Investigating the information-seeking behaviour of academic lawyers: From Ellis's model to design

Stephann Makri, Ann Blandford and Anna L. Cox

UCL Interaction Centre, University College London, Remax House, 31-32 Alfred Place, London WC1E 7DP, UK.

Corresponding author:
Stephann Makri: S.Makri@ucl.ac.uk. Tel. +44 20 7679 5242. Fax +44 8456 382 573.

Information-seeking is important for lawyers, who have access to many dedicated electronic resources. However there is considerable scope for improving the design of these resources to better support information-seeking. One way of informing design is to use information-seeking models as theoretical lenses to analyse users' behaviour with existing systems. However many models, including those informed by studying lawyers, analyse information-seeking at a high level of abstraction and are only likely to lead to broad-scoped design insights. We illustrate that one potentially useful (and lower-level) model is Ellis's - by using it as a lens to analyse and make design suggestions based on the information-seeking behaviour of twenty-seven academic lawyers, who were asked to think aloud whilst using electronic legal resources to find information for their work. We identify similar information-seeking behaviours to those originally found by Ellis and his colleagues in scientific domains, along with several that were not identified in previous studies such as 'updating' (which we believe is particularly pertinent to legal information-seeking). We also present a refinement of Ellis's model based on the identification of several levels that the behaviours were found to operate at and the identification of sets of mutually exclusive subtypes of behaviours.

Keywords: information-seeking models, HCI, legal, attorney, digital library, behaviour, Ellis

1 Introduction

Information-seeking is an important part of lawyers' work and unlike many other professions, the legal profession has access to many dedicated electronic resources. Notable examples are the high-profile commercial platforms LexisNexis and Westlaw (which are commonly referred to by the legal profession as legal databases, but can also be considered to be digital law libraries). Despite access to these resources, lawyers often find legal information-seeking difficult, making them interesting to study. Much of the problem might lie with the fact that digital law libraries have traditionally been regarded as difficult to use. In one of the few user-centred studies on digital law libraries, Vollaro & Hawkins (1986) conducted interviews with patent attorneys at the AT&T Bell Laboratories, focusing on their information search behaviour. Nearly all attorneys mentioned difficulty in finding appropriate search terms and remembering the special features of each resource, especially when use was infrequent. Other problems were not knowing when all possible avenues had been pursued and forgetting commands. In another user-centred study, Yuan (1997) monitored the LexisNexis Quicklaw searches of a group of law students over a year and found the experience did not result in reduced errors or increased error-recovery. Yuan also found that some commands were rarely or never used, but law students were able to accomplish many tasks by knowing only a basic set of commands. Whilst this may allow lawyers to 'get by,' we argue that there is a need to improve the design of these resources in order to better support lawyers and their work.

In order to improve the design of digital law libraries, and closely related to one of the motivations of this special issue, we suggest the need to develop a better understanding of lawyers' information-seeking behaviour with existing systems. One way of achieving this understanding is by using theoretical information-seeking models as lenses for the identification, analysis and description of their behaviour. In the remainder of this paper we highlight that many models (including Leckie et al.'s (1996) model which examines the behaviour of lawyers) analyse information-seeking at a high level of abstraction. We suggest that whilst this may lead to broad design insights for interactive systems, richer data and detailed design insights can be gained by using models that analyse data at a lower-level of abstraction.

We suggest that a particularly useful model for informing design is Ellis's (see Ellis, 1989), which can lead to useful design insights by systems designers asking themselves the question 'how can we design to better support each behaviour?' We illustrate the suitability of Ellis's model for informing design by using it to frame the analysis and discussion of a qualitative study of the electronic information-seeking behaviour of academic lawyers. In this study, we observed the behaviour of a vertical slice of twenty-seven academic lawyers, from first year undergraduate to Professor, asking them to think aloud whilst using electronic resources to find required information for their work. The resultant verbal protocols, along with data from semi-structured interviews were transcribed and the behavioural and design insights arising from the study are discussed.

We begin, however, by framing our study in the context of existing design-focused studies of lawyers' information behaviour, before considering the utility of information-seeking models for informing design.

2 Background

Whilst there are several studies examining lawyers' information-seeking needs and behaviour (Otike, 1999 provides a comprehensive review of many of them), there have only been a handful of studies with the main aim of informing the design of interactive systems. In this section, we briefly review five studies which share our motivation of gaining a better understanding of lawyers' information behaviour to inform the design of tools to support this behaviour.

2.1 Existing design-focused studies of lawyers' information behaviour

Many existing design-focused studies of lawyers' information behaviour have focused on the design of systems and tools for information use and re-use rather than information-seeking. For example, Blomberg et al. (1996) designed an electronic filing cabinet prototype for a Silicon Valley law firm. The authors collaborated with a business division within the company that was involved in developing products that bridged paper and electronic documents and incorporated new approaches for searching, using and re-using electronic documents. Hence the design work focused on the retrieval of previous documents and was based on scanned versions of documents from the frequently accessed folders in a particular lawyer's actual filing cabinet. Similarly, Marshall et al. (2001) designed an e-book prototype to act as a wireless access device to information resources as well as support a wide range of reading-related activities such as annotation. This device was designed by observing law students prepare for Moot Court (a mock legal trial). Komlodi & Soergel (2002) also focused on information use and re-use, specifically legal information-seekers' use of own memory and electronic search histories to inform their later searches. Komlodi & Soergel developed a set of interface tools to support the recording, categorisation and annotation of search results (along with other aspects of legal work such as note-taking, document drafting and knowledge-modelling).

Another study aimed at better understanding lawyers' work in order to inform design was conducted by Kuhlthau & Tama (2001) and involved structured interviews with eight experienced practicing lawyers. These interviews probed how lawyers acquire and use information as well as issues of task complexity and how stages of their information-seeking tasks fit together. The study was framed around Kuhlthau's Information Search Process (ISP) model (1993), which describes the information-seeking process as a series of six stages:

1. **Initiation** - Becoming aware of the need for information when facing a problem.
2. **Selection** - Identifying and choosing a general topic for seeking information.
3. **Exploration** - Seeking and investigating information on the general topic.
4. **Focus formulation** - Fixing and structuring the problem to be solved.
5. **Collection** - Gathering pertinent information for the focused topic.
6. **Presentation** - Completing information-seeking, reporting and using the result of the task.

Although no specific reference was made to the above stages in Kuhlthau & Tama (2001), the authors noted that the lawyers "described a process similar to that of the ISP model." One of the key design requirements that emerged from the interviews was the need for a tool to aid the organisation of internal files and for tracking the progress of cases, as well as for facilitating the storage (and potentially the re-use and sharing) of general information on individual practice areas.

With the future aim of designing a system to support legal information-seeking as well as information use and re-use, Jones (2006) conducted Contextual Inquiry observations of eight students and an instructor working in an academic Legal Aid clinic. She analysed transcripts and videotapes of the lawyers working with clients and examined their LexisNexis and Westlaw search logs and documents produced. Jones suggested that future systems designed to support lawyers in a legal aid clinic such as this should focus on the social nature of legal information-seeking by acting as online repositories that facilitate the sharing, annotation and tagging of documents so that they can be located more easily for re-use.

These studies share our motivation of understanding users and their work in order to design systems to better support them. However, none draw explicitly upon information-seeking models from Information Science to help frame and guide the analysis and discussion of the data found. This is an approach that we follow in our study, drawing on Ellis's (1989) behavioural model. In the next section, we explain our rationale for doing so by examining the potential utility of some key information-seeking models for informing design. We focus particularly on Leckie et al.'s (1996) model of professionals' information-seeking behaviour, which has previously been used to study the behaviour of lawyers.

2.2 Potential utility of information-seeking models for informing design

Studies in the Information Science domain have yielded a number of models to help us to understand users' information-seeking behaviour. These have ranged from models that view information-seeking as a series of stages, such as Kuhlthau's (1993) ISP model (described in section 2.1), to those that view it as a cognitive process (e.g. Sutcliffe & Ennis, 1998) to those that regard information-seeking as a problem-solving activity (e.g. Wilson, 1999). These three models illustrate different approaches to understanding information-seeking, each likely to yield a slightly different insight into information-seeking behaviour.

However, these models were not constructed with the purpose of informing the design of interactive systems and whilst they can be used for this purpose, they analyse data at a high level and therefore are only likely to lead to broad, high-level design insights. This is because in order to inform design, the researcher must make a sizeable creative leap between the stages in the information seeking/problem solving process that the models describe, to the lower-level behaviour performed at the system level to facilitate each broader stage (e.g. the parts of the electronic resource that support 'collection' or 'problem identification'), to design suggestions for supporting these behaviours.

