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INFORMATION OVERLOAD: CAUSES, CONSEQUENCES AND REMEDIES: A STUDY

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Abstract

Information overload, usually characterized by an over abundance of information, is a major cause of concern for general information users, researchers and information managers. With the advent of new technological innovations, the rate of information production has accelerated rapidly. Consequently, people are suffering from an ‘information glut’, which makes it difficult for them to find the required information quickly and conveniently from various print, electronic and online sources. The paper analyzed the causes and causes of information overload in the 21st century and puts forward suggestions for overcoming this problem. It stresses the importance of concerted efforts from information professionals, computer scientists and academics to devise techniques and technologies for countering the effects of information overload.

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Introduction

Although many of us tend to view ‘information overload’ as a new phenomenon, the term, in fact, has been in existence for more than 50 years; and even before that, people were concerned about the growing volume of information that they had to cope with in their everyday life. A report published in 1963 by the U.S. President’s Scientific Advisory Committee stated, ‘We shall cope with the information explosion, in the long run, only if some scientists are prepared to commit themselves to the job of sifting, reviewing, and synthesizing information; i.e. to handling information with sophistication and meaning, not merely mechanically.’¹ The world henceforth has seen exponential growth in the number of information materials in various forms, which has been further accelerated by unprecedented advancements in Information and Communication Technologies. Although there have been systematic efforts by the libraries and information science (LIS) professionals and computer scientists to cope with this huge proliferation of information through various means of bibliographic control and information management and retrieval techniques, no sure success way has been found with which to tackle this growing from of information overload. With massive advancements in research and development in almost every country in the world, we are poised to face an even greater explosion of information in the coming decades.

Information overload: natures and significance

Creation of new ideas necessitates the documentation of those ideas. People have been recording their thoughts and actions and expressions in numerous ways since time immemorial. With the spread of literacy and invention of new methods of recording ones thoughts and ideas, the body of knowledge created and accumulated by human beings started to expand.

Slowly, this started putting pressure on people's limited resources and time. In as early as 1255, Dominican Vincent of Beauvais was found to be deploring about 'the multitude of books, the shortness of time and the slipperiness of memory'.² In the 15th century, with the invention of movable printing machine, book production rapidly increased and the cost of books also substantially decreased. The European Renaissance heralded widespread appreciation of knowledge and the spread of learning for the masses. The founding of the first truly public library in England in 1598 facilitated diffusion of information and knowledge for a larger audience.³ The industrial revolution and various innovations in the 18th and 19th centuries generated a huge body of knowledge which was used as building blocks for social, economic and cultural progresses made in the 20th century. Great advances in computer technology in the mid-twentieth century and subsequently, the emergence of Internet World Wide Web have made our world truly information-driven. As Feather noted, 'The technical developments of the last 50 years have made more information, more available to more people than at any other time in human history.'⁴ The transition of the developed countries from the industrial age to information age has been dubbed by the renowned writer and futurist Alvin Toffler as a transition from the 'Second wave' to the 'Third Wave', the First Wave being the Agricultural Revolution in the prehistoric times.⁵

In the middle ages, the spread of literacy and new innovations in publishing played a pivotal role in helping us to realize the value of 'information'. People realized that, information would help them make better choices and take better decisions. As time passed, this realization grew into a firm conviction, resulting in the central role information is now playing in driving the human civilization forward. As David Shenk noted,

'Because of information, we understand more about how to overcome the basic challenges of life. Food is more abundant. Our physical structures are sturdier, more reliable. Our societies are more stable, as we have learned how to make political systems function. Our citizens are freer, thanks to a wide dissemination of information that has empowered the individual.'⁶ However, with too much information, comes too much tasks – tasks of sifting through this ever increasing body of information to find out the information we need. And in today's hectic life, people have less and less time to do that. This is making information overload a problem whose intensity is increasing every day.

Alvin Toffler popularised the term 'information overload' in the 1970s. He characterised it as 'the difficulty a person faces when taking a decision in the presence of excessive information.'⁷ In general parlance, information overload refers to a situation when the information user fails to process any more information because of its enormity in size and volume. Edmunds and Morris define information overload as an 'overabundance of relevant information that cannot be assimilated, or being burdened with large quantities of unsolicited information (which may be beneficial).'⁸ Mayer views information overload as a 'state that exceeds the limited human information-processing capacity.'⁹ Bawden, Holtham and Courtney observed that, information overload is 'usually taken to represent a state of affairs where an individual's efficiency in using information in their work is hampered by the amount of relevant, and potentially useful, information available to them.'¹⁰ Information overload has been linked with the information processing ability of information users. With little or no information, individuals have little or nothing to process and consequently make poor decisions. As the amount of information increases, so too does information processing

and the quality of decision-making. However, after a certain point is reached, the decision-maker has obtained more information than he can process, information overload has occurred and decision-making ability decreases. Any information received beyond that point will not be processed, may lead to confusion and could have a negative impact on the individual's ability to set priorities as well as remember previous information.¹¹ Eppler and Menjjs have identified five reasons of information overload which are shown in the following diagram¹²:

