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Abstract

Purpose – The complex phenomenon of information overload is one of the pathologies in our present information environment, thus symbolically it signalises the existence of a dark side of information. This paper investigates the approaches on mitigating information overload. Hence it is an attempt to display the bright side.

Design/methodology/approach – Based on a literature review, the sources of information overload are briefly presented, not forgetting about the role of information technology and the influence of the data-intensive world. The main attention is given to the possible ways of mitigating information overload.

Findings – It is underlined that there are both technological and social approaches towards easing the symptoms of information overload. While reducing information overload by increasing search task delegation is a far away goal, solutions emerge when information is properly designed and tools of information architecture are applied to enable findability. A wider range of coping strategies is available when we interact with information. The imperative of being critical against information by exercising critical thinking and critical reading, yields results if different, discipline dependent literacies, first of all information literacy and data literacy are acquired and put into operation, slow principles are followed and personal information management tools are applied.

Originality/value – The paper intends to be an add-on to the recent discussions and the evolving body of knowledge about the relationship between information overload and information architecture, various literacies and personal information management.

Keywords Information overload, Information architecture, Information architecture, Critical thinking, Literacies, Personal information management, Slow principles

Paper type Viewpoint

Introduction

A pioneer of internet services in Hungarian libraries, László Drótos stated in 1995 that networks function as information utilities, similarly to a water supply system, with the difference that on the internet the information is streaming in an ever growing quantity, it depends on us what, and how much we use of it. This requires us to learn ourselves and to teach others to be able to handle and keep in hand this flood to not to drown in it (Drótos, 1995). This metaphor says to us that there is information overload (IO) that is an impediment to efficiently using information (Bawden and Robinson, 2009). Therefore, its symptoms have to be mitigated. Since the time, when it was recognised that excessive information impairs performance, and this phenomenon has been labelled 'information overload', its definitions have not changed substantially (Benselin and Ragsdell, 2016).

Any treatment, applied to IO has to take into consideration that overload emerges not because of a single factor, but is caused by a mix of several causes. Information processing capacity and the nature of the given task or process (that define information processing requirements) may be regarded as such causes (Eppler and Mengis, 2004).

David Bawden and Lyn Robinson painted a detailed picture about the dark side of information, qualifying IO as one of the 'pathologies of information'. As they pointed out, the problems related to IO are real, while they may not be fundamentally information problems (Bawden and Robinson, 2009). On the other hand − as verified by the results of a recent mixed methods quantitative and qualitative study − the perception of IO exist even among varied age groups (Benselin and Ragsdell, 2016.

Numerous papers explain the causes and basic nature of information overload (Savolainen, 1995; Eppler and Mengis, 2004; Himma, 2007; Hargittai, Neuman and Curry, 2012). The aim of this paper is partially different, as it intends to outline, how the symptoms of information overload can be alleviated by applying some pragmatic frameworks and (to a certain extent) tools. In other words, it wants to paint a picture about the bright side of information, focusing on the qualitative type of overload. This means that instead of examining quantitative issues, epitomized as Too Much Information, the discussion will focus on the micro level of IO that obstructs a user's ability to complete a transaction because of a failure to filter information (Davis, 2011). Filtering is substantially obstructed by the ever-widening gap between information that is available to us and that, which is usable (Davis, 2012).

To address IO, we can make use of the critical agendas, suggested by Forte et al (2014). These are the following ones:

1. Technological approaches to foster designing information systems for better information consumption practices.
2. Technological approaches to foster designing information systems that help people to create information sources
3. Social approaches that are meant to encourage better information consumption practices.
4. Social approaches to helping people become good contributors to information sources.

Although none of these is exactly identical with the approaches, advocated in this paper, Agenda 1 and Agenda 2 are close to approaches offered by information architecture. Agenda 3 and 4 are relatively clearly tied to literacies, as it will be outlined in this paper. Agenda 3 reflects the more traditional points of view, common for literacies, while Agenda 4 reminds us that literacies have to reach beyond the simple consumption of information. These understandings of the above agendas constitute a general framework for mitigating IO.

Technological approaches for mitigating information overload

One direction of the technological approaches is tied to the vision of reducing information overload by increasing search task delegation to software agents. As a bibliometric study shows it, 'semantic web' is the most frequently used concepts to depict such visions of future information infrastructures. The idea is to tackle IO by adding intelligence to the web, because the technology of current generation search engines has its limits (Olson et al., 2015). Even though considerable work was done in using semantic web based approaches, we must say at least that there are still some uncharted territories (Ristoski and Paulheim, 2016).

