"Innovator, Fool, I Dream"[1]: Deploying Effective Knowledge Management Principles to Combat Information Overload in Law Firms

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Information overload is a serious problem for many knowledge workers. Increasingly, lawyers and law firms are exposed – willingly and unwillingly – to multiple sources and types of information through and from legal publishers, the Internet, intranets, newspapers, journals, emails, voice mails, faxes, and personal digital assistants. This barrage of information can and does lead to information overload. By definition, this information overload occurs when the amount of information received exceeds the ability to process that information.[2] Studies clearly show that persons exposed to excessive amounts of information are less productive, prone to make bad decisions, and risk suffering serious stress-related diseases.[3] Arguably, knowledge management (KM) is *the* way to combat information overload at the individual, team, and organizational level.

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[1] "Innovator, Fool, I Dream" is one of the many clever anagrams for the phrase "Information Overload" identified by Steve Witham in "Too Many Anagrams for "Information Overload" (January 2003), available online: <*http://www.tiac.net/~sw/2003/01/overload.html*> (Last visited: March 17, 2007). Other anagrams for information overload on that site include: Inane vomit flood roar; Forlorn media ovation; Moderator – fool, in vain; Mr. Noodle of Variation; I love a random info rot; Admiration of no lover; In an old favorite room, and Noontime-arrival food. Also – attributed at the foregoing site to David Britain <*http://www.davidbrittan.com*> – And no more trivia, fool.

[2] Ingrid Mulder et al., "An Information Overload Study: Using Design Methods for Understanding" at 245 (Conference paper presented at the Australasian Computer-Human Interaction Conference 2006). Available online from the Association for Computing Machinery on the ACM Digital Library: <*http://portal.acm.org/dl.cfm*> (Last visited: March 25, 2007).

[3] See the discussion below in Section 2 on the negative impacts of information overload.

A knowledge management team is well equipped to enable lawyers and the firm to control and filter the flow of information so that manageable portions of the most important information can be accessed and redeployed as higher-level knowledge. Before discussing these practical solutions, I briefly review occurrences of information overload over the last 500 years to argue that our current problems with information overload are not unique. By looking at examples where overload was a problem in the past, we can learn from the coping techniques used by our predecessors. Then I try to put information overload into context by analyzing the different types of overload experienced in law firms and the negative impact of information overload on lawyers. Being aware of the different types of information overload that lawyers face and their negative impacts will affect the kinds of strategies one would deploy to combat the problem Finally, I will end by proposing a number of practical "technological" and "human" KM solutions for combating information overload. [4]

Although technology can often be "blamed" for causing information overload, technology also promises a number of solutions; however, my argument will be that technological solutions alone are insufficient and that the individuals on your knowledge management team play a vital role in combating information overload. It remains to be seen, however, whether those of us in knowledge management will be seen as "innovators" or "fools" in our efforts; regardless, we still can (and must) "dream" of finding practical solutions to information overload.

[4] For those readers already facing too much information, Appendix A contains a one page summary of these practical "technological" and "human" KM solutions.

1) The History of Information Overload: From Gutenberg to Google and the Lessons to be Learned

There is nothing more beautiful or fruitful than order.

(1630, Johann Heinrich Alsted)[5]

We have reason to fear that the multitude of books which grows every day in a prodigious fashion will make the following centuries fall into a state as barbarous as that of the centuries that followed the fall of the Roman Empire.

(1685, Adrien Baillet)[6]

Daily experience doesn't lie: technological advances have created huge amounts of information that lawyers must deal with, from emails to voicemails, and from intranets to the Internet. Arguably, too much information is better than no information when your job as a lawyer relies heavily on accessing and understanding a body of specialized knowledge. It is relatively clear, however, that too much information is suboptimal and lawyers must control the flow of information to be effective. One could easily blame digital technology for the reason we are currently experiencing so much information overload. However, we are not unique in experiencing this phenomenon and a number of modern scholars have shown that periods of information overload occurred quite regularly during the last 500 years and longer, especially whenever new technologies, such as the printing press, were introduced. As such, our current experience with

[5] Johann Heinrich Alsted, *Encyclopaedia septem tomis distincta* (Herborn, 1630), cited by Jonathan Sheehan in "From Philology to Fossils: The Biblical Encyclopedia in Early Modern Europe" (2003) 64(1) Journal of the History of Ideas 41at 44.

[6] Adrien Baillet, *Jugemens des sçavans sue les principaux ouvrages des auteurs* (Paris, 1685), I, avertissement au lecteur, sig. avij verso, cited by Ann Blair in "Reading Strategies for Coping With Information Overload ca.1550-1700" (2003) 64(1) Journal of the History of Ideas 11.

information overload may not be entirely unique. In this first section of the paper, I provide some brief examples where early writers, ecclesiastical monks, and botanists, among others, suffered from information overload and then discuss the coping techniques that were used to control the problem. I will argue that early experiences with information overload parallel many of our current/modern experiences with information overload and that lessons can be learned from how our predecessors coped with the problem of too much information.

Information Overload in the Early Modern Age

The invention of movable type by Gutenberg in 1450 is commonly identified as one of the early technologies that led to information overload on a large scale due to the ease and lower cost by which books could be published:

> Most likely, information overload originated sometime during the fifteenth century due to a revolutionary technological development – the printing press. From that point forward, printed materials could be produced in large quantities and disseminated to vast numbers of potential readers. More importantly, for the first time, people began receiving more information than they could possibly digest . . . . Since the invention of the printing press, technological developments, including the telegraph, telephone, typewriter, fax machine, copy machine, television and finally the computer have exacerbated the problem of information overload. Each of these inventions increased the speed of delivery as well as the amount of information disseminated to the public.[7]

However, even prior to the introduction of commercial mass printing, there is evidence that the move from "scroll" technology to "codex" or book technology brought changes in the way readers interacted with the written word and created new ways of

[7] K. Hensiak, "Too Much of a Good Thing: Information Overload and Law Librarians" (2003) 22 Legal Reference Services Quarterly 85 at 88.

dealing with the increasing amount of information. For example, Stallybrass points out the obvious advantages that the codex had over the earlier technology of scrolls and how the introduction of the codex led for the first time to the notion of "discontinuous reading" and new techniques of accessing information.[8] Blair identifies the almost exponential growth in the increase in the number of books available starting as early as the 1200's and continuing thereafter. For example, Blair cites a finding that prior to 1200, paintings of scholars almost never showed the scholar reading more than one book, but that thereafter "[e]arly modern paintings of scholars on the other hand usually depict many open and closed books and manuscripts spread out on desk, shelves, and floor, even to the point of messiness."[9] Moreover, around this time, library collections also began to grow:

> In practice one of the most immediate consequences of the increased availability of books was that libraries increased in size. To choose just a few results from among the growing numbers of studies of book ownership, a typical French royal magistrate in the late fifteenth century would have owned sixty books; one hundred years later Montaigne remarked that he owned about a thousand books, in what would have been an exceptionally large private library for the time; in the early eighteenth century another famous French provincial magistrate, Montesquieu, owned over three thousand books.[10]

The "multitude of books" that French scholar and critic Adrien Baillet complained about in 1685 seems like a quaint sort of problem compared to the multitude of books and other sources of digital information that are currently available over 300 years later.

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[8] Peter Stallybrass, "Books and Scrolls: Navigating the Bible" in Jennifer Andersen and Elizabeth Sauer, eds., *Books and Readers in Early Modern England* (Philadelphia: University of Pennsylvania Press, 2002) at 42-46.

[9] Blair, *supra* note 6 at 16, citing John Willis Clark, *The Care of Books: An Essay on the Development of Libraries and their Fittings, from the Earliest Times to the End of the Eighteenth Century* (Cambridge, 1901), 295-97; and Dora Thornton, *The Scholar in His Study: Ownership and Experience in Renaissance Italy* (New Haven, Conn., 1997).

[10] Blair, *ibid*. at 15.

Nevertheless, at around the same time that Baillet was complaining about the multitude of books, the German philosopher Leibniz was also complaining about information overload:

> In 1680 Leibniz spoke of that "horrible mass of books which keeps on growing," so that eventually, he feared, "the disorder will become nearly insurmountable." He also argued that this plethora of books made it more difficult for the Republic of Letters and the academies to communicate any consensus on fundamentals . . . .[11]

One factor explaining the increase in the number of books during the Renaissance is the new way of thinking about the world and information and knowledge. For example, Ogilvie describes the "explosion" of information in the 1500's in the field of natural history and botany:

> Renaissance naturalists in late fifteenth-century Italy and their pupils focused initially on the problem of identifying the plants described by ancient writers . . . . By the 1530s, their successors had shifted from identification to description. At the same time the community of botanists grew and spread throughout Western and Central Europe. A natural yet unintended consequence of this flurry of descriptive activity and intellectual exchange was that the number of species known to naturalists exploded, from the hundreds to the thousands, and these species were described in a growing flood of books. Renaissance botanists sprang the limited bounds of factual knowledge that had characterized ancient and medieval natural history, creating an information explosion with which naturalists have struggled ever since.[12]

The increase in the number of plant species created difficulties for scholars in developing a vocabulary to describe the new plant species; the lack of a good taxonomy helped to create information overload and resulted in chaos and "a confusion of words" over the short term.[13]

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[11] Richard Yeo, "A Solution to the Multitude of Books: Ephraim Chambers's Cyclopaedia (1728) as 'the Best Book in the Universe'" (2003) 64(1) Journal of the History of Ideas 61 at 62.
[12] Brian W. Ogilvie, "The Many Books of Nature: Renaissance Naturalists and Information Overload" (2003) 64(1) Journal of the History of Ideas 29 at 30.
[13] *Ibid*. 33

Although the amount of information available in medieval times seems laughably small compared to the amount of information available today,[14] everything must be seen in perspective. The 15th-century scholar would have faced many other challenges in daily life that would take up more of his day compared to the modern scholar who would not face those same challenges; as such, to the 15th-century scholar, information overload was – comparatively speaking – a serious problem.