A similar argument can be made with regard to the model of legal information-seeking by Leckie et al. (1996), which was devised by examining the literature on professionals' information-seeking behaviour. Leckie at al. highlight that professionals play many distinct roles, including not only those relating to providing specific expertise and knowledge related to their domains, but other more general roles such as selecting and processing, counselling, supervising and planning. According to Leckie et al., these roles result in distinct types of activities which in turn "shape the type of information needed, the way in which it is retrieved and the ultimate use of that information." (p. 173). These roles are:

1. **Advocacy** – persuading someone (usually a tribunal of some kind) what the law should be, what law should be applied or how the law should be applied.
2. **Drafting** – preparing documents and correspondence.
3. **Counselling** – helping and advising clients.
4. **Managerial** – selecting and processing the firm's resources.

Two studies that have used Leckie et al's model as a basis for analysis were conducted by Wilkinson (2001) and Kerins et al. (2004). Wilkinson investigated the information-seeking behaviour of 154 practicing lawyers in four different sized law firms in Canada, whist Kerins et al. applied Leckie et al.'s model to an academic context by observing twelve postgraduate Irish law students and found similar patterns in the information-seeking behaviour of students studying to become professionals to those that Leckie et al. highlight in their model. Whilst Leckie et al.'s model has been shown to provide some leverage in helping researchers to analyse the information-seeking behaviour of both professional and academic lawyers, this model is not particularly suitable for analysing behaviour in order to generate design insights. As the model is presented at a high level of abstraction, there is a significant leap to be made between the identifiable roles that lawyers perform, the tasks related to those roles, the information-seeking behaviour that relates to each task and the design interventions that can be made to support that behaviour. Of course, even the broadest of design insights can spur the design of a useful

user-centred system. However, we believe that we can minimise the problematic leap between parts of the information-seeking model and system-level behaviour by analysing lawyers' information-seeking behaviour using a different (and lower-level) model – Ellis's (1989) behavioural model, which we now discuss.

2.3 Ellis's behavioural model of information-seeking

Ellis's (1989) model is based on observations of the information-seeking behaviour of academics across a number of scientific disciplines: the social sciences (Ellis, 1989), physical sciences (Ellis et al. 1993) and engineers and research scientists (Ellis & Haugan, 1997). In addition, a more recent study on social scientists by Meho & Tibbo (2003) re-examined Ellis's findings in order to see if they were still applicable now that electronic information-seeking has become more popular. All of these studies identified similar behavioural characteristics. These information-seeking characteristics, according to Ellis (1989) are non-sequential and it is possible to display more than one characteristic at any given time. The characteristics identified in these studies are:

- **Starting/surveying** – According to Ellis et al. (1993), starting involves "activities characteristic of the initial search for information." (p. 359). Ellis & Haugan (1997) elaborate on this definition, suggesting that this behaviour (which they re-named 'surveying') is "characteristic of the initial search for information to obtain an overview of the literature within a new subject field, or to locate key people operating in this field." (p. 395).
- **Monitoring** - "Maintaining awareness of developments and technologies in a field through regularly following particular sources." (Ellis & Haugan, 1997, p. 396).
- **Browsing** - "Semi-directed searching in an area of potential interest." (Ellis, 1989, p.179).
- **Chaining** - "Following chains of citations or other forms of referential connections between material." (Ellis, 1989, p.179).
- **Differentiating** - "An activity which uses differences between sources as a filter on the nature and quality of the material examined." (Ellis et al. 1993, p.179). In Ellis & Haugan (1997) the behaviours of '*distinguishing'* and '*filtering'* were identified instead of differentiating. Distinguishing involves "ranking information sources according to their relative importance based on own perceptions." (p. 399). Filtering is the "use of certain criteria or mechanisms when searching for information to make the information as relevant and as precise as possible." (p. 399). Distinguishing and filtering can be regarded as more specialised differentiating behaviours.
- **Extracting** - "Systematically working though a particular source to identify material of interest." (Ellis et al. 1993, p. 364).
- **Verifying** - "Checking the information and sources found for accuracy and errors." (Ellis et al., 1993, p.364). This characteristic was only identified in the study of physical scientists.
- **Information managing** – A characteristic that was identified by Meho & Tibbo (2003) in their re-examination of social scientists' information-seeking behaviour that involves "filing, archiving, and organizing information collected or used in facilitating their research." (p. 582).
- **Ending** - "The assembly and dissemination of information or the drawing together of material for publication." (Ellis et al, 1993, p. 365).

Regarding the suitability of using Ellis's model to provide design insights, Ingwersen & Järvelin (2005) assert that Ellis's characteristics do not provide any *direct* design specifications for interactive systems, but provide types of activities that users might want to accomplish through the systems. However, we regard this 'leap' between types of activities and resultant design decisions as less of a leap than that required when gaining design insights using other information-seeking models, such as those discussed in section 2.2. We believe that this is due to the low-level nature of Ellis's model.

Although no previous studies of lawyers have analysed observational data according to Ellis's model, the potential for doing so (and for using the model to provide design insights for digital law libraries) has been noted by Sutton (1994), who suggests that "both Lexis and Westlaw were designed with no apparent attention being paid to the information-seeking behaviour of attorneys." (p. 198). Sutton highlights that lawyers might use particular information sources as springboards to gain a basic outline of a particular legal area before moving on to more narrowly-focused sources. This is noted by Sutton

to be equivalent to Ellis's 'starting' behaviour. Sutton also suggests that in order to make competent predictions and give informed advice, "lawyers must engage in a focused, context sensitive exploration of this legal area by following contextual clues from cases found when 'starting' and tracking the citations of useful cases" (p. 194). This, as Sutton points out, is an example of 'chaining.'

Our study moves beyond Sutton's anecdotal examples by using Ellis's model as a theoretical lens to analyse and provide design insights based on the observed information-seeking behaviour of academic lawyers. This serves to validate Ellis's model in a domain in which it has not previously been applied and to provide a much needed user-centred focus to the design of digital law libraries, by helping us to understand how lawyers work with existing electronic resources and use this understanding to propose suggestions for design improvements. In the next two sections, we describe the methodology of our study and present our findings with reference to Ellis's model.

3. Method

3.1 Data collection approach

Our study comprised a series of Contextual Inquiry-style semi-structured interviews and naturalistic observations of twenty-seven academic lawyers, who were studying at a large London university and a nearby vocational Law college. This included law students, teaching staff and research staff at all levels of academia (see table 1).

The lawyers were first asked some introductory interview questions in order to discover the stage that they were at in their academic career, the types of electronic resources they regularly use (and the situations in which they might use them) and the types of materials sought. Next they were set the broad task of using the electronic resource(s) of their choice to look for information currently required for their work. Where participants could not think of a pressing information need, they were invited to step through a recent information-seeking episode. Participants were asked to think aloud whilst using the resources and, consistent with the Contextual Inquiry approach (see Beyer and Holtzblatt, 1998), the researcher asked questions at opportunistic moments during the study to probe their understanding. The sessions were audio recorded to enable transcription and detailed analysis.

Type of academic participant:	**N° interviewed & observed:**
Taught Law students:	
LLB (Batchelor of Law) Undergraduates	9
LLM (Master of Law) Postgraduates	8
Vocational (Legal Practice /Bar Vocational Course) Postgraduates	2
Research students and staff:	
PhD Students and Research Fellows	3
Lecturers/Senior Lecturers	4
Professors	1
	Total: 27

Table 1: Breakdown of participants that took part in our study

3.2 Data analysis approach

Interviews were transcribed and analysed using Strauss and Corbin's (1998) Grounded Theory and excerpts from these transcripts are presented in our findings section. Codes representing categories of information-seeking behaviour were identified and iteratively refined through the Grounded Theory processes of open and axial coding. As Strauss and Corbin explain, this form of coding is 'open' in the sense that the data is explored with no prior assumptions about what might be discovered. Whilst complete objectivity is arguably impossible in qualitative studies, care was taken to avoid preconceived ideas from biasing the data. This was particularly important during the coding process, especially as we were previously aware of several models of information-seeking (including Ellis's). However, our coding process did not involve simply relating our data to different information-seeking models in order to identify which fitted the data best (which might be regarded as 'forcing' as opposed to 'emergence' in a Grounded Theory approach). Instead, the process involved detailed coding of the data using our own terminology and the similarities between our codes and the Ellis's models emerged

from the analysis. This led us to examine our data in the light of Ellis's model. Therefore although the focus of the data analysis shifted from a broad investigation of electronic information-seeking to an investigation into the information-seeking *behaviour* displayed by lawyers, the focus of the data collection was driven by the desire to understand information-seeking in a way that might inform systems design. It was not driven by the desire to validate Ellis's model (although that was the end result).

