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Hall, H. (1998). Networked information: dealing with overload. In *Proceedings of Information Scotland 1997, Strathclyde Business School, November 4th 1997* (pp. 37-44). Paisley: LACIG Scotland.

1. "...too much information coming in, too little time to weed out the trash, too little time to respond to what's important"(Tetzeli, 1994)

In support of peak performance all organisations require optimal information: information that arrives at the right time and in the right format, matching the quality requirements of its potential users (Marcusohn, 1995). In contrast to this, a superabundance of information, some of which may be irrelevant or of dubious quality, that arrives too quickly, can be damaging to employees and their business in the form of information overload. Two decades ago this concept was dismissed as a "phantom" that did "not exist for most people in most circumstances" [1] (Wilson, 1976). However, recent research conducted in industrialised nations of Europe, the United States and Asia Pacific demonstrates that the problems associated with information overload are now much more tangible: 49% of managers feel that quite often or very frequently they are unable to handle the information they receive and two thirds of them believe that information in their organisations is under-utilised. Some managers are even "reluctant to admit personally such sufferance for fear of being seen to fail in their job responsibilities" (Reuters, 1996).

In commercial companies, intranet technologies are implemented to handle the problems of information overload. The world leaders in this area include the computer manufacturers with strong Scottish connections, such as Sun Microsystems with its plant in Linlithgow, and Hewlett-Packard, with a base in South Queensferry. This paper examines how the new Scotland might learn lessons in information handling from the experience of these independent business communities. How this knowledge might be applied to support an effective networked environment to provide information and advice to government, institutions, related bodies and individuals, is discussed.

2. Information overload: the climate

The symptoms of information overload can be attributed to a number of factors. From a broad perspective, it can be argued that over the past two decades changes in management attitudes towards information have created an ideal environment for overload to become an issue. A number of management gurus have urged businesses to focus on information as a resource: for instance, Porter advocated in the 1980s that improved use of information sources and freed information flows were a determinant of economic prosperity (for example see Porter, 1985; Porter, 1987; Porter 1990; Porter and Millar, 1985); Drucker claims that the "most important do is to build the organisation around information and communication" (Drucker, 1990). Changes in management structures have served to facilitate the flow of this information. The move from hierarchical to matrix, or flat, management structures and team-working has altered the communication processes in organisations. Generally, this makes it easier for employees to communicate with one another more freely, in contrast with the more traditional chains of command that lock individuals into certain relationships, imposing a formal set of information filters throughout the organisation. A diminution in the power of perceived status evident from the new organisational chart invites more people to access others more frequently: research has shown that overload is particularly prevalent amongst groups of people with the same status (Reuters, 1996). This freedom to approach individuals is facilitated by the widespread adoption and use of new technologies, some of which were previously accessible only to the privileged few. Cheaper, advanced personal computer and telecommunications have furnished the modern (and often mobile or home) office: direct line telephone and fax numbers; answering machines and voice mail; e-mail addresses and Internet access. The

details on a business card or home page are an open invitation for further contact and in most companies are encouraged, so that close relationships with suppliers and customers can benefit business. It is therefore evident that the "recognition of the significance of information and the developments in technology that have made it more readily available" (Infield, 1996), combined with more open relationships in the work-place, have established a climate in which information overload can prosper.

Looking forward to the Scottish parliament, it is evident that the population hopes for easy access to information and those who hold it. There is talk of taking care not to replicate the set-up at Westminster, particularly with reference to hierarchical organisational structures. It would appear, therefore, that a climate for overload is likely.

3. Information overload: the culprits

Simpson and Prusak contend that "the 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 high value-added nature" (Simpson and Prusak, 1995). This is due both to poor information management techniques of (often well-meaning) individuals and the limitations of technologies they employ. The ready availability of software and other equipment for the creation and duplication of documents enables employees to adopt the role of author, publisher and distribution agent: it does not take much effort to relay information with an undisciplined enthusiasm, regardless of information content or quality, or whether it matches the information needs of the recipients. In an electronic environment the sender takes advantage of the strengths of computers for communication purposes: speed (the message/document will reach the recipients quickly) and storage (the recipient will have plenty of space to store this message/document). The "overloader" in this example is not discriminating enough in what is sent to whom, and works in tandem with computer distribution systems that still fail to address the "processes of reducing the amount of and raising the quality of information brought to the attention of the user" (Taylor, 1986).

Those who receive unsolicited information by these methods can tolerate a certain degree of overload: "Time is precious, therefore information that finds you is preferable. The drawback is diminished control over what is considered information" (Infield, 1996). Uncertainty about future developments encourages the maintenance of individual storage systems for "just-in-case" information that, although irrelevant at the time of receipt, might be important in the future [2]. However, for many, the rate at which both solicited and unsolicited information reaches them exceeds their information processing capacity as human beings. This is pertinent if they carry out very complex tasks with important consequences, under great pressure to frequent deadlines, in a highly charged environment (Reuters, 1996). This also applies to those who support others working in such an environment.