Historical Coping Skills and Their Application to Modern Times

As the number of books grew in the early modern age so did the number of techniques to better process the larger amounts of information, techniques that are still relevant today:

> Many of the methods for managing an abundance of texts have remained identifiable in one form or another from antiquity to the present day: they typically involve selecting, sorting, and storing, carried out in various combinations and with various motives and technologies.[15]

The increasing amount of information that was being produced in the medieval era also led to new types of publications to make accessing information easier:

> The perception of an overabundance of books fueled the production of many more books, often especially large ones, designed to remedy the problem—from new genres like the universal bibliography and the book review to new (or not-so-new) contributions to well-established genres, including the florilegium, the dictionary, and the encyclopedic compilation. Along with the alphabetical index these latter genres originated in the thirteenth century in response to similar pressures of overload . . . .[16]

[14] Richard Wurman notes that "a weekday edition of *The New York Times* contains more information than the average person was likely to come across in a lifetime in seventeenth-century England" – see Richard Wurman et al., *Information Anxiety 2*. Indianapolis, I: Que, 2001 at 5.
[15] Blair, *supra* note 6 at 12.
[16] *Ibid*.

Set out below are examples of six different historical coping techniques used to more effectively process and control information. These technologies and techniques include: (a) navigational tools, (b) the bookwheel, (c) commonplace books, (d) encylopedic compilations, (e) taxonomies and maps, and (f) various methods of annotation, including the use of marginalia.

(a) Navigational tools: Stallybrass identifies a number of navigational aids that were developed as early as the 13th-century to deal with increasingly larger numbers of books.[18] These navigational tools include concordances to help find particular phrases or passages in the Bible, the introduction of subject indexes and library catalogues, the use of alphabetization to organize indexes (as opposed to topical or hierarchical indexes), the introduction of tables of contents and page numbering, the use of tabs and

Above: Incipit from the Evangelary of Saint Mary and the Martyrs, Trier: Mark Incipit. 9th c. A.D. (Trier: Stadt. Bibl Cod. 231 f. 6).[17]

[17] Image taken from the University of Alabama at Birmingham, *Images from World History: Carolingian Era: Iro-Frankish and Anglo-Frankish Art.* Available online: <*http://www.hp.uab.edu/image_archive/cr-03/cr-02/*> (Site last viewed: 1 April 2007).

[18] Peter Stallybrass, "Books and Scrolls: Navigating the Bible" in Jennifer Andersen and Elizabeth Sauer, eds., *Books and Readers in Early Modern England* (Philadelphia: University of Pennsylvania Press, 2002) 42 at 43-46.

bookmarks, and the use of headings and incipits as visual aids to distinguish parts of the text (i.e., at the start of a chapter) . These developments continued to develop in sophistication over the next two hundred years:

> The fifteenth century was a period of comparable change, and one might want to see the invention of printing less as a displacement of manuscript culture than as the culmination of the invention of the navigable book – the book that allowed you to get your finger into the place you wanted to find in the least possible time. Many of the developments of the thirteenth century were taken up on a much larger and more systematic scale.[19]

These various navigational tools still serve important functions today in organizing information, and although they may seem obvious, that was not always the situation. Arguably, where information is increasingly accessed online via computer, the need for familiar navigational tools (i.e., "culturally shared structuring mechanisms" such as the layout of a print newspaper) is that much more important:

> It is more common than we think that the structure of the information matches our shared knowledge. We can immediately turn to the sports section of our daily paper because we know where it is and because it is always in the same place. We know very well what kind of information will be contained in the next *Wall Street Journal* and in the next *Playboy* and it is common cultural literacy what to expect in the respective centrefolds.
>
> But the culturally shared structuring mechanisms do not carry very far in the modern business world. Because of the diversity and the short renewal cycles of information that are produced in the interaction of multi-national corporations, and then enhanced by the technicalization of information processing, there are fewer and fewer information ordering structures that are shared by all the people who are involved in one interaction.[20]

In fact, computer design typically has included a number of features to re-create virtually these navigational tools used historically for print materials, including the concept of a desktop, folders, bookmarks (in your web browser), clickable tables of contents, and cookie crumb navigation to create comfort and context for the user.

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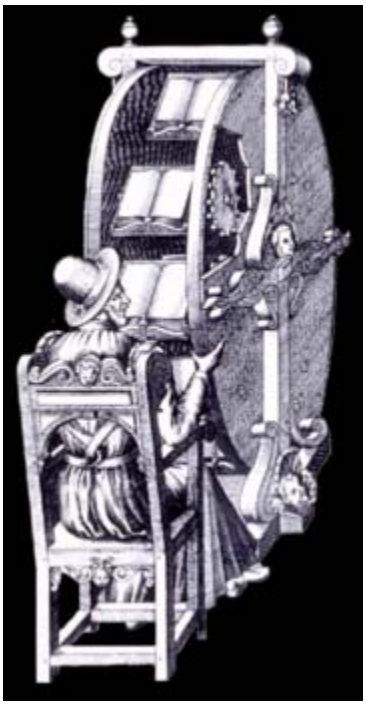
[19] *Ibid*. at 44.

[20] P. Königer and K. Janowitz, "Drowning in Information, but Thirsty for Knowledge" (1995) 15 International Journal of Information Management 5 at 7.

b) The Bookwheel: In addition to the various navigational tolls discussed above, the bookwheel, invented in 1588 by Agostino Ramelli, allowed researchers to quickly access multiple books. The bookwheel (picture below) rotated much like a Ferris wheel with books clamped on the perimeter of the wheel, thereby allowing the reader to quickly "rotate" the wheel to access books more quickly.[21] As Blair has noted, the "Renaissance experienced such a great explosion of knowledge that tools for managing it rapidly became essential" and that one of the technologies developed was the bookwheel, "a freestanding (and expensive) device . . . [that] allowed a scholar to keep up to seventy books open at one time, turning easily from one to the other without losing the specific references . . .".[23]



Above: Bookwheel, from Agostino Ramelli's "Le diverse et artifiose machine" (1588)[22]

Since the bookwheel is a mechanical device, there really is no modern equivalent, although one might think of the bookwheel as an old-fashioned search engine to the extent a search engine, in the broadest sense, is a "function that lets you search for information."[24] Other modern equivalents would be the scroll function in Web browsers and word processors that

[21] Wikipedia, definition of "Bookwheel" in Wikipedia. Available online: *<http://en.wikipedia.org/wiki/Bookwheel>*. (Site last viewed: 1 April 2007).
[22] *Ibid*.
[23] Blair, *supra* note 6 at 68.
[24] Barry B. Sookman, Definition of "Search engine" in *Computer, Internet and Electronic Commerce Terms: Judicial, Legislative and Technical Definitions* (2005) (Toronto: Thomson Carswell, 2005) at 331.

allows users to quickly move in and amongst documents. The bookwheel is almost tantamount to hypertext links to the extent the bookwheel allows the user to quickly jump from one text to another.

c) Commonplace books: Another tool used during the Renaissance to manage information was the "commonplace book", a "bound volume in which aristocratic readers of the Renaissance would copy out their favourite poems from manuscript."[25] Spangenberg points out that "[t]ypically these books were compilations of brief passages, often with commentary, ordered topically or thematically—in short they were collections of commonplaces . . . ."[26] Blair notes that readers and researches would use commonplace books to take note of important information in order to retrieve it at a later date:

> The commonplace book formalized the process of bookish research at a time when the bulk of knowledge to be managed had rapidly become unwieldly . . . . [T]he commonplace book served as an aid to the memory by recording in a retrievable fashion items that seemed worth reusing, but which could not likely be retained until the appropriate moment, possibly many years away.[27]

Although there are a number of print-based modern equivalents to a commonplace book (perhaps such as books of quotations, diaries, notebooks, and the like) the more intriguing equivalent might be a blog to the extent that blogs contain entries from different authors on (presumably) points of interest on a topic:

> [The commonplace book] provides another useful model for understanding both the positive and negative aspects of the world of electronic texts in which hypertext exists. On the positive side, the "interactive" nature of the commonplace book, the practice of copying out favourite passages to be added to a personal anthology (an anthology which in a sense constitutes a new work on to its own), emphasizes the

[25] Christopher Keep, Tim McLaughlin and Robin Parmar in "The Electronic Labyrinth" (Online). Available at <*http://www3.iath.virginia.edu/elab/hfl0231.html*> (Site last viewed: 27 March 2007).
[26] Lisa L. Spangenberg, "Blogs, Definitions and Commonplace Books" (8 February 2002). From the Digitalmedievalist.com Blog (Posted: 18 February 2007 Available online: <*http://www.digitalmedievalist.com/it/archive/000007.html*> (Site last viewed: 27 March 2007).
[27] Blair, *supra* note 6 at 68.

