designed using this standard provide users with the option to search and retrieve information using both metadata elements and a classification scheme. However, interviews with users and data from the difficult searches demonstrate that improvements in the manner in which a few of these principles are implemented in the EDRMS and the organisation are required to improve alignment with users' search behaviours. The RM principles requiring refinement relate to: 1) policies, 2) procedures and standards; 3) metadata; 4) the classification scheme; 5) training; and 6) monitoring and auditing.

The RM tools that most assist with search and retrieval are the metadata elements and the classification scheme. These are mostly required in Stages 2 and 4 in the EDRMS search model. The findings indicate that users prefer to formulate their search using metadata elements to retrieve records from the EDRMS. However, the metadata elements pertaining to classification are neither used nor preferred as a search option. Participants were not observed using the terms in the classification scheme (such as keywords or activity descriptor metadata elements) when they conducted a metadata search to seek information from the EDRMS. Twelve users (30%) reported navigating the tree view using the classification scheme to seek information, but the classification scheme presented in a thesaurus form via the thesaurus module was not used as a retrieval tool.

In summary, the findings confirm the hypothesised EDRMS search behaviour model including the influence of the relationships between search task, task knowledge and training on users' search behaviour. The difficult searches extended the search model and provided valuable insight into users' search behaviour when they stopped their search. More importantly, they offered insight into the factors that made searches simple or difficult for knowledge workers. The findings indicate that although RM principles are necessary, they need to be implemented with the user in mind to facilitate efficient information search and retrieval. The research also enables insight into ways RM professionals could implement changes to their RM programs to achieve this outcome.

8 Conclusion

8.1 Introduction

This final chapter begins with an overview of how the organisational and information culture can be exploited to promote user acceptance of information systems. It then addresses the theoretical and practical contributions of this research to the records management discipline. The perceived limitations of the research are identified, as are potential areas for further investigation. This chapter ends with a summary of conclusions about the efficacy of the findings of the current study.

8.2 Organisational and information culture, information systems and user acceptance

From the literature reported in Chapter 2, it is obvious that there were successes, failures and resistance to the implementation of information systems in organisations. Similar responses and lessons learnt were cited in case studies of RM and EDRMS implementation (Gunnlaugsdottir, 2006, 2008; Maguire, 2005; Public Records Office of Northern Ireland, 2005; Records NI (Northern Ireland), 2006; Williams, 2005). Case studies to date have assisted in identifying critical success factors and lessons, learnt from previous implementations of systems intended to improve RM, which apply to the EDRMS.

These case studies also flag the need for "adaptive workers" who not only have technological skills but also possess the "soft skills" required to be able to keep up with changing professional skill requirements (Paine, 2006, p. 11). Adaptive workers have the "ability to 'unlearn' and learn new concepts, innovate, read technical manuals, think critically, pursue lifelong learning opportunities and demonstrate 'adaptive expertise'"

(Paine, 2006, p. 11). Examples of the soft skills Siemens engineers are trained in include “communication and presentation skills, teamwork, documentation ability, knowledge management and learning strategies” (Paine, 2006, p. 11). Embedding such a set of soft skills in their knowledge workers would enable an organisation to create an information culture that provided a platform for the successful implementation of RM programs via EDRMS. Using Schein’s (2004) model of organisational culture it may be possible for organisations to implement such an information culture, supported by senior management, to improve knowledge workers’ acceptance and use of the EDRMS as a critical system for the organisation’s records management.

Schein’s (2004) model offers three levels of organisational culture: artefacts, espoused values and assumptions. “Artefacts” are the visible elements of an organisational culture, like the presence of an EDRMS to manage corporate information (Schein, 2004). Schein (2004) describes the cultural values adopted, communicated and supported by the organisation’s leaders as “espoused values”. “Assumptions” are the actual values the organisation’s culture represents (Schein, 2004). He argues that all three levels of cultural activity need to be aligned to effectively embed a cultural change.

The EDRMS operates at the artefact level, but the other two levels, the espoused systems and processes, encourage adoption by knowledge workers. The challenge is that espoused values are not necessarily present, as evidenced in this study. Knowledge workers do not view these recordkeeping activities in EDRMS as critical to the organisation. EDRMS integration is not built into the systems, rewards and recognition practices of the work environment, so knowledge workers are not being supported and encouraged to take it on as a core business system. Senior management do not promote RM and EDRMS as critical to the wellbeing of the organisation. Although policies might articulate such attitudes, they are not actually promoted to knowledge workers. The challenge is to create an environment where knowledge workers see records management as critical to their professional and organisational wellbeing: in other words, the artefact (EDRMS) should not be driving the organisation's information culture; it should be driven by the information culture prevalent in the organisation. Schein's (2004) model emphasises the cultural need to build strong connections with each staff member's prevailing values. This is in line with Maguire's (2005) observation that the success of RM and EDRMS systems lies in focusing on "good records management behaviour first" followed by the "promotion of records management principles, getting them embedded in the culture and then introducing a dedicated system that will automate what people are doing already" (p. 156).

Consideration has to be given to how an organisation manages processes which influence the values, beliefs and attitudes that individual employees hold. Knowledge workers need to personally ascribe to RM as an important part of professional practice. Training for senior and middle management is required, to create awareness of the benefits of an information culture that supports positive information management behaviours. Currently, the training provided by the sample organisations is more focused on RM principles and how to work with the EDRMS. More emphasis is required to promote the benefits of good RM practices and working with the EDRMS across the organisation.

This can be performed by working with users of the EDRMS at a community level, reviewing their work requirements and practices and explaining how the EDRMS can assist them to perform tasks efficiently. RM professionals need to work with management to move from a training orientation to a deeply embedded valuing of EDRMS as a key professional system to improve their practice. This could perhaps be achieved by fostering an organisational culture that believes first that good information management practices are essential to the way the organisation operates, second that RM is part of the organisation's core business and third that the EDRMS is not a peripheral device but one of the critical corporate memory and decision system at their disposal. The building of a community of practice that ascribes to positive information management behaviours and beliefs would result in an information management culture. This would improve knowledge workers' productivity by enabling them to perform their tasks efficiently. Such a community of practice would produce more champions – all employees – of RM and EDRMS implementation than does the current model which relies upon a few champions to promote the adoption of the EDRMS.

8.3 Significance of research

The significant theoretical and practical contributions of the research are addressed below, in the sub-sections.

8.3.1 Theoretical

One of the theoretical contributions of the current research is the development of an EDRMS search model, which fills a gap in the literature. It provides an understanding of the seven search processes and varied search activities EDRMS users engage in and exhibit when they start a search in the EDRMS. The exploration of real work tasks in organisational contexts provides important insights into work based search: a different focus from earlier models. The difficult searches provided an insight into users' search behaviours when they decided to stop a search, showing that when users are unsuccessful in their search efforts in the EDRMS it does not mean the end of their search for a specific piece of information. They contact other people and information sources to continue their search to complete their work task. This reveals the presence of a knowledge environment which offers resources beyond the information channel.

The second theoretical contribution of the current research is that it confirms that the eight pillar records management principles specified in ISO 15489 are necessary for the successful design and implementation of an EDRMS. However, only six of these principles are important for the successful search and retrieval of information from EDRMS: policies, procedures and standards, metadata, the classification scheme, training, and monitoring and auditing.

8.3.2 Practical

There are a number of practical contributions to the RM discipline evident from this research. Firstly, the EDRMS search model developed for this research provides records management professionals with an understanding of search behaviour, demonstrating how knowledge workers interact with the EDRMS. The research offers useful guidance on possible revisions to ISO 15489, to better support actual use by organisational members. ISO 15489 is adequate as a guide for developing a RM program, but it does not provide RM professionals with the strategies required to embed the RM culture in their organisations, nor to change the management processes required for its implementation (Gunnlaugsdottir, 2008, p. 22; Oliver, 2007, p. 82). The standard is an organic critical tool for effective RM; however, more focus on the cultural aspects (Oliver, 2007, p. 82) needs to be taken into consideration to embed these practices in the work community. The *AS 5037 Knowledge Management* standard (Standards Australia, 2005), for example, recognises the need for cultural change management and addresses implementation strategies in its guidelines.

The second practical contribution is that records managers can use the EDRMS search model to find out about users' search behaviours in order to provide specific training, or to work out strategies to improve the delivery of their records management services to users.

In identifying the characteristics of what constitutes a simple and difficult search for users, the research identifies the factors that make information search and retrieval from the EDRMS difficult. It clarifies the reasons searches are difficult and how records managers may resolve those issues. Further, it opens consideration of corporate expectations for the smooth and coherent search and retrieval of corporate information from the EDRMS.

A fourth practical contribution suggests that it is best to design EDRMS with both a tree view and a virtual database view. This ensures an efficient and successful information search and retrieval experience for users who prefer to search using metadata fields and those with a preference to search by navigation.

The cumulative evidence suggests that in terms of training delivery, a fifth and important practical significance of this research is that the minimalist approach to training in different search methods available in the EDRMS needs to be changed, with more in-depth and responsive training. This will provide users with a repertoire of search skills that enable them to formulate search strategies using the best search method for their search task and task knowledge.

The fact that none of the 40 users had a clear understanding of the classification scheme nor searched using the scheme leads to the sixth practical contribution. This research has enabled users' and records managers' anecdotal comments and perceptions regarding working with the classification schemes or thesauri implemented in their organisations to be substantiated with evidence from research findings.[93]

Each of the practical contributions stated above will enable records managers to consider what they need to get right to ensure that EDRMS meet the day-to-day operational needs of knowledge workers throughout the organisation as well as the needs of records managers and other professionals who rely on the system for evidentiary and regulatory purposes.

8.4 Limitations of the research

Only four Australian government organisations were sampled regarding their implementation of the eight pillar RM principles stated in ISO 15489. Perhaps a richer data set could have been obtained if more organisations from diverse industries, countries and from the private sector were studied. Government organisations are generally subjected to a higher level of legislative compliance and accountability compared to private enterprises; as such they are more likely to have comprehensive RM practices implemented. The findings from this study would therefore not be reflective of RM practices and EDRMS usage in private organisations. However, given the research methodology it was necessary for the data collection to be conducted at the premises of the organisations, and a rigorous selection process was employed. These design limitations do not limit the generalisability of the research findings to Australia. The EDRMS studied are marketed internationally and implemented by organisations

[93] Appendix 8.1 offers an example of a response from a reader of the journal articles by Joseph (2008, 2009a, 2010) and Singh, Klobas, & Anderson (2007a, 2007b, 2008a, 2008b, 2008c, 2008d) on the research topic. The response confirmed the anecdotal comments. Similar verbal confirmations have been received from conference presentations on the research findings at the AIIM Conference held in Boston (Singh, 2007, April 16 - 19) and the Records Management Association of Australasia (RMAA) 26th International Convention in Adelaide (Joseph, 2009b).

internationally: customer listings at the vendor web sites testify to the international usage of these EDRMS. The same applies to the records management principles used by the participating organisations, which are benchmarked against ISO 15489.

Likewise, the sample size of the users may be perceived as a limitation. However, Ellis (1989) had a sample size of 47 users, and Meho and Tibbo (2003) had 60: the sample size of 40 users for the current research is justified. Moreover, other scholars investigating search behaviours cited in this research report using sample sizes of 12 (Branch, 2002, p. 14), 13 (Ingwersen, 1982, p. 173), 36 (Debowski, 1997, p. 92); and 39 users (Bystrom, 2002, p. 583).

This research studied in total the search behaviour patterns of 40 users, but 104 flowcharts were developed in total from the self-reported and observed simple and difficult search behaviours. This reflected a similar sample size to other studies. A sample size of 40 users justifies the derivation of the EDRMS search model, but it is acknowledged that an increased sample size would enhance the credibility of some data, such as the percentages cited of users' reported responses about the factors that caused search difficulties.

This research focused only on the last simple and difficult searches each user had to do. It would have been beneficial to extend the observations to include perhaps the last three simple and difficult searches of each user, or to have asked users to keep a journal of their simple and difficult searches for a period of two weeks. This would have provided a much richer data set and provide an in-depth insight into each user's search behaviour over a range of tasks. However, it would have required great commitment from users already facing busy work schedules and obligations.

Search software could have been installed in users' desktops to log and record their search history. This would have assisted in monitoring the search terms users entered and in recording their search activities, and provided richer data. However, this was not done as the four organisations had stringent policies about non-approved software. Installation of new software needed management approval and could only be performed by the computing department. Search software might be an option in research conducted in a laboratory environment, but could not be applied in empirical study settings.

8.5 Further observations and future research

Seven possible future research topics have been identified from the current research. These will extend or validate the current research findings on how training, tasks and preferred search styles affect the search behaviours of EDRMS users. More importantly, they will provide insight into how these factors might dynamically influence search behaviours. Further research is also recommended on the affective behaviours of EDRMS users, that is, their feelings, emotions and responses while conducting a search (Debowski et al., 2001a).

