

The role of logbooks as mediators of engineering design work



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Information transformation is key to engineering design work. However, research on how information management tools, and logbooks in particular, mediate this, is fragmented. We explore this via two studies (from which we confirm the central role of logbooks) and propose three modes of mediation: facilitating cognition and creation, gathering and collation of information, and staging and transformation of information. The findings explain the widespread use of logbooks through their support of these three modes. Consequently, we contend that multi-modal mediation is one of the main reasons why logbooks are such a central and enduring medium. This synthesises and extends theory on mediation and information use in engineering design. Further, practical insights are derived for the development new information management tools.

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This paper identifies and explores the key role of engineering logbooks in mediating engineering design work. However, in order to support this re-evaluation of the role of the logbook it is first important to understand current perspectives, and how mediation could be interpreted in this context.

Knowledge-intensive industries such as engineering design may be viewed as an information transformation process with information from multiple sources gathered, integrated, transformed, and used to create an artefact (Hicks, Culley, Allen, & Mullineux, 2002). In support of this, there have been considerable advances in the management of formal design information in, for example, Electronic Document Management (EDM) (Hendley, 2012) and Product Lifecycle Management (PLM) systems (Siemens, 2015). Their success can be attributed to a combination of significant technical (computational) improvements made over the last few decades, e.g. more sophisticated ways of organizing and accessing information (Baeza-Yates & Ribeiro-Neto, 1999), and the adoption of standard information representation and exchange

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formats. Further, tracing the flow of ‘formal’ product and process information contained within, for example, Product Lifecycle Management (PLM) and other document management systems is now possible. However, understanding regarding the roles of tools dealing with informal information is less well developed (Topi, Lucas, & Babaian, 2006). In particular, the majority of research in this domain has focused on logbook use due to its assumed special role. Thus there are two key research needs in this domain: to confirm and contextualise the centrality (or otherwise) of logbooks, and to explore the relationship between informal and formal information use with particular reference to the logbook.

With this in mind, and taking a starting point in the literature surrounding logbooks a review of their use in engineering design is conducted (Section 1.1). Based on this a number of questions are raised as to the assumptions underpinning the prominence of logbooks and their role(s) in engineering information work (Section 1.2). This sets the stage for two empirical studies that elucidate the wider landscape of information tool use, including logbooks (Section 2) and subsequently explore the relationship between the logbook and formal information (Section 3). Finally, the findings from the two studies are considered collectively in order to reveal and elucidate the role of the logbook. Wider implications for both theory on information use in engineering design, and the development of information support tools in practice are also developed (Section 4).

1 Information tools in engineering work

This section outlines the current state of the art in research on informal information tools in engineering design work, with a focus on bringing together and contrasting prior empirical work in this domain (Section 1.1). Based on this review a number of research questions are defined and an empirical methodology derived (Section 1.2).

1.1 The many roles of the logbook

In contrast to the large body of work dealing with formal information and its management, less research has been undertaken in the field of, what can be termed, informal information management, especially in the engineering domain. This is despite a growing recognition of the importance of informal information as a means of accessing tacit knowledge through processes such as socialisation, externalisation, and combination (Nonaka, 1994). Topi et al. (2006) also note that informal notes remain a ‘largely untapped resource’.

One type of informal information that forms the basis for the majority of the research in this area and is almost ubiquitous in the engineering domain is the engineering logbook, or notebook – usually consisting of notes,

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