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Usability of digital libraries

A study based on the areas of information science and human-computer-interaction

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Abstract

Purpose – The conception, planning and implementation of digital libraries, in any area of knowledge, demand innumerable studies in order to verify and guarantee their adequacy to the users' necessities. Such studies find methodological, conceptual and theoretical support in some areas of knowledge, such as human-computer-interaction (HCI) (usability studies, in particular) and information science (IS) (especially studies about users' necessities and behavior in information search and use). This research, therefore, intends to integrate concepts and techniques from these two areas, that is, to analyze the usability of the InfoHab digital library, having as theoretical base the constructivist model of user study proposed by Carol Kuhlthau and the criteria of usability established by Jacob Nielsen.

Design/methodology/approach – In order to do so, a qualitative study with six users with different levels of academic formation and experience in the use of recovery systems was developed. Data were collected through personal interviews, prototype of the library, direct observation, image and sound records. The variables of this study included the following criteria: learnability, efficiency and effectiveness of the digital library, management of errors, memorability and the user's satisfaction from the perspective of cognitive and affective aspects and the actions taken by the users during the information search process.

Findings – The aspects identified in the collected data are discussed and the results are evidence of the possible synergy between the HCI and IS fields.

Originality/value – The authors expect to contribute conceptually for a discussion about a model of usability study that can be more inclusive and incorporate the aspects pointed by the constructivist model.

Keywords Digital libraries, Design, Modelling

Paper type Research paper

1. Introduction

The conception, planning and implementation of digital libraries, in any area of knowledge, demands innumerable studies in order to verify and guarantee the final product adequacy to the users' necessities. Such studies find methodological, conceptual and theoretical support in some areas, such as human-computer-interaction (HCI), for the usability studies, and information science (IS), for the studies about information needs and user's behavior during the information search and use processes.

According to Norman and Draper (1986), the area of HCI studies the contact between computer systems and human use, more specifically, the interaction that occurs in this process. Norman continues, "the properties attributed to the system as the interface, the language, the orientation on the tools and devices, the work load, flexibility, compatibility with other systems, communication, as well as the effort to work, intervene directly in this interaction". In this context, usability is understood as

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"the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (ISO 9241-11, 1998).

IS, in turn, proposes "the holistic understanding of the human being while individuals with cognitive, affective and physiological needs and they operate inside of projects that are part of an environment with partner-cultural, economic and politics restrictions. These needs, the projects and the environment form the base of the context of the behavior of information search" (Ferreira, 1996). Studies with such focus make it possible to the planners of digital systems to better understand the users' mental models, and make it easier the development of more useful and adherent design according the target-public's necessities.

This research intends to integrate concepts and techniques of these two fields, carrying out a usability study theoretically based on Carol Kuhlthau's constructivist model of user study and Jacob Nielsen's quality components of usability. Based on Kuhlthau (1991), the presuppose of this study is that by observing the information search process (ISP) from the user's perspective and analyzing the cognitive and affective aspects involved that are present during the interaction with the system, the authors can diminish the gap between the user's natural process of information use and the one proposed by the information systems.

InfoHab, the Center of Reference and Information in Habitation, was studied. This center is a digital library in the area of construction that offers researchers, professionals and companies a free digital databank on Brazilian technical and academic production in the construction field.

Since 2000, this library intends to integrate associate entities, government agencies and universities. In order to incorporate new scientific communication support services, InfoHab reorganized its system, and in particular, its interface of access. Currently, the library allows the user to search for publications about the subject, as well as chances for divulgation and participation in events of Civil Engineering.

This paper is a qualitative study. It starts with a review of the fundamental concepts of HCI and IS used in this research. Then it presents the methodology applied, analyzes the results found, and recommends future studies.

2. Literature review

The late twentieth century was marked by the following characteristics derived from the internet: a boom of the available information and a fast growth in the number of connected computers. Researchers like Castells (2003) and Lévy (2003) have argued about the social, economic and political changes originated by the use of the new technologies of information and communication for the net connected society. These great alterations in all the scopes of human activity have only become possible to the extent that the new technological resources of information and communication have been accessible to people without specialized formation in computer science.

The proliferation of information systems (including databases, digital libraries, web sites, among others) show the difficulty designers are faced with in the attempt to catch and to satisfy users' expectations and interests. This situation implies a rethink of systems planning and designing, in order to add differentiated values.