4. Problems of information overload

Problems associated with information overload may be emotional, social or political (Welsh, 1997). The time spent handling the incoming flood of documents and messages, and then trying to locate the high-value information content in material received, have been identified as major difficulties when dealing with information overload: "the process of document content analysis itself is not only labour intensive but requires a considerable amount of skill and experience if a user is to determine whether the original document is worth reading in its entirety" (Cooke and Kauppila, 1996). When too much time is spent on information activities, other tasks are neglected: forty-seven per cent of the managers interviewed for the Reuters survey say that the collection of information for decision-making distracts them from their main job responsibilities, and many believe that the cost of collecting information exceeds its value to business.

An attempt to gather all relevant information pertinent to any decision can delay work and actions (Marcusohn, 1995 and Reuters, 1996), especially when the information finally gathered is diverse (Iselin, 1989). Waiting for all available information leads to a

procrastination that may become open-ended: "There are fears that in an information-saturated environment that in addition to the inevitable threats of misinformation and disinformation, the oversupply of relevant information may not lead to rational decisions but instead to a failure to decide at all, or to other forms of irrational behaviour" (Dick, 1995). More information offers more choices, increasing the complexity of decision-making, yet in theory decisions should be made faster because the company has invested in new technologies and information services to make the processes easier. Irrational behaviour may manifest itself in bizarre decision-making because the overloaded individual is overwhelmed by the amount of information to hand (Reuters, 1996). Conversely, certain workers may no longer be able to recognise important information and are in fact underwhelmed: "This constant bombardment, moreover, can lead... to a sense of being disconnected from it [information] and/or bored with it" (Hopkins, 1995). Aligned with this is frustration and stress "caused by not knowing whether the crucial information exists or if it exists, of not being sure where and how to locate it... caused when we know where some essential information is located but we are not sure how to access it" (Reuters, 1996). Reuters claim that "the worldwide burden of keeping up with the information explosion has led to soaring executive stress, loss of job satisfaction and physical ill-health". Welsh names this condition of stress "information fatigue syndrome", and explains that it was first detected amongst British and American intelligence decoders in World War II (Welsh, 1997). The large computer manufacturers in Silicon Glen maintain information infrastructures that provide staff with numerous, readily available information sources. Permanently logged on to a global e-mail system are staff in different time zones who can answer questions and provide help whatever the local time. From the desk-top there is easy access to externally produced information sources ranging from the informal (for example Usenet News) to mainstream news services, electronic journals and commercial online databases. Information gathered from these sources in combination with internal online document databases, web sites and database applications find their ultimate use in generating sales. Overload is a possibility for staff who need to identify, read, digest and analyse the information presented to them within the constraints imposed by customer timescales. The more time spent on keeping up to date with e-mail means that less time is available to perform activities of direct relevance to customers such as writing proposals and giving presentations. However, to abandon one focus of the job in favour of another is risky. Firstly, opportunities may be missed. Competitor information is regularly distributed by e-mail. A lack of familiarity with the opposition's weaknesses in product range, strategy and alliances may compromise a sales team unable to demonstrate the benefits of a purchase. Another consequence is that of mistakenly overselling a product's capabilities: an inappropriate sale may be made. Part of the mental survival kit for employees comprises a series of personal strategies for coping with information overload, and the minimising of stress. These vary from simply coping, to the strategic use of the company's intranet.

5. Information overload: from coping solutions to intranet strategies

An instinctive reaction to information overload might be flight or fight. In the first case a straightforward coping strategy would be to withdraw from whatever is causing overload: "If we sense or fear encounter with an overload situation, we simply subtract ourselves from the situation" (Reuters, 1996). Individuals may find arguments for giving up participation in particular e-mail discussion lists if they are not central to their primary job function: the solution adopted by some employees is to read the pre-sorted e-mail discussions from the aliases through Usenet newsgroups, or receive weekly digests such as those produced via MajorDomo. However, few responsible employees can hide from information altogether, especially since broadcast by e-mail has made receipt of information so public. So employees prefer to work late or take their reading home with them to keep up to date [3] (Reuters, 1996), than suffer the shame of missing an announcement (even if the majority of their colleagues did not read it in its entirety). Another means of coping is to learn to delegate information activities: "The solution... is easy - hire another expert" said Wilson in 1976 [4] (Wilson, 1976). Dick has suggested that the work should be delegated to librarians who should re-evaluate their role from the perspective of their predecessors of the nineteenth century. The librarian should intervene, rejecting any irrelevant information on behalf of clients, and filtering and rewriting what is of true benefit to business objectives (Dick, 1995). This may be possible for commonly used sources, but it is unlikely that a

company would pay for a personal librarian to assist each worker sift through their e-mail inbox or compose succinct answers to questions that have appeared on the aliases.