Each of the seven possible extensions is discussed below.

8.5.1 Training

The current research is an exploratory study into how training in EDRMS search methods affects the search behaviour of EDRMS users. It is recommended that future empirical research be conducted to validate the positive relationship that was observed between the training provided on search methods and the search behaviour displayed by users. This could be undertaken using a before-and-after study to explore how training in different search methods affects search behaviour. It would be advantageous if this future research includes observation, instead of having to rely on verbal reports on what training was delivered and how it was conducted. This will substantiate the effect of training on the basics and benefits of records management, including how classification schemes influence search behaviours. Differentiation of novice and expert user responses will also be useful.

Whether users utilise all the search methods they were trained to perform when searching a particular information source is also an important avenue of investigation. Ways of encouraging knowledge workers to attend refresher training sessions to improve their working knowledge of the EDRMS need to be investigated. Although two of the organisations under study provided refresher training sessions, the records managers reported they were not well supported by users.

None of the organisations at the time of the study used online, self-paced modules to train users in records management concepts or in working with the EDRMS. Since then, the trend to use online training modules in office environments has increased. Surveys indicate that more than 80 percent of Fortune 1000 companies are using computer based training (Horton, n.d.).

The advantages cited for using these new technologies (web based training, CD Roms, videos, etc.) for training are: their ability to enable uniformity in training; the capacity to train large groups of employees cost effectively; ability to track employee performance using learning management systems; and that such training enables employees to learn at their own time and pace (Blanchard & Thacker, 1999; Bonk, 2002; Gordon & Hequet, 1997; Heck, 1985; Noe, 1999; Smith, 1998a; Waller, 2001). The two key disadvantages reported are that training cannot be personalised to address individuals' specific needs or learning styles, and that employees may not do the training at the time they require it (Blanchard & Thacker, 1999; Gordon & Hequet, 1997; Heck, 1985; Noe, 1999; Smith, 1998a; Waller, 2001).

The value of online modules versus having a live trainer deliver face-to-face training is debatable (Blanchard & Thacker, 1999; Gordon & Hequet, 1997; Noe, 1999). Training consultants interviewed by Gordon and Hequet (1997) suggested that before deciding on the delivery mode of the training the question be asked, “What are the consequences of not doing this training successfully?” (p. 27). The consultants reported that the novelty of computer based training (CBT) is dying off as employees who find themselves staring at computer screens all day welcome training provided by live trainers. CBT is reported to be widely used in other disciplines to train employees in key concepts such as teaching the intricacies of flying and maintaining glass-cockpit airplanes (Dornheim, 1992; Henderson, 1992), training employees on the importance of health and safety (Palmer, 1991), training clinicians, nurses and doctors in health care (Farel, Pfau, Paliulis, & Umble, 2003; Gray, Bee, & Bertka, 2010; Kemper, Foy, Wissow, & Shore, 2008), auditing accounts payable processes for auditors and accountants (Siegel, 1992) and training food supervisors in retail setting (Holden, 1992). However, there are training and transfer losses attributable to studying alone.

In contrast, Driscoll (2002), IBM Global Services’ consultant and author of the book titled *Web-based training* points out trends towards ‘blended learning’. Bonk and Graham (2006) define blended learning as “as learning systems combining face-to-face instruction with technology mediated instruction” (p. 189). Bingham and Conner (2010) report how social learning using web 2.0 technologies like wikis, blogs, and twitter is transforming online learning in organisations and how these are not tools used exclusively for marketing. Bonk’s (2002) survey results on the use of the internet in teaching and learning completed by corporate trainers, training managers, instructional designers and chief learning officers, reported 75% indicated their organisations were committed to e-learning and 86% responded an interest in web based learning for their employees (p. 5 & 6). However, the respondents reported employees' lack of time and lack of incentives for online course completion by management led to low online course completion rates (Bonk, 2002, p.2).

Future research assessing the effectiveness of online training versus face-to-face training or even using blended learning approaches on working with the EDRMS is recommended. Other related research topics could consider the effectiveness of online training modules for records management concepts if these are integrated with assessments that test the user and recommend the next step. Perhaps face-to-face training on usage of the EDRMS will prove to be the better alternative, reserving online training modules as refreshers or reference tools for users to consult if they require assistance?

8.5.2 Search preferences

The preferred search style of EDRMS users is a combination of the personal search styles that an individual user either already possesses for information search, or adopts following training. Future research is recommended on how users develop their preferred search styles. An individual's style may be developed through routine and repetitive performance of search tasks in the current work role, while working with other information sources, after exposure to EDRMS in previous jobs, or while using search engines such as Google to search the Internet or Intranet. It is unclear whether preferred search styles are developed from users' training or in other ways.

A further question relates to how users' preferred search styles affect their search behaviour in the EDRMS. Users did express some information search preferences in the interviews. For example, eight users (20%) said they would create shortcuts to access their frequently used records or documents quickly. Some users who had used the tree view hierarchies in network drives or Microsoft Windows Explorer stated that they preferred navigating the folders in the EDRMS over using metadata fields: verified during observations of how they conducted their simple and difficult searches.

At times the direct relationship between the preferred search style and the actual search method decided upon was moderated by both training and user task knowledge. For instance, users who had a preferred search style of navigating down the tree view of the EDRMS were also observed using metadata fields when their preferred search method failed them. Their EDRMS training provided them with the skills to search via metadata fields, and the current findings suggest that users' search tasks and task knowledge may force them to use a non-preferred search method in order to find required information, which may moderate subsequent search behaviour. The observed moderating influence of training, based on the current research on preferred search styles, suggests that it is possible to improve the search and retrieval skills of EDRMS users by providing appropriate training. Future research on whether training on different search methods subsequently influences users' preferred search methods is recommended.

8.5.3 Task

The research findings reported in Chapter 6 noted that work task, search task and task knowledge were observed for each simple and difficult search EDRMS users performed. As seen from the data analysis in the Task Matrix SQ_3 (Appendix 6.1), task knowledge is derived from the search task the user has to perform. Consequently, task knowledge is a subset of search task as presented in Figure 8.1.

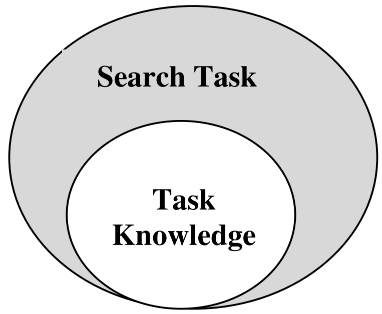

Figure 8.1: Task knowledge is a subset of search task

The aim of SQ_3 was to explore how search task and task knowledge affect the search behaviour of EDRMS users. The current research findings indicate that search task and task knowledge jointly affect a user's search behaviour. However, future research is recommended to replicate this finding and to investigate the nature of task knowledge and its effect on search task and search behaviour of EDRMS users (Figure 8.2). A possible area of focus might be the impact of training in different search methods on subsequent search strategies. While users draw on their task knowledge to formulate a search, these cues may not assist in determining the right search method. Users may therefore benefit from an extended repertoire that better allows them to match task knowledge with search method.

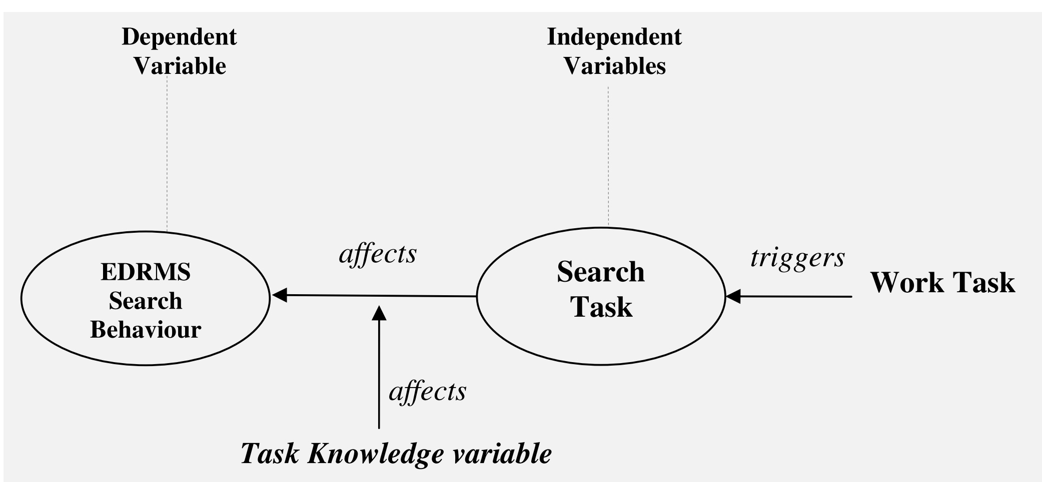

Figure 8.2: Task knowledge affects the relationship between the search task and EDRMS search behaviour

The possible effect of task knowledge on search task is observed by comparing the self-reported and observed search behaviour flowcharts developed for each user (Figure 6.13, Chapter 6). The potential effect of task knowledge on search task is again illustrated via the data presented in Task Matrix SQ_3 (Appendix 6.1) and the condensed versions of this matrix (Tables 6.5 and 6.6). Future research could thus be conducted to confirm 1) whether search task and task knowledge jointly affect a user's search behaviour; or 2) whether task knowledge moderates the effect of search task on search behaviour.

8.5.4 The role of motivational and affect factors on EDRMS search behaviour

It was not the aim of this research to investigate the motivational aspects of EDRMS users' search behaviours. Motivation refers to the beliefs and attitudes that affect users' engagement with their search task (Watters, 2005, p. 242). Motivation theories such as self-determination (Deci, Schwartz, Sheinman, & Ryan, 1981; Medway, 1982; Ryan & Deci, 2001), goal (Elliott & Dwek, 1988), self-efficacy (Bandura, 1986; Debowski, 1997) and attribution (Eccles & Wigfield, 2002; Weiner, 1985) were observed in the current research. It is recommended future research be conducted to investigate the effect of such motivational theories on the EDRMS search model developed in this research. Doing so may provide insight into users' emotions and feelings as they perform searches, particularly difficult searches.

The affective behaviours described by Nahl (2005) were prominently displayed during the interview and protocol analysis sessions held with EDRMS users.[94] During

[94] Nahl (2005) defines affective load theory (ALT) as a "social-behavioral perspective on the thoughts and feelings of individuals while engaged in information behaviour (IB)" (p. 39). He drew his research on the role of affective information behaviour from studies conducted by Belkin (1980, 2000), Dervin (1992a), Kuhlthau (1993), Wilson (1984, 1999), Wilson, Ford, Ellis, Foster, & Spink (2000), Spink (2000), Erdelez (1997) and Picard (1997), among others.

the search process in the EDRMS (Figure 6.11), users displayed positive and negative thoughts and feelings, or affective behaviours, which indicated success or failure in their search attempts. Both the positive and negative affective behaviours observed provided insights into how users felt, and how this seemed to affect their thought processes and possibly their search behaviour (Carver & Scheier, 2001; Isen, Daubman, & Gorgoglione, 1987).[95] These initial observations are confirmed by Nahl's (2005) report that negative affective states of behaviour disrupt the ongoing cognitive operations of the user. When disruptive affective states are identified, Nahl suggests "coping assistance services" will encourage users to mitigate the disruptive states and achieve task success (Nahl, 2005). This was evident in the search behaviour model of EDRMS users. When users stopped their search they turned to other assistance services available to them by consulting designated help staff, records management professionals or colleagues, as well as other information sources.

Nahl's (2005) research drew from a number of theorists in the field of psychology such as Bandura (1986), who contributed to the behavioural approach in cognitive psychology. Future research aimed at studying the affective behaviours of EDRMS users may confirm the preliminary observations described in the current research.

8.5.5 Research on users' experience working with the KAAA and KFC

It is not the aim of this research to focus on the effectiveness of the KAAA or the KFC, but the findings reveal that users in the studied organisations had difficulties working

[95] The issue of positive and negative behaviours is beyond the scope of this thesis.

with these tools. It is recommended that future research be conducted on how users retrieve records using these tools.

In general, further research on the value of classification schemes and thesauri seems warranted, particularly given the predominance of metadata searching among EDRMS users. Focused research on organisations that have implemented the KAAA and the KFC, and their users' experiences, is required to ascertain the value of these RM tools for classification and retrieval. Research on whether records managers are expecting too much from the classification scheme/thesaurus tool is worth embarking on as well. The KAAA and the KFC tools enable records managers to sentence, classify, assign accountability and security and conduct audits of the RM program. Are these tasks preventing the tools from being good mechanisms for information search and retrieval by users? In particular, it would be interesting to see if training in using classification schemes for searching the EDRMS has any effect on search effectiveness, and if not, why not.

The current research focuses only on users' search behaviour when they search for information to complete a work task. Future research to investigate users' preferred way of searching for file locations to decide where to classify information they created or received may enable an understanding of whether such behaviours are similar or different to the EDRMS search model (Figure 6.11, Chapter 6). This may shed light on users' experiences working with the classification schemes implemented. Would they find it easy to classify their information into the EDRMS based on the existing scheme?