> active role of the reader in the distribution process. One of the benefits of hypertext is that it too may be added to, modified and then re-distributed so that several parallel versions of the same "original" text might be in circulation at any one time.[28]

Likewise, Jonathan Swift touches upon an aspect of the commonplace book that closely mirrors how blogs or wikis work as a record of information containing the input or knowledge of more than one person:

> . . . . [A] book of this sort [i.e., a commonplace book], is in the nature of a supplemental memory, or a record of what occurs remarkable in every day's reading or conversation. There you enter not only your own original thoughts, (which, a hundred to one, are few and insignificant) but such of other men as you think fit to make your own, by entering them there.[29]

d) Encyclopedias: The encyclopedia has existed in one form or another for thousands of years and served as a means to capture or contain knowledge in a single bound source:

> For more than 2,000 years encyclopaedias have existed as summaries of extant scholarship in forms comprehensible to their readers. The word at first meant a circle or a complete system of learning—that is, an all-around education.[30]

Historically, the goal of most encyclopedias was to capture all knowledge on the topic being covered:

> Only the encyclopaedia attempts to provide coverage over the whole range of knowledge, and only the encyclopaedia attempts to offer a comprehensive summary of what is known of each topic considered. To this end it employs many features that can help in its task, including pictures, maps, diagrams, charts, and statistical tables.[31]

Modern law-related encyclopedias, such as *Corpus Juris Secundum* or *Halsbury's Laws of England*, have been essential legal research tools that provide a broad overview of the

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[28] *Supra* note 25.
[29] Jonathan Swift, in his "A Letter of Advice to a Young Poet," cited by Spanenberg, *supra* note 26.
[30] Encyclopedia Britannica, definition of "Encyclopaedia" in *Encyclopædia Britannica Online* (30 March 2007). Available online: *<http://www.britannica.com/eb/article-9106030>*.
[31] *Ibid*.

law. Even as recent as the mid-1950's, the third edition of *Halsbury's Laws of England* purported to be "a complete statement of the *whole* law of England"[32] (emphasis added). The more recent fourth edition of *Halsbury's* makes no such claim for exhaustiveness, and even though all of the major law-related encyclopedias have online versions (that would in theory be easier to update), the ability to make law-related encyclopedias exhaustive and up-to-date is becoming increasingly difficult for legal publishers.

e) Taxonomies and maps: Ogilvie describes the difficulty that Renaissance botanists faced with the increasing number of plant species being identified. There was an urgent need for these scientists to develop a new language and new taxonomies to describe newly found species of plants:

> Faced with the plethora of botanical information, the casual student must have felt overwhelmed.
>
> Serious scholars too felt threatened, if not overwhelmed, by the explosion of botanical information. But by the turn of the seventeenth century they had developed several techniques for managing new information and integrating it with what they already knew. On the one hand they routinized the presentation of botanical information, by adopting standard descriptive terminology and forms; on the other they developed guides to nomenclature and attempted to compile botanical encyclopedias that would sum up the results of new discoveries and present them as a comprehensive whole.[33]

The standards terms that were created "allowed naturalists to quickly assimilate a botanical description" and "[g]lossaries of synonyms, combined with indices, allowed them to quickly find any plant whose name they knew."[34]

[32] Lord Simonds, *Halsbury's Laws of England*, 3rd ed. (London: Butterworths, 1952), Vol. 1, preface.
[33] *Supra* note 12 at 34.
[34] *Ibid*. at 36.

Another technique used (primarily in the development of encyclopedias) to capture knowledge was the use of maps or trees to visually depict the world of knowledge being discussed:

> Alsted took the absolute faith that knowledge was ultimately comprehensible within a logical structure, in fact was only comprehensible within a logical structure. In this sense the maps on Alsted's pages were the very representation of human thought itself, at least human thought that had been appropriately disciplined and trained. Trees of knowledge did not bear a merely metaphorical relationship to the materials they organized; rather they were essentially connected.[35]

The average person is comfortable using maps to find their way; as such, both the "metaphor" of the map and the practical sense of direction provided for by maps is a useful technique for providing context for whatever content is contained in the map:

> To find our way through information, we also rely on maps that will tell us where we are in relation to the information, give us a sense of perspective, and enable us to make comparisons between information.[36]

Taxonomies and "maps" of course play an important role in current knowledge management:

> Most things can be found in context with a map. A map provides people with the means to share in the perception of others. It is a pattern made understandable; it is a rigorous, accountable form that follows implicit principles, rules, and measures.
>
> Maps provide the comfort of knowing in that they orient us to the reality of place. They enable us to make comparisons between places, and they tell us where we are in the grand scheme.[37]

[35] Sheehan, *supra* note 5 at 44.
[36] Wurman, *supra* note 14 at 156.
[37] *Ibid*. at 155.

In the field of knowledge management, "knowledge maps" can be used as a navigational aide to visually depict how information is being used in the organization:

> A knowledge map portrays a perspective of the players, sources, flows, constraints and sinks of knowledge within an organization. It is a navigation aid to both explicit (codified) information and tacit knowledge, showing the importance and the relationships between knowledge stores and the dynamics. The final 'map' can take multiple forms, from a pictorial display to yellowpages directory, to linked topic or concept map, to inventory lists or a matrix of assets against key business processes.[38]

f) Annotated comments: The final historical technique I will comment on is the way that early scholars combated information overload by marking up text through notes or comments in the margin (known as "marginalia"):

> Renaissance marginalia usually offer clues not just about the contexts in which books were circulated and read, but about how they were used; indications of the kinds of training that readers brought to bear on their encounters with texts, and the kinds of needs they could be made to serve.[39]

The comments or notes added by readers provided additional information and cross-references to help subsequent users of the material

> Marginalia can identify other texts a reader associated with or even read alongside a particular book. Cross-references and passages copied verbatim from other books are frequent enough to attest to the widespread practice of what has been called "extensive" rather than "intensive" reading . . . . While we might expect readers from the legal profession to have knowledge of and access to a wide range of statutes and precedents, it is striking how often readers of sermons, herbals, or husbandry manuals were able to reference other books and authors in their reading.[40]

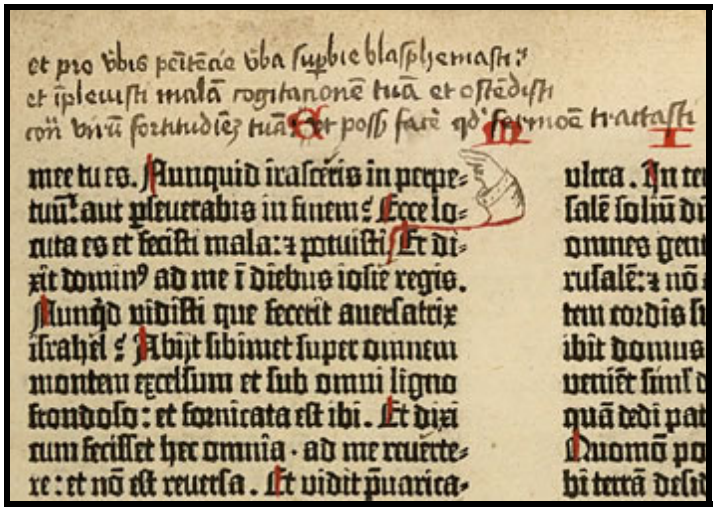
Sherman notes that this practice has been discouraged in recent times as being tantamount to "defacing" the book:

> It is important to note . . . the changing place of marginalia in the training of readers since the early modern period. While many readers still write notes in the books they

[38] D. Grey, "Knowledge Mapping." Available online: <*http://kmwiki.wikispaces.com/Knowledge+mapping*> (Site last viewed: 1 April 2007).
[39] William H. Sherman, "What Did Renaissance Readers Write in Their Books?" in Jennifer Andersen and Elizabeth Sauer, eds., *Books and Readers in Early Modern England* (Philadelphia: University of Pennsylvania Press, 2002) 119 at 126.
[40] *Ibid*.

> read, only rarely do marginalia play a part in the education of students. They are generally seen as antithetical to the respect toward books that teachers try to inculcate, and university libraries regularly display books that have been "defaced" by the pens and pencils of readers. For their part, students tend to be reluctant to write in the books they buy because it affects their value when they want to sell them at the end of their courses . . . . But at times readers have been encouraged and even taught to mark their books as a way of making them more useful for their present and future needs, and in the early modern period marginal annotations played a central role in pedagogical theory and practice.[41]

Even though modern researchers do not typically mark print-based textbooks with marginalia, the reasons for and the advantages of annotating text with explanations or commentary carries on in modern knowledge management through electronic annotations or commentary in the form of annotated models and precedents using, for example, the "Comment" feature in Microsoft Word or Adobe Acrobat.



Left: Image of Gutenberg Bible, Volume 2, page 72*r* [42]

Note the well-drawn hand/sleeve with the pointed fingers drawing the attention of the reader to additional commentary.

With these various coping techniques used for the last several hundred years, we can see some similarities in the way in which researchers over time have struggled with

[41] *Supra* note 39 at 120.
[42] Image taken from the Harry Ransom Center, University of Texas at Austin, "Marginalia: How Have the Bible's Readers Left Their Mark?" Available online: <*http://www.hrc.utexas.edu/exhibitions/education/modules/gutenberg/invention/marginalia/*> (Site last viewed: 1 April 2007).

information overload (and many of these techniques are still relevant today). However, the advent of electronic text and storage with full-text searching capability raises new issues with new possible solutions that are unique and not a technology that was available to our predecessors. The next section looks at the types of information overload in the modern law firm and the negative impact information overload can have.

2) Information Overload in the Law Firm and its Negative Impact

When it was announced that the Library contained all books, the first reaction was unbounded joy. All men felt themselves the possessors of an intact and secret treasure. There was no personal problem, no world problem, whose eloquent solution did not exist . . . .

