Exploring Information Seeking Behaviour in a Digital Museum Context

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ABSTRACT

This paper describes the preliminary results of a case study of task-based interactive information seeking and retrieval behaviour of virtual museum visitors in context. The research described here is part of a larger study: this paper specifically looks at 1) leisure tasks/interests and derived information needs, and 2) main characteristics of virtual museum visitors' information seeking behaviour. Both quantitative and qualitative data were gathered from written enquiries to the museum, an online questionnaire and a user study of simulated interest tasks combined with retrospective think-aloud sessions. The data collected did not show exploratory behaviour to be predominant as expected. Rather analysis of data indicates a broad coverage of different types of needs. Finally, four main characteristics of virtual museum guests' information seeking behaviour were identified

Categories and Subject Descriptors

H.3 Information Storage and Retrieval

General Terms

Human Factors

Keywords

Information Seeking Behaviour; User Study; Integrative Information Seeking and Retrieval; Cultural Heritage.

1. INTRODUCTION

Following the idea of the visitor-centred museum (Anderson [1]) together with new possibilities of information technologies, there is a trend to make museum collections widely accessible by digitising cultural heritage collections for the internet. While research into museum visitor behaviour in the traditional, physical museum is extensive, studies of remote access to museums' web sites are less common. Consequently, a number of studies (e.g. Booth [4], Chaudhry & Jiun [7]) suggest to investigate remote access in greater detail and call for an (end) user oriented approach to virtual museums.

The paper presents preliminary results from a case study of task-based interactive information seeking and retrieval behaviour of virtual museum visitors in context. The aim of the study is to gain more knowledge of the information seeking behaviour of virtual museum visitors in relation to an online cultural heritage collection. Inspired by findings in studies of museum visitor behaviour in physical museums (e.g. Black [3], Treinen [12]) it is a main hypothesis, that virtual museum visitors seek information in a highly exploratory manner, which is not necessarily task oriented with a predetermined information gap or need to be resolved.

The case study is based on the integrated approach to information seeking and retrieval outlined by Ingwersen and Järvelin [10]. We extend the traditional information seeking study into an integrated point of view by exploring information seeking in a leisure context and by addressing the implications for resource description of museum artefacts.

2. SEEKING BEHAVIOUR OF NON-PROFESSIONALS WITHIN THE CULTURAL HERITAGE DOMAIN

Studies of information seeking behaviour have mainly focused on job related environments and scientific users and students in particular (e.g. Butterworth & Perkins [6]). Within the museum domain most surveys on virtual museum visitors describe the kinds of people who visit but do not do much to address motivation, interest areas and information seeking behaviour in relation to online cultural heritage collections. However, a few notable exceptions (Booth [4], Gilliland-Swetland, White & Chandler [9], Kravchyna [11]) provide valuable insight. In an extensive analysis of visitor information seeking behaviour at the London Science Museum, Booth [4] validated and identified three groups of virtual visitors and information needs:

> The *general visitor* who requires information on opening hours, prices, the Museum's facilities, what's on, notable exhibits and navigation aids in the Museum; the *educational visitor* who requires (in addition to the above information for general visitors) more detailed information to help plan visits...and project based information; and finally the *specialist visitor* who requires (in addition to the information for general visitors) detailed information concerning the Museum's collections and access to its expertise, together with links to other sources of information ([4], p. 150).

Statistical data (Booth [4]; Kravchyna [11]) indicate that the specialist visitor, considered most likely to engage in exploration and searching of online collection databases, represent only a small percentage (9-15%) of the total visitor group. Both Kravchyna [11] and Gilliland-Swetland et al. [9] evaluate user needs of key constituencies and agree that differentiated online approaches are necessary to meet the variety of information needs.

Within the closely related field of genealogy and family history a handful of archives studies report on seeking behaviour of non-professionals (e.g. Butterworth & Perkins [6], Duff & Johnson [8], Yakel [15]). Yakel illustrates how the broader information needs like seeking meaning and connections are a primary motivation for information seeking activities of genealogists. And accordingly, searching often lacks a clear end goal.

