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Providing Social Interaction in the Digital Library

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> *In the old days, we used to sit all in one room around the Mini. Everyone knew what was going on. If I had a problem, I could just ask. Now we all sit in our separate offices [with workstations] and no one talks..* -- Astrophysicist.

1. Introduction

As we build the digital library, we need to be careful not to carelessly obliterate some of the important features of current libraries. Many proposals for digital libraries remove social exchange and interaction, focusing narrowly on the technical mechanisms of information access. This is not only unwise, it is unnecessary since we could provide mechanisms for social exchange and interaction within our systems. Simply put, we do not need to remove the social world from our systems. This paper discusses why such interaction is important, and then presents a toolkit, called the Cafe ConstructionKit, that can provide computer-mediated communication support at low cost.

2. The digital library as ideal

Clearly, the promise of the digital library is enormous [6, 7]. In the ideal, an information seeker can have access to materials whenever and however he wants it. There will be no shortage of copies, retrieval can be instantaneous, and the materials will not decay or fade. One would never need to trudge in the snow to the library. In short, the idea of the "digital library" includes solving many of the technical and logistical issues in current libraries and information seeking.

Despite this promise, the digital library, if improperly considered, could lead to a problematic future. The scientist in the beginning quote inhabits such an environment. Many of the scientists at this research site have spoken with wistfulness about the past, remembering themselves in a single physical room. They do not want to go back; they do not want to lose the independence of separate workstations. But, they do miss the camaraderie and social cohesion furthered by the interaction in that room.

Such interaction is too easily lost and regained only with great difficulty. Considering only the mechanical aspects of access can lead to ignoring the positive and useful social interactions in information seeking.

3. The use of social interaction in information environments

Social interactions can be quite helpful to information seekers in four ways. First, one may need to know what to know. In general, it could be argued that as access to material becomes easier, emphasis will shift from the mechanical aspects to knowing what material to access. If we can have every book in the world, we will need to know what handful of books to read. *Help in selecting materials* can be alleviated through technical means (e.g., better navigation methods, critical annotations by well-known scholars, and voting). Nonetheless, one may need to have the help of other people as well. For example, it is often easier to ask another person, since interaction can refine questions and tailor answers [1, 10].

Second, social interaction is helpful in providing mechanism for *seeking informal information*. Informal information includes unofficial information such as technical fixes, organizational work-arounds, and personal correspondence [11]. Because this information is often quite volatile and transitory, it seldom written down, let alone indexed. Other people are often the only source of informal information. Current libraries do not handle this type of information seeking, but digital libraries could [2].

Third, information seeking is often ad-hoc and highly contextual [8, 12]. *Information seekers often have highly specific interests and needs*. It is often more simple and efficient to go to others for information than to written materials. Allen [3], in his classic study, noted that R&D engineers eschewed the formal literature, going instead to colleagues and the trade press for the information they considered necessary. Again digital libraries could provide this functionality.

Fourth, current libraries do have some important -- and useful -- social functions. For students, the university library can have an important *socializing function*. Students meet one another and talk in the hallways and canteens, and faculty members bump into colleagues in elevators and stacks. Libraries serve as a place to co-learn (e.g., in study groups). Moreover, community libraries

offer a number of social outreach and care programs. Many of these useful social functions exist secondarily, as by-products of the library's information access goals. Nonetheless, they are not only useful functions, they also make life more pleasurable and rich.

There is some evidence that such exchanges and interactions provide a "glue" for communities. Fischer [5], while examining people's sense of community in urban and small-town settings, found that the density and public-nature of social interaction may be a critical feature for people's perceptions. Certainly, there is little sense of community in sitting at one's workstation.

The above arguments -- the need for help in selecting material, the desirability of informal information, the ad-hoc and contextual nature of most information seeking, the personal enjoyability and community benefits from social interaction -- all argue for the inclusion of some form of social interaction within the digital library. Such interaction should include not only librarians (or some human helper), but other users as well.

4. The Cafe ConstructionKit

The goal of the Cafe ConstructionKit is to provide a generic interactive communications toolkit for supporting the easy construction of applications such as digital libraries and other CSCW projects. In short, the Cafe ConstructionKit provides a toolkit for sociality.

The Cafe ConstructionKit provides a set of reusable objects that include message transport for asynchronous and synchronous communication, parsing for a variety of semi-structured protocols, private and public channels for narrowcast communication, message filters, and message retrieval by a variety of semi-structured methods. The Cafe ConstructionKit is programmable through the Tcl programming language [9][1] By configuring the objects and providing the suitable Tcl program, *any* application can include the functionality of bulletin boards, chat systems, and electronic mail filters. Additionally, we are actively working on providing the important construction facilities of MUDs [4], so that users can interactively and collectively construct information access methods and environments.

Because of this emphasis on providing building blocks for social interaction, the Cafe ConstructionKit can provide a range of social functionality to digital library applications. It can also serve as a platform for testing various heuristics for interactive information seeking, where users work together to find, create, maintain, and store new information and knowledge.

The current version of the Cafe ConstructionKit is still in prototype. An earlier version exists and was tested on small-scale problems. The first version showed that it was possible to provide a flexible, distributed construction set for interactive communications. However, informal user studies of the first version argued for a better command language (hence, Tcl), using a standard synchronous protocol (hence, the use of NCSA's Data Transfer Mechanism), user interface support for the interactive communication objects, and careful attention to scalability issues. The second and current version is under construction: The core objects (written in C++ and connected through the Tcl interpreter) exist and work, but more work is needed, primarily on the user interface components.

[1] We are using a modified version of Tcl, from NASA Space Telescope, that supports the Athena widget set [13].

5. Conclusion and Future Work

This paper has argued that the design of a digital library does not have (and should not try) to eliminate the social world. Quite simply, there are important elements of the social world, including a sense of community, that we do not want to lose from our notions of "library". Many social mechanisms are important and useful in information access, and social interaction provides an enjoyable and community-building function.

This paper briefly presented a toolkit that makes it easy to add social functionality to applications such as digital libraries. The Cafe ConstructionKit provides auxiliary mechanisms for seeking and locating information without adding significant programming or computational overhead. Most importantly, using the social interaction capabilities of the Cafe ConstructionKit should make digital libraries and similar applications more pleasant to use -- a worthwhile goal.

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