4. Findings and discussion

The academic lawyers mainly used a core set of electronic resources, most commonly the digital law libraries LexisNexis Professional and Westlaw, the search engine Google and the academic search engine Google Scholar. When using these resources, the lawyers were found to display similar behavioural characteristics to those found by Ellis (1989), Ellis et al. (1993), Ellis & Haugan (1997) and Meho & Tibbo (2003) when observing academics from the social and physical sciences. Ellis's behaviour of 'verifying' (*"checking the information and sources found for accuracy and errors":* Ellis et al., 1993, p.364) was not identified in our study. We suggest that this is not because accuracy is not as important for lawyers as it is for physical scientists but, quite the opposite, that legal documents must be checked thoroughly for accuracy *before* they are made available in electronic or paper form.

Despite the similarities between the behaviours displayed by lawyers in our study and those displayed in other domains, our findings can be regarded as a theoretical (and partly practical) extension of previous findings in the following six ways:

1. We have identified the broad overarching categories of 'identifying and locating,' 'accessing,' and 'selecting and processing.' These categories subsume many of the behavioural characteristics that we have identified in our study (and have been identified in previous studies by Ellis and his colleagues and Meho & Tibbo).

2. We have identified the additional lower-level behavioural characteristic of 'updating' (ensuring a current understanding of amendments or changes to legal documents and content and an understanding of whether a particular case or piece of legislation is good law). We suggest that this is because updating behaviour is particularly pertinent to the legal domain (and not necessarily to other domains).

3. We have identified the additional lower-level behavioural characteristic of 'collating and editing,' which also, to the best of our knowledge, has not been previously identified in information-seeking studies. We suggest that this is because we do not draw as firm a line between information-seeking behaviour and information *use* behaviour as other studies. Wilson (2000) highlights that information use behaviour "consists of the physical and mental acts involved in incorporating the information found into the person's existing knowledge base" (p. 50) whilst information-seeking behaviour "is the purposeful seeking for information as a consequence of a need to satisfy some goal." (p.49). We regard any behaviour that could inform the design of systems to support information retrieval to be of interest.

4. We have identified several lower-level searching behaviours of 'search query formulating,' 'search query refining, 'search query reformulating,' 'search query refocusing,' 'search query spelling/syntax altering,' 'search result sorting' and 'search query/result recording.' Similar behaviours have been identified in studies of information-searching behaviour, but have not (to the best of our knowledge) been included as components of information-seeking behavioural models. We suggest that this is because we also do not draw as firm a line between information-seeking behaviour and information-*searching* behaviour - "the 'micro level' of behaviour employed by the searcher" (Wilson 2000, p. 49) as other studies.

5. We have identified several mutually exclusive subtypes of behaviours (presented in brackets in table 1). These subtypes serve to draw distinctions between different types of each behavioural characteristic. For example, 'updating' behaviour can be performed *directly* by searching or browsing for documents/content and manually checking it is up-to-date (i.e. current) or good law. Updating behaviour can also be performed *indirectly* by using an electronic citator service to check whether a document or the content within is up-to-date or good law. Most of these subtypes, to the best of our knowledge, have not been previously identified in information-seeking studies.

6. We have identified multiple levels at which the lower-level behavioural characteristics can operate – at the resource level (i.e. at the level of the electronic resource itself), the source

level (i.e. at the level of an information source or sources within a particular electronic resource), the document level (i.e. at the level of a document or documents within a particular information source), the content level (i.e. at the level of content within a particular document) and the search query/result level.

4.1 Our refinement of Ellis's model

Table 2 provides an overview of the higher and lower-level behavioural characteristics identified in our study. In table 2, several lower-level behavioural characteristics (presented in the right-hand column) and related subtypes (presented in brackets) are subsumed under each broader higher-level characteristic (presented in the left-hand column). The notion of incorporating Ellis's behaviours under broader headings is not new. Indeed, Meho & Tibbo (2003) present a 'summary model' where they place each of the behavioural characteristics they identified under the four inter-related headings of 'accessing,' 'searching,' 'processing' and 'ending.'

As with Ellis's original model, ours is not intended to be regarded as a process model of information-seeking, as the behaviours are not always performed in a linear fashion. Similarly, these behaviours are not entirely discrete (as certain behaviours can be facilitated through other behaviours or performed in parallel).

Our revision of Ellis's model is framed around the levels that we found Ellis's behaviours to operate at (i.e. the resource, source, document, content and search query/result levels) and features the three higher-level behaviours of 'identifying and locating,' 'accessing,' and 'selecting and processing.' 'Identifying and locating' resources might be facilitated by one or many of a core set of lower-level behaviours (surveying, monitoring, searching, browsing, extracting and chaining). With 'selecting and processing,' different lower-level behaviours were identified for each level (see table 2). At the resource and source levels, 'selecting and processing' only involved the lower-level behaviours of 'recording' and 'selecting.' At the document and content level, it also involved the behaviours of 'filtering,' 'distinguishing,' 'extracting,' 'updating,' 'analysing' and 'collating and editing.'

Given that both Ellis et al. (1993) and our current study have observed slightly different behavioural characteristics in different domains, our refinement to Ellis's model should not be regarded as a 'complete' or 'correct' set of behaviours that are intended to generalise to a wide range of contexts, but as a way of conceptualising information behaviours in terms of broader parent and lower-level behaviours, subtypes of behaviours and different levels of behaviours.

Higher-level behaviours & subtypes:	Related lower-level behaviours (& subtypes):
Identifying & locating	Surveying (lightly/heavily directed) – D&C
	Monitoring (active/passive) – S, D&C
	Searching – R, S, D, C. *Lower-level searching behaviours not shown in this table.*
	Browsing – R, S, D, C
	Chaining (forwards/backwards), (across resource /within resource), (direct/indirect) – D&C
	Extracting - D
Accessing (direct/indirect), (visible/invisible) – R	
Selecting & processing	Distinguishing (direct/indirect) – S, D
	Filtering (direct/indirect) – D&C
	Selecting – R, S, D
	Extracting (direct/indirect) – C
	Updating (direct/indirect) – D&C
	Recording (manual/automatic) – R, S, D&C, Q
	Analysing – C
	Collating and editing – D&C

Key: R= resource level, S= source level, D= document level, C= content level, D&C= combined document/content level, Q= search query/result level.

Table 2: Summary refined model of information-seeking behaviour identified in our study along with the levels that each behaviour was observed to operate at. Shaded behaviours are those that have not, to the best of our knowledge, been identified in previous studies.

In the remainder of this section we present each of the behaviours identified in our study, illustrated by representative quotations from participants. We discuss, at each level, the behaviour, the ways that academic lawyers performed it, how commonly it was observed and how this relates to previous findings. For each behaviour, we also discuss any related subtypes identified. The levels at which each behaviour was found to operate and the subtypes identified for each behaviour, where applicable, are presented in brackets next to each behaviour name in the section headings below (see key under table 2). Our findings are followed, in section 5, by a discussion of resultant design insights.

4.2 Identifying and locating resources, sources, documents and content

4.21 Surveying (D&C) (lightly directed/heavily directed)

The first behaviour we identified that can be subsumed under the broader heading of 'identifying and locating' was Ellis's behaviour of 'surveying,' found to operate at the document and content level. This behaviour is identical in nature to Ellis & Haugan's behaviour and, according to Ellis & Haugan (1997), involves the "initial search for information to obtain an overview of the literature within a new subject field, or to locate key people operating in this field." (p. 395). Surveying was found to be a common behaviour amongst taught and research academic lawyers alike and was displayed or mentioned in four ways:

- By using secondary electronic commentary sources to gain an overview of the area.
- By using Internet search engines, almost always Google or Google Scholar, to gain an overview of the area.
- By using personal collections of resources (for example stored bookmarks of Internet sites).
- By using shared collections of resources (for example a departmental Intranet site with links to resources).

Surveying behaviour in the legal domain involved much more 'gaining an overview' of particular legal areas as opposed to 'locating key people' that have written legal documents in that area, probably due to the relative lack of importance of who wrote a particular document (provided it is published in a reputable source) and the greater importance of the content and legal principles arising from the document.

We identified one pair of mutually exclusive subtypes of surveying behaviour, *lightly* and *heavily directed surveying*. Strictly speaking, these are not truly mutually exclusive as 'directedness' can be regarded as a continuum. However, for practical purposes, lawyers often displayed surveying behaviour at the extremes of this continuum and therefore they are discussed as mutually exclusive subtypes. Lightly directed surveying was undertaken when lawyers had few or imprecise details about the area on which an overview is required. Heavily directed surveying was undertaken when lawyers already had many or specific details about the research area (either due to prior knowledge of the area or due to a 'research lead' from a colleague or lecturer).