Studies of information seeking behaviour within the cultural heritage domain are few and scattered. Findings in the above studies point to several discrepancies between seeking behaviour of professionals and non-professionals.

3. THE STUDY ENVIRONMENT

The study environment is the Danish National Museum of Military History. It is a medium sized museum of cultural history, covering the history of the Danish defence and development of weapons from the introduction of firearms to present day. The museum's collections are digitised and successively made accessible online in a collection database with photos, textual description and scanned registration materials[1]. See a sample record and result list in Figure 1 and 2 (next page). At the time of study the collection database contained 1700 museum artefacts.

4. METHODOLOGY

The aim of the case study was to characterise the information seeking behaviour of *virtual museum visitors*, as to:

1. Their leisure tasks/interests and derived information needs;
2. What are the main characteristics of virtual museums visitors' information seeking behaviour

A combination of qualitative and quantitative data was gathered as described below.

4.1 Analysis of Enquiries

First written enquiries from the general public to the museum were analysed. A total of 179 object and collection related enquiries (containing 226 requests) from emails and letters were categorised according to Ingwersen and Järvelin's ([10], p. 291) matrix of eight intrinsic types of information needs. Even though the enquiries not necessarily reflects information needs related to the virtual museum, the data were easy accessible and served as inspiration in the following research design.

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[1] Link to the Danish National Museum of Military History's online collection database: www.thm-online.dk

4.2 Online Questionnaire

The purpose of the online questionnaire was twofold. Firstly, to gather data on visitors' demographic, context and purpose of visit, interest areas and important features in resource description of museum artefacts. Secondly, to recruit participants to the user study. The involvement of real life users was a critical issue in the study design, and the intangible group of virtual museum visitors was best approached online. The questionnaire was advertised on the museum's web site, in a relevant newsgroup and a printed journal. A total of 145 respondents completed the questionnaire and we focus on the 83% who visited the museum's web site in relation to their hobby/personal interest area.

4.3 User Study of Simulated Leisure Tasks

A user study with 12 volunteer respondents from the online questionnaire was conducted. Inspired by Borlund's [5] simulated work task situations each participant was given the same four assignments in order to assure experimental control and realism. A simulated work task situation is to be seen as a cognitive trigger, which creates an information need. In this study we had to adapt Borlund's proposed experimental setting to fit our area of study. Instead of work task participant were assigned *simulated leisure tasks*, which were semantically open and two of them were closer to cover *interest areas* instead of tasks (task C and D). An example of a simulated leisure task is given in figure 3.

Task A:

You went to the flea market last weekend and by coincidence you found an old powder horn. You bought the powder horn and was told, that it had been used in connection with hunting. However, one of your friends is certain it was used in the military. Now you are looking for different types of powder horns to try to decide on its use. (A photograph of the "purchased" powder horn is shown to the test person).

Figure 3. Simulated leisure task A, representing an information need of ill-defined, topical character.

The goal of the user study was not to measure performance but to characterise and explore seeking behaviour. The Morae logging software was used to log screen activity and mouse movements during search sessions. The logged search sessions were shown to the participant in the retrospective think-aloud sessions (Van den Haak, De Jong & Schellens [13]) afterwards to help obtain supplementary information.

5. RESULTS AND DISCUSSION
5.1 Information Needs of the Virtual Museum Guests

Data from the online questionnaire provides a first hand impression of who the virtual museum visitors are. The average age is 46 years, 21% are retired and 95% are men (not surprisingly given the coverage of the museum). Only 11% are

Figure 1. Example of how two records are shown in the result list from the museum's online collection database

Figure 2. Example of record from the museum's online collection database

novices with little domain knowledge. This indicates that mainly people with *some* (57%) or *extensive* (31%) background knowledge use this specialized online collection. This corresponds well with Booth's [4] findings on the specialist visitor group.

Surprisingly, the categorisation of the written enquiries showed (Table 1) that only 56% of the requests can be characterised as exploratory. Based on our main hypothesis we had expected a higher percentage.

Table 1. Categorisation of written enquiries according to Ingwersen and Järvelin's ([10] p. 291) intrinsic information need types.