8.5.6 Hierarchy of the EDRMS as the information source selected

Figure 4.1 and Table 4.5 (Chapter 4) highlight the different information source options available to EDRMS users to search for their required information. Given that the users in this research selected the EDRMS to conduct their information search, it was not possible to determine if the EDRMS was their preferred information source if the information was also stored elsewhere, or where in the hierarchy of user's preferred information sources the EDRMS fitted. Debowski (2001a) states that "most decisions are determined by consideration of a number of options" which leads to a "selected behaviour" (p. 19), and defines "this process of option identification and selection" as users' search behaviour (p. 19). It would be useful to investigate the decision strategies users undertake as they choose their information sources (Newell & Simon, 1972). Linked to this, it would be interesting to find out how federated searches or enterprise search engines which enable one-stop searching across different business systems in the organisation would affect users' strategies and search behaviours (Broder & Ciccolo, 2004; Hawking, 2004; Mukherjee & Mao, 2004).

It is also worth investigating the effectiveness of enterprise search mechanisms. Will they add value to knowledge workers' search experience or will they be similar to search experiences on the Internet that result in information overload (Broder & Ciccolo, 2004; Hawking, 2004; Mukherjee & Mao, 2004)?

8.6 Concluding thoughts

The primary aim of this research was to find out if the records management principles used to manage corporate documents and records registered, stored and managed in the EDRMS support the ways knowledge workers search for corporate information. The aims of the research have been achieved, as the findings indicate that although the eight pillar RM principles are intended to align with the way EDRMS users search for information, in practice six of them could be better aligned with users' search behaviours. The interviews with users, as well as data obtained during the difficult searches, indicate that improvements in the manner in which these six principles are implemented, in the organisation as well as in the EDRMS, are required to support users' search behaviours. These principles are policies, procedures and standards, metadata, classification schemes, training, and monitoring and auditing.

The research findings provide insight into the search behaviours of EDRMS users which will assist records managers in reviewing their records management programs, and especially in the area of user training. It is evident from the findings reported in Table 7.4 that 59% (16 users) of search difficulties were caused mainly by the user's limited understanding of the classification scheme, poor document titling skills and not registering into the EDRMS. The provision of user training by records management professionals could remove the majority of the barriers cited for search difficulties. Additionally, the findings stress the need for greater effort from both users and records staff when new information is registered into the EDRMS. Both groups needed to ensure relevant metadata are captured accurately and corporate information is registered so that retrieval is possible by others and not only themselves in the future. The latter seems achievable if an information culture (Oliver et al., 2009, 2010) is implemented to improve users' *perceived usefulness* and *perceived ease of use* of the EDRMS, that are cited (Davis, 1989) as critical factors for knowledge workers' acceptance of the EDRMS.

The need for records managers to work with different stakeholders such as EDRMS vendors, senior management and the knowledge workers who are the EDRMS users is necessary to overcome search difficulties experienced by users, and to align RM principles to support users' search and retrieval of information from the ERDMS. RM professionals need to acknowledge that EDRMS are a subset of the overall enterprise content management system (ECM) implemented in their organisations, and that records are captured and stored in business applications other than the EDRMS. This highlights the need for RM professionals to work with the custodians of the other business applications to ensure integration with the EDRMS where possible, and at the least to ensure that these additional records are managed according to RM standards.

Records management responsibilities have shifted from qualified records managers to knowledge workers who are not RM experts. There is a clear need for RM principles to be simplified so that they can be understood and used by non-experts. For instance, classification schemes can be simplified by records managers and aligned to work tasks and search behaviours, to make them intuitive for the knowledge workers who are actually registering or searching for data. Such efforts by RM professionals may reduce the hostility of knowledge workers who may resent being assigned RM administrative tasks when the EDRMS is implemented, and assist with better acceptance of the EDRMS (Jensen & Aanestad, 2007; Van Akkeren & Rowlands, 2007).

This research finding also illustrates the importance of RM professionals assuming auditing and monitoring roles to ensure the integrity of the contents captured into the EDRMS, and the implementation of quality assurance programs. For successful user acceptance of computing systems, users needed to see the system benefiting their work performance by simplifying their tasks (Jensen & Aanestad, 2007; Van Akkeren & Rowlands, 2007). It is critical that RM professionals ensure content integrity by taking their auditing and monitoring responsibilities seriously and budgeting for resources that are dedicated to performing quality assurance of content captured into the EDRMS.

EDRMS are one of the “Decision Support Systems”[96] (Silver, 1991; Smith, 1998b) of an organisation. For them to serve the organisation’s decision making process effectively, they first need to gain user acceptance (Brown et al., 2002; Davis, 1989; Lim et al., 2005; Wilson & Lankton, 2004). This would be possible if an information culture (Oliver et al., 2009, 2010, p. 44) existed. Findings reveal that directives and support from senior management are necessary to direct the organisation’s information strategy on how network drives, EDRMS and other information repositories are to be used (Gunnlaugsdottir, 2006, p. 237; Ngai et al., 2008). Organisations need to explore how positive attitudes towards good information management behaviours can be cultivated to foster knowledge workers’ readiness to comply with good information management practices (Oliver et al., 2009, 2010, p. 44). Ways in which organisations can promote their information culture are by stating expected information behaviours in their employees’ job descriptions, including this criterion in performance appraisals and providing rewards for positive behaviours. Additionally, those tasked with records management responsibilities for their departments need to have such tasks recognised in their job descriptions, and to be given the time and the training necessary to perform their roles effectively. In an increasingly decentralised records management implementation model where RM responsibilities are devolved to non RM experts, it is necessary to acknowledge and reward such new responsibilities to attract suitable candidates to the organisation and to elicit best performance.

The high turnover of employees in many organisations creates the strong risk of an organisation’s corporate memory walking out the door (Glesinger, 2008). It has been estimated that employees stay with the same organisation anywhere from 2.5 years to

[96] Silver (1991) describes decision support systems as “any computer computer-based information system that affects or is intended to affect how people make decisions” (p. 35).

four or six years (Linkedin Corporation, 2008). This emphasises the need for organisations to make efforts to capture and manage both the tacit and explicit knowledge of its employees before they take it to a competitor. It presents challenge, too, in that employees engaged to help design the EDRMS or classification schemes may no longer be with the organisation when these systems are implemented, contributing to negative reactions from others who may feel they were not consulted and are now forced to work with a system they had no say in (Jensen & Aanestad, 2007; Van Akkeren & Rowlands, 2007). Senior management's support for the RM program and the EDRMS is vital if RM professionals are to be able to mitigate such perceptions and negative attitudes.

EDRMS and similar business systems such as enterprise content management systems (ECMs) are being implemented globally, to manage the growth of electronic information (Gantz et al., 2008), to meet regulatory compliance (Miller, 2006, p. 40), to be prepared to respond to e-discovery litigations (Kahn & Silverberg, 2008; Nelson & Simek, 2009; Swartz, 2006; Unger, 2007) and to fulfil corporate governance requirements (Standards Australia, 2003). Finding corporate information with the least amount of time and effort is crucial for the sustainability of businesses operating in the 21st century. It is too often assumed that knowledge workers will be able to use these systems efficiently. This research provides evidence that this is not so: the actual search behaviour patterns of EDRMS users show how users often fail to interact effectively with the EDRMS for search and retrieval. Further, this research provides insight into what knowledge workers consider simple and difficult searches, and pinpoints what cause search difficulties. This research places users and their search behaviours in the limelight, and highlights the importance of considering them when designing and implementing RM programs and computing systems generally. The success of EDRMS implementations, as with any other information system, is dependent on how it is used (Delone & McLean, 2004; Gunnlaugsdottir, 2006, p. 238; Markus, Axline, Petrie, & Tanis, 2000; Markus & Tanis, 2000).

The importance of investing in the training of knowledge workers to provide them with the records management skills they need to take responsibility for the information they create, receive and transmit cannot be underestimated. This is especially so in current corporate environments where transparency in government (Eade, 2009) and private business transactions is demanded and responsible corporate governance practice expected (Barrett, 2007; Bettington, 2005; Standards Australia, 2003; Willis, 2005). Of equal significance is the need to invest in training knowledge workers with search and retrieval skills to find required information efficiently from corporate information systems. How records managers may produce effective task-based training programs that influence knowledge workers' search behaviours remains a challenge.

Further challenges relate to gaining senior management sponsorship and cultivating an embedded culture that values EDRMS as corporate information systems that provide evidence of business accountability. The 2009 Cohasset survey reported that RM professionals believed that:

> senior level executives in their organisation do not adequately understand the relationship between records management performance and good governance (33% vs. 12%), nor the role that records management plays in risk mitigation (35% vs. 11%) (Williams & Ashley, 2009, p. 20).

This is substantiated by Dherent's (2006) observation that the success of the RM program adhering to the ISO 15489 standard implemented in the French National

Library "depended upon the president's and chief executive officer's personalities and willingness" (p. 101). EDRMS are critical corporate information repositories as well as decision making systems of the organisation, so senior management's support is crucial in establishing a community of practice with the desired information management mindset amongst knowledge workers. There is a clear need for organisations to encourage adaptive and flexible work practices that value knowledge and information management as core organisational behaviours.

While the broad records management frameworks and EDRMS architecture are now well established, this research has demonstrated the critical connection between the user and organisational system acceptance. It is clear that there is considerably more research to be done.

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Appendices: Chapter 2

Appendix 2.1: Description of EDRMS functionalities

Appendix 2.1: Description of EDRMS functionalities

Document capture and registration

Corporate documents and records captured and registered in the EDRMS are centrally stored and managed in a document repository. Some organisations force the capture and registration of documents and records directly into the EDRMS upon their creation, instead of saving them on network or personal drives. To enable this automatic capture, the EDRMS are integrated into office applications such as the Microsoft Office suite of Word, Excel, PowerPoint and Outlook.

Viewing

EDRMS enable the viewing of documents and records in their native applications. They also have a viewing tool to enable the viewing of documents and records in formats that are not supported by available desktop applications, or are best displayed without loading the native authoring tool (Asprey & Middleton, 2003).

Check-in and check-out

When documents stored in the EDRMS need to be edited, they need to be checked out of the EDRMS and checked back in again after editing. The check-in/check-out function controls who is editing documents stored in the system. The system only allows one user at a time to edit a document, and the act of checking out places an electronic lock on the document to prevent other users from editing it: they are able to view the document in read-only mode, but are able to see who has checked the document out. Once the document is checked back in, the updated version is saved in the system for users with access rights to view and edit. The EDRMS automatically updates the version control for the edited document. Only documents in the EDRMS can be edited using the check-in/check-out functionality: records cannot be altered.

Declare record

Given that the EDRMS stores both documents and records, and that there is a point in time when a document becomes a record, there is "declare record" or "make record" function in the EDRMS to enable this transition. This function is presented differently in different EDRMS, but is generally offered using metadata fields such as "status of item" or via a check-box option to indicate the status of the item. To activate this function, the user is required to return to the document and make a manual declaration that the document is now a record.

Version control

When documents are edited, a mechanism in the EDRMS automatically tracks the version and revision history of the document. Versions monitor major changes and revise the minor changes leading up to the major version. For example, an organisation may decide to set their version and revision controls as follows: when a document is first edited it has a version history of 1.0, and after it is updated as a major version it is assigned version 2.0. Revisions are tracked as 1.1, 1.2, and so forth until the final revised version is assigned 2.0. Administrators of the system can configure how version and revision history will be tracked by deciding upon the numbering system for the organisation. Besides keeping track of version numbers, EDRMS also allows authorised users to view previous versions or revisions of documents.

Auditing

The auditing function keeps an audit trail of actions that happen to a document or record. Examples of the audit trail information automatically captured by the system are details of when and by whom a document or record was created, viewed, edited or deleted. This is one mechanism that enables organisations to meet legal compliance and prove accountability for what happens to information stored in the EDRMS.

Security settings and access permissions

EDRMS have mechanisms that enable the implementation of security settings within the system. There are layers of security settings that can be implemented at folder levels, cascading to the contents stored within the folder, and at individual document or record levels. Examples of security access to the content are the ability to view just the metadata of the content, to read the content, or to read and edit the content. Users can be grouped by their business groups and/or ad hoc projects, and will have authorised access to information that only their groups or they personally have.

If the organisation uses information security classifications (such as classified, unclassified, restricted and most confidential) to distinguish sensitivity levels of its information, these can be applied to the content stored in the EDRMS as well. Users will be assigned an information security classification level (also referred to as a caveat) and will only be able to access information that matches their information classification level.

Administrators of the system have full permission to manage the content and administer the system. Some organisations appoint Record Focal Points, staff within a business unit trained to become super users of the EDRMS so that they can assist their team on RM and EDRMS matters. Usually, organisations provide these Focal Points with semi-administrator rights to assist with the management of the EDRMS.

