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Contents lists available at [ScienceDirect](#)

Information Processing and Management

journal homepage: www.elsevier.com/locate/infoproman

An investigation of the search behaviour associated with Ingwersen's three types of information needs

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ARTICLE INFO

Article history:

Received 1 July 2012

Received in revised form 3 March 2014

Accepted 8 March 2014

Available online 2 April 2014

Keywords:

Information needs

User study

Interactive information retrieval

Internet searching

Ordinary users

Everyday-life information seeking

ABSTRACT

We report a naturalistic interactive information retrieval (IIR) study of 18 ordinary users in the age of 20–25 who carry out everyday-life information seeking (ELIS) on the Internet with respect to the three types of information needs identified by [Ingwersen \(1986\)](#): the verificative information need (VIN), the conscious topical information need (CIN), and the muddled topical information need (MIN). The searches took place in the private homes of the users in order to ensure as realistic searching as possible. [Ingwersen \(1996\)](#) associates a given search behaviour to each of the three types of information needs, which are analytically deduced, but not yet empirically tested. Thus the objective of the study is to investigate whether empirical data does, or does not, conform to the predictions derived from the three types of information needs. The main conclusion is that the analytically deduced information search behaviour characteristics by Ingwersen are positively corroborated for this group of test participants who search the Internet as part of ELIS.

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1. Introduction

In 1980 [Ingwersen and Kaae \(1980\)](#) report a study of user-librarian dialogues observed in the public library. Later [Ingwersen \(1986, p. 223\)](#) builds upon that study when he labels three types of user information needs: the verificative information need (VIN), the conscious topical information need (CIN), and the muddled topical information need (MIN). Later again Ingwersen transfers these three types of information needs into the context of online information searching and adds characteristics of information searching behaviour to each of the three types of information needs ([Ingwersen, 1996](#), pp. 14–16; [Ingwersen, 2000](#), pp. 163–164; [Ingwersen & Järvelin, 2005](#), pp. 291–292). The characteristics are intellectually deduced by Ingwersen based on search experience and the nature of the information needs. The behavioural characteristics are as such not investigated empirically in the context of online searching, which is what the present study aims at. A study of the characteristics of user search behaviour with respect to the three types of information needs is important in its own right in order to either corroborate or falsify the associated characteristics outlined by Ingwersen. In addition, the study will provide insight, no matter the outcome of the study, regarding how the actual user search behaviour of the three types of information needs are characterised. An insight that is most useful, for example, for system design in terms of how best to support the user's searching of the different types of information needs. Given the search behaviour of the needs differ, then different search supports may be desirable. The results of the study are also useful in relation to evaluation of information retrieval (IR)

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systems and user search behaviour by use of simulated work task situations hence reflecting different types of information needs. So far the test instrument of a simulated work task situation is validated only with respect to exploratory searching, which corresponds to a mix of the expected search behaviour of the CIN and the MIN (e.g., Borlund, 2000, 2003). We do, however, see a demand within the interactive information retrieval (IIR) evaluation literature for evaluation instruments that reflect the three types of information needs identified and labelled by Ingwersen (e.g., Bell & Ruthven, 2004; Toms et al., 2007; White, Bilenko, & Cucerzan, 2008; White, Jose, & Ruthven, 2001, 2003; White, Ruthven, & Jose, 2002). An investigation of the search behaviour of the three types of information needs would serve as an initial basis for how to further extend and refine the requirements for the employment of simulated work task situations with respect to the handling of the various types of information needs. Further, the demand for representation of different types of information needs noticed in the aforementioned IIR evaluation literature may be seen as a confirmation of the types of information needs identified by Ingwersen. In the present work we do not question the three types of information needs, but accept them as presented by Ingwersen.

The present paper reports the investigation of information search behaviour of users who search the Internet with the three types of information needs. The purpose is to gain insight about the characteristics of the information search behaviour of the three types of information needs in order to compare those behavioural characteristics to the corresponding descriptions by Ingwersen. Hence an empirical IIR study is carried out by use of 18 ordinary users, in the age range of 20–25, who searched three personal, self-prepared information needs corresponding to the three types of information needs: the VIN, the CIN, and the MIN. The users formulated the information needs themselves to ensure the information needs were relevant, of interest, and reflected their everyday-life information seeking needs (Savolainen, 1995). The study aims at answering the following research question:

- How does the test participants' information search behaviour correspond to the predicted search behaviour associated with the three types of information needs characterised by Ingwersen?

The remainder of the paper is structured as follows: in Section 2, we introduce in detail the three types of information needs including the associated search behaviour as described by Ingwersen (e.g., 2000). However, the starting point of Section 2 is a brief introduction to how the concept of information needs is perceived within the cognitive viewpoint, which is the epistemological standpoint of Ingwersen (e.g., Ingwersen, 1996). In Section 3, we present the methodology of the study, including the test participants' search characteristics, a description of the study design and data collection methods, the overall test procedure, and the methods used for data analysis. The research question is answered in Section 4 with the presentation and comparison of the search characteristics. The paper closes with Section 5 that presents a summary and implications for future research.

2. The cognitive viewpoint and the concept of an information need

The cognitive viewpoint is user-centred and acknowledges the user's personal perception of an information need and the subjective relevance assessments of information in response to that information need (Borlund, 2010, pp. 23–24). The cognitive viewpoint within IR originated as an alternative to the dominating system-driven approach to IR systems evaluation signified by the lab-based Cranfield model (Cleverdon & Keen, 1966; Cleverdon, Mills, & Keen, 1966). As such the cognitive viewpoint is concerned with the concept of an information need and its formation process as perceived and acted upon by the user. At a more abstract level the information need formation process is referred to as the changes or transformations of the recipient's knowledge structures by the act of communication and the processes of perception, evaluation, interpretation, and learning (Ingwersen, 1992). The concept of an information need is defined as the outcome of a change in the state of knowledge of the user which results in an anomalous state of knowledge (ASK) (Belkin, 1980; Belkin, Oddy, & Brooks, 1982). The change that results in an ASK, which is a cognitive development internal to the user, is happening due to an external situation, e.g., a given work task situation. In other words, an external situation causes a change in the knowledge state and in the user's knowledge structure, which results in an ASK. An ASK can be described as the user's recognition of an insufficient knowledge model which results in an information need, for instance, in order to reduce uncertainty. As the result of the impact of further externally added information, e.g., retrieved information, the information need may change or develop over time in order to satisfy the present problem situation as perceived by the user. This means that the concept of an information need, within the cognitive viewpoint, is understood as a potentially dynamic and developing concept, as also indicated by the cognitive revolution presented by Robertson and Hancock-Beaulieu (1992). Basically, an information need is born out of a situation, and may develop during the process of reaching the requirements of that situation. The user's perception of an information need is thus triggered by the perception and interpretation of a given situation, a problem to be solved or a state of interest to be fulfilled, under influence of the user's current cognitive and emotional state. This state is affected by the cultural and social context in which the user acts. In essence, the cognitive viewpoint is about the user's desire for information, and hence a frame for authentic information studies of users' retrieval, search and seeking interactions in the process of achieving the desired information (Borlund, 2010, p. 24).

Having touched upon the cognitive viewpoint to IIR and how the concept of an information need is viewed it is time to take a closer look at the three types of information needs identified by Ingwersen. Thus the purpose of the following section

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