That unbridled hopefulness was succeeded, naturally enough, by a similarly disproportionate depression. The certainty that some bookshelf in some hexagon contained precious books, yet that those precious books were forever out of reach, was almost unbearable.

Jorge Luis Borges, "The Library of Babel"[43]

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British workers' IQ test scores drop temporarily by an average of 10 points when juggling phones, e-mails, and other electronic messages—more of an IQ drop than occurs after smoking marijuana or losing a night's sleep.[44]

Law firms are by their very nature heavy users of information, both in sending and receiving, and in collecting and organizing, information. In theory, a law firm is consciously in control of this information; in reality, however, since the practice of law involves any number of important time pressures and deadlines, lawyers are not always in control of the information that surrounds them. Before prescribing possible solutions for

[43] Jorge Luis Borges, "Library of Babel" in *Collected Fictions* (Translated by Andrew Hurley) (New York: Penguin, 1998) at 115-16.
[44] Anne Casselman, "Does E-mail Make You Dumber" *Discover Magazine* (August 6, 2005). Available online: <*http://www.discovermagazine.com/issues/aug-05/rd/email-make-you-dumber/*> (Last viewed: 25 March 2007).

information overload in the law firm setting, it helps to first identify the types of information (and knowledge) that lawyers deal with and to understand the negative impact that information overload can cause.

Categories of Typical Information in the Law Firm

Although a number of scholars and researchers over the last 500 years have complained of information overload, imagine if they were transported to the modern law firm. What would they see? The print materials might seem familiar – the journal articles, treatises, agreements and precedents, memos and the like. Obviously, however, the electronic and digital technologies would be shocking – computers, the Internet, portals, telephone and voice mail, PDAs and Blackberrys, PowerPoints, and the ability to conduct full-text searching. Sometimes this barrage of information is even overwhelming for modern day lawyers. Typically, the pressures inherent in the practice of law create a number of situations where lawyers can be overwhelmed by information. I would break these situations down into two broad categories:

- **Current awareness**: Lawyers are ethically (and in many states, legally) obliged to inform themselves of the inevitable changes in legislative, regulatory and judicial legal developments. This has been described as "upkeep" overload in the literature – the need to "keep up" with information.[45] In the legal field, this can happen when "the incoming data becomes so vast that [we are] overwhelmed and as a result, data never makes the progression to information or knowledge."[46]

[45] Patrick Wilson, "Interdisciplinary Research and Information Overload (Navigating Among the Disciplines: The Library and Interdisciplinary Inquiry)" (1996) 44(2) Library Trends 192 [note: online version did not contain page numbering] .
[46] *Supra* note 7 at 87.

- **Substantive knowledge of the law**: Related but different from the need to stay current is the obligation of the lawyer to have substantive knowledge of the law (or to have the ability to find out what the law is on particular matters). This can range from knowing or finding the relevant primary (and secondary) sources of law and knowing which documents or which strategy to use to advance the client's interests. This has been identified in the literature as "task" overload – needing information to do one's job as a lawyer.[47] In the law firm setting, this can often happen, whether searching large case law databases or the firm's intranet while looking for relevant documents:

> Law librarians are particularly susceptible to task overload. For instance, searching a database on Westlaw or LexisNexis and retrieving 300 relevant documents, which frequently happens, will result in task overload.[48]

Although Wilson applies his descriptions of "upkeep" and "task" overload to the field of social science, the descriptions of this type of information overload could easily apply to the daily work of a lawyer:

> A different problem of overload arises in the context of particular inquiries or research projects. Here the problem is the overabundance of available data relevant to the particular inquiry – i.e., experimental results, field observations, historical records, statistical and survey data, and the like. Data may be scanty in one case but torrential in another to the point that no one could hope to analyze and evaluate them all or integrate them into a coherent picture, even supposing that there were no problems of locating and assembling them in the first place . . . . The kind of overload involved in maintaining currency we might call "upkeep" overload – the price of maintaining the intellectual capital that is the research worker's chief asset., the kind of overload presented by information relevant to a particular inquiry we might call "task" over load (the two kinds will frequently overlap).[49]

What adds to the challenge of information overload in law firms is the fact that lawyers themselves are producers of information (or knowledge); as such, there is both internally-generated information in addition to externally-generated information. Add to this the

[47] *Ibid*.
[48] *Supra* note 7 at 87.
[49] *Supra* note 45.

ease by which information can be duplicated and stored in a digital environment and you create conditions ripe for information overload:

> Our work is far more information intensive than it had been in a world whose economy was largely agricultural or even industrial just decades ago. In larger organizations, the problem is exacerbated by the number of people who generate information and "share" it with thousands of colleagues. Today, everyone is an information publisher or content creator. This of course makes it difficult to discern what information is valid and most up-to-date . . . . The problem is further exacerbated by information technology allowing information to be created and disseminated at a far greater pace and to a far greater number of individuals than book publishing every did.[50]

In addition to thinking of law firm information as falling broadly into "current awareness" information or "substantive knowledge" information, one can consider the average workday of a lawyer to see the types of information that he or she might encounter. These might include:

- **Too much information**: In a database of 100,000 or 1,000,000 documents, a lawyer may have difficulty in picking out the best or most appropriate document. One solution here, to be discussed in section 3 below, is a technological one of more sophisticated search engines and tools to filter or organize search results.

- **Too many sources**: Lawyers will often have the challenge of too many possible sources to search and not being sure which one to choose. "Sources" in this context are more than simply databases but include the multiple types of way in which information comes to the attention of a lawyer – by phone, by fax, by email, via a paper "inbox", and through print and online resources. To the extent that the

[50] Jonathan B. Spira et al., *The Cost of Not Paying Attention: How Interruptions Impact Knowledge Worker Productivity* (New York: Basex, 2007) at 5-6 [the "2007 Basex study].

practice of law is becoming more globalized and interdisciplinary, this also increases the possible sources of information that a lawyer will (and must) interact with. The solution here is largely one of developing the information literacy skills of your lawyers so they know how to effectively select the best sources of possible information.

- **Too many interruptions**: Although they are not a "source" of information overload, interruptions are definitely a symptom or result of a lawyer being barraged by too much information. As will be seen below, interruptions may negatively impact lawyers more than one might think due to the time it takes to return to the original task after being interrupted. The solution here is likely better time management.

- **Information too quickly**: Although technology has made information more easily accessible, technological improvements have also increased the speed by which information arrives and must be processed. Hensiak describes the time that information is "in the pipes" as "information float" and the speed by which information can flow has reduced information float and also raised expectations on the speed by which lawyers must increase their "turn around time" in responding to the faster flow of information:

> In particular, the speed in which data can be exchanged among parties has increased the prevalence of information overload. This phenomenon is called "information float" and it is defined as the "time that information spends in the communication channel." Traditional means of information delivery, such as the mail, takes several days. Now we can send that same information via email in several seconds. In the past, to get the latest news,

> we would wait for the morning or evening newspaper or for the evening newscast on television. Now, this same information is available over the Web almost instantaneously. Due to technological advances, such as email and the Internet, information float has been substantially reduced. As a result, more data enters information systems more quickly. However, our capacity to filter the information has not increased at the same pace. We receive far more information than we could possibly ever digest. Consequently, decreases in information float have caused an increased likelihood of information overload.[51]

The speed by which information flows is a particular risk for "upkeep" overload due to the volume of new information created each day and the speed by which it arrives, literally creating a *flood* of information for the lawyer trying to keep current.[52]

Separate from information overload challenges caused by large repositories of research and documents is the information overload (or appearance of information overload) caused by email. In many cases, it is reasonable to speculate that much information overload is actually *email* overload. The sheer potential volume of email from both internal and external sources, can cause information overload. Where the email is important but potentially ambiguous or unclear as to which, if any, of the recipients are meant to act on it, this merely compounds the problem.[53] As such, some lawyers who suffer from information overload are possibly really suffering from *email* overload, and if a firm is better able to help their lawyers control and manage email, that alone may

[51] *Supra* note 7 at 88-89.
[52] We frequently use the metaphor of "information as water". There is, among other metaphors: surfing the Net, drowning in information, a flood of information, waves of information, pipes and channels, the flow of information, etc. This likely has to do with the "fluid" (i.e., transmutable) nature of information, especially in a digital environment when bits and bytes of data are literally flowing through Internet routers or wirelessly through the air. To that extent, knowledge managers have multiple possible roles – as "lifeguards" to save our users from drowning, as "dam builders" trying to control the flow of information, and as "Moses" parting the seas leading our users into knowledge Nirvana.
[53] R. Janssen and H. de Poot, "Information Overload: Why Some People Seem to Suffer More than Others". Paper presented at NordiChi, Oslo, Norway (14-18 October 2006) 397 at 398. Available online from the Association for Computing Machinery on the ACM Digital Library: <*http://portal.acm.org/dl.cfm*> (Site last viewed: 27 March 2007).

greatly reduce the risk of information overload. In a world where "more than 50% of knowledge workers surveyed write e-mails or engage in IM sessions during conference calls,"[54] it is clear that the new communication technologies present in law firms are a factor in causing information overload.