Training individuals to handle their personal information flows can minimise the effects of information overload. Improved information literacy helps individuals learn effective search techniques for appropriate recall and precision. Individuals need to learn evaluation techniques so that they only subscribe to information sources that are worthy of the investment of their time. This should cut out the amount of irrelevant solicited material received. Personally held files of gathered information and pointers can save time and effort of retrieval in the future. To avoid the paralysis where decisions are delayed in anticipation of further information, employees should be trained to become what Driver et al label "satisficers" rather than "maximisers" (Driver et al, 1993). Whereas maximisers aim to uncover every detail prior to action, satisficers use just enough information to make a decision. One way of ensuring that staff understand their information needs, and thus turn them into satisficers, is to ensure that the focus of core competencies recognised at review time is translated into information seeking behaviour.

As publishers and distributors of information, individuals need to refine their communication skills and learn to be responsible in their efforts not to overload others. Material should be pre-analysed and filtered (Reuters, 1996) and only value-added detail should be distributed (Asheim, 1982) so that the recipient is exposed to fewer chunks of information containing many bits, rather than many chunks of information, each containing few bits (Wilson, 1976). If good information handling techniques are recognised as part of the job they are more likely to be adopted: "The greater the individual's perception that increased information processing is instrumental to retaining his or her position, or advancing in the organisation, the greater the processing that will occur" [5] (Marcusohn, 1995).

The coping strategies discussed above have their uses, but alone are inadequate: take a couple of steps back from the information flow and you make one step towards professional isolation; delegation of information handling is not an option because easy access to machines permits most workers to deal with their incoming and outgoing information personally; and information skills training is not yet taken seriously enough in the workplace to have an adequate impact [6]. Information overload problems may be lessened, however, through the strategic use of intranet technologies.

The emergence of enterprise wide webs, general business applications of intranets and their strengths and weakness are described elsewhere in the information management literature (for example White, 1997). Here the discussion is focused on how intranets improve access and distribution of information in the computer industry.

Intranets facilitate day to day information transactions, which previously used paper-based systems, for example in the claiming and payment of expenses. Automation shortens turnaround time and reduces printing and document publishing costs. Employees can access internal reference works that, in an earlier guise, would have taken the form of print manuals. Strategic decision-making is supported through the provision of pages on aspects of business development. As the intranet develops, the problems associated with distribution and receipt of e-mail diminish. Following current management thinking that staff should concentrate their efforts in the areas of their core competencies, individuals who have expertise to share are encouraged to be responsible for web pages that present in one location high quality, validated, analysed information that is pre-chunked for the benefit of those who want to be sure that their facts come from a reliable source. This allows information users to become satisficers, happy that information derived from a knowledgeable expert in an appropriate format, can be acted upon immediately without further processing. Provided that adequate signposting is made across the internal web pages, common information no longer needs to be distributed, nor held by individuals over gigabytes of disk space, for a just-in-case scenario [7]. That the intranet can be accessible from anywhere means staff can enjoy the benefits of physical closeness to customers on site at the same time as virtual proximity to the office. The greatest benefit is better use of e-mail. For example, with a full text search engine mounted on e-mail archives for

retrospective searching, individuals can be trained to treat an e-mail distribution list as the information source of last resort, thus minimising overload on colleagues. Intranets are proving to be cost effective: Sun Microsystems estimates that \$25 million per annum is saved in staff time through the use of its intranet (Gillooly, 1996); Amdahl reports a substantial return on intranet investment (Campbell, 1997). In the future, the use of intelligent agents, for example British Telecom's Jasper, and text analysis and management facilities such as Oracle's ConText should help further overcome the limitations of human channel capacity, for example in alerting the user to the existence of information that adds to what is already known, and further justify investment in intranet technologies.

6. Scotland the intranet?

It has been demonstrated how communities within business are benefiting from intranet solutions. It may be ambitious to apply corporate case studies to a nation, but with a fresh start ahead there exists the opportunity to establish ground rules for the handling of information in the future. Possibilities include taking initiatives to give the population the option of carrying out transactional interactions with government electronically and providing multiple sign-posts to high quality, one-stop locations for reference material. However, as with all issues related to information activity two issues remain paramount: (a) that the population at large is information literate and (b) that those with information expertise continue to be involved in managing the development of the national information infrastructure, whether or not the suggestions proposed here are adopted.

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Footnotes

[1] This is probably still the case for the majority of the world's population living in non-industrialised societies

[2] In the case of electronically transmitted material the prospect of difficult future retrieval of information (due to the inconsistencies of electronic archiving practices) further encourages the build up of just-in-case information bases.

[3] For example the work for this paper (literature searching, reading, literature review and writing up) was all completed out of office hours at home.

[4] This was before the term "downsizing" had ever been coined, let alone its theory implemented.

[5] E-mail flaming also achieves this by a more negative means.

[6] Witness the number of people who believe that proficiency in word-processing is an adequate basis for launching a Boolean search on a remote database or CD ROM.

[7] At Hewlett-Packard the librarians have helped with the company's information management function in conjunction with systems staff (Gillooly, 1996).