Lightly directed surveying was common across both groups of academic lawyers, as it was often the case that the information-seeking problem was vague and not as well defined at the start of the information-seeking episode as it would become later. Heavily directed surveying was common amongst taught students, but not amongst research students and staff. These groups of lawyers tended to scope out their own direction for surveying a research area rather than rely on others to provide direction. Taught students often obtained 'research leads' from colleagues or, more frequently, academic staff. This is exemplified by the quotation below from a 2nd year Batchelor of Law Undergraduate:

> *A30 (2nd year LLB): We were referred to a number of publications and articles, so I guess the first thing was to basically get as many of the articles that we could, mainly from online resources. Also just to build a bibliography [ourselves] of relevant sources, so that at the stage where we were actually building the dissertation we would know where the relevant material was to be found.*

Surveying behaviour was only identified at the combined document and content level. This may be because most information-seeking tasks are focused on finding information (i.e. documents and content) as opposed to finding useful sources or resources and this makes the widespread observation of resource or source surveying (gaining an overview of potential resources/sources to use) unlikely.

4.22 Monitoring (S, D&C) (active/passive)

Another behaviour identified was Ellis's behaviour of 'monitoring,' which was found to operate at the source, document/content levels and involves "maintaining awareness of developments and technologies in a field" (Ellis & Haugan, 1997, p. 396). Whilst Ellis & Haugan's definition also suggests that monitoring behaviour is achieved by "regularly following particular sources" (p. 396), the lawyers in our study displayed monitoring at both the source level described by Ellis and his colleagues and at the document/content level. Whilst this behaviour was rarely mentioned or displayed by taught students, there was slightly more mention and display by research students and teaching staff. This difference might be due to the fact that taught students primarily conducted prescribed electronic research tasks, which resulted in little need to perform monitoring behaviour.

We found monitoring may be active, facilitated by pull technologies such as the 'current awareness' sections of LexisNexis Professional and Westlaw (which allow lawyers to browse recent legal developments by topic) or passive, facilitated by push technologies. We found active monitoring was achieved in three main ways:

- By manually conducting regular searches on a particular legal topic in digital law libraries, as illustrated by this LLM (Master of Laws) student:

  A17 (LLM student): One of the good things about online resources is that they are very up to date. It's good to check online to see if there's any recent additions to this academic debate or to see if anyone's written an article recently that isn't available in the library. So it's really about updating yourself - filling in the gaps, trying to find anything that you've missed.

- By regularly browsing particular sources in digital law libraries or on law-related Internet sites, as described by this LLB (Batchelor of Laws) student:

  A11 (2nd year LLB student): The other thing I do research on is the Law Commission website, because as a law student you're supposed to know what's happening and the Law

Commission is the body responsible for new laws and statutes coming out. For example, in Criminal Law the law of murder is in reform and it's going to come out in a few months and we're supposed to read the Law Commission proposals and they're only available on their website.

- By regularly following previously bookmarked Internet pages, as illustrated by this Law Lecturer:

  A7 (Lecturer): I would have links to all the various documents in the areas that I researched; in particular that was European Union Employment Policy. So here [shows folder list] are my various links and it's an annual process of producing policy documents and I would know that around about March every year and in the summer there will be something new.

Passive monitoring was displayed in one main way, by subscribing to e-mail alert lists, as illustrated by the same lecturer:

> *A7 (Lecturer): I subscribe to various mailing lists, legal and other mailing lists from government departments such as the Treasury or publishers telling me what they have recently published. You can also subscribe to things from think-tanks or one of the main ones I subscribe to is one of the units responsible for European Employment Law and Policy. They send weekly mails about the work they're doing and it just links you to this week's news on Employment Law and Policy in the EU.*

None of these ways of achieving monitoring were identified by Ellis and his colleagues or by Meho & Tibbo. However, these forms of monitoring are conceptually similar to some of the ways that monitoring was identified in previous studies. For example, just as the social scientists in Ellis's (1989) study regularly consulted sets of journals deemed to publish material of interest, some of our lawyers periodically followed previously bookmarked pages to Internet sources deemed to publish material of interest. Just as the social scientists read secondary sources such as book publishers' lists and reviews, our lawyers browsed commentary sources in digital law libraries and on law-related Internet sites.

4.23 Searching (R, S, D, C)

The information-seeking behaviour of 'searching,' which is not discussed at all by Ellis and his colleagues, was also identified. Although it is included as part of Meho & Tibbo's (2003) summary model of behavioural characteristics, it is not discussed in detail in their paper. Searching involves formulating a query in order to locate information within a particular meta-resource (a resource that catalogues or indexes other resources), resource, source or document. Searching behaviour also involves lower-level behaviours associated with editing the query that is entered into the system. The lower-level search query editing behaviours identified in our study include 'search query refining' (making minor changes to a search query in an attempt to improve the volume or quality of the results), 'search query reformulating' (formulating a query again from scratch, often differently), 'search query refocusing' (adjusting the focus of the current query, but not reformulating it altogether), and 'search query spelling/syntax altering' (changing the spelling of query terms/the rules used to instruct the system to connect the query-terms or define the scope of the search). Searching behaviour also subsumes the lower-level behaviour of 'search result sorting' (arranging the results of a search in a systematic order, such as in date order). The definitions for these behaviours are from the Oxford English Dictionary. We do not discuss these lower-level searching behaviours further in this article.

4.24 Browsing (R, S, D, C)

Browsing involves "semi-directed searching in an area of potential interest" (Ellis, 1989, p.179) and was a highly common information-seeking behaviour in our study. Previous studies by Ellis and his colleagues identified the browsing of physical shelves as a common behaviour across several domains. However, electronic browsing was restricted to electronic indexes and abstracts for the social scientists in Ellis's (1989) study. The social scientists in the study by Meho & Tibbo (2003) displayed a greater range of electronic browsing, presumably due to the increased support for browsing since Ellis's study was conducted. However, all of these studies describe browsing at the document and content levels (i.e. browsing sources for documents and documents for content). In our study, we observed browsing at four levels – the resource level (i.e. lawyers browsed meta-resources to locate resources), the source level (lawyers browsed resources to locate sources), the document level (browsing sources to locate documents) and the content level (browsing documents to locate content).

Resource browsing was fairly common and displayed mostly by the sub-group of taught students. This level of browsing was mentioned and displayed in two ways:

- By browsing university library or law library pages that listed electronic journals and the digital law libraries that carry each journal, as illustrated by this LLB student:

  A2 (3rd year LLB student): I don't think anyone has 'Hastings Centre Report' for example. You can find that also by if you go to the [university library] main page and go to 'electronic journals,' you can see what's listed and it'll tell you where you can access them.

- By browsing the university list of digital law libraries directly.

Source browsing was also fairly common and predominantly displayed by taught students (although some evidence for source browsing was also observed amongst research students and staff). This level of browsing was mentioned and displayed in three ways:

- By browsing within digital law libraries to locate a particular journal title source (which would then lead to browsing the source at the document level).
- By browsing within digital law libraries to locate a particular database within the library (which would then lead to searching the database at the document level).
- By browsing university library or law library pages that listed electronic journals.

The most common level of browsing to be mentioned and observed was *document browsing*, which involved browsing sources within a particular electronic resource in order to find documents within those sources. Document browsing was mentioned and demonstrated in three ways:

- By browsing a hierarchy of related documents.
- By browsing within a search result list to identify documents within a particular category.
- By browsing a particular source for documents within it (e.g. browsing a particular journal title for articles within it or database for documents within it).

Finally, browsing at the *content* level (i.e. browsing documents for content) was another common level at which browsing behaviour was observed. Content browsing was observed in two main ways:

- By browsing (i.e. scanning) through the textual content of a document.
- By browsing through the headings within a document which, as this Professor of Law explains, becomes easier with practice:

  A21 (Professor): I know the anatomy of a decided case now and I know where to go. I can scan down knowing pretty well, given the logic of the judge's mind and the conventional order in which the material is presented, where it's going to come in the case.