As a result of innumerable research projects into this direction, one can note that to guarantee and to add value to the systems implies drawing and projecting products

and services centered on the users' needs and focused on the way users perform their tasks. It is essential, therefore, to consider both cognitive and operational aspects involved in the process of information search and use (Norman and Draper, 1986; Dervin and Nilan, 1986).

Norman (1986, p. 61) defines the user-centered system as the design carried out from the user's point of view, thus emphasizing people rather than technologies. This proposal refers to planning and developing a system, specifically interfaces, focusing on the users' necessities, perceptions, mental models and information processing structures.

Researchers of various areas of knowledge have studied methodologies and developed methods and techniques aiming at guaranteeing systems with the characteristics mentioned above. Some examples are the usability studies detailed by the area of HCI, and the studies about information search and use behavior prescribed by the alternative approaches of user studies in the IS field.

2.1 Usability

According to Nielsen (2000a), usability has became a question of survival in the economy of the internet. The author affirms "there is an abundance of available sites, [therefore] to leave is the first defense mechanism when the users find difficulties". These difficulties are usually related to the organization schemes, navigation systems, search system and labeling systems of information in the web. That is, because of the great number of available options today, the information architecture can determine the user permanence or abandonment of the virtual systems (Rosenfeld and Morville, 2002).

Usability, as Nilsen (2003) argues, is a *quality attribute* that assesses how easy user interfaces are to use, making it possible to the customers to develop tasks in a clear, transparent, agile and useful way. This concept corroborates the one prescribed by norm ISO 9241-11 (1998), which considers usability the "capacity that an interactive system offers its users, in a determined operation context, for the accomplishment of tasks, in an effective, efficient and pleasant way". For the Usability Professional's Association – UPA (web site institucional, Disponível em: www.upassoc.org/), usability is directly related to quality of the product, as well as to the user's efficiency, effectiveness and satisfaction. This same association defines usability as a set of techniques developed to create usable products, with a user-centered approach.

Nilsen (2003) considers that the usability of a system can have five quality components:

(1) *Learnability*. How easy is it for the users to accomplish basic tasks the first time they encounter the design?

(2) *Efficiency*. Once users have learned the design, how quickly can they perform tasks?

(3) *Memorability*. When users return to the design after a period not using it, how easily can they reestablish proficiency?

(4) *Errors*. How many errors do users make, how severe are these errors, and how easily can they recover from the errors?

(5) *Satisfaction*. How pleasant is it to use the design?

Usability tests play an important role in each stage of the process of virtual systems development, specially in the drawing of the interface, "space" in which the interaction between the user and the system's available content, services and products occurs.

2.2 Users study – information search and use behavior

The "user-centered" perspective or alternative studies, as referred to by Dervin and Nilan (1986) was initiated in the 1970s, in the IS field, when the necessity to extend the focus of the research appeared, concentrating in the individual actors of the information search and use processes, in social, practical and cultural contexts. "The approach focuses on the user's problems and on the production of meaning, pointing out that the efficiency of the information recovery depends on the integration of the results with the user's life and specially on the evaluation the user makes about the utility of the information to solve problems" (James, 1983; Hall, 1981; Ingwersen, 1983; Kuhlthau, 1991).

While the system-oriented studies (studies of use and usability) examine what happens in the informational environment external to the individual, the user-oriented studies also examine the individual's psychological and cognitive necessities and preferences and how they affect the standards of search and use of information (Choo, 1998). Therefore, such studies focus on the analysis of internal behavior and/or behavior externalized through non-verbal communication, allowing individuals to construct and project their movement through time and space.

The development of users studies, from this perspective, has been searched and described by three distinct approaches: the user-values approach by Taylor (1994), the constructivist model by Kuhlthau (1991) and the sense-making approach by Dervin and Nilan (1986).

Among these, the constructivist model suggested by Kuhlthau (1994) emphasizes the occurrence of affective and cognitive states that certainly appear in an ISP. Its central axle is the "ISP" considered as "the user's constructive activity of finding meaning from information in order to extend his or her state of knowledge on a particular problem or topic". This process occurs in phases experienced by individuals as they build their view of the world by assimilating new information (Kelly, 1963; Kuhlthau, 1991). The analysis of these phases must incorporate three aspects of activities: physical (real actions performed by the users); affective (experienced feelings) and cognitive (ideas related both to the process and to the content).