Hensiak identifies a number of other law-firm technology tools that add to potential information overload, including the cheap and easy availability of hard drive disk space, a constantly changing environment, and the trend towards interdisciplinary practice.[55] The trend towards fewer secretaries in law firms and the need or desire for knowledge workers in law firms to directly have access to information themselves has also added to information overload:

> Another factor identified by some authors . . . as a contribution to overload, is the greater proportion of information searching done by end-users rather than information professional intermediaries: so-called 'disintermediation.' The presumption is that users will not be so skilled as information specialists at rapidly identifying a core of valuable material, and hence may feel more overloaded.[56]

In addition, the increasing move from paper to online sources of law-related information in law firms has meant that some users have lost the "context" that comes with using print resources (e.g., the ability to quickly thumb through pages and being able to see and know what is contained in the particular book):

> Information is only valuable to the extent that is is structured. Because of a lack of structure in the creation, distribution and reception of information, the information often does not arrive where it is needed and, therefore, is useless. It is easy for us to cope with large amounts of data as long as they are organized in systematic ways and as long as we are familiar with and can master the ordering principle for these data. It is very difficult, however, to find one particular piece of information in an

[54] *Supra* note 50 at 3.
[55] *Supra* note 7 at 89-90.
[56] David Bawden, "Perspectives on Information Overload" (1999) 51(8) ASLIB Proceedings at 252.

> amorphous pile of papers. It is even more difficult to cope with the millions of pieces of information that we receive in intangible form through our modern electronic media.[57]

It is easy to observe the anxiety of students or lawyers who are asked to search a database (be it a commercial online database of case law or the firm's own internal document repository). This anxiety is most prevalent when the search results are at either extreme, with there being either no results or too many results. If no results, the searcher is uncertain if the database truly does not contain the type of document they are looking for or whether instead their search is inadequate. If too many results, the searcher may grow frustrated at the difficulty in winnowing down results to only the truly relevant documents. This is the nature of searching online databases where one cannot easily visualize the contents of what is being searched:

> Because of the unlimited adaptability of modern information storage devices, their physical nature no longer allows for the formation of a preconceived notion about their content. The user cannot adjust his expectancy level before he actually consults the medium. Thus, the universality of modern media, which can store and distribute virtually any type of data, creates a uniformity for which we have yet to find methods for coping.[58]

Eppler and Mengis have identified a number of factors that affect information overload, including: (i) *Organizational design* – is the firm decentralized (which requires more and better communication among units) or is there coordinated standards and procedures for communication? (ii) *The nature of information itself* – is it reliable, ambiguous, complex, novel, lengthy? (iii) *The type or person* – what are their skills, level of experience, motivation? (iv) *The type of task to be achieved* – is it a routine and reoccurring transaction or is it instead complex, requiring a number of steps to integrate

[57] *Supra* note 20 at 6.
[58] *Ibid*. at 8.

various types of information? Also: how many tasks are there and will the person be interrupted? (v) *Technology* – new technologies can increase the amount of information available.[59] Applying these five factors to law firms would suggest that law firms are potential breeding grounds for information overload: Law firms tend to be decentralized, the information they deal with is often ambiguous, there are varying skill levels among firm members, tasks are often complex, and some law firms implement technology quite quickly.

The Negative Impact of Information Overload

> *A patient asked me whether I thought it was abnormal that her husband brings the BlackBerry to bed and lays it next to them while they make love.*[60]

What then is the effect of all of these potential sources of information overload in the law firm? Besides possibly ruining one's social life outside of the law firm (see the quotation above), it is relatively clear that information overload can negatively affect lawyers resulting in poorer or inaccurate decisions being made:

> . . . [T]here is wide consensus today that heavy information load can affect the performance of an individual negatively (whether measured in terms of accuracy or speed). When information supply exceeds the information-processing capacity, a person has difficulties in identifying the relevant information.[61]

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[59] Martin Eppler and Jeanne Mengis. "The Concept of Information Overload: A Review of Literature from Organization Science, Accounting, Marketing, MIS, and Related Disciplines" (2004) 20(5) Information Society 325 at 330-31.

[60] Attributed to psychiatrist E.M. Hallowell, as cited by Claudia Wallis and Sonja Steptoe, "Help! I've Lost My Focus." Time (10 January 2006). Available online: <*http://www.time.com/time/magazine/article/0,9171,1147199,00.html*> (Site last viewed: 27 March 2007).

[61] *Supra* note 59 at 331, citing J. Jacoby, "Information Overload and Decision Quality: Some Contested Issues" (1977) 14 Journal of Marketing Research 569.

Studies have shown that people will perform better with the right amount of information but as soon as there is too much information, performance declines results in the person not integrating the excess information and forgetting past information.[62]

Information anxiety appears to be a real problem caused in part by a disconnect between what we know and what we think we should know and the difficulty in getting that knowledge:

> Information anxiety is produced by the ever-widening gap between what we understand and what we think we should understand. Information anxiety is the black hole between data and knowledge. It happens when information doesn't tell us what we want to know.[63]

The challenge of evaluating the sheer volume of information to discern the most important parts also causes stress:

> The glut [of information] has begun to obscure the radical distinctions between data and information, between facts and knowledge. Our perception channels are short-circuiting. We have a limited capacity to transmit and process images, which means that our perception of the world is everything. The more images with which we are confronted, the more our view of the world is likely to be distorted.[64]

Information overload will also often lead to interruptions. A 2005 study by Basex reports that interruptions now consume 2.1 hours or 28% of the workday – not just interruptions and distractions but the time needed to get back to the original task.[65] And the effect of interruptions are more insidious than mere time wasters. Wallis cites a study at the University of California at Irvine that tracked 36 office workers where on average

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[62] *Ibid*. at 326.
[63] *Supra* note 14 at 14.
[64] *Ibid*. at 17-18.
[65] Jonathan B. Spira et al., *The Cost of Not Paying Attention: How Interruptions Impact Knowledge Worker Productivity*. New York: Basex, 2005.

they could only get 11 minutes into a project before being interrupted and once interrupted it took, on average, 25 minutes to return to the original task.[66] The Basex research also noted that "55% of workers surveyed said they open e-mail immediately or shortly after it arrives, *no matter how busy they are*"[67] (emphasis added).

In addition, stress of information overload can lead to "attention deficit trait" (ADT) which can negatively impact a worker's performance:

> [There is] a very real but unrecognized neurological phenomenon that I call attention deficit trait, or ADT. Caused by brain overload, ADT is now epidemic in organizations. The core symptoms are distractibility, inner frenzy, and impatience. People with ADT have difficulty staying organized, setting priorities, and managing time.[68]

The symptoms of ADT create a vicious circle of negative impacts that cause the sufferer to increasingly spiral out of control unless the circle is broken:

> The symptoms of ADT come upon a person gradually. The sufferer doesn't experience a single crisis but rather a series of minor emergencies while he or she tries harder and harder to keep up. Shouldering a responsibility to "suck it up" and not complain as the workload increases, executives with ADT do whatever they can to handle a load they simply cannot manage as well as they'd like. The ADT sufferer therefore feels a constant low level of panic and guilt. Facing a tidal wave of tasks, the executive becomes increasingly hurried, curt, peremptory, and unfocused, while pretending that everything is fine.[69]

Research by Janssen and de Poot also notes the "vicious circle effect", particularly for those in one group of their study who were sufferers of information overload; this group were the most likely to be unable to escape from the vicious circle of information overload:

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[66] Wallis and Steptoe, *supra* note 60.
[67] *Supra* note 50.
[68] E.M. Hallowell, "Overloaded Circuits: Why Smart People Underperform" (January 2005) Harvard Business Review 55 at 55-56.
[69] *Ibid*. at 56.

> [Permanent sufferers of information overload] are in a vicious circle . . . where information overload negatively affects the ability to reflect on one's job and one's priorities. This in turn leads to an inefficient, reactive work style that we typically noticed for this group of people. As clear priorities seem to be a key property of a successful coping strategy, information overload can in this way easily reinforce itself. We therefore expect that people in [this] group will be unable to escape from the vicious circle; they will need help from an outsider (personal coach or trainer) for this. Not surprisingly, this is exactly what they mention themselves.[70]

The effects of ADT are not trifling but are instead described by Hallowell as a "neurological effect" that impact how different parts of our brains are stressed by information overload and how this negatively impacts work performance:

> When the frontal lobes approach capacity and we begin to fear that we can't keep up, the relationship between the higher and lower regions of the brain takes an ominous turn. Thousands of years of evolution have taught the higher brain not to ignore the lower brain's distress signals. In survival mode, the deep areas of the brain assume control and begin to direct the higher regions. As a result, the whole brain gets caught in a neurological catch-22. The deep regions interpret the messages of overload they receive from the frontal lobes in the same way they interpret everything: primitively. They furiously fire signals of fear, anxiety, impatience, irritability, anger, or panic. These alarm signals shanghai the attention of the frontal lobes, forcing them to forfeit much of their power. Because survival signals are irresistible, the frontal lobes get stuck sending messages back to the deep centers saying, "Message received. Trying to work on it but without success." These messages further perturb the deep centers, which send even more powerful messages of distress back up to the frontal lobes.[71]

The alarm signals that are triggered in the brain dim intelligence and the sufferer is prone to making rash judgments and loses flexibility and sense of humour; alternatively, another reaction is to go into denial and avoid dealing with the problem, what Hallowell calls ADT at its worst.[72]

[70] *Supra* note 53 at 398.
[71] *Supra* note 68 at 59.
[72] *Ibid*. at 58-59.