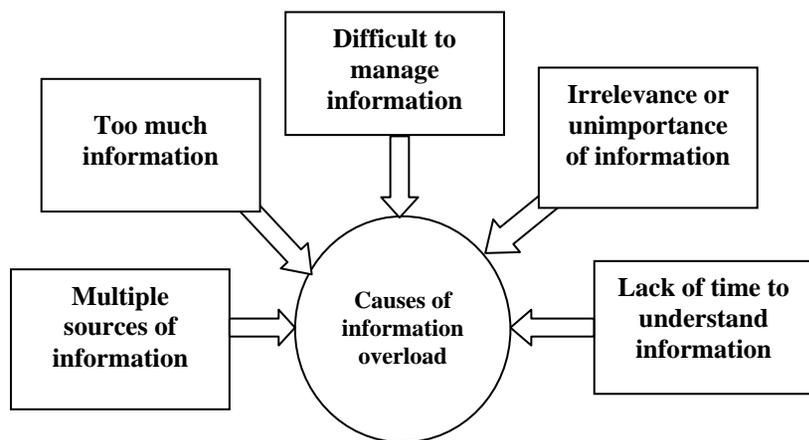


Diagram: Causes of information overload

The diagram shows that, information overload is usually caused by the existence of multiple sources of information, over-abundance of information, difficulty in managing information, irrelevance/unimportance of the received information and scarcity of time on the part of information users to analyze and understand information. The advancement in ICT, especially search engine technologies has resulted in

over abundance of information from myriad sources in response to online searches, which causes time constraints for the information users to scan all these information. With the advent of new publishing media, especially the online ones, there is too much information generating from a multiple sources which is one of main causes of information overload. This puts increasing pressure on information users who have very limited time to find, locate, retrieve and assess information from all these various sources. The problem is exacerbated by the fact that, relevant information is far outnumbered by irrelevant and unimportant information constantly piling up in various media, especially electronic media like television, web sites, blogs, social networking sites, email, etc. Besides, majority of people lack adequate information literacy skills, i.e. the skills of identifying information needs, locating required information in appropriate sources, retrieving information in the right format, assessing the worth of retrieved information in context of his/her needs and, lastly, using the retrieved information for meeting his/her needs. As a result, the information explosion is happening unabated and people are facing more and more problem in dealing with these information. Another unique feature of information overload is that, it has a number of dimensions. The number of information materials and media are increasing, with new techniques and approaches of presenting information to a multitude of audience. As Gantz, Boyd and Dowling note, information overload is not just about the growing mountain of information. It is also about the growing diversity of information. The old information types never seem to go away – paper forms, documents, drawings, database output, emails, faxes, files and records, and phone messages. Meanwhile, new forms have sprouted, from text and instant messages to blogs, wikis, social networks, podcasts, digital images and sounds.¹³

Consequently, the problem of information overload is finding new shapes and manifestations, making our task of getting the right information at the right time in the right format increasingly difficult.

Implications of information overload for information users and information professionals

The 21st century has equipped us with new tools and techniques of creating and disseminating information to a worldwide audience. Anybody with a computer and Internet connection could make his/her message reach a global audience quite easily. This has enabled and encouraged a huge number of people from various parts of the world to create and contribute information on the cyberspace. The emergence of social media has made this a global phenomenon where hundreds of millions of people are publishing information on a wide range of social media. IDC, a research organization, estimates that in 2009, there were 800,000 petabyte of information (a petabyte is a million gigabyte); in 2010, the digital universe grew to 1.2 million petabyte or 1.2 zetabyte. IDC predicts that by 2020, the digital universe will be 44 times as large as it was in 2009, or 35 zetabytes.¹⁴ It is estimated that, 41 trillion pages of paper were produced in 2009, with output from electronic printers, scanners, fax machines and copies alone totaling more than an estimated 6 trillion pages. The National Archives and Records Administration (NARA) of the United States has averaged 475 million pages of records per year for the past 10 years. In November 2011, the organization reported a significant growth in the volume of electronic records and total archival electronic holdings – 142 terabytes.¹⁵ All these are putting a tremendous pressure not only on information searchers, but also on librarians, information managers, information aggregators and others who are facing an uphill task in capturing, sorting,

cataloguing, classifying, preserving and retrieving information from a myriad of print and electronic sources.

