Chapter III
Exploring Information Management Problems in the Domain of Critical Incidents

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ABSTRACT

In this chapter, information management problems and some of the computer-based solutions offered to deal with them are presented. The claim is that exploring the information problem as a three-fold issue, composed of heterogeneity, overload, and dynamics, will contribute to an improved understanding of information management problems. On the other hand, it presents a set of computer-based solutions that are available to tackle these problems: information discovery and retrieval, information filtering, information fusion, and information personalization. In addition, this chapter argues that a rich and interesting domain for exploring information management problems is critical incident management, due to its complexity, requirements, and the nature of the information it deals with.

INTRODUCTION

There is more than one information problem. Information is one of those concepts that encompasses many possible views and approaches. Consequently, probably the first information problem is to know what exactly information is (van Rijsbergen & Lalmas, 1996; Burgin, 2003). This issue has been treated with an information theory perspective, with information measurements in mind, or with philosophical, communication, sociological, or mathematical lenses. There are general definitions of information (studied recently from the unified theory of information perspective) or domain-specific definitions of information. In classic information (communication) theory, information measurement was defined originally by Shannon as the entropy measure of information and is now typically defined as that property of data which represents effects of processing of them (data) (Hayes, 1993). It has also been defined as the value attached or instantiated to
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a characteristic or variable returned by a function or produced by a process (Losee, 1997). Within the information retrieval domain, information as a concept has been addressed by studying the information that one object contains about another object. This shifts the focus from measurement or procedural views, to concentrate on the information flow between objects, which is seen as the key component of an information retrieval system (van Rijsbergen & Lalmas, 1996).

Information may also be seen as a vessel, channel, or flow related to knowledge in all fields. Indeed, data, information and knowledge are often differentiated, but also presented as complementary as if each is a further abstraction of the previous one (e.g., information as meaningful data, or knowledge as applied or understood information). This is why many of the problems in all fields of knowledge can be seen as an information problem (or a language problem) in which semantics, interpretations, worldviews, and distortions all contribute to confusion, ambiguity, or onto-epistemological sources of conflicts of consistency, definition, and truth. The work of Foucault, Wittgenstein, Gadamer, Chomsky, and many other philosophers or epistemologists are testament to the importance of these issues, but this approach is outside the scope of this chapter (see “Additional Reading”) as it is of philosophical nature. Rather, the interest of this chapter is to explore information problems within the computer-supported information management domain.

When information management (storing, finding, exchanging, and using information) is mediated with computers, the generic information problems are inherited, but are also complemented with problems of representation (e.g., how to use types or how to balance machine vs. man readability), description (e.g., how formal should it be or how metadata should be used), and exchange (e.g., how to handle synchronization or how to deal with centralization vs. distribution), among others. Technology also poses new challenges for handling information because, while it supports traditional information management tasks, it has also made available a wide and increasingly cheaper array of mechanisms to support that management. Today, the sheer multitude, diversity, and dynamic nature of information sources, especially on the Internet, makes finding and accessing any specific piece of information extremely difficult (Huokka & Harada, 1998, p. 91). In this chapter, the information problem is presented as composed of three dimensions: heterogeneity, overload, and dynamics. All three dimensions are related to the nature of information, to its context, to its flow, and to the technology used to support its storage and exchange. Of course, as the beginning of this introduction suggests, there are many other possible information problems, or dimensions or categories. The claim of this chapter is that to explore these problems in computer-supported information management, it is useful to begin by looking at these three dimensions: heterogeneity, overload, and dynamics. Another claim is that to do so with a particular domain in mind can also contribute to make this exploration richer and more interesting.

One domain which can aid in the understanding of information problems and their associated solutions is that of critical incidents (crises, emergencies)—because of their complexity and the particular and urgent needs for information they pose—and the nature of the information itself. This chapter will use this domain to explore some of the practical implications of the information problem and its solutions.

The structure of this chapter will be as follows. The next section explains the proposed understanding of the “information problem” by discussing the notions of information heterogeneity, information overload, and information dynamics as subsections. We then take the opposite approach by presenting some of the solutions that are available to deal with the information problem (as described in the second section). In particular, four subsections will treat the following types of
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