Despite the Basex research results that suggest that people under the age of 33 are more comfortable multitasking,[73] a different study suggests that multitasking does in fact make one more ineffective in task accomplishment,[74] something noted by the Basex study when their report states that "the ability to devote partial attention to multiple sessions does not necessarily make an individual more productive."[75] Other studies have shown that sufferers of information overload become highly selective and ignore a large amount of information or give up and don't go beyond the first results in many cases, [76] need more time to reach a decision,[77] make mistakes,[78] have difficulties in identifying the relationship between the details and the overall perspective,[79] and waste time.[80]

[Section 3 continues on the next page]

[73] *Supra* note 50 at 3.
[74] Steve Lohr, "Slow Down, Brave Multitasker, and Don't Read This in Traffic" (25 March 2007) *New York Times*, citing a recent study at Oxford Univeristy.
[75] *Supra* note 50 at 3.
[76] *Supra* note 56.
[77] J. Jacoby, "Perspectives on Information Overload" (1984) 10 Journal of Consumer Research 482.
[78] N.K. Malhotra, "Reflections on the Information Overload Paradigm in Consumer Decision Making" (1982) 10 Journal of Consumer Research 436.
[79] S.C. Schneider, "Information Overload: Causes and Consequences" (1987) 7 Human Systems Management 143.
[80] Nick Parnell, "Managing Information Overload" (2001) Business Information Review 45 at 48.

3) Practical Tips for Combating Information Overload in the Law Firm Through "Human" and "Technological" Solutions

Sideshow Bob ("The Simpsons") (having appeared on television before the townspeople in order to threaten to abolish television): *By the way, I am aware of the irony of appearing on television in order to decry it. So don't bother pointing that out.*[81]

* * * * * * *

A single conversation across the table with a wise man is worth a month's study of books.

Chinese Proverb[82]

Because of the negative impact that information overload can have on lawyers, it is incumbent on KM departments to develop policies and procedures to help combat the problem. A number of the solutions identified in the literature for combating information overload seem surprisingly trite – better time management, turning off the tap by not compulsively checking email, and so on. As has been mentioned by one commentator, "[s]olutions to information overload, like its causes, are multi-faceted, and there is no single tool or technique that will correct the problem."[83] Mulder, for example, suggests four categories of "guidelines" that take into account both individual and organizational factors:[84]

- **Sender guidelines**: These are techniques that "aim to increase awareness such that senders communicate and distribute information more effectively and efficiently."
- **Receiver guidelines**: These "aim to provide sufferers of information overload with coping strategies and role-based best practices."

[81] Sideshow Bob from "The Simpsons" Episode: Bob's Last Gleaming" (Original airdate: 26 November 1995), written by Spike Ferensten.
[82] *Supra* note 14 at 97.
[83] *Supra* note 56 at 253.
[84] *Supra* note 2 at 251.

- **Tooling guidelines**: These would largely be technology solutions "to improve the tools used to organize and manage information on a personal as well as organizational level."

- **Organization guidelines**: These guidelines "are aimed at introducing training and awareness programs throughout the organization, as well as the introduction of organization-wide principles."

Mulder states that these "guidelines need different implementation strategies because they address different aspects of information overload." Success "depends not only on the nature of the guidelines and the audience, but [also] on the organizational culture."[85]

Bawden, on the other hand, would divide solutions to combating information overload into two broad categories – managerial and technical:

> On the managerial side, the single most applicable and useful general concept in overcoming overload is that of "control". It was noted at the outset that loss of control over information is the single major symptom of overload, and restoring control is the major stem towards its remedy.
>
> . . .
>
> On the technical side, it is also, not surprisingly, suggested that, as new ICTs can be held responsible for a large part of information overload, so they provide something in the way of a solution. Many specific systems or functions have been suggested. These mainly fall into two classes: intelligent search agents and intelligent interfaces . . . and systems for automatically ranking and filtering email and similar messages . . . . A third general category is systems for customising retrieved information after it arrives.[86]

Another approach to combat information overload is to pay attention to personal knowledge management (PKM) by educating individual knowledge workers on the techniques they can implement to better control the flow of information:

> The idea behind personal knowledge management (PKM) is to provide the individual with the tools and techniques they need to surmount the overwhelming information they encounter at the work place and to enable them to increase their own

[85] *Ibid*.
[86] *Supra* note 56 at 253-54.

> productivity. While traditional organizational KM initiatives take a top-down approach, imposing the objectives of the organization on the end-user. PKM is focused on a bottom up approach, with an individual perspective to KM. The goal is to allow individuals to choose what information to collect, how to structure it, and who to share it with.[87]

As will be seen below, some of the PKM techniques involve technological solutions (e.g, using RSS as a tool to control incoming news and law-related information) while others involve individual skills and building the information literacy of the lawyer.

At the heart of the various tip and techniques to control information overload in the law firm is the notion of control – using technology or other techniques to control the flow of information. Below, I divide these various tips into two broad categories: technological solutions and "human" solutions.

Technological Tips to Control Information Overload

The idea that technology would be the solution to combating information overload is slightly ironic, not unlike the episode of "The Simpsons" in which Sideshow Bob notes the irony of appearing on television to advocate that television be abolished. Nonetheless, as new technologies are developed that will increase the amount of information available, expect new technologies to also be developed to help manage this new information. The challenge, of course, is that there may often be a slight gap or delay in the technological solutions being developed or the technological solutions may not be

[87] Theresa L. Jefferson, "Taking it Personally: Personal Knowledge Management" (2006) 36(1) Vine 35 at 35-36.

able to solve all aspects of information overload. Here are a few technology tips culled from the literature:[88]

a) Better search engines: data mining, filtering, automatic categorizing:

Clearly one advantage we currently have over Renaissance researchers is having access to technology that allows full-text searching of large repositories of information. However, simply full-text searching with Boolean operators has its limitations, placing the onus for successful information retrieval largely on the user. Place 10 young lawyers in a computer lab working independently and ask them, based on a specified fact pattern, to use full-text search engines to find relevant case law in a commercial online database or relevant documents from within a document management system and I would venture it would be highly unlikely that you would get 10 identical search results. Fortunately, the answer to combating information overload through the use of search engines is the move beyond mere full-text search engines to using search engines that incorporate smart technology to mine the text of documents and make connections between the documents that an ordinary full-text search engine cannot do:

> Text mining is useful because of the enormous amount of knowledge, either within an organization or outside of it, that resides in text documents. Since most organizations rely on textual information, both from outside and inside the organization, working with this sea of text can become extremely difficult. The whole collection of text is simply too large to read and analyze easily. Furthermore, it changes constantly and requires ongoing review and analysis if one is to stay current. Text mining addresses these problems, providing tools to analyze and learn from this kind of dynamic information.[89]

[88] I have summarized in Appendix B a non-exhaustive list of "smart search engine" companies identified in the literature that advertise "smart search technology" as part of a KM or content management solution.
[89] L.J. Haravu and A. Neelameghan, "Text Mining and Data Mining in Knowledge Organization and Discovery: The Making of Knowledge-Based Products" (2003) 37 Cataloging & Classification Quarterly 97 at 103.

Likewise, Knowles and Ferguson identify a number of technologically advanced techniques for getting better search results through the use of smart technology including vector space modeling (using probalistic profiling and weighting of terms to improve relevancy), neural networks (search engines such as Autonomy or Recommind that "learn" to recognize patterns in text and to make relevant associations), data mining and knowledge discovery, and collaborative filtering technologies[90] that "compare the inquiries and actions of one user, with the inquiries and actions of other users, and look for similarities between users."[91]

Haravu distinguishes between (full-text) searching and "discovery" through text mining using a discovery engine, along the lines described by Knowles and Ferguson:

> Text mining is receiving considerable research and development attention. Content searching using a search engine based on a search term–keyword or string–does not address the information overload problem adequately enough even with methods that list the retrievals according to one or more other ranking methods. This has led to the need to differentiate between search and discovery. A search engine's main function is to locate documents based on the user's keywords. A discovery engine on the other hand attempts to extract relevant textual data from a corpus of text and then provides a graphical, dynamic and navigable index . . . . The visual presentation of concepts is aimed at promoting a better understanding of the underlying content and structure of the textual data, leading hopefully to improved retrieval, and hence, productivity of the knowledge worker.[92]

Although already getting somewhat dated, Bostock in 2002 was advocating XML technology and the use of smart agents to gain control over information:

> Metadata has a useful role to play, especially for some purposes, but it cannot do everything. Metadata offers the potential to improve the functionality of Internet search tools, and resource discovery services, over the short- to medium-term. It also has a key long-term role in describing processes associated with a resource, and describing the content of resources that cannot easily express themselves (e.g. an image). (However, some knowledge management systems do have the capability to classify and match concepts in various multimedia formats.) Metadata standards

[90] See A. Borchers et al., "Ganging up on Information Overload" (1998) 31(4) Computer 106 for a discussion of GroupLens filtering technology.
[91] Chris Knowles and Innes Ferguson, "Six Techniques for Better Matching, Filtering and Profiling of Stored Knowledge" (June 1998) 1(6) InsideKnowledge [online version].
[92] *Supra* note 89 at 103.