The implications of information overload for average information users are almost always negative. They have to face a whole range of challenges to locate their required information, resulting in fatigue and anxieties. Elson identified a number of fallouts of information explosion, which are:

- (i). Despite availability of large quantity of information, one seems to be knowing less because the quantum of what is know is insignificant to available information.
- (ii) Too much information leads to brain freeze or fatigue. And the response to this could even be information avoidance. Doing this could also make a user to loose or miss valuable information.
- (iii) Information explosion or overload could also lead to information addictions in which the urge to get more information could lead to over dependence on sources such as the internet. The effect of addiction is drop in productivity which could lead to spamming in which organizations restrict the type of information that employees could have access to with official equipment and facility.
- (iv) Shorter attention span.
- (v) Long-range thinking stops because virtually all information needed is available in large quantity for a user to select from and from varied sources.
- (vi) With avalanche of information available especially the uncensored ones there could be information contamination which could lead to wrong decision making and serious mistakes.

(vii) Information Explosion also makes one think of the past and immediate future without adequate attention to the present.¹⁶ Hallowell opined that, information overload leads to adverse neurological effects on information users which he termed as ‘attention deficit trait (ADT)’. He maintained that, 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.¹⁷

Libraries and information centres, already struggling to serve an increasing number of readers within a shrinking budget, are also being adversely affected information overload, because every day, they are forced to consult a huge number of information materials in order to find out the best materials – thus putting additional pressure on their time and efforts. Classifying and cataloging these resources also pose additional challenge. Many users consult the library professionals about whether to use a particular information or information source. With the influx of information from various sources, the library professionals are hard-pressed to give appropriate replies to the questions asked by the users. Besides, managing all these information properly is also a challenging task. The professionals who do not have adequate information management and bibliographic control skills could easily get overwhelmed by information overload. Kadiri, elaborating on Hjørland’s observations, maintain that, libraries are particularly susceptible to the effects of information overload because of an explosion of ‘publications’ or ‘papers’ which is characterised by more pages of professional journals and books, which are expanding exponentially.¹⁸ According to him, information overload may partly be attributed to ‘publish or perish’ condition among academics and researchers. Indeed, many of

today’s academics seem to engaged in a competition among themselves to ‘outwrite’ and ‘outpublish’ colleagues and other academics and assert their own dominance – resulting in the publication of more and more books, articles, reports, blogs and as such. Besides, because of their ephemeral nature, many papers, especially in science and technology, rapidly lose their relevance and becomes a burden on the already outsized and unmanageable library collection. All these are contributing to an exacerbation of the information overload problem.

MacColl classified today’s library collection into four broad types: i. Print; ii. Online or electronic (the early form of digital information managed by libraries); iii. Digital (which is differentiated from ‘online’ mainly by implication: it implies that the digital form is end-to-end, e.g. metadata to full-text); and iv. ‘Free web’ – which is characterized by abundance. Anything can be put on it and accessed from it.¹⁹ In MacColl’s view, a growing proportion of what constitutes the digital library is provided from the abundant environment of the free web. The management of this has proved challenging for libraries, thereby contributing to the information overload problem. Libraries and information institutions are also facing a moral dilemma in advising the users which information materials they can use and which they cannot. Majority of the information found freely on the web is fictitious rather than factual, often unreliable and potentially dangerous. Reliance on such information may lead to serious repercussions. Librarians have a moral responsibility to educate the users on judicious use of information. However, information overload makes it doubly difficult for information professionals to discharge this duty because of the sheer volume of information on which they have to provide expert advice.

Control of information overload: approaches and strategies

With the growing intensity of information overload, individuals and organizations are seeking solutions to this multi-dimensional problem. Libraries and information specialists are in the forefront of these efforts, because as information managers, they have to bear the brunt of this problem. Every day, new information is being added to the existing body of knowledge, making information identification, location and retrieval more and more difficult for individual information seekers and information professionals alike. A landmark study on information professionals conducted by IDC found that, many information workers are engaged in time consuming and unproductive works which may waste up to 20 hours a week per worker. These works include reformatting from multiple formats to a one document format; searching for but not finding information; recreating content; publishing the same content to different audiences using different applications; moving documents from one format to another and acquiring archived records with little or no automation.²⁰ This shows that, if the information management skills of information workers could be developed, they could do more work in less time and meet the information requirements of the users more effectively.