4.25 Chaining (D&C) (forwards/backwards, direct/indirect, across/within resource)

Chaining behaviour -"following chains of citations or other forms of referential connections between material" (Ellis, 1989) was found to be another common behaviour amongst the lawyers in our study. Chaining is an inherent and important part of scholarly research as explained by one law lecturer who compared it to a spider spinning a web:

> *A7 (Lecturer): Research always changes as you progress. But it is always the case that you read one document and that leads you to another document [pauses] so one document will refer to an earlier document or a journal document will obviously refer in its footnotes to other articles, so you do it sort of like a spider spinning a web. Your starting point leads you in unexpected directions and it makes you aware of things that you're missing and then you start a search.*

Chaining behaviour was found to operate at the document/content level (even though it may be theoretically feasible to follow referential connections between resources or sources as well as documents). Similarly to Ellis (1989) and subsequent studies, we identified both *forwards chaining* (which involves following chains of citations or other forms of referential connections between documents which have subsequently cited the current document) and *backwards chaining* (which involves following references to documents that have been cited in the current document). We consider this to be a pair of subtypes of document/content chaining behaviour. We also identified two

other subtypes of document/content chaining, *across resource vs. within resource* chaining and *direct vs. indirect chaining*. Across resource chaining involves following referential connections between material that leads from one electronic resource to another. Within resource chaining involves following referential connections between material that exists within the current resource. In many electronic resources, chaining can often be facilitated directly by following hyperlinks to other referenced materials. Sometimes indirect chaining is necessary, where the user has to follow the references manually. Often this is the case when chaining across resources. We concentrate our discussion, however, on backwards and forwards chaining.

Backwards chaining was by far the most common type of chaining observed amongst the lawyers that took part in our study. Legal documents routinely listed hyperlinked citations to previous documents and the lawyers in our study often followed them. For example, this Bar Vocational Course student searched for a known case involving a company called Ramsey Walkers Snack Foods Ltd. and, in the text of the case, found reference to another case that discussed the same principles and followed the hyperlink to this case:

> *A33 (BVC student): If it linked to other cases such as Linford and Carey [reads related case from screen] which is an earlier case that discussed the same principles then I'd just click on the highlighted link on the page and it takes you straight to it.*

As in Ellis (1989), we also found forwards chaining to be rarely mentioned or displayed (despite the fact that, in recent years, tools to facilitate forwards chaining have been incorporated into many digital law libraries). Some evidence of forwards document chaining was displayed:

> *A17 (LLM student): One of the useful things about databases like Westlaw is that they will quote not just articles which have Franck as the author [points at example] but also articles which have quoted Franck.*

However, none of the lawyers in our study who used Westlaw mentioned or demonstrated use of tools within the library to support forwards chaining, for example the 'related info' tab which lists referential connections between the current legal document and other types of legal material (for example cases which cite the section of an Act which is currently being viewed).

4.26 Extracting (D)

Extracting involves "systematically working though a particular resource, source or document to identify material of interest" (definition adapted from Ellis 1989). At the content level (i.e. when extracting documents from content), this behaviour can be better regarded as a lower-level example of 'selecting and processing' as opposed to 'identifying and locating' (because unlike identifying resources, sources and documents, identifying content usually involves a greater degree of processing than identification). This is why extracting is presented twice in table 2 and is discussed at the *content level* in section 4.44.

There was relatively limited evidence of document extracting, perhaps due to the fact that most modern digital libraries provide facilities for searching and browsing within the resource and therefore it is unnecessary to 'systematically work though' a source to identify a document, for example. However, some evidence was found to suggest that lawyers occasionally perform this behaviour. This undergraduate student, for example, believed that the only successful way of finding a journal article in Westlaw where the volume and issue number are known is to browse through and locate it (i.e. to systematically work through the source, selecting the volume and issue number of the journal in order to locate the article):

> *A2 (3rd year LLB student): You could expand that [points to collapsible tree] and then it would have the date of the journals and then you could go to the date that you wanted and expand it but then you've got to read every single title in that particular volume or issue of the journal. Literally the only way that you can find journals on Westlaw is through the titles and not through an author search.*

4.3 Accessing resources (and the sources, documents and content within them) (direct/indirect, visible/invisible)

The second broad category of accessing is a standalone behaviour in its own right and was also identified as a discrete characteristic by Meho & Tibbo (2003). We define accessing as "gaining access to resources, sources or documents/content," again adopting the Oxford English Dictionary definition. We found accessing could be *direct* or *indirect*, *visible* or *invisible*. Indirect accessing involves gaining

access to a resource, source or document/content by using a third-party site/resource as a gateway (for example logging in using the educational Athens devolved login). Direct accessing involves gaining access without using a third-party gateway (for example logging in directly to a particular resource). Visible accessing involves gaining access to a resource, source or document/content through a procedure that can be seen at the interface level (usually a username/password login screen). Invisible accessing involves using recognition technologies (such as IP recognition) to gain access automatically, without a noticeable access procedure.

4.4 Selecting and processing resources, sources, searches, documents and content

Subsumed under the final higher-level behaviour of 'selecting and processing' are the highly related behaviours of distinguishing, filtering, selecting and extracting. They are related as they all involve the selection of resources, sources, document and content. However, they are subtly different. Distinguishing involves "ranking resources, sources or documents according to their relative importance based on own perceptions" (definition adapted from Ellis & Haugan 1997, p. 399). These perceptions may be based on firm criteria or more fluid and subjective criteria. This distinction is part of the subtle difference between filtering and selecting behaviours. Filtering involves the "use of certain criteria or mechanisms when searching for information to make the information as relevant and as precise as possible" – Ellis & Haugan 1997, p. 399). 'Selecting,' on the other hand, does not involve applying concrete criteria or mechanisms as a filter on information, but "carefully choosing resources, sources or documents as being the best or suitable for the information task at hand." (Definition adapted from Oxford English Dictionary) and is heavily based on subjective perception. There is, however, overlap between these behaviours. For example, 'carefully choosing' sources might sometimes involve distinguishing between them (i.e. ranking them based on own perceptions), perhaps even subconsciously. Similarly, distinguishing might involve employing criteria or mechanisms in order to perform such ranking.

There is also overlap between individual levels that these behaviours can operate at. For example, selecting content from documents is likely to involve extracting behaviour ("systematically working though a particular resource, source or document to identify material of interest." - definition adapted from Ellis 1989). Therefore although all four of these behaviours have attributes which make them distinct, the boundaries are less clear-cut than with other behaviours discussed in this article.

We now turn to discuss each of the above behaviours at the levels they were most commonly observed. This is followed by a discussion of several other behaviours which involve the selection and processing of information. These include recording, updating, analysing and collating/editing.

4.41 Distinguishing (S, D)

Distinguishing involves "ranking information sources or documents according to their relative importance based on own perceptions." - Ellis & Haugan 1997, p. 399). This behaviour was not very common, perhaps due to the fact lawyers did not tend to 'rank' resources based on their perceptions of how useful they might be, but instead selected them based on a number of 'hard' and 'soft' criteria (which we discuss in section 4.43). It might also be argued that once a lawyer has selected an electronic resource to search or browse within, it is often unnecessary to distinguish between individual sources within that particular resource. However, there are some occasions in which distinguishing was mentioned or demonstrated. These were almost always at the source level. Unlike with Ellis's social scientists, who used the generality or technicality of documents as important distinguishing criteria, academic lawyers always distinguished between sources based on the perceived authority of the content within the source. For example, one PhD student scanned his journal article search results in order to find which ones came from 'credible' law journals:

> *A4 (PhD student): Searching journals is for me a bit tricky because there are not a lot of credible law journals. There are a few journals which you find are just basically law news. They are ok to read, but there is no academic value in citing them [pauses] like New Law Journal is good if you want to learn new things, but we do not find it very credible to cite. Nor do we find it useful for discussion. So basically I tend to read through the title and what journal it's in.*

When it came to looking for other types of legal document, no lawyers mentioned or demonstrated a need to distinguish between sources or documents containing legislation, probably because competing sources all display identical wording of statutes and statutory instruments as passed by the relevant government. However, some source distinguishing could be noted when deciding when to use one

particular report series over another. For example this Bar Vocational Course student talks of a 'hierarchy' of law report series based on their authority:

> *A33 (BVC student): Seven cases have come up [points to results list] and two of them appear to be the same [pauses] from the AIT. So I'll take the one that's been published in the All England Reports.* ***R: Why did you choose to look at that version?*** *A33: I chose it over the other alternative which was the AIT case itself because of the hierarchy of journals that you should use when citing cases. All England Reports are higher than the other options that were there.*

4.42 Filtering (D&C) (direct/indirect)

Ellis's behaviour of filtering involves the "use of certain criteria or mechanisms when searching for information to make the information as relevant and as precise as possible" – Ellis & Haugan 1997, p. 399). Document and content filtering was found to be a common behaviour amongst both taught and research lawyers. We found that many of the criteria used by participants in studies by Ellis and his colleagues to perform source distinguishing were used by our lawyers to perform document and content filtering. Just as Ellis's (1989) social scientists distinguished between information sources by substantive topic, our lawyers filtered documents and content by legal topic or issue. Lawyers also, like Ellis's social scientists, filtered by quality, level and type of treatment (but in slightly different ways). For example, whilst the authority or reputation of journal titles was important in both the social science and law domains, lawyers tended to filter based on the level of court in which a case was decided rather than the report series it was written in. In addition, like the Chemists in Ellis et al.'s (1991) study, our lawyers also filtered by author.