Type of information need:	#
Known item	26
Known data element	48
Known topic	18
Factual search	7
Muddled item	40
Muddled data element	43
Muddled topic	44
Muddled factual search	0
Total	226

Data from the questionnaire did not provide specific data on information needs. However, a question on "purpose of visit" showed that the two most frequent purposes were 1) "find information on a generic item type" and 2) "find a photo or illustration". Less common were broader topical related purposes like "general knowledge on defence history" and "knowledge on the museum's collections". Finally, and interesting finding, supporting an exploratory seeking behaviour, is that 30% of the respondents did not have a purpose of visit and were not looking for anything specific.

The presented data on types of information needs indicate a broad coverage of different types of needs. Well-defined along with ill-defined or exploratory needs are equally represented. The user study provides additional, explanatory information closely connected to the characteristics of the virtual museum guest's seeking behaviour.

5.2 Characteristics of Seeking Behaviour

Table 2 shows quantitative data from the user study of simulated leisure tasks. Firstly, remarkably few catalogue records of museum artefacts were viewed. The retrospective think-aloud sessions explained how the result list with a combination of high quality thumb nails, a title, production year and period of use often gave sufficient information. Accordingly, only a rather limited number of records were viewed. Secondly, searching is apparently dominant to browsing and navigating in three of the tasks. Only in task C, the semantic open and broad surprisingly given the coverage of the museum). Only 11% are *novices* with topic, browsing and scanning were dominant. Also, participants

Table 2. Data from user study of simulated leisure tasks. Categorization of tasks:
Task A: Ill-defined topic   **Task C: Ill-defined topic (broad and semantically open)**
Task B: Data element   **Task D: Know item + data element**

	Task A Powder horn Total (avg.)	Task B Gunmakers, Odense Total (avg.)	Task C 2. World War Total (avg.)	Task D Colt revolver Total (avg.)
Search time (minutes)	52:06 (04:21)	01:07.20 (05:37)	01:25:23 (07:07)	01:02:36 (05:13)
Result list with short display formats and thumb nails	350 (29,17)	128 (10,67)	362 (30,17)	241 (20,08)
Number of records viewed	22 (1,83)	50 (4,17)	31 (2,58)	25 (2,08)
Number of large photos viewed	13 (1,08)	9 (0,75)	26 (2,17)	15 (1,25)
Number of scanned registration material viewed	8 (0,67)	23 (1,92)	15 (1,25)	17 (1,42)
Number of search iterations	21 (1,75)	26 (2,17)	12 (1,00)	10 (0,83)
Browsing: Intentional and undirected (percent of sessions)	0,00%	0,00%	66,67%	8,33%
Navigation: Intensional and goal directed (percent of sessions)	0,00%	0,00%	66,67%	8,33%
Free text searching (percent of sessions)	100,00%	100,00%	16,67%	91,67%
Searching with use of modifiers (percent of sessions)	33,33%	41,67%	25,00%	41,67%

spent most time on task C. Observed searching behaviour, especially in relation to task C, showed, that the semantically open task allowed participants to develop his own individual and subjective information need within the simulated situation, in accordance with Borlund's [5] methodological aim. This often resulted in a development in the conception of the participant's information need triggered by new input - in line with Bate's [2] berry-picking principle. Accordingly, two or more types of information needs may be entwined within a search session.

Primarily based on information gathered in the retrospective think-aloud sessions the following four main characteristics of seeking behaviour were identified (illustrated in Figure 4): Exploratory behaviour, highly visual experience, meaning making and known item/element searching.