Kuhlthau (1991) identified, analyzed and described six phases of her model for ISP: initiation, selection, exploration, formulation, collection and presentation. The first one, *initiation*, is marked by feelings such as uncertainty and apprehension, whose commonest thought is the search for something vague and general. Thus, the user's task is to recognize the necessity of information and to talk to other researchers so as to look for similar experiences. In the second stage, the *selection*, the task is to identify the general topic of the research, in which feelings such as optimism after the task is completed appear. After the general topic is selected, the user goes to the third stage of the ISP, *exploration*, in which confusion, frustration and doubtful feelings occur, since the user's task is to investigate about the general topic and search for new and relevant information. The fourth stage is the *formulation*, in which the task is to formulate a perspective focused on the needed information. Therefore, feelings of uncertainty and doubt turn into confidence and clarity. Kuhlthau considers this stage as the critical

point of the ISP, because if the user cannot determine the focus of the search, he or she will probably have difficulties in the following stages. In the fifth stage, the *collection*, a sense of direction starts to appear, as well as the researcher's interest for the subject. The most common actions are seeking the pertinent or focused information in more appropriate sources, such as the libraries. The sixth stage, *presentation*, is the moment to finish the search and the production and to present the final knowledge resultant from the research.

Table I summarizes the set of feelings, thoughts, actions and tasks that occur during each stage of the ISP.

These stages identified by Kuhlthau evidence that the emotional and cognitive aspects can influence the success of the information seeking. At the moments when there is a feeling of uncertainty, causing doubt, confusion and anxiety, as in the stages one (initiation) and three (exploration), there is a great risk that these feelings provoke the mismanagement of the task, compromising the course of the following phases. In phase four, considered crucial and thus highlighted in the table, for example, if the user is fully successful in the research, it is important that when he or she performs the task he or she feels prepared to continue, with sufficient security, because without the focus of the research, the user is unlikely to reach his/her goal fully.

A review of the users studies (IS field) such as usability (HCI field) points to the existence of various feelings during the information search or other kind of interaction with a web system. Nielsen (2000a), for example, affirms that the users can feel anguish and uncertainty during a visit to a web site, and he attributes these feelings to mistakes in the systems interfaces (Figure 1). Based on these evidences, this research aims at checking out whether the integration between the concepts and methods proposed by Carol Kuhlthau's constructivist model and the quality components of usability established by Jacob Nielsen, in a study with a specific digital library, contributes to the enlargement of our knowledge about the subject.

Stages in ISP	Common feelings in each stage	Common thoughts in each stage	Common actions in each stage	Appropriate task according to Kuhlthau's model
Initiation	Uncertainty	General/vague	Seeking background information	Recognize
Selection	Optimism			Identify
Exploration	Confusion/frustration/doubt		Seeking relevant information	Investigate
Formulation	Clarity	Narrowed/clearer		Formulate
Collection	Sense of direction/confidence	Increased interest	Seeking relevant or focused information	Gather
Presentation	Relief/satisfaction or disappointment	Clearer or focused		Complete

Source: Kuhlthau (1991, p. 367)

Table I.
Information search process

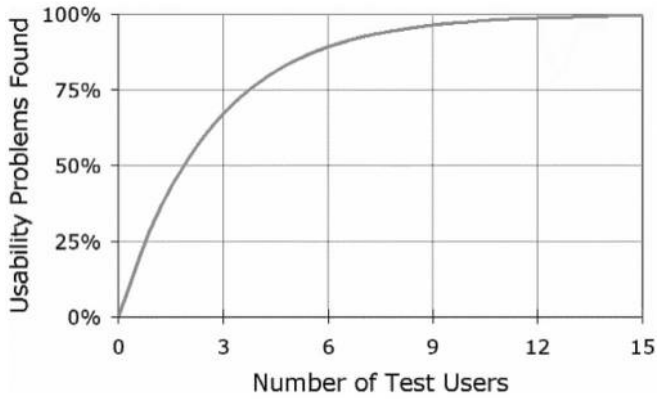

Figure 1.
The number of usability problems found in a usability test with *n* users

Source: Nielsen (2000a, p. 1)

3. Research methods

This is a qualitative empirical research that analyzed the interaction and use made by a group of users of the InfoHab digital library, considering specifically the affective and cognitive aspects found and the actions the users took to solve situations presented to them. This study also describes the selected sample, the variables and the methods of data collection.

3.1 Definition of the sample

To Nilsen (2000b), the number of test users can influence the identification of the problems of usability of a web site. One user makes it possible to identify about 25 percent of usability problems, while 15 users allow us to identify 100 percent of the problems.