We found that document and content filtering could either be direct or indirect. *Direct filtering* involves looking at the actual content of a document when using certain criteria or mechanisms when searching to make the information as relevant and precise as possible. Reading the actual content of documents in order to perform filtering behaviour was rather rare. However, when lawyers *did* decide to consult the text of a particular legal document, they tended to skim read it in order to determine whether the legal issues covered were relevant to the information-seeking problem at hand. *Indirect filtering*, which was observed far more than direct filtering, involves using meta information about the content (such as a summary or a results list or snippet) when using these criteria or mechanisms. The ways indirect filtering was achieved included filtering by:

- The level of court that a particular legal case was reported at.
- The date that a particular case was heard, piece of legislation was introduced or amended and journal article was published.
- The title of a particular legal journal article or piece of commentary or piece of legislation and the party names involved in a particular case.
- The author of a particular legal journal article.
- The source in which a particular legal journal article was published.
- The headnote or summary of a case or abstract or contents page of a journal article.
- The keywords or index terms used to describe a legal case, piece of legislation, journal article or piece of commentary.
- The context in which query search terms are mentioned within the document.
- How many times search query terms are mentioned within the document.

An example of the last bullet point is illustrated by the LLB student below, who refers to the 'results snippet' feature within LexisNexis Professional which lists the surrounding sentence for every instance the search query terms are found in the document. This, as the student explains, can help lawyers decide whether a document might be useful by examining how much of the screen is devoted to the result snippet (i.e. how many times the search query terms are mentioned):

> *A2 (3rd year LLB student): So it lists where those terms [pauses] 'access legal advice' have been mentioned in the case. I think it's good because you can go through it and tell quite quickly if a case is going to be relevant based on how much was said on it. If there's a big*

chunk of the screen devoted to it [pauses]. You see there it's been mentioned three times [pauses] then I'll probably have a look at this case.

4.43 Selecting (R, S, D)

We also identified the new lower-level behaviour of 'selecting.' We define selecting as "carefully choosing resources, sources or documents as being the best or suitable for the information task at hand." (definition adapted from Oxford English Dictionary). Many of the activities involved in 'carefully choosing' resources, sources, documents have already been discussed in the context of the more precise behaviours of distinguishing and filtering. However when choosing *resources*, lawyers did not tend to rank them based on own perceptions or use firm criteria or mechanisms as a filter. Instead, they *selected* resources based on several criteria that were far less concrete (and far more subjective) than those employed when filtering. These were:

- The subject and nature of the content of the resource.
- The structure of the content.
- The perceived authority of the content.
- The perceived comprehensiveness of coverage of the content.
- The perceived cost of accessing the content.
- The perceived ease of use/simplicity of the resource
- The perceived speed/time savings offered by the resource
- Prior positive experiences that the user has had with the resource
- The user's familiarity of the resource
- Whether the resource had been recommended by others or not.

4.44 Extracting (C) (direct/indirect)

In section 4.26, we discussed document extracting. We now discuss extracting at the *content* level, which was found to be either direct or indirect. *Direct content extracting* involves systematically working through the actual content of sources or documents whilst *indirect content extracting* involves systematically working through meta-information. Both subtypes of content extracting were equally common and unlike at the document level, content extracting was fairly widespread.

As with direct document filtering, not all direct content extracting behaviour was achieved by reading or skimming the entire textual content of a document. Sometimes lawyers searched within the document to jump to specific parts, or browsed the document and only read content within headings of interest. Indirect content extracting was achieved in some similar ways to those used to achieve indirect document filtering (indeed the three ways in which we observed lawyers to achieve content extracting have already been discussed in the context of document filtering). These were by examining:

- The headnote or summary of a case, summary or contents page of a piece of legislation and abstract or contents page of a journal article, as illustrated by this LLB student:

  A2 (3rd year LLB student): If you're pushed for time, like property law for example, you've got so many cases to read, you just want to draw the point out of it quickly and sometimes it's not necessary that you need to know all the legal reasoning in a case, so if you're just looking for the main principle then you just go for the headnote.

- The context in which query search terms are mentioned within the document.
- How many times search query terms are mentioned within the document.

4.45 Recording (R, S, D&C, Q) (manual/automatic)

Our study also identified an information-seeking behaviour that we named 'recording,' which is similar in scope to 'information managing' behaviour as identified by Meho & Tibbo (2003). According to Meho & Tibbo, information managing involves "filing, archiving, and organizing information collected or used in facilitating research." (p. 582). The 'recording' behaviour we identified can also involve

filing, archiving and organising information. However, whilst 'information managing' is a broad term that might describe several types of behaviour, we believe 'recording' is a more precise description of the behaviour we observed. Recording involves making a record of resources or sources used, of documents/content found or of the query terms used or results returned in a search. Recording behaviour can be *manual* (i.e. by hand) or *automatic* (with the help of technology – such as a 'search trail' which automatically keeps a record of search queries entered and results received).

Evidence for *resource* recording (keeping a record of resources found) was observed, but was not particularly widespread. This might be because these sorts of behaviours are less likely to be uncovered by asking lawyers to find information that they currently need or have recently needed for their work (the broad task that our participants performed during observation). However, when resource recording behaviour was mentioned or displayed, it almost always involved saving and re-visiting Internet bookmarks. *Source* recording behaviour was also not very common. One student did, however, mention that LexisNexis Butterworths allows lawyers to keep a part-manual part-automated record of the sources that they search:

> *A33 (BVC student): Because I've used LexisNexis Butterworths before, the last thing that I've used, Harvey's Employment Law, is already there in my sources [points to the list of recently used sources]. It wasn't under the original list, so you have to add it to your list.*

Recording at the *document* level was far more commonly mentioned and observed than resource or source recording and often involved simply printing or saving documents and occasionally e-mailing the document to oneself. Finally, like resource and source recording, search query/result recording was also not particularly common, although it was mentioned and observed to a limited extent. It was more common for lawyers to keep manual records of search queries used (and sometimes brief information about the number of results returned) than to use automatic means of search result/query recording. Indeed no mention at all was made of other tools within electronic legal resources that might support search query/result recording, such as features that keep a record of the user's 'research trail,' saving a time-stamped list of the searches that they have performed and allowing users to re-run these searches.

4.46 Updating (D&C) (direct/indirect)

The information-seeking behaviour of 'document/content updating' has not, to the best of our knowledge, been identified in previous information-seeking studies. Updating involves ensuring a current understanding of amendments or changes to legal documents and content and an understanding of whether a particular case or piece of legislation is good law.

Updating is related to 'monitoring' as is possible to ensure a current understanding of legal documents and content through keeping abreast of developments in a particular legal area. However, updating is an important behaviour in its own right as it does not necessarily involve regular searching or browsing within electronic resources (as with active monitoring), or passively receiving updates (as with passive monitoring). Instead, updating can occur on a document-by-document basis. Updating behaviour is also related to 'forwards chaining behaviour' as it is possible to ensure a current understanding of legal documents and content through identifying and accessing documents which have subsequently cited the current document. However, unlike forwards chaining, updating does not necessarily involve accessing documents which have subsequently cited the current document, but merely identifying the *existence* of these documents. Finally, updating is related to 'verifying.' However, it does not involve checking whether an individual document is accurately written, but whether the document contains a currently accepted interpretation of the law.

Updating is a particularly important behaviour for lawyers, as explained by this BVC student:

> *A33 (BVC student): It's quite important that you make sure that whatever it is that you're using is up to date because you don't want to be relying on things that have been overruled later or things that have changed the law. There's no point in citing a case that is a year old if it's not current law. You need to make sure that the law is still the case today for any argument that you use the law for. You'd look a bit of a fool when you go to court if you didn't!*

Updating behaviour can be performed *directly* by searching or browsing for documents and content and manually checking that the document or content within is up-to-date or good law. Updating behaviour can also be performed *indirectly* by using an electronic citator to check whether a particular document or the content within it is up-to-date or good law.

Direct document and content updating was fairly widespread across all groups of lawyers and was achieved in three main ways:

- By conducting manual searches within a digital law library.
- By looking for mentions of amendments within the document text, as illustrated by the same BVC student:

  A33 (BVC student): One of the good things that you get is the footnotes on Halsbury's Laws. LexisNexis do an update section when they list at the bottom of the commentary all the updates. I don't know if I can remember how, but you used to be able to get the date that it was correct from [pauses] maybe if I click on 'source information' [does so and scrolls down a popup with some lengthy text]. So it was updated on 1st June 2006.

- By looking for symbols within the document (usually a case) to indicate its positive, negative or neutral treatment.