Technological approaches to mitigate information overload are thus limited to the scope and capabilities of information architecture that explores ways to organize and create semantic and contextual informational relationships that accommodate user goals and behaviour (Davis, 2010). Obviously, information architecture is just one facet in the complex of interactions that contribute to the user's overall experience with an information resource (Morville, 2005). Its effects on IO are also limited because information architects and user experience designers can discover information overload only retrospectively and through indirect means (Davis, 2012).

Ill-structured, unclear information causes IO. However, if we can improve the conciseness, consistency and comprehensibility of information, the level of information processing

capacity of the individual can increase (Eppler and Mengis, 2004). In other words, the proper presentation of information, materializing in its organization, selection, and format play an important role in reducing information overload (Blummer and Kenton, 2014). Therefore, mitigating IO requires the intervention of information architects.

Organization and representation that occupy an important position in information architecture materialize in the concept of findability that is the art and science of making content findable. Findability is a critical factor for overall usability, because users need to find what they need through some combination of asking, browsing and searching (Morville, 2005).

Searching is not only a predecessor of findability, but it is its foundational component. Nonetheless, neither search engines, nor loosely defined naming conventions make navigating easy or enable retrieving content effectively and timely. Therefore, the difference between searching and cultivating findability is in the intent to place the burden of intelligent content processing on the content itself through adequate findability strategies that comprise of several technologies and methodologies. The ultimate challenge for them is to provide complete retrieval of content, based on user needs while simultaneously eliminating the need for reviewing irrelevant information by the user. In other words, findability has to find a balance between the somewhat diametrically opposed metrics of search effectiveness, i.e. precision and recall (Frappaolo and Keldsen, 2008).

Sometimes, the role and importance of information architecture is challenged by those, who regard it outmoded, because they suppose that internet users are able to do what experts used to do for them. However, architecture is never superfluous. No matter if structures are made for private, everyday purposes, or serve professional goals, they must have architecture. If we let users manage information for themselves, the information architectures that evolve will have more chance not to work well (Hinton, 2009; Davis, 2012).

Combating information overload fits well into information architecture's mission that is directed towards social usefulness by describing the processes of designing, implementing and evaluating humanly and socially acceptable information spaces (Dillon, 2002).

In summary, it is not an overstatement that information architecture can offer a framework to elaborate solutions that help in avoiding IO conditions, provided that it goes beyond considering simple design issues by gaining deep understanding of information users (in this case, the overloaded ones) (Davis, 2011; Davis, 2012). Fulfilling this mission requires familiarity with the social contexts of users and information among the conditions of digital information, characterised by a growing complexity that materializes in diverse and abundant information choices (Morville, 2005).

IA solutions should not be primarily technological, nor even cultural ones. Rather, they should focus the information user's situation and tasks (Surla, 2007).

From the principal uses of information, identified by Buckland (1991), the act of informing, i.e. information-as-process deserves attention as IA is should focus on the domain of processes (Martin, Dmitriev and Akeroyd, 2010).

From the particular tools of IA, collating document architectures with information architectures may be a relevant one towards mitigating IO. As it is well-known, the documents we interact with belong to distinct document types (genres). Their presence restricts the potential variability in document and information architectures. With the emergence of new genres and changes to existing ones, new insights are (or will be) needed to enable IA that can positively influence information practices or provide tools that can be used to treat symptoms of information overload (Francke, 2009).

Social approaches for mitigating information overload

Social approaches are available on a much broader and more varied scale that the technological ones. All of them are based on recognising the importance of critical thinking

and applying it, first of all in the form of critical reading. Pragmatic frameworks for these activities are offered by information literacy and other related literacies that help us in understanding the digital world better and taking meaningful courses of action, because what is digital, is also subject to human agency and to human understanding (ACRL, 2000).

The role of critical thinking and (implicitly) of critical reading is fundamental to all social approaches for mitigating information overload, even though this commitment is more markedly expressed in the case of information literacy and related literacies. Critical thinking is closely connected to the conceptual competencies of innovative thinking, problem solving and critical thinking, and human competencies, such as social networking skills, self-management and cross-cultural interaction skills (Lee, 2013).

According to a more detailed definition, critical thinking is the processes of analysis, synthesis and evaluation, necessary to understand and acquire knowledge (Radcliff and Wong, 2015). Nonetheless, it should not be conflated with problem solving, but defined as the critical evaluation of media messages (Bulger, 2012). Assessing content can benefit from coupling it with a self-awareness of our worldview and biases (ACRL, 2015).