> development, agreement and implementation require significant effort and cost. Adding metadata is extra work; and many end users lack the time and skills.[93]

Bostock also predicts the growth of artificial intelligence systems that will supersede traditional knowledge management systems:

> There is a blurred boundary between knowledge management systems and artificial intelligence. It is probably reasonable to state that the current generation of knowledge management systems is an interim measure, to eventually be superseded by AI systems. Such systems will probably be able to process natural language and XML encoded content.[94]

Borchers describes work being done at Xerox to improve collaborative filtering that would allow workers to rank messages or other content (as "superior" for example), something which would could be included as part of their evaluation of search results (i.e., knowing that a particular document has been flagged as "superior" by someone in the firm who is an expert in that areas gives subsequent searchers more confidence in using that document).[95] At the "output" end of searching, O'Leary advocates clustering search engines such as Clusty.com (from Vivisimo) and Grokker, ask.com and Firstgov.gov that organize search results in folders by topic:

> In addition to retrieving a set of Web pages that are relevant to your search query, they classify, or "cluster," them by subject to provide more targeted and focused results . . . .They automatically scan the initial search set to identify recurring terms or phrases on the premise that subject-related pages use common language, and then place them together in separate folders.[96]

As O'Leary (and personal experience) have discovered, however, is that clustering search engine technology has not been perfected and the systems have trouble separating out similar subjects and making fine distinctions.

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[93] Adam Bostock, "Avoiding Information Overload: Knowledge Management on the Internet" (June 2002) JISC. Available online: <*http://www.jisc.ac.uk/whatwedo/services/services_techwatch/techwatch/techwatch_0202_supp1.aspx*> (Last viewed: 27 March 2007). 11.
[94] *Ibid*. at 12.
[95] *Supra* note 90.
[96] Mick O'Leary, "Clusty Solves Information Overload" (2006) 23(7) Information Today 35.

b) Email management: Another technological solution identified in the literature is aimed at controlling email through a variety of techniques:

> Another simple solution is to better manage email. Email is designed to be a means of synchronous communication even though it is seldom used for this purpose alone. People use email as a filing system for important documents or keep old emails as a de facto "to-do list." Most email programs are not designed to perform these kinds of functions. Moreover, using email for these functions often causes email inboxes to be overrun with hundreds, if not thousands, of messages. Without cohesive organization or upkeep, using email in this manner will result in feelings of frustration and eventually, feelings of overload. Limiting email to communication functions is one simple way to avoid the frustration that accompanies information overload.[97]

Wallis describes a recent project by Microsoft to design "an intelligent office-communication system that calculates whether an interrupting email or IM should be transmitted immediately or delayed on the basis of, among other factors, the worker's appointments and projects that day, his past preferences and habits and the organizational-chart relationship between sender and receiver."[98] Likewise, Finch holds out promise for technology to provide better or "smart" email filtering.[99]

There are also any number of relatively trite suggestions in the literature on combating email overload, including, for example, making important firm-wide announcements by voicemail. Other suggestions focus on email policies that promote meaningful subject line wording (such as "Urgent", "FYI" and so on),[100] limiting the sending of unnecessary email, unsubscribing from listservs, using Microsoft Outlook flags with one's assistant to offload the handling of as many email messages as possible

[97] *Supra* note 7 at 94.
[98] Wallis and Steptoe, *supra* note 60.
[99] I. Finch et al. "Using Cooperating Knowledge-Based Systems to Reduce Information Overload" (20 November 1995) 20 IEE Colloquium on Information Overload 8/1-8/3.
[100] Carol Macaskill, "Information Overload" (April 2002) Knowledge Management 30.

to the lawyer's assistant, and finally, "turning off the technology" on evenings and weekends.

c) RSS/Web 2.0: More recent literature focuses on the possibility of Web 2.0 technologies such as RSS feeds or law firm (internal) blogs to put lawyers back in control of incoming information by no longer using the email inbox as the main source for collecting incoming information:

> The RSS model puts the subscriber in complete control of the subscription process. You only subscribe to the feeds you want, then you can unsubscribe by simply deleting the feed in your news aggregator.[101]

Kennedy identifies the features of RSS that serve the purpose of combating information overload by making it easier to control and scan information served up by the RSS reader:

> With respect to new information, we ideally want to do several things—each of which we can easily do with news aggregator tools:
>
> 1. Know that the information is there (via an Alert).
> 2. Quickly determine what it is (via a Headline).
> 3. Quickly scan or get the gist of the information (via an Excerpt or Summary).
> 4. Read the full article if we are interested (via Full Text).
> 5. Deal with the information, typically by acting on it, moving on it, deleting it or filing it (via Action Steps)."[102]

Despite the power of RSS to control the flow of information, Kennedy remains somewhat skeptical whether all lawyers at every firm would adopt the technology:

> So, at this point, I'm quite pessimistic about adoption by RSS in the legal profession and use of RSS readers by lawyers, even though RSS/XML has been my favorite technology for quite a few years. For the foreseeable future, I expect this to be the domain of a small group of tech-savvy lawyers, whose clients will definitely benefit.

[101] Ron Miller, "Can RSS Relieve Information Overload?" (March 2004) 27(3) EContent 20 at 24.
[102] Dennis Kennedy, "Beating Information Overload with News Aggregators" (November/December 2003) 29(8) Law Practice Management. Available online: <*http://www.abanet.org/lpm/magazine/articles/v29is8an4.shtml*> (Site last viewed: 27 March 2007).

> On the other hand, as RSS gets integrated into websites, many lawyers will be consuming feeds without realizing it. Ultimately that's a good thing, but it's ironic that as far into the RSS era as we are, that lawyers using RSS readers can still be seen as early adopters.[103]

Miller sees RSS as a way of providing fresh content for your intranet to avoid the "Empty Portal Syndrome" by including internal updates on new content or intranet developments and external information (news, court decisions, new legislation, new library arrivals, firm newsletters and the like).[104]

According to Truch, the networking company Cisco uses online discussion forums chat boards internally (and externally) to gain, as he says, "bite-size chunks of information":

> Cisco, based at San Jose, California, encourages its employees to gain bite-size "chunks" of learning to answer specific questions as they arise during the working day. Dolezalek explains that the company has turned to online communities of practice that include discussion forums, chat boards, e-newsletters and other Internet-based sources of information. Such media enable employees to tap into relevant information – wherever it is located in the world – with a few clicks of the mouse.
>
> The company is extending some of these online communities – such as the community for networking professionals who use Cisco's routers and hubs – to include customers as well as employees. More than 80 percent of this community's visitors come to troubleshoot their networking problems, and 89 percent of these report that they get some level of resolution for their question or problem.[105]

d) Design: As was noted earlier, the design of online information plays a crucial role in providing context to the user in an environment that is otherwise unfamiliar or difficult to gauge. Studies have shown that data that is visualized, compressed and

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[103] Dennis Kennedy, "Will Lawyers Adopt Newsreaders?" From the the Denniskennedy.com Blog (Posted: 18 February 2007 Available online: <*http://www.denniskennedy.com/blog/2007/02/by_request_will_lawyers_adopt_newsreaders.html*> (Site last viewed: 27 March 2007).
[104] *Supra* note 101 at 23.
[105] Edward Truch, "Coping with Information Overload: The Cases of Canon and Cisco" (2004) 12(7) Human Resource Management 5-6.

properly aggregated is much easier to process.[106] Look and feel matters on your intranet and the layout of your design and the links (and images) you provide your users will affect the ease by which they can effectively find the information to be found. Although the effective design of online information is beyond the scope of this paper, there are a number of design criteria that should be included in any intranet or portal project to make it easier for users to access content and to reduce the information anxiety that can be associated with information overload. Design criteria should take into account things such as typography, the use of (white) space, colours, placement on the screen, navigability, layout, the use of shapes and images, and so on.[107]

Combating Information Overload with the Human Touch

In addition to purely technological solutions to combat information overload, there are a number of other "human" approaches that your KM department can deploy to help overcome information overload. While some of these solutions seem relatively simply or obvious, they are "trite" most likely because they work:

a) Time management: To the extent that time pressures on lawyers reduce their available time for searching for information, anything that can be done to encourage better time management should help reduce the negative effects and stress of information

[106] R.L. Ackoff, "Management Misinformation Systems" (1967) 14 Management Science 147 and J. Meyer, "Information Overload in Marketing Management" (1998) 16 Marketing Intelligence and Planning 200.
[107] For more, see, for example: Jakob Nielsen, *Designing Web Usability* (Indianapolis, IN: New Riders, 2000); Alison J. Head, "Demystifying Intranet Design: 5 Guidelines for Building Usable Sites" (2000) 24(4) Online 36-42; Cynthia L. Nicotera, "Information Access by Design: Electronic Guidelines for Librarians" (1999) 18(2) Information Technology and Libraries 104-8.

overload. Bawden identifies time management as one of the techniques that can be implemented at the individual level to gain control over information

> At individual levels, the skills required are neither complex nor technical. Many of them may be placed under the general heading of "time management". An obvious example is an explicit prioritisation of information seeking related to work goals and objectives, as opposed to a semi-random surfing among peripherally relevant material on the web, and an over-zealous reading of all in-coming emails.[108]

Where lawyers are able to block unnecessary channels of information or communication, they should do so.[109] Citing research done at UC Irvine, Wallis describes a very low-tech solution in one company where the workers wear coloured hats to signify when they do and do not want to be interrupted![110] All of the other standard advice on limiting interruptions should also reduce the feeling of information overload. These include such things as setting aside set times in the day to read and reply to email, using a closed door policy when needed, and blocking off chunks of time in your Outlook Calendaryou're your own time to avoid being over-booked.

b) Stress management: Hallowell, who identified the "attention deficit trait" problem discuss in section 2 above, has a number of solutions to reduce the stress caused by ADT, including creating a positive environment with people you respect and trust, taking physical care of your brain, getting good sleep and exercise, eating a balanced diet, breaking large tasks down into smaller tasks, and limiting your "to do" lists to only high

[108] *Supra* note 56 at 253.
[109] *Supra* note 2.
[110] *Supra* note 98.