We found far less evidence of indirect document and content updating as compared with direct updating. Few practicing lawyers mentioned of demonstrated the use of citator tools and even fewer academic lawyers mentioned or demonstrated the use of these tools. One exception was illustrated by this PhD student, who explained that he uses the LexisNexis Shepardize tool to determine whether a particular case has been subsequently supported, overruled, repealed etc.:

> *P4 (PhD student): You probably don't know whether a case has been supported or overruled by later cases. 'Shepardize' compiles information about these things so you know whether this law is good authority or not. But even in Lexis UK, we can't use 'Shepardize' because they only cover US cases.*

4.47 Analysing (C)

The information-seeking behaviour of 'content analysing' was also identified by Meho & Tibbo (2003) amongst social scientists. The authors, however, do not elaborate much on this behaviour. As with the other behaviours that have not been formally defined previously, we adopt a definition based on the Oxford English Dictionary. Therefore we regard analysing to involve "examining in detail the elements or structure of the content found during information-seeking." We found this behaviour to operate at the content level (which is somewhat unsurprising, as it is not possible to analyse and synthesise anything other than document content). Content analysing was not commonly observed, probably because our observation task directed lawyers to 'find' information that they require, not necessarily to process it in any way.

Content analysing often involves writing lists of questions to be answered, issues to look out for or points to prove through reading particular content (as described by the PhD student below):

> *A12 (PhD student): My supervisor was drafting a report for the House of Lords Constitution Committee, so what I did is I went through all their reports, read them all and summarised [pauses] looked for the questions they asked and the idea was to make a checklist on the basis of the reports they had written.*

The end result is often a piece of written work. As explained by this undergraduate student, analysing does not simply involve lifting information from a document, but applying that information to the information-seeking problem at hand:

> *A30 (2nd year LLB student): There will be one or two paragraphs in the judge's decision in which he states the preceding law and preceding authorities and says how these apply to the facts of this case and how it leads to this conclusion. And basically that's what we're looking for.* ***R: Then what would you use those facts to do?*** *A30: We'd apply them to the problems that we were facing if it's a problem question or say that in these circumstances, this and this applies, this case looks pretty much similar to that, so we can infer such and such [pauses].*

4.48 Collating and editing (D&C)

The final behaviour subsumed under 'selecting and processing' is 'collating and editing,' which was found to operate at the combined document/content level. As with some of the other lower-level 'selecting and processing' behaviours, collating and editing has not, to the best of our knowledge, been identified in previous information-seeking studies. This behaviour involves "drawing together, preparing and arranging documents and/or content for later use" and although it appears similar on the

surface to Ellis's (1989) behaviour of 'ending,' it is actually quite different. This is because although Ellis's 'ending' behaviour shares a similar definition to our definition of 'collating and editing' ("the assembly and dissemination of information or the drawing together of material for publication.") (Ellis et al, 1993, p. 365), typical 'ending' activities in studies by Ellis and his colleagues involved searching for final pieces of information to fill gaps as opposed to the collating/editing behaviours described in this section. Our behaviour of collating and editing also bears some surface similarity to Meho & Tibbo's (2003) behaviour of 'synthesising' (however Meho & Tibbo do not make reference to synthesising behaviour other than to stipulate that it occurs during their 'processing' stage of information-seeking).

Like analysing, collating and editing were not commonly observed, again probably due to the nature of our information-seeking task. However some evidence of collating/editing was identified. The main way in which lawyers collated documents and content was by using facilities within digital law libraries to print groups of legal documents at the same time. The main way in which lawyers edited documents and content was to paste the document into a word-processing package (such as Microsoft Word). As an example of editing, this undergraduate student explains that he is usually uninterested in any of the content other than the judgement of a legal case (i.e. the judge's decision) and therefore pastes the content into Microsoft Word and deletes the beginning part of the case report:

> *A30 (2nd year LLB student): Once we'd saved a copy on our hard disk I think we could edit it. And I think a lot of people do edit case reports by cutting out all of the beginning. For example, in this document you have the headnote and there would often be a brief statement by the judge [pauses] the judge's decision, arguments by the lawyers [pauses] and only then do you have the judgment, which is really what most people are concerned about. So most people would just highlight all of these and delete them. [Laughs].*

5 Implications of findings for design

One of the important aims of this article is to illustrate that findings based on Ellis's model can also provide useful design insights. In this section, we make suggestions for the improved design of digital law libraries such as LexisNexis Butterworths and Westlaw. It is important to note, however, that we do not aim to spur iterative improvement of specific systems, but to provide general design suggestions that can be used to inform the design of electronic legal resources in general, not just the systems that the academic lawyers in our study chose to use. It is also important to note that the space of information-seeking behaviours that a user can demonstrate is constrained by behaviours that are currently supported by a particular system. This means that using Ellis's model to inform design, as highlighted by Attfield (2005), is likely to lead to evolutionary rather than revolutionary design improvements.

Our design suggestions involve either *enhancing support* for particular behaviours, *increasing awareness* of how existing systems support particular behaviours or a mixture of the two. We suggest, as a result of our findings, that it is necessary to:

- *Enhance support for surveying*, particularly lightly directed surveying, by making secondary materials more prominent at the interface. For example, LexisNexis Butterworths publishes 'Halsbury's Laws of England,' a large electronic legal textbook organised by subject that aims to provide lawyers with an overview of the law, highlighting important legislation and case law for each subject. However, only one academic participant mentioned or demonstrated use of this information source (most academic lawyers preferred to use textbooks or Google to perform surveying). A separate part of the interface should be dedicated to this information source (rather than presenting it in a drop-down list of specialist secondary materials) to emphasise its importance for gaining an overview of particular areas. In addition, both LexisNexis Butterworths and Westlaw also publish many textbooks electronically and there is scope to integrate these within their main digital library platforms.

- *Increase users' awareness of chaining* by making it clearer to users that forwards as well as backwards chaining can be achieved and *enhance support for chaining* by making forwards chaining easier to achieve. Awareness can potentially be increased by integrating tools to support chaining into electronic legal resources. For example, some electronic publishers such LexisNexis Butterworths provide citator tools which list the history of particular pieces of legal material (for example, which cases have subsequently overruled the current case) as well as which other pieces of material the current case cites. A link could be provided to invoke these tools for the current case if the user has subscribed to the citator functionality.

This might also help to increase users' awareness of updating and make it easier to achieve. Enhancing support for forwards chaining can be partly accomplished by making the ways in which it can be achieved more consistent across different types of legal documents. For example, Westlaw currently facilitates chaining in different ways for different types of legal materials. It includes a 'related info' tab that when clicked on whilst viewing a particular case might display related commentary or a Westlaw-edited digest of the case. However, clicking the tab when a viewing a particular piece of *legislation* has no effect as a list of which cases and journal articles are related to the legislation are usually presented in the legislation full-text. It is also possible to find out which cases refer to a particular piece of legislation by searching for the legislation title in the 'search terms' box in the 'case search' section of the site. Consistency can be provided by integrating chaining for all types of legal material into the 'related info' or equivalent sections of these resources (i.e. it should be possible to identify at a glance which cases, articles or pieces of legislation *cite* and *are cited by* the current piece of legal material).

- *Increase users' awareness of browsing* information in digital law libraries and *enhance support for browsing* by making browsing a prominent behaviour at the interface and simpler to accomplish. Increasing awareness might involve making browsing a more important form of interaction. For example, browsing by legal topic in Westlaw is possible but only accessible from a 'current awareness' tab. We can make browsing a more important behaviour by embedding browsing into the legal materials themselves (i.e. by providing browsable subject headings in these materials). Indeed, it should be technically feasible to facilitate browsing by any of the meta-data headings in a digital law library that can be used to restrict the user's search (for example by the presiding judge of a case or the author of a journal article).

- *Increase users' awareness of monitoring.* Whilst digital law libraries such as LexisNexis Butterworths and Westlaw provide tools to save and automatically re-run searches at user-defined intervals, our academic lawyers were rarely aware of these tools. Awareness of these tools would save time for those lawyers who performed similar manual searches. Indeed, there is a broader need to make it clear to users exactly what monitoring functions the digital law library provides (such as customisable alerts, scheduled searches, recent news on certain legal topics etc.) and how to go about using them.

- *Increase users' awareness of and enhance support for updating.* Aside from integrating citator tools into digital law libraries, we might also enhance support for updating by including a visual representation of the positive, negative or neutral treatment of legal material at the search result stage (not in the text of the document itself as with digital libraries such as LexisNexis Butterworths and Westlaw). This could be in the form of a small icon. It might also be useful, at the search result level, to provide a link next to each search result to the 'history' of each piece of legal material.