Renditions of documents

EDRMS have the capacity to maintain multiple renditions of the same document. For example, a version of a word-processing document created using Microsoft Word may be saved in HTML or PDF format for publishing, review and approval. It is essential that the various versions of a document are linked to the same version of the original document.

Workflow for review and approval of documents

Workflow functionality is used to manage the flow of work in the organisation. It can, for example, be configured to process and approve an incoming invoice into the organisation by scanning the invoice and routing it through the invoice approval workflow by relevant staff.

Most EDRMS have workflow modules that are packaged as part of the EDRMS suite of products. The workflow module can be customised by the organisation to suit its different workflows for document review and approval, and final controlled distribution of documents or records. Increasingly, workflows are implemented in the EDRMS to provide accountability for each task assigned to an individual. The review functionalities include the capability to post comments to documents without changing them, decide on publication dates, and schedule documents into appropriate queues for publication in information systems like the EDRMS, Intranet or Internet.

Managing physical records

EDRMS can manage both physical and electronic records. Functionalities enable the management of the physical location of records in the form of paper files, CD-ROMs, DVDs, reports and archive boxes, and their storage locations, including record registries, filing cabinets, offsite commercial storage locations and archival repositories.

Scanning, imaging and optical character recognition (OCR)

To capture incoming correspondence or convert paper documents or records into electronic content, scanning software is used. Some EDRMS have integrated scanning and imaging modules that enable organisations to scan documents in batches and index them. If these modules are not available they can be added as optional modules to the EDRMS suite of products.

Once documents and records are scanned and registered into the EDRMS, some organisations decide to use the OCR method to index the text content of this information. This enables users to search the content using the full text search mechanism of the system.

Appendices: Chapter 4

Appendix 4.1: Semi-structured interview questionnaires for records managers

Appendix 4.2: Short questionnaire for EDRMS users

Appendix 4.3: Semi-structured interview questionnaires for EDRMS users

Appendix 4.4: Letter to the organisations requesting participation in the research

Appendix 4.5: Participant's information sheet and consent form

Appendix 4.1: Semi-structured interview questionnaire for records managers

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Interview Questions – Records Managers

Records Management Policies are written to outline that the EDRMS is the corporate information repository. Policies also outline roles and responsibilities for RM.

1. *Is there an IM/RM Policy in the organisation?*
2. *What is the IM/RM policy of the organisation?*
3. *Is it endorsed* and supported by senior management?
4. *Does the policy state that the EDRMS is the corporate information repository for the organisation?*
5. How is the policy implemented in the organisation?
6. How would you describe the understanding and acceptance of the policy in the organisation?
7. How do you perceive the usage of the EDRMS in the organisation?

Records Management procedures and standards identify what is a record, what information is to be created and captured into the EDRMS, how information should be stored and managed in the EDRMS.

8. *What are the procedures, standards, guidelines on IM/RM in the organisation?*
9. How are these procedures, standards, guidelines communicated and implemented in the organisation? Are these published on the intranet?
10. *Does this documentation state what records need to be captured into the EDRMS?*
11. Are staff aware of what records they need to captured into the EDRMS? How is this message communicated to staff?
12. *Are emails being captured into the EDRMS?*
13. *Are staff aware of the various information repositories and what information is to be stored in each of these repositories?*
14. *Are there standards on document titling in the EDRMS? Is this widely known by staff?*
15. Do staff apply document titling standards when titling documents in the EDRMS?

Recordkeeping metadata standards provide the contextual framework for records. It specifies the metadata elements that need to be captured for records stored in the EDRMS. It also states what the mandatory and optional fields in the EDRMS are. Also provides a pick list in some fields to restrict metadata to be captured.

16. *Is there a recordkeeping metadata standard?*
17. *What are the mandatory and optional metadata elements?*
18. How is this metadata standard implemented in the EDRMS?
19. What metadata is captured automatically by the system and what needs to be manually captured by users?
20. What is the reaction or feedback from EDRMS users about the need to capture metadata when registering items into the EDRMS?

Records are managed using a corporate Classification Scheme. The Classification Scheme enables information stored in the EDRMS to be classified by common business process or subject.

21. *Is there a classification scheme developed?*
22. *Describe the classification scheme?*
    - *Function, activity, subject based*
    - *Subject based*
    - *Process based*
    - *Etc*
23. *How many layers does the classification scheme go to? 4 to 5 layers/ 3 layers, etc.*
24. Were users engaged in the development of the classification scheme?
25. *What training on the usage of the classification scheme did users receive?*
26. What is the general feedback or acceptance of the classification scheme from EDRMS users?
27. **Is the classification scheme implemented in the EDRMS.**
28. **How is the classification scheme displayed in the EDRMS? Is a 'tree structure' view of the classification scheme displayed in the EDRMS or is a drop down menu version displayed?**
29. **Do users see the classification scheme in the EDRMS? If so how do they access the classification scheme?**

A corporate Retention and Disposition Schedule is implemented in the EDRMS to sentence records stored in the EDRMS.

30. *Is there a R&D Schedule developed and signed off for use in the organisation?*
31. **Is the schedule implemented in the EDRMS?**
32. **How is the schedule implemented in the EDRMS? At folder or individual item level?**
33. **How is inactive information managed in the EDRMS?**
34. How are requests for restoration of offline or archive information in the EDRMS handled?

Security permissions are set on records to ensure access to authorised personnel and to protect records.

35. *Is there a security model developed and adhered to on how information is managed in the EDRMS?*
36. **How is the security model applied in the EDRMS?**
37. Do EDRMS users have an understanding of how information is securely classified in the EDRMS?
38. Are there any issues with users not being able to access information owing to lack of security permissions? How is this resolved?

Training is provided to users on records management practices as well as how to use the EDRMS. RM training includes records awareness raising training as well as how the corporate classification scheme works.

39. *What IM/RM training and awareness raising is provided to staff?*
40. *What training is provided on the usage of the EDRMS to users?*
41. *Is training on IM/RM & the EDRMS part of the induction process?*
42. *Describe the above training:*
    - *Training materials*
    - *How the training is conducted?*
    - *Frequency of the training*
    - *EDRMS training split for beginners and advanced users?*
43. *For the EDRMS training is training provided on:*
    - *how to access the classification scheme?*
    - *how to create shortcuts to frequently used folders, documents, & searches.*

Monitoring and Auditing of the record management practices and systems is performed to ensure the RM strategies established are followed and meet the business requirements of the organisation.

44. *How are the organisation's IM/RM practices monitored and audited?*
45. *What are the performance monitoring components impacting EDRMS usage?*
46. How is this information reported?
47. What steps have been taken in the past to remedy ineffective practices?

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Short Questionnaire: Background information on EDRMS user

1. Name: ____

2. Position Title: ______________________________________

3. Department Name: _________________________
4. What are your main job functions and areas of responsibilities in the organisation?

____
____
____
____

5. What electronic information sources do you use for your work in this organisation? Indicate the percentage contribution of each of the following resources to your work.

Information Sources	% of Use
Record Keeping System [TRIM]	
Paper Records	
Emails in Lotus Notes	
Network Drives	
Intranet	
Internet	
Library Management System	
Core Business Databases or other systems: (e.g. Advanced Asset Mgt Sys, Fin. Mgt Sys, HR Info. Sys, Land Info Sys, etc.) List or circle the databases/systems used by you :	
Total:	**100%**

Thank you.
Pauline Singh
Doctor of Philosophy Student
University of Western Australia

Appendix 4.3: Semi- structured interview questionnaire for EDRMS users

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Interview Questions – EDRMS Users

Usage

1. Why do you use the EDRMS? *Probe to find out if they are aware of RM policies on the use of the EDRMS.*
2. What are the types of information you would search/look/find for in the EDRMS? *Probe to find out why they would search for these information in the EDRMS instead of other information sources?*

Searching Patterns in the EDRMS:

3. Tell me about the different ways you search/look/find information in the EDRMS?
4. Why do you search the EDRMS? Probe to find out if searching is conducted to mainly FILE or FIND information?
5. What is your preferred way of searching to FIND information? ***Probe to find out if they use basic or advance search functionalities.***
6. What is your preferred way of searching when you FILE information*?* ***Probe to find out if they use basic or advance search functionalities.***
7. If I asked you to describe the registration process to FILE information, how would you describe it*?* ***Probe to find out if they find the registration process easy or cumbersome (too much of data entry to do?). .. any benefit they see in entering all the metadata?***
8. When you have completed a search, the search results will be displayed. Describe the actions you take when you assess which items you should follow up from the search results?
9. How do you decide when you should stop following up items from your search results?
10. Is the reliability or authenticity of the information of concern to you? *Probe to find out the reason for their response.*
11. When searching for information is the retention period of information of interest to you?
12. When was the last time you had to search for information that needed to be restored from offline storage or was destroyed?
13. Do you follow up references cited in material consulted in the EDRMS?
14. Are you familiar with the electronic or paper files you need to use frequently for your work stored in the EDRMS? How do you search for this frequently used information?
15. Do you 'save' your frequently used search criteria?
16. How would you rate your efforts in finding the information you require in the EDRMS? ***Probe to find out whether it is efficient?***
17. How do you decide when to stop searching further in the EDRMS**?**
18. How do you keep track of new items added to the EDRMS relevant to your work or projects or of interest to your job function within the EDRMS? ***Probe to find out how they find this experience – cumbersome, easy, difficult, other comments?***
19. What is the most difficult problem you experience in searching for material via the EDRMS?
20. Would you ask for help when searching for information in the EDRMS? If so, when would you ask for help?

Classification Scheme:

21. Are you familiar with the classification scheme used in the EDRMS? Can you describe how the classification scheme works in your organisation?
22. Do you use the classification scheme in the EDRMS? If so how? If not why?
23. If I asked you to evaluate the Classification Scheme in the EDRMS, how would you describe it? Probe to find out what they like about the classification scheme and what they would like changed? How many levels should the classification scheme have i.e. 1 to 2 levels only???

Situational/Time Factor:

24. How does the time available to you to conduct a search affect the way that you search?
25. Do you apply a time limit on your time spent searching for information in the EDRMS?

Training:

26. Have you had training on the EDRMS?
27. Please describe the training you received.
28. When was the training conducted?
29. If I asked you to evaluate the training you have received, how would you describe it?

Design:

30. Explain and show them how their EDRMS is currently designed. Then ask them what do they think of the design of the EDRMS?
    - ***Probe - what do you like about the design of the EDRMS?***
    - ***Probe - what would you like changed about the design of the EDRMS?***

Appendix 4.4: Letter to the organisations requesting participation in the research

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[insert name of Information Mgr \Records Mgr]
Position,
Organisation
Address
Date

Re: Participation in a PHD research on the information search behaviour of electronic document and records management system users

Dear [insert name of Information Mgr \Records Mgr],

I am writing this letter to seek your organisation's participation in a research study to be undertaken by my student Pauline Singh who is enrolled in a Doctor of Philosophy program. Pauline is a practicing information management consultant and she has elected to base her study on an information management topic relating to electronic document and records management systems (EDRMS). The title of her research is:

EDRMS search behaviour:
Implications for records management principles and practices

The aims of the study are to find out:

1. How do users search for information in an EDRMS?
2. Are the ways in which corporate documents and records are managed consistent with the information searching patterns of users?

As an incentive for your organisation to participate in this research, a report of the findings on the information searching pattern of EDRMS users in your organisation will be prepared and provided to the Information/Records Manager. This report should:

- assist you to understand the information searching patterns of your staff and evaluate if they are consistent with the design of the EDRMS implemented in the organisation;
- provide your organisation with the opportunity to redesign the EDRMS implementation to better meet the information searching patterns of staff;
- provide information about how the records classification practices of the organization are applied by EDRMS users.

Confidentiality of the information gathered and the name of your organisation will be ensured. In the PhD thesis and publications that arise from this research, we will report only aggregate and anonymous data. It will not be possible to identify your organisation or individual respondents from these reports of the research.

<u>Benefits of this study.</u>
Currently the records management discipline has no reference model of how users seek information stored in an EDRMS. EDRMS are designed with records management principles in mind, but the absence of a user reference model may have resulted in EDRMS that are less consistent with users' needs than with those of records management practitioners. The focus of this research is on developing an information searching model for EDRMS use that can be used to improve the design and implementation of EDRMS.

Appendix 4.4: Letter to the organisations requesting participation in the research

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An outline of the research methodology is presented below, including the time requested from your staff at various stages of the research.

1. Meeting with the Records/Information Manager to gather information regarding the organisation's records management regime, view demo of the EDRMS, and seek the Records/Information Manager's assistance in identifying 10 EDRMS users. (30 to 40 mins)
2. Ask the identified users to complete a short questionnaire about their background and about what other information sources they use. (5 to 7 mins)
3. Conduct interviews with these users to find out their information searching patterns using the EDRMS. (20 - 25 mins)
4. Use the 'Think Aloud' Protocol Analysis research method and ask users to think aloud and show the researcher how they conducted their last simple search, followed by how they conducted their last difficult search using the EDRMS. (20 mins)

The above data gathering exercise will be conducted on your premises. Steps 2 and 3 can be conducted in either a meeting room or in the user's office. Step 4 needs to be conducted in front of the user's PC or with a PC providing access to the user's computing profile. With the permission of the participants, the interview sessions will be taped and transcribed.