Specialists agree that, for information users and information professionals alike, achieving information literacy is vital for successfully dealing with information overload.²¹ Information literacy has been defined as ‘a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information.’²² An information literate person 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.²³

Therefore, if a person can acquire at least a moderate level of information literacy, he/she will be able to find the relevant information from various sources and judiciously use the information for problem solving. Admittedly, this is not an easy task and even the most expert information seekers could be overwhelmed by the huge quantity of information from which to find his/her required information. However, as one continues acquiring, upgrading and refining information literacy skills, he/she will find it easier to deal with information overload in the long run. That is why Edmunds and Morris suggest educating end-users in information processing techniques.²⁴

Simpson and Prusak maintain that, the essential mechanisms to fight information overload are to assure that the information provided is of high value, that it is delivered in the most convenient way and format.²⁵ Meyer puts emphasis on proper visualization, compression and aggregation of information.²⁶ In many organizations, information overload stems from inherent weaknesses in information processing. When an organization does not have proper mechanism in place for processing the data and information it receives as part of its operational

procedures, information tends to pile up at various points and clog the organizational processes. Therefore, every organization needs to have a comprehensive system of information processing, which, in fact, is a part of its knowledge management infrastructure. Authors like Bawden²⁷ and Schneider²⁸, therefore, suggest for standardizing operating procedures inside an organization and encouraging collaboration with information specialists within process teams to successfully deal with information overload problem. Standard information management techniques like citing, reusing and linking of information to the existing information is also advocated as a virtuous practice.²⁹

The role of information and communication technologies (ICT) in tackling information overload has been discussed widely. While ICT is viewed by authors like Whitaker and Sidner³⁰ and Janssen and De Poot³¹ to be one of the key causes of information overload, many others like Schultze and Vandenbosch³² and Farhoomand and Drury³³ consider it to be the main provider of solution to this problem. Because of increased efficiency of today's search engines, they tend to retrieve far more information against every search request than anybody could possibly handle. In view of this, acquiring web searching skills is an important prerequisite for tackling information overload, because a user conversant in searching skills is likely to retrieve more relevant information from the web than one who is not. Besides, a number of advanced technological tools are in use which enhances a user's ability to find the most relevant information quickly and conveniently. Carlson mentions some such tools which include advanced tools like intelligent agents (information retrieval programs that observe through sensors, act upon an environment and influence it towards achieving a goal), ranking algorithms (methodologies by which search engines calculate positioning

results), cluster analysis (statistical method that attempts to find the natural groupings of objects based on attribute information about the objects), data mining (system for discovering and modeling hidden patterns in large volume of seemingly unrelated data) and personalization algorithms (application of known facts about users to customize information services for them).³⁴

However, whatever ICT tools or techniques one may adopt, in the end, tackling information overload relies largely on one's information management abilities, the way one handles the information seeking and retrieval processes. This has been described by Bawden, Holtham and Courtney³⁵ as 'taking control of one's information environment', which enables a person not only to avoid the effect of information overload, but also makes him capable of controlling the information searching and retrieval process to his/her utmost satisfaction. As observed by Bawden and Robinson³⁶, 'The methods by which this is done are often rather "traditional", and not necessarily strongly associated with information management *per se*: they include time management, desk management, critical thinking, information presentation, better information organisation (including good use of metadata), and cultivation of a rational personal information management style.' The standard tools and practices of library and information science, applied in conjunction with information searching and retrieval techniques, may contribute greatly in minimizing the adverse effects of information overload. For example, the traditional tools for bibliographic control like catalogue, index, bibliography, etc., if judiciously used, could help an information seeker quickly locate and retrieve his/her required information. More educational and skills development initiatives in this regard and the strengthening of library instruction, user orientation and reference services could play a

pivotal role in enabling the twenty-first century information users successfully deal with information overload. Information professionals could play a key role in this regard. They not only have the skills and ability to manage available information appropriately (acting as an intermediary to evaluate information prior to dissemination), but can also educate and assist people in evaluating their information needs and choosing the appropriate vehicle for obtaining that information.³⁷ This puts them in the forefront of the struggle against information overload. Although new technologies have made information users capable of independently searching and locating information, they need expert help from library and information professionals to make the searching more specific and relevant. Through transferring information literacy skills to the novice information users, assisting them to hone their ICT skills and guiding them in their quest towards finding the right information at the right time, today's library and information workers could consolidate their position as 'information leaders' in an increasingly competitive professional world.

As it is evident from the above discussions, the importance of mastering information literacy skills has been highlighted by the specialists for successfully dealing with information overload. These skills need to be taught at various educational levels to equip the information users with necessary skills and expertise to use information effectively for solving their livelihood problems and ensuring academic and professional excellence. ICT has been indicated as an essential tool for controlling information overload. Besides traditional bibliographic controlling tools used in libraries and information centres, advanced tools for information retrieval and evaluation have also been suggested by the specialists so that information users could take better control of their information use and

application activities. General information users need proper orientation and guidance from information professionals so that they could use these tools and techniques effectively.

Conclusion

The foregoing discussions have made it clear that the problem of information overload is here to stay and with growing focus on research and development in the coming decade, its intensity will only increase. The advent of new technologies and various techniques of self-publishing, information overload will present itself to a worldwide audience in new shapes and dimensions. This calls for concerted efforts from library and information professionals, computer scientists, academics and knowledge management specialists so that the adverse effects of information overload could be kept at a minimum and the information seekers are provided with effective and innovative ways for tackling this problem.

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