Practicing Information Literacy

When speaking about literacies, it would be a legitimate concern to decide if there is a one-and only literacy that stands out from the multitude of literacies. However, the development of literacies has shown a different trajectory, characterized by the complexity and change, as well as the proliferation of concepts in this area, such as information literacy, media literacy, digital literacy and transliteracy. Therefore, declaring that we do not have to look for new literacies, because we have enough conceptual clarity, would be a wrong decision. Without the intent to substitute the concept of information literacy, the concept of *information fluency* can be used as a meta-model that gives attention to critical thinking about the most appropriate platforms and technologies of creating and distributing new knowledge, not forgetting about the lifelong learning aspect of these activities. Information fluency can be defined as a conceptual understanding of, and ability to adapt to, changing information environments, ecologies, or contexts, adding that the information fluent person possesses integrated technological skills and understanding about finding, using, reusing information and knowledge in the networked digital age. Hence, information fluency focuses on understanding, rather than skills or competences (Bawden, 2014).

For the purposes of this paper, this suggestion allows us to leave the explanation of the similarities and differences between different literacies aside. On the other hand, it is inevitable to examine if there can be such a thing as a generic information literacy, or whether each discipline or domain must have its own variant.

Pinto, Pulgarín and Escalona (2014) observed differences between information literacy in health sciences and in social sciences, and confirmed that 'discipline dependence' exists, thus information literacy has a specific personality in each of the two disciplines. According to Bawden (2014), the evidence is clear that domain-specific literacies are needed, as they give the opportunity for expression of domain-specific issues. On the other hand, there are general features that may be applied universally. Maybee and Zilinski (2015) emphasize that new approaches to information literacy address how information is used in the different disciplinary contexts in which people learn and work. Farrell and Badke (2015) underline that in order to meet the demand of the information age for skilled information users, information literacy education must become situated within the socio-cultural practices of the disciplines. Accordingly, information literacy has to be understood as the information practices belonging to a discipline. Seen against this background, the case of chemical information literacy is especially enlightening. By examining its history, Bawden and Robinson (2015) found that –

while chemical information literacy contains some generic elements – it is more strongly domain specific than any other subject.

Engaging in Data Literacy

Previously we underlined the importance of refraining from explaining the similarities and differences between different literacies. Nonetheless, in the case of data literacy an exception has to be made. The reason for this is that – despite having its antecedents and being closely connected to information literacy – data literacy brings in a new facet to the world of literacies.

The prevalence of data in everyday life, in the business world and as research data in the natural sciences, the social sciences and the humanities significantly contributes to IO. Taking the similarity between data and information, information overload caused by the excess in data may also be called *data overload*.

Data literacy appears under different names, such as data information literacy, science data literacy or research data literacy. As indicated above, it has several close ties with information literacy (Koltay, 2015). Among data literacy competencies, quality evaluation appears as an utmost important activity that includes assessing sources and data itself for trustworthiness (Ridsdale et al., 2015). Hence, the need for critical assessment, mentioned above occupies a distinguished place among its characteristics (ACRL, 2013).

The question if data literacy's relatedness to the underlying disciplines can be answered affirmatively, because it is clear that data literacy programs have to be aligned with current disciplinary practices and cultures (Carlson et al., 2011).

Following Slow Principles

The accelerated pace of life brought with it an increase in the speed of accessing and using information, and rapid consumption of information also causes IO. This kind of overload could be mitigated by applying slow principles (Bawden and Robinson, 2009). Influencing the speed of information consumption, i.e. slowing it down is not only useful, but may be also regarded as part of being critical against information.

Following slow principles is not identical with doing something less rapidly. It rather about being concerned with control by judging the right speed and tempo for a given activity and the context, with a reflective attitude that is basically identical with the ideals that manifest in information literacy's critical stance. Even though it may seem impractical and impossible because of the constant pressure to consume and produce information, slow principles provide a framework for making balanced choices appropriate to a given situation by creating enough time and space to make choices that may prove beneficial (Poirier and Robinson 2014).

Slow search also has to be mentioned. Conventional Web search is supposed to be quick in returning results to users. However, there is also a need for slow search, which provides improved quality that can be traded for quickness (Burton and Collins-Thompson, 2016).

Applying slow principles can be qualified as a kind of literacy, at least concerning information overload, as time sensitivity is related to the perception of being overloaded due to the limitation of time for reviewing available information. Time constraints become even more profoundly obstructing in the case of decision making, especially if critical decisions have to be made (Hargittai, Neuman and Curry (2012).

Applying Personal Information Management Tools

Bawden and Robinson (2009) emphasize that developing a "personal information management style", i.e. managing someone's personal information environment helps in avoiding not only the effect of being controlled by the information, but helps fending the feelings of powerlessness.