Steps moving forward.
If you consent to participate in this research, please complete the appended consent form and email this letter back to paulines@iinet.net.au

If you have any questions regarding the research, please contact Pauline Singh directly on mobile 0411 550 111 or at the above email address. I would also be pleased to discuss this research with you. I can be contacted by email at jklobas@ecel.uwa.edu.au or by phone on 6488 3980.

Thank you for your time.

Regards,

Jane Klobas
Professorial Fellow
Business School
University of Western Australia

Consent Form

On behalf of my organisation, I complete this consent form agreeing participation in this research. I will make available staff and time as outlined in the above letter for participation in the research.

Name: ______________________________

Designation: ______________________________

Organisation: ______________________________

Date: ______________________________

Disclaimer: The Human Research Ethics Committee at the University of Western Australia requires that all participants are informed that, if they have any complaint regarding the manner, in which a research project is conducted, it may be given to the researcher or, alternatively to the Secretary, Human Research Ethics Committee, Registrar's Office, University of Western Australia, 35 Stirling Highway, Crawley, WA 6009 (telephone number 6488-3703). All study participants will be provided with a copy of the Information Sheet and Consent Form for their personal records.

Appendix 4.5: Participant's information sheet and consent form

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Participant's Information Sheet and Consent Form

Dear EDRMS User,

I am writing this letter to seek your participation in a research study to be undertaken by me in a Doctor of Philosophy program at the University of Western Australia. I am a practising information management consultant and have elected to base my study on an information management topic relating to electronic document and records management systems (EDRMS). The title of my research is:

EDRMS search behaviour:
Implications for records management principles and practices

The aims of the study are to find out:

1. How do users search for information in an EDRMS?
2. Are the ways in which corporate documents and records are managed consistent with the information seeking patterns of users?

Your Document Management Manager, has nominated you as an EDRMS user suitable for participation in this research. Your participation will require in total an hour of your time participating in the following activities:

1. Completion of a **short email questionnaire** about your background and about what information sources you use (5 to 7 mins);
2. Participation in an **interview** about your information searching patterns using the EDRMS (20 - 25 mins); and
3. **Show me** how you conduct searches in the EDRMS (20 mins).

The above data gathering exercise will be conducted in the premises of your organisation. Steps 1 and 2 can be conducted in either a meeting room or in your office. Step 3 needs to be conducted in front of your PC.

Once the study in your organisation is complete, I will summarise my findings in a report to your Document Management Manager. Data will also be aggregated and included in my thesis and publications that arise from the research. **All data that you provide will be confidential.** I will not discuss you as an individual with any member of your organisation and it will not be possible to identify you from the aggregated data included in any of the reports from this research.

Your participation is entirely voluntary. If you do not wish to participate, there is no need to respond to this request. If you do agree to participate at this stage, you may still withdraw your participation at any time and ask me to destroy any data I have collected from you.

If you would like to participate in this research please complete the attached consent form and either email to paulines@iinet.net.au or fax it to me at **(08) 64881072**. If you have any questions regarding the research, please contact me directly on mobile 0411 550 111 or via paulines@iinet.net.au. Alternatively, please feel free to contact my supervisor, Professor Jane Klobas by email at jklobas@ecel.uwa.edu.au or by phone on 6488 3980.

Thank you for your time.

Pauline Singh
Doctor of Philosophy Student

Appendix 4.5: Participant's information sheet and consent form

THE UNIVERSITY OF WESTERN AUSTRALIA — UWA Business School

Attention: Pauline Singh, PhD Student

EDRMS search behaviour:
Implications for records management principles and practices

Consent Form

I ____ have read the information provided and any questions I have asked have been answered to my satisfaction. I agree to participate in this research, realising that I may withdraw at any time without reason and without prejudice.

I understand that all information provided is treated as strictly confidential and will not be released by the researcher. I have been advised as to what data is being collected, what the purpose is, and what will be done with the data upon completion of the research.

I agree that research data gathered for the study may be published provided my name or other identifying information is not used.

Participant's Signature: ____

Organisation: ____

Date: ____

(Please note that as this document is not a contract between parties, it is not necessary that the researcher sign it. Nor is it necessary to have a witness.)

The Human Research Ethics Committee at the University of Western Australia requires that all participants are informed that, if they have any complaint regarding the manner, in which a research project is conducted, it may be given to the researcher or, alternatively to the Secretary, Human Research Ethics Committee, Registrar's Office, University of Western Australia, 35 Stirling Highway, Crawley, WA 6009 (telephone number 6488-3703). All study participants will be provided with a copy of the Information Sheet and Consent Form for their personal records.

Appendices: Chapter 6

Appendix 6.1: Task Matrix SQ_3

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge**	**Why search was classed to be difficult by user?**
P1	Write minutes for current meeting.	Find the minutes of previous meeting so that it can be used as template to write current minutes.	P1 knew where the minutes of his Board Meetings are filed in EDRMS. Hence, decided to navigate to the folder.	Did not have a difficult search for the PA.			
P2	Assist colleague to search for an approval document.	Find a specific approval document.	P2 knew where the approval document is filed and thus decided to navigate to the folder.	??	P2 had to find a document in EDRMS that he had not accessed for a long time and did not know how to navigate to the folder where it would be filed.	P2 knew some words of the title of this document, so he decided to do a Title word search. He typed in 'NEMCO statement'.	
P3	User's task is archiving paper records. In this instance user had to confirm that an electronic copy of the paper record at hand was registered in the EDRMS. If it was registered where was it filed in the EDRMS?	Find the electronic copy in EDRMS that matches the paper document.	Since the EDRMS document number was handwritten in the paper record, user decided to conduct her search using the document number to find out where the electronic copy was filed in EDRMS.	User had a paper file & wanted to find out where it was classified in EDRMS so that she could determine which box the file needs to be stored into for archiving purposes.	Where paper file at hand was classified in EDRMS?	Title of the paper file. User knew where file was classified in the EDRMS & decided to NAVIGATE to the folder via the CLASSIFICATION SCHEMA.	
P4	Share new information on HR with Team Leaders in the organisation.	Find the folder titled 'Team Leader Information' in EDRMS where I store all new info I want to share with various Team Leaders. P4 knew where this folder was stored in EDRMS and navigated to the folder.	Awareness of where the info should be filed and knowledge of the folder titled - 'Team Leader Information', and where it is classified in the classification schema. This TIA enabled P4 to navigate to the folder.	Did not have a difficult search for the PA.			

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** What info is being searched or retrieved from the EDRMS?	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** What info is being searched or retrieved from the EDRMS?	**Task Knowledge**	**Why search was classed to be difficult by user?**
P5	User had to register a new incoming business email into EDRMS on behalf of her team in her role as the Records Focal Point for team.	Find a folder into which the email needs to be filed into in EDRMS.	P5 knew where the email should be filed and also where it is located in the classification schema and thus navigated to the folder titled 'Fuel Management \ Accounting (Fuels): Coal Stack Adjustment Information' to file the email.	In her Records Focal Point role, P5 had to assist her colleague find a paper file.	P5 decided to search for the location of the paper file in the EDRMS using terms her colleague provided regarding the file.	Search terms provided by colleague that could be the title of the file.	
P6	P6 needed to look at drawing number 328890 to see what that drawing displayed and to find out what that drawing was about.	Find a specific drawing stored in the EDRMS.	Since P6 had the TIA about the Drawing number 328890 it influenced how he formulated his search strategy.	Don't know what task P6 had to do with the equipment he required the drawing for. Perhaps to repair the equipment?? Or someone requested for him to conduct the search on their behalf.	The valve circuit drawing for a piece of equipment referred to as the 'boiler drum'.	The name of the equipment which was 'boiler drum' and the type of drawing required which is the 'valve circuit diagram'.	
P7	P7 needed to create a controlled label for the dangerous goods drawings.	Find the dangerous goods' drawings controlled labels.	TIA was some words that could be part of the title of the label being searched for. I.e. 'label' & 'controlled'.	In her Records Focal Point role, P7 had to assist her Chemist colleague find a document in EDRMS.	Document that Chemist wanted retrieved for him from the EDRMS.	The perceived words in the document title provided by the Chemist colleague.	

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** What info is being searched or retrieved from the EDRMS?	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** What info is being searched or retrieved from the EDRMS?	**Task Knowledge**	**Why search was classed to be difficult by user?**
P8	Assist colleague to search for a property drawing.	Find a specific property drawing stored in the EDRMS.	P8 was aware that it was an electronic drawing, hence selected 'electronic drawings' as a document type. Additionally, P8 was aware of the drawing number as it was written in her black book, where she maintains a log of frequently accessed drawing numbers for ease of finding them in future.	??	Drawings for a security fence in the plant.	This time P8 did not know the drawing number. Hence P8 conducted a title search hoping that the word 'security' will be part of the document title.	
P9	??	Searching for safety alert document.	TIA P9 had was that it was a MS Word document & had a rough idea of where these Safety Alerts are filed and decided to use the Tree structure -- DELTA MAINTENANCE - WESTERN HEALTH & SAFETY - SAFETY ALERTS.	??	Searching for the Executive Safety Committee minutes.	TIA that P9 had was that the Executive Safety Committee minutes that was about 6 months old. Other than that, P9 didn't know where it would be filed for her to use her preferred search method which is to navigate the tree view folder structure.	

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge**	**Why search was classed to be difficult by user?**
P10	Simple search turned out to be difficult search			??	Find a policy document P10 authored and registered into the EDRMS.	P10 initially navigated to where he thought he had filed the document. He was not able to find the document. P10 had another document that referred to the document being searched for. The Object ID of the document being searched was stated in the document. P10 decided to conduct a new search using the Object ID to search.	
P11	User was searching for the memo on credit card payments of the Lord Mayor.	Find the memo re credit card payments of the Lord Mayor.	P11 had awareness that he always titles such documents using the words 'Lord Mayor' and adds the date as part of the title. E.g.: MEMO - LORD MAYOR - MASTERCARD STATEMENT - MAY - JUNE 2005	User was searching for information regarding a particular elected Councillor member's expenses.	User FORMULATED a search using the TITLE WORD search criterion and typed in the words 'elected member expenses'.	User knew the name of the Councillor whose expenses he was searching for, but did not know much else. Like what document types or date range.	Search was difficult because it resulted in too many search results and used had to trawl thru the info to get what he wanted.

Appendix 6.1: Task Matrix SQ_3

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge**	**Why search was classed to be difficult by user?**
P12	Request from P12's boss to find a specific invoice.	Find invoice requested by Boss for the organisation whose company name had the words 'Flood'.	P12 knew that the invoice was registered in the EDRMS, and was aware that she could search using the 'Contact' metadata field as she knew the name of the company had the words 'Flood'.	In P12's RFP role, her colleague requested she finds a specific correspondence letter.	Search for specific correspondence requested by colleague.	P12 was aware of the company name from whom the correspondence was from and the had a rough idea of the date range of the correspondence.	P12 is only aware of searching using metadata fields and not using the classification scheme. However, corro being searched did not have the 'Contact' metadata field completed by the Records Section when it was being registered. Also it was classified for filing into a folder P12 would not think of looking into for the corro.
P13	Process parking applications forms.	Find a specific parking application form for processing.	P13 knew the name of the applicant for parking permit and searched using the 'Contact' metadata field.	P13 could not recall the last difficult search he had to do. It was about 3 weeks ago when he had to do a difficult search. The search was viewed to be difficult because P13 used his preferred search methods to search and still could not find what he was searching for. He decided to contact the Help Desk at Records Services and seek their assistance in finding the information. P13 mentioned that he does not use the EDRMS often and only knows of a couple ways of searching and if this does not find what he is looking for he will usually stop the search and ring the Help Desk.			

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge**	**Why search was classed to be difficult by user?**
P14	P14 had to file an ecopy of a response that her boss prepared to a correspondence that is registered in the EDRMS.	Find the folder into which the ecopy of the response to the correspondence prepared by the Boss needs to filed into.	P14 had the paper copy of the actual correspondence to which the boss prepared the response for in her hand. Hence, P14 decided to search by the Contact metadata from the corro to find out which file the corro is filed under. Once P14 found the file she was able to identify the folder into which the response letter needs to be filed into.	In P14's RFP role, her colleague requested she finds a tender relating to a specific car park that was closed a couple of years ago.	Find the folder relating to the tender of a specific car park that was closed a couple of years ago.	Since the tender was closed, P14 was aware that she should have access to view the tender, but suspected that the access rights have not been amended. P14 knew the name of the car park the tender was related to. However, did not know which folder it would be filed under. P14 decided to conduct a TITLE search using words she thought would be part of the title of the tender.	The search was difficult for a number of reasons. 1) P14 may not have access to the folder. 2) P14 was not familiar with the classification schema used in the organisation, to be able to browse by the contents in the folder using the CA. P14 was going to check another system where she hopes to get the file number and then conduct a search by the file number in the EDRMS.
P15	??	P15 wanted to find out when he filed the last media statement in the EDRMS and what was the content of this media statement?	P15 has memorised the folder number in which the media statements are filed and decided to formulate a search using the folder number. He also knew that it has the metadata of 'report' as the record type and used this criteria in his research.	Did not have a difficult search for the PA. P15 commented that he uses the EDRMS for only searching for media statements and this search is always conducted by typing the folder number in the metadata field.			

