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# Discussing Design: How search interface features support job tasks in an institutional repository

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## ABSTRACT

Search engines are increasingly becoming a primary method of finding information. As organizations increase their collections of electronic documents, searching is also becoming a method of accessing institutional knowledge. This paper presents the findings of an inductive, interpretive field study on how institutional repository searchers describe their search experience in relation to their job tasks. Qualitative data were collected during a brainstorming meeting with searchers at a large public institution. The findings suggest that search interfaces require flexibility in order to accommodate multiple job tasks. The participants want direct control through interface customization features. They also want to cut down on repetitive search actions. Overall, institutional searchers want to manipulate the interface to reflect specific work tasks. The relationships identified in this study add to the existing quantitative data on the relationship between task and technology. This qualitative research approach provides detailed, authentic task descriptions for future usability testing.

## Keywords

interface features, field study, search, institutional repository, knowledge representation, tasks, usability

## INTRODUCTION

Search interface design is becoming increasingly relevant as Internet searching becomes a primary mode of finding information. The success of Internet searching has been, in some respect, due to the simplicity and efficiency of its interface. Searchers type a few words in a single box and immediately receive relevant content. The single box interface works well for searching general collections but there are more options for searching specialized collections.

Searching matches the query to a targeted subset of the content. Within general collections, matches are defined by the words in the text. In contrast, content within specialized collections can be matched in additional ways. Specialized collections are centered on a single theme or emerge from a single organization. Specialized collections are more likely to contain metadata shared by many items. Metadata are brief descriptions attached to content. Metadata, which are often record-keeping fields, can be used to search in addition to words. An institutional repository is an example of a specialized collection that is likely to contain metadata.

An institutional repository is a collection of electronic documents that arise from ongoing work and projects. An example of metadata in an institutional repository would be a document number that appears on all items. Searchers of these collections share an understanding of the institution's organization and operation. Because these collections are so closely tied to actual work practices, they can provide researchers access to clear relationships between specific tasks and interface features.

This usability study investigates the relationship between job tasks and search interfaces in an everyday environment within a government agency. Usability research measures the efficiency, effectiveness and satisfaction of a technology interaction with one or more people (International Standards Organization, 1999). Empirical evidence in the information systems research literature suggests that a close relationship between task and technology design leads to increased productivity (Gaines, 1993; Goodhue, 1995; Griffith, 1999; Vessey, 1991). Usability and human computer interaction (HCI) research has provided insight into how people respond to specific interface designs (Schneiderman and Plaisant, 2004; Hearst, 2002). Prior research has not investigated how people explain the best way to conduct everyday job tasks in their own words. An inductive interpretive approach was used to identify common perspectives from close observation. Knowledge representation, a concept derived from information retrieval research, was used to guide the analysis (Lesk 1997, Warner, 1987).

This research is designed to answer the question: how do searchers describe their understanding of the relationship between job tasks and search interfaces? Study participants, users of an institutional repository, described the search interface features

and knowledge representations needed to accomplish their job tasks. The descriptions were analyzed and interpreted to identify common patterns.

## BACKGROUND

The conceptual framework of this study views technology as socially constructed (Bijker et al., 1987). Social construction theory assumes that meaning is actively created through interactions between people with common understandings. Organizations share meaning and metaphor (Orlikowski, 2000, 2001; Weick, 1985, 1995). This idea can be extended to communities that use the same computer software to complete common work tasks. Orlikowski (2000) describes technology as a cultural artifact that is structured by habits, power dynamics and social norms. Technology user groups also share cultural meaning and metaphor.

In addition, neoclassical institutional theory suggests that cultural elements are embedded within an organization's systems, routines and artifacts (Scott, 2001). An institutional repository is a collection of electronic cultural artifacts. Prior research has shown that cultural artifacts can be physical objects that are socially constructed. (Gaines, 1993; Orlikowski, 2001). Search interface design for an institutional repository, by extension, is also a cultural artifact.