This personal information management style is embodied in personal information management (PIM) that is an activity in which an individual stores personal information items in order to retrieve them later (Bergman, 2013). In conformity with its name, personal information management operates on a personal level, while information architecture concentrates on the relationship between relatively well-defined actors, i.e. architects and their target audience. Another comparison shows that literacies operate on a more collective, i.e. societal level, even though we argued before that it is connected to disciplines.

Historically, PIM has not received much attention for two reasons. Until recently, personal digital collections usually had limited size, so there was no need to manage them. Besides of that, attention was focused on public data (Bergman and Whittaker, 2016).

PIM is "both the practice and the study of the activities a person performs in order to acquire or create, store, organize, maintain, retrieve, use and distribute the information needed to complete tasks (work related or not) and fulfil various roles and responsibilities" (Jones, 2008: 453). Accordingly, PIM practices consist of the following activities:

- finding information;
- keeping this information for future re-use.

These two basic activities are accompanied by meta-level activities, such as organising, maintaining, measuring and evaluating information, making sense and maintaining the flow of information, and managing privacy (Jones, 2008). Information, managed through PIM activities, by its origin can be either public, or produced by people themselves, while both types can be present in the PIM environment of the same person (Whittaker, 2011).

Gathering personal information is accompanied by decisions to keep or discard a given piece of information. If it is judged to be useful, decisions have to be made in what format (print, electronic, or both) to keep it, where to keep it, how to structure or classify it, not forgetting about taking its relationship to other items into consideration. Positive decisions are followed by creating or organizing some sort of personal information space, where recognition and enabling retrieval have to be cared for. In the case of researchers, PIM gains special weight, because most researchers 'own' more objects than they can remember, and personal information management strategies help them in becoming aware of their information decisions and needs more explicitly (Bruce, Jones, and Dumais, 2004).

Among the variables of PIM, identified by Bergman (2013), the organization of information is of prime interest. PIM is one of the answers to the availability of large quantities of documents in digital form and the requirement to have technical ability to handle them with relative ease. Even though we emphasized its personal nature, it is secondary that users decide about preservation on their own, even though this decision is based on their perceived actual needs, thus it is not obligatory for them. By keeping personal information in order to reaccess it later, we are performing a type of curating (Bergman and Whitakker, 2016).

The well-known recommendations for information literacy, set forth by the American Library Association (ALA, 1989) contain several steps of the process that begins with recognizing the need for information, identifying, finding and evaluating it. The fourth step, i.e. organizing information may have various interpretations. We may think that it is identical with the knowledge organization role of the library. However, organizing information in PIM contexts is much closer to fulfilling such library functions, as collecting, and preserving information and giving access to it. Obviously, the principal difference between the library's activities and organising information personally is that personal collections are in the possession of the users, and they "give access" to themselves.

Access in this context still exists in analogue form as people continue to take notes on paper in ordered form, usually on index cards. In the digital environment, information is stored on computers and requires additional tools. Alongside with making use of the search capabilities of someone's computer, citation management software (e.g. EndNote, RefWorks or Zotero)

can be used for managing personal collections. Even though searching personal desktops is possible, it is often difficult to find what someone is looking for, if the object is not known or it is not a remembered one (Marshall, Bly, and Brun-Cottan, 2006). Opinions on PIM are dissimilar in the sense that, on the one hand, its quality to exploit subjective properties of each user, who use unique organizational schemes by reflecting specific interactions (Bergman and Whittaker, 2016) makes it distant from literacies. On the other hand, using the expression *personal archiving literacies* is justifiable, if we define it as an activity that involves appreciating the future value of someone's files and remembering where personal information is stored, identifying information that needs to be preserved, deleting unneeded items and maintaining important files (Zastrow, 2014),

Conclusion

We have investigated information overload in its complexity with the intention to demonstrate how it can be mitigated. The main thrust of the argument was on utilising information architecture, applying information literacy and related literacies, as well as making use of personal information management. The apparent loss of gatekeepers, like reviewers, editors, librarians and others lead to the consequence that readers themselves had to become the gatekeepers (Badke, 2004). Notwithstanding, this writing has been conceived in the belief that gatekeeping is not lost definitely, thus not only information users, but also information architects, and information professionals should be well-prepared to alleviate the symptoms of IO (Koltay, 2011). As information overload has many faces, our argument tried to be as diverse as possible. Nonetheless, in this paper those approaches dominated that are connected more or less directly to the idea, expressed by Forte et al (2014) that it is better to make people smarter instead of producing smarter computers.

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