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge**	**Why search was classed to be difficult by user?**
P16	Compare the cost of fresh milk currently ordered versus the cost of UHT milk which can be purchased from the stationery supplier.	Find invoices by milk supplier for cost comparison purposes.	Could not recall the name of the milk supplier so contacted colleague from the Accounts Dept who processes the invoices for this supplier for the name of the milk supplier - 'West Coast Milk Supply'. Decided to formulate a metadata search using the Contact metadata field.	P16 received a phone call from a supplier who provided background to his business but did not state the business name or invoice number. Supplier wanted to remain anonymous but inform the City that their future invoices will quote the purchase order number and for P16 to inform her boss. P16 wanted to find out the name of this organisation so that she can provide a full update to her boss on who the supplier was and what tender their services related to.	P16 decided that the best way to conduct this search was to use the City's ISYS database and find out what tender the supplier had won based on his business description. From ISYS P16 determined that the supplier's name is (Sita Pty Ltd) and the tender number is (06070405). Using this information user searched TRIM to find out the supplier's latest invoice. "And that's the tender there, 06070405 Green Waste Disposal Service including Bins".	From another system P16 found out the metadata fields that will provide her with the relevant metadata information such as the supplier's name (Sita Pty Ltd) and the tender number (06070405).	Search was difficult because P16 did not have the necessary metadata information with her to enable her to conduct the search in the EDRMS. P16 had to go to another system that will provide her with the required metadata information to enable her to search for the information in the EDRMS. Again indicating how lack of awareness of the how the classification scheme works leads to users not being able to effectively search for info in the EDRMS. Also indicates how the lack of a tree view folder structure of the system prevents users from browsing folders to search for info they need.

Appendix 6.1: Task Matrix SQ_3

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge**	**Why search was classed to be difficult by user?**
P17	P17 said he did not have a difficult search but his simple search turned out to be a description of a difficult search. Hence, I have reported the simple search as a difficult search.			1) Confirm that a payment certificate to supplier Syrinx Environmental was registered in the EDRMS. 2) If it is registered then take note of the Record Number of the payment cert so that it can be referenced to process future invoices by supplier.	1) Find payment certificate for supplier Syrinx Environmental and take note of the 'Record Number'.	Name of the supplier.	1) Inconsistency in the data entry of names of companies. E.g. sometimes entered as Syrinx or Syrinx Environmental. 2) Records are not 'RELATED' in TRIM. E.g. an invoice is not related to its payment certificate in the above example. This is not the fault of the Registry Services staff as they are not aware of the links between these documents. However, officers need to be trained on how to relate records so that they could do this linking of records.
P18	P18 was working on the North Bridge Precinct matter.	P18 had to search for a letter regarding the North Bridge Precinct's Memorandum of Understanding.	P18 knew words that will be part of the Title of the letter and typed in 'North Bridge Precinct Memorandum'.	Did not have a difficult search for the PA.			

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge**	**Why search was classed to be difficult by user?**
P19	Needed to confirm if payment was made to a supplier.	Find the payment certificate for the supplier Westpac.	P19 knew the name of the supplier and the invoice number.	??	Required land use and planning information about a the property '72 King Street'.	Name of the property.	Search was difficult because P19 had to trawl thru a huge amount of search results matching her broad search criteria. If P19 was familiar with the classification schema she would be able to search use LAND USE AND PLANNING than refine by title search on the property address.
P20		P20 had to search for a memo that she had created recently to add a note to the memo.	P20 was aware that the 'Doc Type' is memo and the title had the words 'reimbursement of expenses', and the name of the Councillor who created the memo.	P20 could not recall the last difficult search she had to do as it had been some long time ago.			

<table>
<tr><th rowspan="2">Participant</th><th colspan="3">What was the last simple search you had to do?</th><th colspan="3">What was the last difficult search you had to do?</th><th rowspan="2">Why search was classed to be difficult by user?</th></tr>
<tr><th>Inferred Description of Simple Task (Work Task)</th><th>Search Task
What info is being searched or retrieved from the EDRMS?</th><th>Task Knowledge user has</th><th>Description of Difficult Task (Work Task)</th><th>Search Task
What info is being searched or retrieved from the EDRMS?</th><th>Task Knowledge</th></tr>
<tr><td>P21</td><td>?? Not sure what the WT is, could be a request from her boss or colleague as P21 is both a secretary and RFP for her area.</td><td>Searched for a ministerial.</td><td>P21 was aware of the ministerial number and searched using this metadata field.</td><td>In P21's RFP & Secretary role, her boss requested she finds a document.</td><td>Find the document requested by the Boss.</td><td>Boss informed P21 that he had authored the doc and what the subject matter of the doc was.</td><td>P21 was provided with incorrect info for the search. It turned out that the Boss was not the author. And since P21 combined metadata for the author and the title of the doc she could not find the info.</td></tr>
<tr><td>P22</td><td>Compose response to incoming correspondence.</td><td>Find the folder where other correspondence related to the response P22 had to compose are filed in the EDRMS.</td><td>P22 had the paper copy of the incoming corro in front of him to respond to. As such he had details of the content and decided to conduct a title search thinking how Records would have titled the doc.</td><td>Prepare the Individual Performance Plan (IPP) of staff reporting to P22.</td><td>Search for the IPP of sub ordinate.</td><td>Awareness of the document type being searched for which is the IPP and also the name of the subordinate.</td><td>Search was difficult bec HR misfiled the IPP into a folder P22 does not have access to. HR then moved the IPP to a folder where P22 has access.</td></tr>
<tr><td>P23</td><td>Action the document in P23's in-tray from a workflow module.</td><td>Find the document referred to in the workflow module in the EDRMS to action the task assigned to P23 via workflow.</td><td>The workflow module displays the document number that requires action. Hence, P23 knew he could use this doc no to find the doc.</td><td colspan="4">No difficult search for this user.</td></tr>
<tr><td>P24</td><td>Format a document for boss before submission to Treasury.</td><td>Find ecopy of the document that needs to be formatted.</td><td>Hardcopy of document was at hand, which had the 'Document Number' stated. Hence, formulated search using the document number.</td><td colspan="4">For P24 a difficult search would be to find something and he can't find, even after asking his colleagues for assistance. In the last 8 months he has been with DTF he has not encountered a difficult search.</td></tr>
</table>

Appendix 6.1: Task Matrix SQ_3

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge**	**Why search was classed to be difficult by user?**
P25	P25 had an action in his workflow to respond to a ministerial request that came to the Commissioner and needed to review previous responses before actioning the latest response.	Find previous responses made to the person to whom the ministerial relates to.	The name of the person requesting the information via the ministerial was known to P25. P25 recalled that this person has asked similar questions previously and he had saved the responses in his Shortcuts.	P25 received a phone call from a tax payer enquiring about a letter he wrote to the Dept a month ago. The taxpayer mentioned that he has not had a response to his letter. He provided his name and his client ID number. P25 told taxpayer, he will check on the letter and get back to him.	Search for the letter the taxpayer said he sent to the Dept.	The topic of the letter the taxpayer mentioned he sent to the Dept - re exemption for a caravan park. P25 knew that these exemption letters are titled with the words EXEMPTION OTHER.	Search was difficult bec P25 could not find the letter in the EDRMS. During the time of the PA P25 decided to contact Records initially to check and then if it fails to contact the taxpayer and ask him to resend the letter.

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge**	**Why search was classed to be difficult by user?**
P26		Search for a document colleague prepared for P26.	Reference link to the document in the EDRMS was emailed to P26 which she clicked on to access the document.	Revise a contract that P26 has been working on previously stored in the EDRMS.	Search for contract that P26 was revising.	Awareness of the title of the contract.	Search was difficult bec P26 is not familiar with how to checkin/checkout documents being revised. Hence she got confused when revising document and saved it into the wrong place. This problem is compounded for the user, as she uses 2 different information repositories to store her documents, which ultimately confuses her on where she has stored her documents.
P27	Assist colleagues in their requests for folders or documents stored in the EDRMS.	Search for document or folders on behalf of colleagues.	Access shortcuts created to access frequently accessed folders and documents.	P27 mentioned that she has not conducted a difficult search before.			
P28	Link scanned ministerial received with related documents in the EDRMS.	Search for the Treasurer's reference of the scanned ministerial.	Metadata field 'Treasurer's Ref No' which is a unique number relating to the ministerial and related documents.	Assist colleague in searching for ecopy of letter he had a hardcopy of.	Find for ecopy of letter at hand for colleague.	Contents of the letter provided both metadata and full text for searching.	Search was DIFFICULT because letter searched for was never registered in the EDRMS.

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge**	**Why search was classed to be difficult by user?**
P29	Refer to document worked on yesterday.	Find document that was being referred to yesterday.	Awareness of the File No in which the document was filed.	Wanted to confirm if the document prepared for the Treasurer's signature was signed and registered in the EDRMS.	Find final signed and scanned ecopy of letter prepared for the Treasurer's signature.	P29 knew which folder he previously saved this document, hence went to find for this document by navigating and drilling down the tree structure of the File Plan.	P29 found this search difficult because although he knew which file the document would be filed in, it was hard to locate the specific document he was after, as there were a number of items in the file. Also it was difficult for him to identify the FINAL document in the file. Although his letter was signed off by the Treasurer and scanned into the DMS it was not MADE FINAL. People generally don't actively return to their documents to 'MAKE THEM FINAL'.
P30	Assist colleagues in searching for ecopy of the hardcopy document at hand from the EDRMS.	Search for ecopy of the hardcopy document at hand from the EDRMS.	Details of metadata and full text content from hardcopy held at hand.	P30 reported that she does not have difficult searches as she was the trainer for the EDRMS as it was implemented and as such has good knowledge of searching and nothing thus far has been a difficult search.			

Appendix 6.1: Task Matrix SQ_3

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge**	**Why search was classed to be difficult by user?**
P31	Update document registered in EDRMS with the TRIM Record Number in the footer of the document.	Find document recently registered and update it.	The title of the document as it was recently registered into the system.	Register scanned documents into the EDRMS.	Find relevant folders to registered scanned documents in the EDRMS.	Content of the scanned documents at hand to be registered into the EDRMS.	Lack of understanding of the classification scheme make identification of the folder to register the scanned docs difficult. P31 had to use words in the document title to conduct searches to find out where similar documents were filed and then register her scanned docs into the same folder.
P32	P32 had to find the reconciliation document that she checked into the EDRMS yesterday, so that she could create a Super Copy of the document to do today's reconciliation.	Find reconciliation document created yesterday.	Awareness of the metadata such as title, creation date, etc of the document as it was worked on yesterday.	Process invoice for a VCR and CTTC purchase.	Find background information re requests and approval for the purchase of VCR and CTTC to process incoming invoice.	P32 recalled that the purchase occurred in Oct '05. Also that she titled the documents being searched for using the words 'VCR' & 'CTTC'.	Search was difficult as P32 searched for VCR and CTTC using abbreviations but previously titled the document by spelling these words in full.
P33	P33 had to prepare a table on the decisions that have been made on the subject of 'payment systems to date'.	Find the information on the 'Payment Systems Board Meetings'.	P33 knew that the information he requires will be available from past minutes of the Payment Systems Board Meetings.	P33 reported that he could not recall a difficult search.			

Appendix 6.1: Task Matrix SQ_3

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge**	**Why search was classed to be difficult by user?**
P34	P34 had to update a salary sacrifice Excel spreadsheet for a particular staff member for a FBT application	Find the FBT application form submitted by the staff member.	1) Awareness that the form would be filed into a folder which has the words 'salary sacrifice' as part of its folder title. 2) Also the name of the staff member who completed the application form.	Fulfil request from colleague to find the minutes of Risk Management Committee meeting.	Find the 'risk management paper by the Risk Management Committee'.	Awareness of the keywords to search by for the information being seeked.	Search was not really classed to be difficult by P34, she actually reported that she does not have much difficulty in searching for info in the EDRMS.
P35	P35 had to process a worker's compensation claim.	Search for a 'workers compensation claim' that needs to be processed.	P35 was aware of the claim number as this was stated in a hardcopy at hand for processing claim.	P35 reported that she could not recall a difficult search, most of her searches are simple.			
P36	Update training attendance list stored in EDRMS.	Find the 'attendance list for TRIM' training.	Awareness of the document title that needs updated.	Consult training materials prepared by external trainer.	Search for training materials prepared by external consultant.	Awareness of the subject matter and possible words used in titling the training materials.	The reason this search for difficult is because the document was titled differently from how p36 would have titled it.