Search technology, for this study, is considered as having three parts: 1) content 2) knowledge representation and 3) interface features. The content is the underlying intellectual substance of a collection. For instance, an institutional repository is a content collection. Knowledge representation represents a logical view of the content. Features are the software interface access points to the underlying representation. The features carry the message of the underlying knowledge representation. Both the features and the knowledge representation can be seen as being socially constructed because the same content could potentially be described multiple ways.

Interface features within a computer interface are the actions and techniques used to access content. Features are often grouped in logical sets. In the possible universe of things that a computer can do, there are certain features that are related by association. For instance, spell check is characteristic of software that manipulates words. Griffith (1991) has applied the marketing concept of constellations to interface features. Constellations are groups of items that are found to be related through association. Griffith argues that software designers first filter through the range of possible features to distill the primary constellation of functions. Users then narrow that range further by creating a constellation of features they understand and find useful.

Knowledge representation is a logical description created to summarize and symbolize the content. Content descriptions, also known as metadata, are a form of knowledge representation. Metadata do not directly appear as part of the content but describe it. For instance, the metadata for the content phrase "To be or not to be" could be William Shakespeare or Hamlet. Previous interface research has indicated that search interfaces can effectively use metadata (Schneiderman, 1994; Hearst, 2002). Metadata descriptions reflect how an institution chooses to organize its artifacts.

## METHOD

The field research was carried out at a large public institution that is composed of many smaller organizations. It will be known by the pseudonym CamTwo. The central institutional repository, in place for nearly 25 years, will be known as InfoX. The interface design under discussion had been stable for over ten months. Info X is available through the CamTwo Intranet, an institutional private network. However, many of the items in this institutional repository are also available to the public through the Internet. This study focused on the interface design available only through the Intranet system.

The observations were made during the first meeting of the InfoX user group. This user group was designed as a series of meetings open to anyone who uses InfoX and has an interest in learning more about it. A user group had existed before but had not been active for many years. Of the 18 people who attended, all had a minimum of five years of experience and eight had more than 20 years experience. The facilitators were members of the InfoX design team. As an icebreaker, all participants were asked to give an example of the last time they used InfoX. The second part of the meeting was a brainstorming session for new features. Ideas were written down as they were suggested. Participants were then asked to vote on their favorite ideas from the brainstorming session.

The primary data generation method was participant observation (Dewalt and Dewalt, 2002). In addition, brief interviews, documentation and emails were used as supplementary sources for understanding the events before and after the meeting. The vote tallies also were considered as an indication of ideas shared by multiple participants. This triangulation method is recommended to obtain multiple perspectives of the situation (Miles and Huberman, 1994).

## FINDINGS

Analysis of qualitative research involves an interpretive process of data reduction (LeCompte and Schensul, 1999). Field notes were stored in a spreadsheet and coded repeatedly. This iterative process is inductive as opposed to theoretically driven. Initially, descriptive open codes were used. Similar codes were then grouped to form theme clusters. These themes were further evaluated to identify larger dimensions about how searchers viewed their job tasks in relation to InfoX. The codes were vetted with peer qualitative researchers not involved in the study. The data reduction was also under the supervision of an experienced qualitative researcher. From an initial 40 items in five categories, the data were reduced to a series of four codes: tasks, work success, knowledge representation, and interface features. See Table 1 for a summary of the codes. Below the findings for each code are described.

TASKS	Perception of job duties and tasks.
JOB SUCCESS	Perception of success in completing tasks by getting the computer to provide what was needed
KNOWLEDGE REPRESENTATION	Logical description of the content targeted for a given community
FEATURES	Actions and access techniques within the search interface design
<b>Table 1. Codes</b>	

### Tasks

Job tasks described overall work goals that caused searchers to use the InfoX system. Participants, in the initial icebreaker, described their job responsibilities. Many of the tasks used InfoX to find evidence of a particular event or concept from the institution.