On the one hand, Nielsen (2000a) shows that the usability evaluation would have to be made with 15 users but, on the other hand, he considers the test can be trustful enough with five users. According to him, by testing the site with five users it is possible to identify a great part of the usability problems (about 85 percent) without the unnecessary involvement of many resources or users. He recommends, however, that studies should be made systematically each time the site project is reformulated, so as to correct errors of usability pointed out by the users and other errors generated by the reformulation itself (Nielsen, 2000a).

For this research, the authors first analyzed the users registrations in the InfoHab Library and noticed a significant presence (about 80 percent of the 7.789 registrations) of students (under-graduate and graduate students) and professors.

Among this academic public, this research selected users from the Department of Civil Engineering of the Polytechnical School of the University of São Paulo (USP) in Brazil. From the 33 professors and 65 students in this department, 19 professors and 44 students are registered in InfoHab. This research works only with the academic public, following Nielsen's (2000b) recommendation. Six users were invited to compose the sample of this study: an experienced doctor professor, a professor recently awarded a doctorate, a master's course freshman, a doctorate student and two under-graduate students. Fifty percent of this sample already use InfoHab.

3.2 Variables of the study

This research considered the five variables by Nilsen (2003): learnability, efficiency, memorability, errors and satisfaction – all observed from the perspective of the feelings, thoughts and actions taken by the users during the interaction with the digital library (following the model by Kuhlthau (1991)), which, therefore, have become variables of the study. Each variable used in this study is defined as follows:

- *Learnability*. Users' assimilation of distinct ways of solving problems or using InfoHab.
- *Efficiency*. Easiness of task accomplishment, verified through the fluency and difficulty felt by the user during the task performance in InfoHab.
- *Memorability*. The possibility of the user to remember interactions with the system, explaining them or acting in order to repeat correctness and prevent errors.
- *Errors*. Errors occurred due to internal problems of the system or to users' misuse, as well as the analysis of the answers that the system emits in the various interactions with the users.
- *Satisfaction*. Pleasantness in the use of the site as well as the way efficiency and effectiveness of the system was perceived by the user.
- *Feelings*. User's feelings revealed during each phase of the ISP: first contact and knowledge of the new InfoHab interface and its use for the solution of a given task and its conclusion.
- *Thoughts*. Thoughts formulated by the user during the phases involved in the accomplishment of a task.
- *Action*. Actions taken by the users to know the new interface and to accomplish the task.

3.3 Data collection

Appealing to an online prototype of the InfoHab digital library, the data collection was divided in three phases: random exploration of the new interface of InfoHab, performance of a task predefined for the research team, and an interview at the end of the meeting. In the phase of the random exploration, the researcher explained the objectives of the research and questioned the users about how they used to search information about events and scientific publication as well as about their expectation about the services that a library should offer. After that, the digital library was presented and the user was requested to visit InfoHab freely and to say out loud each and every idea and thought that came to their minds. After a short period of navigation, the researcher made some questions about their impressions and opinions.

After that, the users had to perform two predefined tasks of information search request, which demanded the use of the system. Also, during this interaction, the user was requested to say out loud his/her thoughts and actions. The tasks, designed to demand the use of some available functionalities in InfoHab, were:

- to save a list of the master's theses on "rice rind ash" defended at the Federal University of Santa Catarina and to access the complete document; and
- to identify the events that will take place in 2005.

After the tasks were completed, the researcher carried out a half-structured interview, whose objective was to identify the user's perception about his/her performance and difficulties, strong and weak points of the system, level of satisfaction, emotional and cognitive aspects involved in the interaction with the system. Also, the authors made prospective questions aiming at identifying the user's expectations, priorities and suggestions. The script defined for the accompaniment of all the phases, including the questions to be asked is found in Appendix 1. The guidance for the interviewer observation activity is in Appendix 2.

All the three phases of data collection were filmed with a digital camera, placed so as to follow the face and corporal expressions of the participants. Sound files were also generated to record the interviews. The software Screen Record was used to follow and to register the users' actions during the interaction with the systems. Direct observation of the interaction with the prototype of the system was used as a tool of data collection. In order to increase the degree of trustworthiness of the research, the authors used triangulation of empirical information collected from various sources of evidence. The duration of user participation in every stage of this research was about 35 minutes.