We will briefly comment on two of them. Firstly, data clearly showed that photos are the most important feature. This stresses the importance of the visual aspects of the virtual museum visit. Secondly, objects do not themselves represent facts and in this connection *meaning making* is described by Weil [14] as the "…process by which those objects acquire meaning for individual members of the public will in each case involve the specific memories, expertise, viewpoint, assumptions and connections that the particular individual brings" (Weil, [14], p. 212). An example of meaning making is when participants tried to conclude how items on a result list either related or differentiated. Here they often relied on prior domain knowledge for example to make implicit features explicit. Meaning making includes creating own meaning regardless of curator perspective.
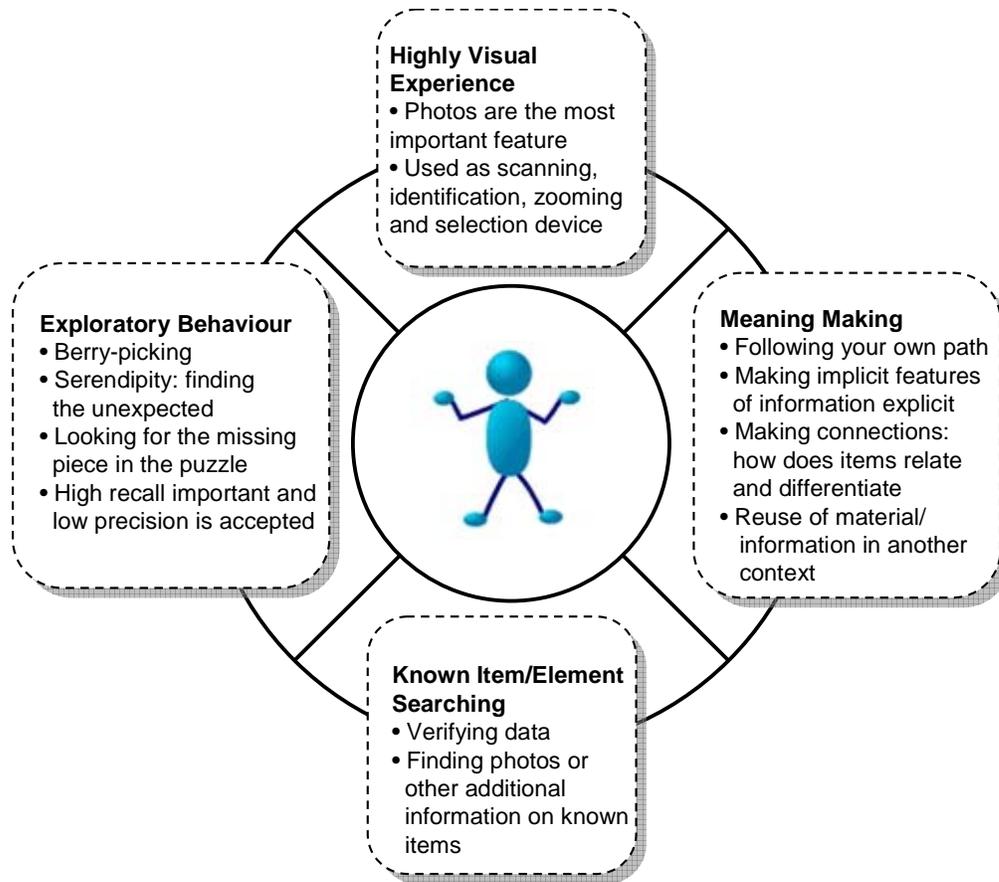

Figure 4. Characteristics of information seeking behaviour of virtual museum visitors.

6. CONCLUSIONS AND FUTURE WORK

Remote access to museum collections provides an excellent opportunity to reach new groups of visitors and provide additional knowledge and experiences to existing visitors. This paper adds to the few and scattered studies of information seeking behaviour in a virtual museum context (Booth [4], Gilliland-Swetland et al. [9], Kravchyna [11]). Analysis of leisure interests and derived information needs did not show exploratory behaviour to be predominant as expected. Rather data indicates a broad coverage of different types of needs. Four main characteristics of virtual museum guests' information seeking behaviour were identified (Figure 4), which clearly point to some of the differences between professional/academic and non-professional behaviour. Further, the seeking behaviour was highly task dependent.

This paper describes preliminary results of research in progress. Future work will include data analysis of user studies with additional 12 test persons, which has just been completed in order to make the empirical data more robust. Likewise qualitative interviews with ten museum curators at the case museum have been conducted within a work task framework together with participatory observation. The data will be used in a comparative study of the professional/non-professional museum context. Finally, implications for resource descriptions of museum artefacts and preferred access points will also be addressed, hence extending the seeking study into the information system context.

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