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge**	**Why search was classed to be difficult by user?**
P37	Prepare travel itinerary for colleague travelling interstate.	Find travel agenda previously registered in EDRMS by P37 so that it can be referenced to prepare the travel itinerary.	Knowledge that she had previously prepared a travel agenda and had titled it with wording that includes the colleague's name.	Register email correspondence re the reissue of a conference cheque into the EDRMS.	Find a suitable folder to classify the email for registration into the system.	Given that the email related to a cheque, P37 knew it has to be classified into a folder titled 'FINANCIAL'.	Search was difficult because there were 2 folders where the email could be filed into. P37's dilemma was whether it was going to be in 'Financial payments January 2/05' or 'Financial payments conferences'.
P38	??	P38 was searching for a project-based document, that relates to 'infrastructure'.	P38 was aware that the document relates to a project titled 'B2 Data Centre' and that all documentation related to this project are titled with the project name. Hence, decided to formulate search using the doc title 'B2 Data Centre'.	??	Find an invoice.	P38 knew the invoice number and the item it related to.	Search was difficult because although P38 was aware of the invoice number, this metadata was not captured in the title of the invoice.

Participant	What was the last **simple** search you had to do?			What was the last **difficult** search you had to do?			
	Inferred Description of Simple Task (Work Task)	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge user has**	**Description of Difficult Task (Work Task)**	**Search Task** **What info is being searched or retrieved from the EDRMS?**	**Task Knowledge**	**Why search was classed to be difficult by user?**
P39	P39 wanted to write a new policy on personal leave and was aware that some work was done previously on this topic and wanted to research it before writing this new policy.	Search for documentation on 'personal leave'.	An awareness that documentation exist on this topic and thus to use the words 'personal leave' to conduct a title word search. P39 was aware of the date range as well and thus browsed the search results using the date range.	??	P39 wanted to find the correspondence bet her dept (Personnel) and the Audit Dept about the audit conducted on the Personnel Dept in 2005.	Content of the correspondence and date range when it was documented.	Search was difficult because the audit document was never registered in the EDRMS. P39 later found out that document was sent to her boss who most likely did not register it into the EDRMS, hence making the search difficult for her.
P40	P40 had to search for submission papers for the 'financial claims compensation scheme' required by her boss.	Search for submission papers for the 'financial claims compensation scheme'.	P40 had awareness of the subject matter being searched for as the details were provided to her by her boss when he requested the search.	P40 reported that she is usually able to find what she is searching for and does not have difficult searches.			

Appendix 6.2: Example of P5's search task and task knowledge

Using participant P5 as an example, the visual comparison of these flowcharts (Figure 6.12) illustrates how search task and task knowledge jointly affect the search behaviour of an EDRMS user. The first column in Figure 6.12 shows P5's two preferred strategies for search formulation in "Stage 2: Formulate Search Strategy". One search strategy involved navigation of the tree view folder structure, whilst the other involved conducting a metadata search using the search engine in the EDRMS. In "Stage 4: Process and Evaluate Search Results", P5's preferred search activities were browsing and refining her search results rather than sorting and filtering. In "Stage 7: End Search", P5 indicated she would close the search if she found her sought information or else stop searching in the EDRMS.

Column 2 in Figure 6.12 presents the observed individual search behaviour flowchart for P5's last simple search based on her role as the Records Focal Point. The work task was to register a new incoming business email into the EDRMS on behalf of her team; hence, P5's search task was to find an appropriate folder in the EDRMS into which the email would be filed. P5 had two specific sets of task knowledge related to this search task: she knew some words of the folder title where the email should be filed; and she knew where the folder was electronically located in the tree view folder structure of the classification scheme. Based on this task knowledge, P5 decided to perform her search as follows in Stages 2, 4 and 7. In Stage 2, P5 used the navigation and browse search strategies to find the folder where the email needed to be filed, instead of conducting a metadata search. In Stage 4, she browsed the folder titles to evaluate and process her search results as she navigated through the folder structures in the classification scheme. Although P5 stated in her self-reported flowchart that she refined her searches, she did not display this activity in her last simple search. It can be inferred that she did not consider it necessary to refine her search in this instance. Finally, in “Stage 7: End Search”, P5 found her sought file and closed her search.

Column 3 in Figure 6.12 presents P5’s observed flowchart for her difficult search. Her work task was to retrieve a paper folder requested by her colleague. P5 had to search in the EDRMS for the physical location number of the paper folder requested by her colleague. Once the number was known, she would be able to retrieve the paper folder for her colleague. P5’s task knowledge comprised some terms in the folder’s title, provided by her colleague. She decided to formulate a search using the metadata search strategy to first find the folder in the EDRMS, then find its physical location. In Stage 4, P5 initially browsed her search results, and when she did not find the sought information she decided to refine her search. Returning to Stage 2, P5 reformulated her search strategy by combining different metadata fields in order to vary the terms of the folder title. Subsequently in Stages 5, she again browsed through her search results. Not finding her sought information, in Stage 7 P5 stopped her search and decided to return to check details of the folder with her colleague. With her updated task knowledge, P5 retried her search, using a combination of metadata fields to formulate her search. She found the sought information and closed her search.

Appendix 6.3: Example of P12's search task and task knowledge

Using P12's search behaviours as an example, her last simple and difficult searches are explained. Tables 6a and 6b are condensed versions of the Task Matrix SQ_3 of P12's work task, search task and task knowledge, split into three columns.

Table 6.a: Condensed task matrix for P12's simple search

What was the last *simple* search you had to do?

Work Task	Search Task	Task Knowledge
Request from P12's boss to find a specific invoice.	Find invoice requested by boss for the organisation whose company name included the word Flood.	P12 knew that the invoice was registered in the EDRMS, and was aware that she could search using the Contact metadata field as she knew the name of the company included the word Flood.

For P12's last simple search, her work task was to find an invoice requested by her boss: the search task was to search and retrieve a specific invoice. P12's task knowledge comprised two specific sets of information: she was aware of the company name from whom the invoice was received; and she was aware that incoming invoices were registered in the EDRMS. Given this search task and task knowledge, P12 decided to formulate her search strategy using metadata fields, typing the name of the company into the "Contact name" metadata field. From the search results displayed, she browsed through the titles and found the invoice. She stated that since the invoices were titled with the prefix "INV" it was easy for her to browse this way to locate the invoice.

P12 found her search to be simple because she was able to find the invoice with least effort using the task knowledge she had. The task was easy because the Records Section was consistent in using the prefix 'INV'. Additionally, the name of the company originating the invoice was captured and entered correctly in the "Contact" metadata field of the EDRMS.

Data analysis on the reasons why users categorised their searches as difficult was conducted by adding a column entitled: *"Why search was classed to be difficult by user"*. This enabled finding the answer to the question raised in the Task Matrix SQ_3 (see Appendix 6.1). In P12's last difficult search, a condensed version of the Task Matrix is appended in Table 6b.

Table 6b: Condensed task matrix for P12's difficult search

What was the last *difficult* search you had to do?			**Why was the search classed as difficult by the user?**
Work Task	**Search Task**	**Task Knowledge**	
In P12's RFP role, her colleague requested that she find a specific letter.	Search for specific correspondence requested by colleague.	P12 was aware of the name of the company from whom the correspondence came, and she had a rough idea of the date range.	P12 is only aware of searching using metadata fields: she does not use the classification scheme. However, the correspondence being searched for did not have the Contact metadata field completed by the Records Section when it was registered. It was also classified and filed into a folder that P12 would not think of looking in for the correspondence she was seeking.

Because of P12's role as the record focal point for the business unit, her work task was to assist her colleague to find a specific piece of correspondence in the EDRMS. The colleague approached her for assistance in finding the correspondence; P12's search task was to search and retrieve a specific item of correspondence registered in the EDRMS.

P12's task knowledge was two specific sets of information: she was aware of the company name from whom the correspondence was from; and she had a rough idea of the date range of the correspondence. With this search task and task knowledge, P12 decided to formulate her search strategy using the metadata fields, typing in the name of the company in the "Contact name" metadata field. After a few attempts at refining her search using variations of how the company name could be entered, P12 decided to stop her search and seek assistance from colleagues who might be aware of more details regarding the specific correspondence sought. One of these forwarded her a paper copy of the correspondence and, using other metadata available in the paper copy, P12 was able to find the correspondence in the EDRMS.

Appendix 6.4: Search task and knowledge task matrix

Self-reported and Observed EDRMS search behaviours	Stage 2: Formulate Search Strategy			Stage 4: Process & Evaluate Search			
	Metadata	Navigate	Shortcuts	Browse	Refine	Sort	Filter
Organisation A							
P1 - SB from Interview	✓	✓		✓	✓		
Simple Search		✓		✓			
Difficult Search				No difficult search			
P2 - SB from Interview	✓	✓		✓	✓		
Simple Search		✓		✓			
Difficult Search	✓			✓			
P3 - SB from Interview	✓	✓		✓	✓		
Simple Search	✓			✓			
Difficult Search	✓	✓		✓	✓		
P4 - SB from Interview		✓		✓			
Simple Search		✓		✓			
Difficult Search				No difficult search			
P5 - SB from Interview	✓	✓		✓	✓		
Simple Search		✓		✓			
Difficult Search	✓			✓	✓		
P6 - SB from Interview	✓	✓	✓	✓	✓		
Simple Search			✓	✓			
Difficult Search	✓		✓	✓	✓		
P7 - SB from Interview	✓	✓		✓	✓		
Simple Search	✓			✓			
Difficult Search	✓			✓	✓		

Appendix 6.4: Search task and knowledge task matrix

Self-reported and Observed EDRMS search behaviours	Stage 2: Formulate Search Strategy			Stage 4: Process & Evaluate Search			
	Metadata	Navigate	Shortcuts	Browse	Refine	Sort	Filter
P8 - SB from Interview	✓	✓		✓	✓		
Simple Search	✓			✓			
Difficult Search	✓			✓	✓		
P9 - SB from Interview	✓	✓		✓	✓		
Simple Search		✓		✓			
Difficult Search	✓	✓		✓	✓		
P10 - SB from Interview	✓	✓		✓	✓		
Simple Search	Simple search turned out to be difficult search						
Difficult Search	✓	✓		✓	✓		
Organisation B							
P11 - SB from Interview	✓	NA		✓	✓		✓
Simple Search	✓			✓			
Difficult Search	✓			✓	✓		
P12 - SB from Interview	✓	NA		✓	✓		✓
Simple Search	✓			✓			
Difficult Search	✓			✓	✓		
P13 - SB from Interview	✓	NA		✓	✓		✓
Simple Search	✓			✓			
Difficult Search	No difficult search						
P14 - SB from Interview	✓	NA		✓	✓		✓
Simple Search	✓			✓			
Difficult Search	✓			✓			

Appendix 6.4: Search task and knowledge task matrix

Self-reported and Observed EDRMS search behaviours	Stage 2: Formulate Search Strategy			Stage 4: Process & Evaluate Search			
	Metadata	Navigate	Shortcuts	Browse	Refine	Sort	Filter
P15 - SB from Interview	✓	NA		✓	✓		✓
Simple Search	✓			✓			
Difficult Search	✓			✓	✓		
P16 - SB from Interview	✓	NA		✓	✓		✓
Simple Search	✓			✓			
Difficult Search	✓			✓	✓		
P17 - SB from Interview	✓	NA		✓	✓		✓
Simple Search				No simple search			
Difficult Search	✓			✓	✓		
P18 - SB from Interview	✓	NA		✓	✓		✓
Simple Search	✓			✓			
Difficult Search				No difficult search			
P19 - SB from Interview	✓	NA		✓	✓		✓
Simple Search	✓			✓	✓		
Difficult Search	✓			✓			
P20 - SB from Interview	✓	NA		✓	✓		✓
Simple Search	✓			✓			
Difficult Search				No difficult search			
Organisation C							
P21 - SB from Interview	✓			✓	✓		
Simple Search	✓			✓			
Difficult Search	✓			✓	✓		