4. Data analysis and results

It was possible to obtain much data as evidence of the validity of studies that integrate criteria of the two fields (IS and HCI), identification of the users' mental model when faced with the InfoHab web site, finding of information architecture and content implementation problems. Owing to the great diversity and depth of the data and results, this paper presents some aspects of the results specifically related to the convergence and possible synergy between the mentioned areas, presenting them in accordance to the collection phases described in the methodology section.

4.1 Phase 1 – random exploration

During the phase of random exploration, the authors aimed at collecting the initial impressions about InfoHab, as well as the main references of other informational resources periodically used by the participants as a source of scientific information.

InfoHab was immediately identified as a service for the access of scientific publications in the area. It was also compared by some of the users to other systems of the USP (Dedalus System of the library). Normally, the users use as information source databases Scirus for Scientific Information, Science Direct and CAPES journals portal. Beyond these, sites of research groups from other universities and scientific associations were cited.

The users considered themselves capable of easily using InfoHab, and believed that they would find the same logical structure of the systems mentioned above: "I tend to remember logical things, if the path is logical, I'll remember it". Systems that apply and/or adopt a design that is familiar to the users' cognitive model tend to become more logical, which increases the possibility of memorization of its characteristics and functionalities.

All the users' first impression about InfoHab was that it is a pleasant site in terms of visual aspects, organization and distribution of information. One of the users, however, specifically commented on the used labeling system, inferring that it used unnecessary and unclear terms for the understanding of the content:

> I would like to have a more defined image of what it is, for example, virtual nuclei or management of events [. . .] I would like to get a brief glimpse and already understand a little more before going on.

4.2 Phase 2 – task performance

The users, in this phase, provided evidence of their previous experiences with other search systems (cited in phase 1) when they tried to talk back their models of development of the requested task, for example the use of the word-key strategy, simple and advanced search. There was no consensus about the strategies used by the users, so various paths were followed, but all of them remade the search more than once. Some examples of the users' commentaries during these activities are: "can the research be refined?", "what happened with my search that it generated zero register". Other users brought suggestions of new available interesting and complementary functionalities in similar systems:

> . . . maybe here in the key-words, look! There are ash, rice. This might be a link to other works. Dedalus is like this. There you have the key-word, so you click . . .

In general, in the information search, not all the users showed fluency to deal with the specific site (it took them from 15 to 25 minutes to complete the task), although they are experienced users in activities of bibliographical searching. It happened due to problems of usability and architecture of information in the digital library that generated feelings of unreliability, anguish and discomfort during the process. Besides, the task involved more actions than a mere simple search, since users were supposed to save a list of references and to access the documents. Despite being able to locate the documents, none of users completed the task, although some declared they did. Therefore, although the user was apparently satisfied with his/her own performance, the system offered more possibilities and these were not identified by the user, what certainly would have had a direct impact on the understanding of the mentioned satisfaction.

It should be noted that the subject was not of interest to the users and this might not have generated great motivation. This is why a more detailed inquiry should be carried out to verify how the variable personal motivation derived from a necessity of real information influences the users' actions and decisions.

The same happened to the second search, for 2005 events. The users used the cognitive model they had consolidated from their experiences with the other systems of the University. None of them was able to complete the task, generating a direct impact onto their self-esteem and confidence: "I feel a little . . . I don't know if I got everything . . ." – "I felt insecure, for example, did I do right, there in the events?" Another user compared the system with the previous one and considered that the events were divulged better in the previous system. Both results corroborate the proposal by Borgman (1986), adapted by Bishop *et al.* (2003) when it describes the three abilities that are necessary to the users to carry out a search in digital libraries: conceptual knowledge about the process of recovery of information, semantic and syntactic knowledge of the area to implement an adequate query and, finally, technical abilities in the use of the selected source to perform the search.

In relation to the memorization and learning variables, the authors observed that the problems mentioned above generated an impact directly onto these components of the digital library in question, since when the authors change a preexisting model, they

must justify it logically so that the user recognizes it as valid and rethink and reformat his/her previous standard.

In the analysis of the digital library efficiency, some technical errors were observed (for example, once the site did not offer the user the chance to return to the previous movement and obliged him/her to restart the task from the beginning), others were due to the search tool specification, which did not offer certain expected functionalities (such as: refinement of the search result). In those situations, the most common feelings were insecurity, anguish, scare, discomfort, impatience and frustration, besides the great deal of time spent to finish the task. This demanded intervention by the interviewer to maintain users' motivation, and assistance so that they could solve the problems and continue the task. One of the users felt embarrassed and thought: "I think I do not know how to make a research any more".