... there was a big cloud of things that we were searching for... The miracle of InfoX is that I was able to go into [a specific document type]. You know they are huge. And sure enough, ..., I found [it]. [Participant #7 – Opening Statement] Reference #07

I use it for [institutional] history. I need to find all the documents about the intention behind a decision. I also use it to create lists of items on the topic to share with others. [Participant #10 – Opening Statement] Reference #11

### Job Success

Participants mentioned that they are perceived as efficient in their jobs because of their ability to use InfoX. Other CamTwo employees seek them out as InfoX experts. When they are able to grasp the knowledge representation of InfoX, they are considered successful in their work. Participants discussed how their understanding of InfoX enabled them to be successful and confident, often under time pressure.

A recent search used the advanced search [page] across multiple years. There was a subject term exactly for [mytopic]. I just chose it and found everything. I don't know how I would have found them without the [subject term] feature. [Participant #9 – Opening Statement] Reference #20

### Knowledge Representations

A representation condenses content into logical segments so it can be understood. Participants indicated which knowledge representations were helpful and should be expanded. Visualization is another form of knowledge representation. Participants suggested ways to better understand the content through graphic arrangements. One participant wants a diagram to show the progress of how the documents developed through internal processes. Another wants to be able to compare documents side by side. Although the information is currently available, visual knowledge representations are not a part of the current

system. Some knowledge representations negatively impacted a searcher's ability to complete a task. In the situation described below, the content representation was not detailed enough for the job task.

The [specific search page] database needs more fielded searching. The information is there in the text. I am trying to track pending activity on certain [documents]. I can't do that now. I have to manually search for each one. [Participant #13 – Brainstorm] Reference #53

I'd like to identify not just [common document type] but [specific document type] by topic. [Participant #13 – Brainstorm] Reference #48

Could you list results not in chronological order but somehow [identify] the important documents ... so you don't have to look through all of them? Some kind of ranking ...out of number order. Not for all but just some. [Participant #18 – Brainstorm] Reference #36

## Features

The software interface features give searchers the ability to manipulate the content they retrieve and see. Participants asked for features that emphasized customization to give them more control over their search experiences. Participants also discussed repetitive search actions they wanted automated. Many participants wanted to be able to control of how the results sets appeared.

I'd like to choose how to sort information. Be able to sort backwards or forwards. [Participant #7 – Brainstorm] Reference #38

Email alert enhancements. Set it up automatically so it goes from one year to another without having to redo it all each [year]. [Participant #11 – Brainstorm] Reference #47

Have the search stay when I switch to another database. Don't lose whole search. Right now it wipes it all out when I search a different time or a database.[Participant #10 – Brainstorm] Reference #46

## CONCLUSION

In summary, these findings show that an institutional repository is important to users trying to do their job efficiently. In some cases, searchers want additional content. In other cases, they just need the existing content to be organized differently. Interface features such as sort and automatic tracking could help in reducing repetitive actions. The meanings embedded within the institutional repository have cultural relevance and they fit within the social constructs used in this community. Knowledge representations perceived as successful could be made more widely available. Meanings could be better matched to the tasks that the business demands of its employees. Employee job success is directly impacted by the relationship between knowledge representation, interface and task. Overall, the findings show that people were interested in having their tasks reflected in the search interface design.

The findings are transferable to other situations. Many institutions have expert searchers who deeply understand institutional structure, process and documents. Although the specific content and institutional needs may change, the overall relationships can be elicited from other field studies. However, how to leverage these narratives into an efficiently designed system remains a problem. Each person's story could be accommodated on many different levels of search design.

There are some limitations to this analysis. Employees at this field site are on a tight schedule and may not make time to attend a user group meeting. All the participants were expert searchers. They were able to relate specific searching needs to specific tasks. A future study may use participants with a wide range of searching abilities.

The qualitative research approach of this study adds to existing knowledge by providing rich and authentic task descriptions. Usability tests assess functionality by having multiple participants repeat a similar task. The tasks described in this qualitative study could be used as the basis for future usability testing. The user's perspective can also be the basis for quantitative studies to test if these relationships are characteristic of the population. This study indicates that businesses rely on the knowledge representation and features of an institutional search system to accomplish work tasks. Employees want search interfaces to match their employer's demands on them.

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