Appendix 6.4: Search task and knowledge task matrix

Self-reported and Observed EDRMS search behaviours	Stage 2: Formulate Search Strategy			Stage 4: Process & Evaluate Search			
	Metadata	Navigate	Shortcuts	Browse	Refine	Sort	Filter
P22 - SB from Interview	✓			✓	✓		
Simple Search	✓			✓			
Difficult Search	✓			✓	✓		
P23 - SB from Interview	✓	✓	✓	✓	✓		
Simple Search	✓			✓			
Difficult Search	No difficult search						
P24 - SB from Interview	✓			✓	✓		
Simple Search	✓			✓			
Difficult Search	No difficult search						
P25 - SB from Interview	✓		✓	✓	✓		
Simple Search			✓	✓			
Difficult Search	✓			✓			
P26 - SB from Interview	✓			✓	✓		
Simple Search			✓	✓			
Difficult Search			✓	✓			
P27 - SB from Interview	✓			✓	✓		
Simple Search	✓		✓	✓			
Difficult Search	No difficult search						
P28 - SB from Interview	✓			✓	✓		
Simple Search	✓			✓			
Difficult Search	✓			✓	✓		
P29 - SB from Interview	✓	✓		✓	✓		
Simple Search	✓			✓			
Difficult Search		✓		✓			

Appendix 6.4: Search task and knowledge task matrix

Self-reported and Observed EDRMS search behaviours	Stage 2: Formulate Search Strategy			Stage 4: Process & Evaluate Search			
	Metadata	**Navigate**	**Shortcuts**	**Browse**	**Refine**	**Sort**	**Filter**
P30 - SB from Interview	✓		✓	✓	✓		
Simple Search	✓			✓			
TIA affecting ISB - Difficult Search				No difficult search			
Organisation D							
P31 - SB from Interview	✓		✓	✓	✓	✓	✓
Simple Search	✓			✓		✓	
Difficult Search	✓			✓	✓		✓
P32 - SB from Interview	✓		✓	✓	✓	✓	✓
Simple Search			✓	✓			
Difficult Search	✓			✓	✓		✓
P33 - SB from Interview	✓			✓	✓	✓	✓
Simple Search	✓			✓		✓	
Difficult Search	✓			✓	✓	✓	✓
P34 - SB from Interview	✓			✓	✓	✓	✓
Simple Search	✓			✓			✓
Difficult Search	✓			✓			✓
P35 - SB from Interview	✓			✓	✓		✓
Simple Search	✓			✓			
Difficult Search				No difficult search			
P36 - SB from Interview	✓			✓	✓	✓	✓
Simple Search	✓			✓		✓	
Difficult Search	✓			✓	✓	✓	✓

Appendix 6.4: Search task and knowledge task matrix

Self-reported and Observed EDRMS search behaviours	Stage 2: Formulate Search Strategy			Stage 4: Process & Evaluate Search			
	Metadata	Navigate	Shortcuts	Browse	Refine	Sort	Filter
P37 - SB from Interview	✓		✓	✓	✓	✓	✓
Simple Search	✓			✓		✓	
Difficult Search	✓			✓	✓	✓	✓
P38 - SB from Interview	✓			✓	✓	✓	✓
Simple Search	✓			✓		✓	
Difficult Search	✓			✓		✓	
P39 - SB from Interview	✓			✓	✓	✓	✓
Simple Search	✓			✓			
Difficult Search	✓			✓			
P40 - SB from Interview	✓		✓	✓		✓	✓
Simple Search	✓			✓		✓	✓
Difficult Search	No difficult search						

Appendix 6.5: Training matrix SQ4

Participants	EDRMS Search Behaviour Model – Stage 2 : Formulate Search Strategy: Metadata Search using Boolean	Navigating Tree Structure of Classificat-ion Scheme	Both Metadata & Navigation	Retrieve Search from Shortcuts	Metadata Search using 1st or 2nd level terms in Classification Scheme	Using Terms in the Thesaurus Module	Stage 4 : Process & Evaluate Search: Sorting Search Results	View Related Documents / Containers	Refining Search using Boolean or by Varying Metadata
P1 - SRSB	✓	✓	✓	X	X	X	X	X	✓
OSB - SS		✓							
OSB - DS									
P2 - SRSB	✓	✓	✓	X	X	X	X	X	✓
OSB - SS		✓							
OSB - DS	✓								
P3 - SRSB	✓	✓	✓	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS	✓	✓							✓
P4 - SRSB	X	✓	X	X	X	X	X	X	X
OSB - SS		✓							
OSB - DS									
P5 - SRSB	✓	✓	✓	X	X	X	X	X	✓
OSB - SS		✓							
OSB - DS	✓								✓
P6 - SRSB	✓	✓	✓	✓	X	X	X	X	✓
OSB - SS				✓					
OSB - DS	✓			✓					✓
P7 - SRSB	✓	✓	✓	X	X	X	X	X	✓
OSB - SS	✓								

Appendix 6.5: Training matrix SQ4

EDRMS Search Behaviour Model

Participants	Stage 2 : Formulate Search Strategy						Stage 4 : Process & Evaluate Search		
	Metadata Search using Boolean	Navigating Tree Structure of Classificat-ion Scheme	Both Metadata & Navigation	Retrieve Search from Shortcuts	Metadata Search using 1st or 2nd level terms in Classification Scheme	Using Terms in the Thesaurus Module	Sorting Search Results	View Related Documents / Containers	Refining Search using Boolean or by Varying Metadata
OSB - DS									
P8 - SRSB	✓	✓	✓	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS	✓								
P9 - SRSB	✓	✓	✓	X	X	X	X	X	✓
OSB - SS		✓							
OSB - DS	✓	✓							
P10 - SRSB	✓	✓	✓	X	X	X	X	X	✓
OSB - SS	✓	✓							
OSB - DS									
P11 - SRSB	✓	NA	NA	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS	✓								✓
P12 - SRSB	✓	NA	NA	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS	✓								✓
P13 - SRSB	✓	NA	NA	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS									
P14 - SRSB	✓	NA	NA	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS	✓								

Appendix 6.5: Training matrix SQ4

Participants	EDRMS Search Behaviour Model								
	Stage 2 : Formulate Search Strategy						**Stage 4 : Process & Evaluate Search**		
	Metadata Search using Boolean	**Navigating Tree Structure of Classificat-ion Scheme**	**Both Metadata & Navigation**	**Retrieve Search from Shortcuts**	**Metadata Search using 1st or 2nd level terms in Classification Scheme**	**Using Terms in the Thesaurus Module**	**Sorting Search Results**	**View Related Documents / Containers**	**Refining Search using Boolean or by Varying Metadata**
P15 - SRSB	✓	NA	NA	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS									
P16 - SRSB	✓	NA	NA	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS	✓								
P17 - SRSB	✓	NA	NA	X	X	X	X	X	✓
OSB - SS									
OSB - DS	✓								✓
P18 - SRSB	✓	NA	NA	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS									
P19 - SRSB	✓	NA	NA	X	X	X	X	X	✓
OSB - SS	✓								✓
OSB - DS	✓								
P20 - SRSB	✓	NA	NA	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS									
P21 - SRSB	✓	X	X	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS	✓								

Appendix 6.5: Training matrix SQ4

Participants	EDRMS Search Behaviour Model: Stage 2 : Formulate Search Strategy						Stage 4 : Process & Evaluate Search		
	Metadata Search using Boolean	Navigating Tree Structure of Classificat-ion Scheme	Both Metadata & Navigation	Retrieve Search from Shortcuts	Metadata Search using 1st or 2nd level terms in Classification Scheme	Using Terms in the Thesaurus Module	Sorting Search Results	View Related Documents / Containers	Refining Search using Boolean or by Varying Metadata
P22 - SRSB	✓	X	X	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS	✓								
P23 - SRSB	✓	✓	✓	✓	X	X	X	X	✓
OSB - SS	✓								
OSB - DS									
P24 - SRSB	✓	X	X	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS									
P25 - SRSB	✓	X	X	✓	X	X	X	X	✓
OSB - SS				✓					
OSB - DS	✓								
P26 - SRSB	✓	X	X	X	X	X	X	X	✓
OSB - SS									
OSB - DS	✓								
P27 - SRSB	✓	X	X	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS									
P28 - SRSB	✓	X	X	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS	✓								

Appendix 6.5: Training matrix SQ4

Participants	EDRMS Search Behaviour Model								
	Stage 2 : Formulate Search Strategy						**Stage 4 : Process & Evaluate Search**		
	Metadata Search using Boolean	Navigating Tree Structure of Classificat-ion Scheme	Both Metadata & Navigation	Retrieve Search from Shortcuts	Metadata Search using 1st or 2nd level terms in Classification Scheme	Using Terms in the Thesaurus Module	Sorting Search Results	View Related Documents / Containers	Refining Search using Boolean or by Varying Metadata
P29 - SRSB	✓	✓	✓	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS		✓							
P30 - SRSB	✓	X	X	✓	X	X	X	X	✓
OSB - SS	✓								
OSB - DS									
P31 - SRSB	✓	X	X	✓	X	X	✓	X	✓
OSB - SS	✓						✓		
OSB - DS	✓								✓
P32 - SRSB	✓	X	X	✓	X	X	✓	X	✓
OSB - SS				✓					
OSB - DS	✓								✓
P33 - SRSB	✓	X	X	X	X	X	✓	X	✓
OSB - SS	✓						✓		
OSB - DS	✓						✓		✓
P34 - SRSB	✓	X	X	X	X	X	✓	X	✓
OSB - SS	✓								✓
OSB - DS	✓								✓
P35 - SRSB	✓	X	X	X	X	X	X	X	✓
OSB - SS	✓								
OSB - DS									

Appendix 6.5: Training matrix SQ4

Participants	EDRMS Search Behaviour Model: Stage 2 : Formulate Search Strategy						Stage 4 : Process & Evaluate Search		
	Metadata Search using Boolean	Navigating Tree Structure of Classificat-ion Scheme	Both Metadata & Navigation	Retrieve Search from Shortcuts	Metadata Search using 1st or 2nd level terms in Classification Scheme	Using Terms in the Thesaurus Module	Sorting Search Results	View Related Documents / Containers	Refining Search using Boolean or by Varying Metadata
P36 - SRSB	✓	X	X	X	X	X	✓	X	✓
OSB - SS	✓						✓		
OSB - DS	✓						✓		✓
P37 - SRSB	✓	X	X	X	X	X	✓	X	✓
OSB - SS	✓						✓		
OSB - DS	✓						✓		✓
P38 - SRSB	✓	X	X	X	X	X	✓	X	✓
OSB - SS	✓						✓		
OSB - DS	✓						✓		
P39 - SRSB	✓	X	X	X	X	X	✓	X	✓
OSB - SS	✓								
OSB - DS	✓								
P40 - SRSB	✓	X	X	✓	X	X	✓	X	✓
OSB - SS	✓						✓		✓
OSB - DS									

Appendix 6.5: Training matrix SQ4

Participants	EDRMS Search Behaviour Model — Stage 2 : Formulate Search Strategy						Stage 4 : Process & Evaluate Search		
	Metadata Search using Boolean	Navigating Tree Structure of Classificat-ion Scheme	Both Metadata & Navigation	Retrieve Search from Shortcuts	Metadata Search using 1st or 2nd level terms in Classification Scheme	Using Terms in the Thesaurus Module	Sorting Search Results	View Related Documents / Containers	Refining Search using Boolean or by Varying Metadata
Number of users who were trained on search method	40	20	20	30	0	10	30	30	40
Number of users who stated or were observed using the search method	39	12	11	7	0	0	9	0	39

Index:

Traffic Light Colours to indicate what training was provided to users by the organisation:

	Training provided to EDRMS Users
	Funtionality not applicable to specific EDRMS plus training was either provided or not provided to users
	Training not provided to EDRMS Users
✓	User exhibted the search behaviour characteristic
X	User did not exhibit the search behaviour characteristic

Appendices: Chapter 8

Appendix 8.1: Practical contribution, verified by quotations

Appendix 8.1: Practical contribution, verified by quotations

The appended is an example of a quote received from a reader of the published journal articles by Joseph (2008, 2009a, 2010) and Singh, Klobas, & Anderson (2007a, 2007b, 2008a, 2008b, 2008c, 2008d) on the research topic verifying confirmation of the anecdotal comments.

> *"I was particularly interested in your recommendations regarding implementing a user-friendly BCS (Business Classification Scheme) and then letting the records managers map that to the RDA (Retention and Disposal Authority). This is a recommendation I am making to my clients and I was very glad to see my anecdotal findings are supported by your research findings in the 4 organisations you looked at" (Sanderson, personal communication, 9 July, 2007).*
>
> *"Also, throughout your article I found myself agreeing with your findings on search behaviours as related to training, based on my experience and anecdotal evidence"* (Sanderson, personal communication, 9 July, 2007).

Appended is a quote from a delegate at the Records Management Association of Australasia (RMAA) 26th International Convention held in Adelaide in September 2009.

> *"I was lucky enough to attend the recent RMAA conference where I saw your presentation on information seeking behaviour, which was fascinating with some fabulous discoveries.*
>
> *The reason I am sending this email is that I was hoping to include some of the results from your research (and cite that it is your research) in a short article to go on our* ***intranet*** *here at Post. I wanted to verify if you were okay with this, and gain your permission. I have drafted an article where I have included the top 6 reasons why searching was difficult and also the statistic of 78% of search difficulties being caused by the 'user'"* (Legge, personal communication, 21 October, 2009).