- *Enhance support for accessing* by making the access process and effects of access restrictions clearer. Include simple access instructions on the login page of digital law libraries that explain exactly what content the user has access to, where they are able to access this content from (for example only using an institutional computer, or off-campus) and how to log in. Similarly, informative feedback about the effects of access restrictions is also important. Whilst digital law libraries are beginning to inform users of whether they have access to only a summary or the full text of material, it would be useful to inform users on how they might go about obtaining the full text in the former case. In addition, although both LexisNexis Butterworths and Westlaw inform users when particular content or entire systems are not included as part of their subscription upon attempted access, it would be useful to visually indicate whether material is included in the user's current subscription or not through the use of icons presented to the user *before* they attempt to access the resource.

- *Increase users' awareness of how to achieve updating behaviour and make system features that support this behaviour more prominent.* Academic lawyers were generally unaware of the citator tools which can be used to support updating and there is a need to make these tools more prominent at the interface level and better integrated into the resource (as discussed earlier). As updating behaviour can be facilitated through the behaviours of chaining and monitoring, designing to better support these higher-level behaviours should also make updating easier. For example, it may be possible to add additional functionality to the e-mail

alerting services within LexisNexis Butterworths and Westlaw. These services currently allow the automatic scheduling of searches and e-mailing of results but could be extended to better support updating (for example by informing users when any cases are reported that overrule or support a case the user is interested in, by informing them when any new articles of interest are published or when any changes are made to certain legislation). This functionality would parallel the earlier design suggestions of making it easier to chain between resources and to facilitate browsing by meta-data fields such as author name or legal topic area.

- *Increase users' awareness of recording.* Digital law libraries such as LexisNexis Butterworths currently support keeping a record of frequently used and 'favourite' sources and both LexisNexis Butterworths and Westlaw allow users to keep a record of their search queries and re-run them at will. These features could be made more prominent by allowing lawyers to add the current source to their list of favourite sources, or save the current search and hence make them aware that these system features that support recording behaviour exist.

- *Increase users' awareness of collating and editing.* There is the potential to provide better provision for tasks that border information-seeking and information-use by providing functionality to bridge the gap between the two. For example, the ability to annotate, highlight and select text of interest could be integrated into the information seeking environment. This approach is similar to that employed by Komlodi and Soergel (2002), who designed a set of integrated tools for lawyers that included text-editing features to support lawyers in creating notes, document outlines and documents.

In summary, we have presented several design suggestions for electronic legal resources to help then better support the behaviours we have identified. In doing so, we have illustrated that analysing data using Ellis's model can provide design insights at a useful level of abstraction – a level that is neither too abstract so as to require a sizeable creative leap between the data and the proposed design suggestions, nor too concrete so as to be applicable only to particular systems.

6 Conclusions

Not only have we illustrated that Ellis's model is useful for informing design, our work also makes several other contributions. Firstly, it serves to validate Ellis's model in the new academic domain of law. Secondly, it serves to validate Ellis's model through a new research method of Contextual Inquiry (which includes a naturalistic observational element as well as an in-depth interview element). This is particularly useful because all of the previous studies that identified information-seeking behaviours (i.e. those by Meho & Tibbo and Ellis and colleagues) only used a research method based on semi-structured interviews. This means that previous studies have only been based on participants' *reports* of the behaviour that they display as opposed to *observed* behaviour. Our study has shown that these behaviours *are* actually displayed by lawyers when they use electronic legal resources. In addition, our findings extend Ellis's original model to include behaviours pertinent to legal information-seeking (e.g. updating), and broaden the scope of Ellis's original model to cover information-seeking behaviours that overlap with information-search and information-use behaviour (e.g. analysing and collating/editing). Finally our findings enhance the potential analytical detail of Ellis's original model through the identification of mutually-exclusive pairs of behavioural subtypes of behaviour and through the identification of different levels at which many of the behaviours can operate (i.e. the resource, source, document, content and search query/result levels).

We have also illustrated the wider importance of gaining a better understanding of the information-seeking behaviour of specific user-groups in order to feed this understanding into the design and improvement of systems that are truly designed to support user behaviour. We hope that an appreciation of this wider importance amongst the designers of electronic legal resources will help promote a user-oriented design process that will, in the long run, make systems easier to use and information-seeking easier and more intuitive for lawyers.

Acknowledgements

This research was supported by an EPSRC DTA studentship.

References

Attfield, S. (2005). Information-seeking, Gathering and Review: Journalism as a Case Study for the Design of Search and Authoring Systems. PhD Thesis, University College London, London, UK.

Beyer, H. & Holtzblatt, K. (1998). Contextual Design: Defining Customer-centred Systems. Morgan Kauffman. London, UK.

Blomberg, J., Suchman, L. & Trigg, R. (1996). Reflections on a Work-oriented Design Project. Human-computer Interaction, 11, pp. 237-265, 1996.

Ellis, D. (1989). A Behavioural Approach to Information Retrieval System Design. Journal of Documentation, 45(3), pp. 171-212.

Ellis, D., Cox, D. & Hall, K. (1993). A Comparison of the Information-seeking Patterns of Researchers in the Physical and Social Sciences. Journal of Documentation 49(4), pp. 356-369.

Ellis, D. & Haugan, M. (1997). Modelling the Information-seeking Patterns of Engineers and Research Scientists in an Industrial Environment. Journal of Documentation 53(4), pp. 384-403.

Ingwersen, P. & Järvelin, K. (2005). The Turn: Integration of Information-seeking and Retrieval in Context. Springer Publishers, Netherlands.

Jones, Y.P. (2006). "Just the Facts Ma'am?" A Contextual Approach to the Legal Information Use Environment. In Proceedings of the 6th ACM Conference on Designing Interactive Systems, pp. 357-359. University Park, PA, USA. ACM Press.

Kerins, G., Madden, R. & Fulton, C. (2004). Information-seeking and Students Studying for Professional Careers: The Cases of Engineering and Law Students in Ireland. Information Research, 10(1), paper 208. Available online: http://InformationR.net/ir/10-1/paper208.html. [Accessed: 07/01/06].

Komlodi, A. and Soergel, D. (2002). Attorneys Interacting with Legal Information Systems: Tools for Mental Model Building and Task Integration. In Proceedings of the 65th Annual Meeting of American Society for Information Science and Technology, pp. 152-163. Philadelphia, USA. ACM Press.

Kuhlthau, C.C. (1993). A Principle of Uncertainty for Information Seeking. Journal of Documentation, 49(4), pp.39-55.

Kuhlthau, C.C. & Tama, S.L. (2001). Information Search Process of Lawyers: A Call for 'Just for Me' Information Services. Journal of Documentation, 57(1), pp. 25-43.

Leckie, G.J., Pettigrew, K.E. & Sylvain, C. (1996). Modelling the Information-seeking of Professionals: A General Model Derived from Research on Engineers, Health Care Professionals, and Lawyers. Library Quarterly, 66(2), pp. 161-193.

Marchionini, G. (1995). Information-seeking in Electronic Environments. Cambridge University Press, Cambridge, UK.

Marshall, C., Price, M., Golovchinsky, G. & Schilit, B. (2001). Designing e-Books for Legal Research. In proceedings of the 1st ACM/IEEE-CS Joint Conference on Digital Libraries, Roanoke, Virginia, USA. 2001, pp. 41-48.

Meho, L. & Tibbo, H. (2003). Modeling the Information-seeking Behavior of Social Scientists: Ellis's Study Revisited. Journal of the American Society for Information Science and Technology 54(6), pp. 570-587.

Otike, J. (1999). The Information Needs and Seeking Habits of Lawyers in England: A Pilot Study. International Information & Library Review 31, pp. 19-39.

Strauss A. & Corbin J. (1998). Basics of Qualitative Research. Sage. London, UK.

Sutcliffe, A. & Ennis, M. (1998). Towards a Cognitive Theory of Information Retrieval. Interacting with Computers, 10, pp. 321-351.

Sutton, S.A. (1994). The Role of Attorney Mental Models of Law in case Relevance Determinations: An Exploratory Analysis. Journal of the American Society for Information Science 45(3), pp. 186-200.

Vollaro, A. & Hawkins, D. (1986). End-user Searching in a Large Library Network: A Case Study of Patent Attorneys. Online 10(4), pp. 67-72.

Wilkinson, M.A. (2001). Information Sources Used by Lawyers in Problem-solving: An Empirical Exploration. Library and Information Science Research, 23(2001), pp. 257-276.

Wilson, T.D. (1999). Models of Information Behaviour Research. Journal of Documentation, 55(3), pp. 249-270.

Yuan, W. (1997). End-user Searching Behavior in Information Retrieval: A Longitudinal Study. Journal of the American Society for Information Science and Technology. 48(3), pp. 218-234.