4.3 Phase 3 – interview

The final interview was important to analyze some aspects of the memorization easiness, learning of the dynamics, general impressions after use and final satisfaction with the InfoHab digital library.

In general, the users demonstrated easiness in learning and remembering the steps they had taken to perform the task, when asked during the interview. However, it is not possible to affirm that the page is easy to memorize, since there are many conflicts between the proposed model and the users' mental models. It is also necessary to verify whether after a period of absence the user remembers the steps to perform those tasks made during this research.

Although the users were faced with difficulties during the accomplishment of the tasks, they felt satisfied at the end, in part due to the interaction in the interview process, in which they were presented with other services not identified before or other forms of search task performance that they did not know. Thus, Dervin's (1984) comment can be confirmed when he says that qualitative studies that make the user remember and speak out his/her previous experiences help his/her learning, because they lead to a process of systematization and understanding of the problem that, usually, ends up extending his/her initial perception of the problem and of the ISP.

In relation to the satisfaction with the site, the users suggested ways to improve it, such as: to diminish the amount of text, to increase the size of the font type, to allow refinement in the search and inclusion of new search criteria (like by date and geographical location).

5. Final considerations

The results evidenced the synergy between the areas of HCI and IS, according to the theory by Kuhlthau (1991) and the proposal by Nielsen (2000a, 2003). Therefore, through the test of usability in the site of a digital library it was possible to evidence that to analyze information search and use behavior validates and adds new perspectives to the analysis of usability aspects. Thus, it was possible to observe that the users' actions, feelings and thoughts, as well as their experiences disclose significant indications to learning components, memorization, errors, efficiency of the digital library and mainly users' satisfaction.

This synergy, however, still needs other deeper studies that incorporate contributions from other areas of knowledge to explain still not investigated

phenomena about this relation between usability, information necessity, ISP and users' satisfaction. Another item that also deserves attention is related to specific studies on users' nonverbal communication, since, as identified in this research, their body movements (noted by the interviewer and also registered by the tools of data collection) can evidence other factors related to cognitive and/or affective aspects that can contribute to the design of digital libraries.

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Appendix 1. Interview script

After the site visit task	
Site	
In general, what do you think about the biblioteca digital?	Satisfaction, feelings, thoughts
What did you like the most?	
What did you like the least?	
What would you change in the site?	
Who do you think the site is most appropriate to?	
What are the digital library objectives?	Satisfaction, thoughts
Did you find it difficult to understand any term used in the site? Which one?	Efficiency, thoughts, action
After finishing the task	
Do you usually make this search in the site?	User's experience
Do you think it is easy to reach the task goal?	Feelings, thoughts
After each task	
Task	
Do you think you reached the task goals?	Efficiency, satisfaction, feelings, thoughts, action
Did you reach the task goals the way you would like to?	
Did you find any difficulty to accomplish a task? Which one?	
Do you remember the steps taken during the performance of the task? Which were they?	
Did you follow those steps? Why? Did you take into account your previous experiences?	Efficiency, thoughts
What did you feel when you were presented with the task?	Thoughts
After the interview	
Prospecting	
If you needed to use the site again to perform a task, do you think you would find it difficult?	Learnability, memorability, thoughts
If you were to implement an Information System like InfoHab, how would you do it? What would you put in it and prioritize?	Learnability, efficiency, memorability, errors, satisfaction, feelings, thoughts

Table AI.

User identification

Name:

Age:

Major:

How long:

Phase 1 – random exploration

Do you usually search on the internet for works that are relevant in your area? Which sites do you usually search?

Do you know InfoHab? How do you use it?

How do you get to know about events that are going to take place, technical journals and national research projects?

Do you think it is important that there is a site that gathers information about calls for papers or events that facilitate communication among researchers?

How would you like to receive that information? How do you divulge them in a site?

Do you think InfoHab could play that role? Why? How?

What does a Center of Reference and Information in Habitation mean to you? What would you expect from it?

Appendix 2. Observation script

During task performance, the following aspects are observed:

Task	
Learnability, efficiency, errors, action	The steps taken to the task performance
Efficiency, action	Task time spending
Efficiency, action	Strategy used to perform the task
Efficiency, learnability, errors, action	Doubts, difficulties in the search steps performance
Errors, action	Errors made and how the user managed the situation
Satisfaction, efficiency, feelings	Feeling shown or spoken out loud

Table AII.

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