priority items.[111] He specifically advises people to "devise strategies to help your frontal lobes stay in control":

> To stay out of survival mode and keep your lower brain from usurping control, slow down. Take the time you need to comprehend what is going on, to listen, to ask questions, and to digest what's been said so that you don't get confused and send your brain into panic. Empower an assistant to ride herd on you; insist that he or she tell you to stop e-mailing, get off the telephone, or leave the office.[112]

To trick your mind of getting of "panic mode" and allowing your frontal lobes to gain (rational) control when you are caught in the vicious circle caused by information overload, Halowell recommends a number of "mind-clearing" tricks to clear your brain. These include, for example, spending 5 minutes doing a crossword or writing a memo on a neutral topic or a paragraph on something unrelated to your project (e.g., describing your house or car).

c) Training/information literacy: The definition of information literacy from the Association of College and Research Libraries emphasizes the role of the individual in gaining mastery or control over the way in which they interact with information:

> Information literacy forms the basis for lifelong learning. It is common to all disciplines, to all learning environments, and to all levels of education. It enables learners to master content and extend their investigations, become more self-directed, and assume greater control over their own learning. An information literate individual is able to:
>
> - Determine the extent of information needed
> - Access the needed information effectively and efficiently
> - Evaluate information and its sources critically
> - Incorporate selected information into one's knowledge base
> - Use information effectively to accomplish a specific purpose
> - Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally[113]

[111] *Supra* note 68 at 59-60.
[112] *Ibid*. at 60-61.
[113] Association of College and Research Libraries, "Information Literacy Competency Standards for Higher Education" (18 January 2000). Available online: <*http://www.ala.org/ala/acrl/acrlstandards/informationliteracycompetency.htm*>

Members of your KM (and Library Services) Department can play an important role in training and developing the information literacy of the knowledge workers in your firm. Bawden sees information literacy as the key to overcoming information overload by giving your users information-handling skills that "go beyond the simple ability to retrieve information" to include "elements of evaluation, organization and use."[114] Where possible, it is often ideal to place information specialists within various practice groups to collaborate and to establish standard operating procedures for that group.[115] Truch describes the use of online e-learning programs used at Canon to allow employees to educate themselves through e-learning;[116] creating online teaching materials to supplement in-person training is an excellent way to promote information literacy.

d) Annotations/taxonomies/analysis: As someone with a library science background, it is hard for me to not want to fall back on the use of controlled vocabularies to help organize large bodies of information. If the Library of Congress can effectively organize over "29 million books and other printed materials, 2.7 million recordings, 12 million photographs, 4.8 million maps, and 58 million manuscripts"[117] through Library of Congress classification schema, there is something to be said for the value of controlled vocabularies and the use of taxonomies to organize information.[118] The challenge, of course, is the difficulty for the people within your firm developing,

[114] *Supra* note 56 at 253.
[115] *Ibid*.
[116] *Supra* note 105 at 5.
[117] Library of Congress, "About the Library" Available online: <*http://www.loc.gov/about/*> (Site last viewed: 2 April 2007).
[118] *Supra* note 89 at 98.

maintaining and consistently using a taxonomy to organize their information. In addition, the large amount of information, which includes potentially unimportant or insignificant documents, makes it doubtful that there would be value in classifying every document in your document management system. To the extent that smart search technology is improving to automatically classify documents through technology, then perhaps the need for a human touch for classification in this regard is lessened. Despite that possibility, and short of developing extensive taxonomies, there is still value in your subject experts within the firm to annotating or adding value to the more important documents in your collection (e.g., models and precedents):

> [T]he problem of information overload is to a large extent a symptom of a failure to create "high quality" information for management use, that is to say, information of a high value-added nature.[119]

The ability to provide value-added information and make it accessible to your users in a way that is meaningful to them can greatly reduce their information anxiety and reduce the risk of information overload:

> Simply providing access to an ocean of information is not enough, however. Executives need knowledge delivered in a form they can quickly interpret and act on. The failure of firms to find adequate ways to prioritise information is cited as the biggest impediment to good decision-making by 55% of executives. A significant proportion of respondents also expressed misgivings about whether the information they receive is even accurate or reliable.[120]

Bates certainly advocates a role for the information professional – someone who is information literate – to help in the process of filtering too much information and delivering it in a form most meaningful to the user, whether by annotations or summaries or the like:

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[119] Chester Simpson and Laurence Prusak, "Troubles with Information Overload – Moving from Quantity to Quality in Information Provision" (1995) 15 Int. J. of Information Management 413.

[120] Economist Intelligence Unit, *Know How: Managing Knowledge for Competitive Advantage* (2005) at 6. Available online: <*http://graphics.eiu.com/files/ad_pdfs/Tata_KnowHow_WP.pdf* > (Site last viewed: 2 April 2007).

> Our greatest asset – our ability to find, filter, and manage information – becomes a liability when we overwhelm our clients with content.
>
> Our goal is to return to the days before search engines and information overload, when our clients were amazed at our ability to dig up high-value information, and to again have them marvel at what we deliver and know they are standing in the presence of an Info God.[121]

Likewise, Eppler and Mengis also advocate an approach to combating information overload in a way that ensures the information is of high value and delivered in the most convenient way and format.[122] Bawden also sees an important role for knowledge managers and librarians in helping to control information overload but also notes the irony that information professionals, who ordinarily would seek to uncover all possible relevant information on a topic in helping a patron, might now instead need to protect their users from information:

> Finally, it is true to say that some commentators see a role for the information professional in helping users to combat overload, largely through exercise of 'traditional' information-handling skills; for example, creating catalogues of web resources, and providing advice of focused searching. It is interesting to consider that the role of the information professional, which has hitherto been assumed to be that of identifying and accessing essentially all relevant information, may have to change to that of protecting users from information.[123]

e) "Culture": One final "human touch" is the goal of nurturing a law firm culture that supports KM initiatives and creates an environment of trust and sharing among lawyers and staff. In the belief that the individuals in a law firm are better and stronger collectively than as individuals, teamwork is one way of lessening the information overload burden that any single individual might bear:

[121] Mary Ellen Bates, "Are We Overloaded Yet?" (February 2003) 26 EContent 17.
[122] *Supra* note 59 at 334.
[123] *Supra* note 56 at 254.

> A group of workers can easily do what a single individual would find impossible . . . . Each specialist [on the team] may continue to face the problem of upkeep overload, but the problem need not be exacerbated by the social situation of working on a team: indeed it may well be mitigated (if for instance there are others to serve as filters to screen out literature one need not bother to examine). And while the problem of task overload may be horrendous – if, for instance, the task is to explore real social problems and find plausible solutions – still it can be treated as a collective problem, not an individual one. So the conduct of research by teams or groups is a way of increasing the amount of expertise and information that can be brought to bear on a problem without increasing the burden of overload on the participating individuals. This is not to avoid the problem of information overload entirely, but at least it makes it possible to do what overload would otherwise make impossible.[124]

Ultimately, although I remain optimistic that technology will play an important role in reducing information overload, for the near future, it is likely that a combination of both technological and human solutions will be needed.

Conclusions

By definition, information overload occurs when the amount of information received exceeds the ability to process that information. Because lawyers are exposed to so much information from different sources in different formats, the challenge is to control the flow of information. Since medieval times, researchers have coped with information overload through a number of techniques that are still relevant to day, including the use of navigational tools, taxonomies and maps, and new digital technologies that mimic and enhance these old-fashioned coping techniques. Whether it is managing current awareness or maintaining and accessing substantive knowledge, coping techniques make not only financial sense in the cost savings but also in building an environment and culture where lawyers can thrive. Although technology is often

[124] *Supra* note 45.

blamed for causing information overload, technology promises a number of solutions, including improved methods of controlling and filtering information through more sophisticated search engines, techniques for filtering email and, on the current awareness side, using RSS and other Web 2.0 tools to allow lawyers to better control the information flow. However, the KM department also has the opportunity to provide the "human" touch to help lawyers reduce information overload through time management, stress management, training/information literacy, annotations/taxonomies/analysis, and developing a positive culture that supports KM and reduces information overload.

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Appendix A

Summary of Tips and Techniques to Combat Information Overload

Technological tips:

- Smart search technologies to improve search results; text and data mining; filtering software, collaborative tagging
- Email management: possible new, smarter email filtering
- RSS feeds to control type and volume of current awareness
- Better intranet/portal design

"Human factor" tips:

- Better time management skills
- Better stress management skills
- Developing information literacy of users
- Valued-added annotations, taxonomies and analysis to save the time of the reader
- Developing a culture to support sharing of information workload

Appendix B

Sample Listing of Technology Companies with Information Overload Solutions

Note 1: The following list is by no means comprehensive

Note 2: Recommind and WestKM are sponsors of this seminar

Companies that advertise "Smart" Search Engine or Text Mining Technologies

- Autonomy (http://www.autonomy.com)
- ClearForest (http://www.clearforest.com)
- Convera (http://www.convera.com)
- EMC^2 (http://software.emc.com)
- Gammasite (http://www.gammasite.com)
- InXight (http://www.inxight.com)
- LawPort from SV Technology (http://www.svtechnology.com)
- Microsoft Sharepoint (http://www.microsoft.com/sharepoint/default.mspx)
- Open Text (http://www.opentext.com)
- Recommind (http://www.recommind.com)
- SmartLogik (http://www.aprsmartlogik.com)
- SPSS (http://www.spss.com)
- Stellent (http://www.stellent.com)
- West KM (http://www.elite.com/solutions/product-fam/westkm/index.asp)