

## Testing the usability of an Hypermedia Encyclopedia on Data Networks

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### Abstract

The usage of hypermedia systems has several side effects mainly regarding human factors. Enhancing the power of expressiveness and multiple user interface's options are their most outstanding features, but the gap between the intended benefits and their real effect is hardly considered. Comparison of basic tools for exploring and searching information in hypertexts has been elaborated in several publications [Frei92], [Guinan92]. Nonetheless, the introduction of additional tools to simplify the understanding and usage of hypertexts had not been explored at all. New tools were carefully examined when creating the MHEF model [Díaz95], that is an Hypertextual Model with Statistics and Filters, defined in our Laboratory (LINTI at the University of La Plata) and implementing an application in 1995. This model includes tools for information retrieval and for the customizing and personalizing of the system. So, the purpose of this paper is to demonstrate the effect of these additional tools for hypertexts with regard to the user's perspective in order to improve the human-computer interaction and to denote all their potential features. This is achieved through an evaluation process carried out with different kinds of readers. To perform the testing we have chosen an application called Hypermedia Encyclopedia on Data Networks [Díaz94a] [Díaz94b]. We define a test for usability evaluation over a range of thirty participants [Petre95] [Kara95].

The conclusions reveal the real advantages of using additional tools that facilitate the user interaction and present hints to be considered in future versions of MHEF.

## Descriptive synthesis of MHEF

MHEF (Hypertextual Model with Statistics and Filters) incorporates a set of tools constructed in order to help readers in the information retrieval process [Frei92] [Guinan92] [Belkin92] [Inchimura93] and to allow for customizing and personalizing the system.

The tools for data retrieval incorporated in MHEF are: **Recommended Lecture paths** by the hypertext's author, **Dynamic guided tours** that are related with the popularity of the hypertext's nodes, **Key-word filters** that allow direct access to specific nodes of the system [Díaz95].

The **Recommended Lecture path tool** allows users to take a glance at the basic subjects involved in the hypertext. It is determined by the author of the hypertext. In the application under consideration (the Encyclopedia on Data Networks), this tool brings a brief trace to the most relevant information about data networks. It constructs a static linear representation of the hypertext graph, including the creation of new appropriate links to connect the most important nodes. This tool facilitates the comprehension of the ideas included in the hypertext.

The **Dynamic guided tour tool** shows the nodes and links most visited by all the readers of the system, in a hierarchical structure [Rivlin94] [Trigg88] [Marshall89]. The links shown are those that relate the most popular nodes and also, new ones are generated if it is necessary for the connectivity of the overall tree structure. This a dynamic and evolutive mechanism which depends on the empirical usage of the system. It was incorporated in MHEF for helping users to visualize in a simply manner the most advised information of the hypertext (remarking the most popular concepts referenced by the universe of readers).

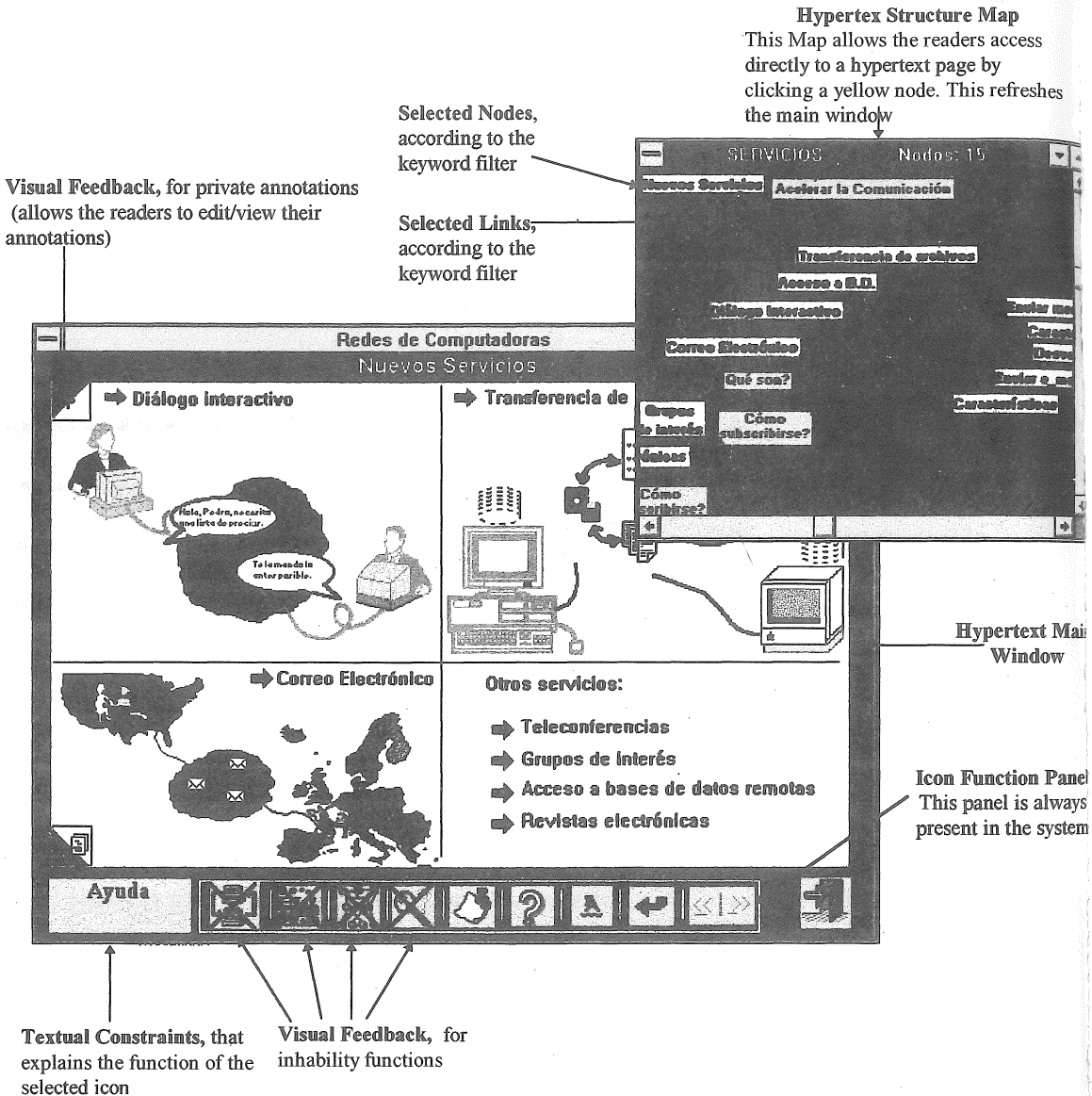
The **Key-word filters tool** allows the recovering of nodes related to a specific topic selected by the user allowing the direct access to nodes according to their contents. It constructs a subgraph with the nodes classified by the key-word filter selected and the active links are only those that connect them. The fundamental purpose of this tool is to simplify the information retrieval for end users.

When one of these tools is selected by a reader, a simplified domain of the hypertext is activated as the result of the tool applied. Users can navigate in the resulting domain structure as usual or they can work with a map constructed in order to bring a visual representation of that structure and to permit the direct access to the hypertext pages.

The other tools let the users set up individual views of the hypertext's domain. They include **Filters according to the user's profile** [Sokolnicki88], and the possibility to have **Private (personal) annotation** in the hypertext's nodes [Díaz95]. The first one consists on a classification of the potential users of the system in well-defined categories partitioning the hypertext domain according to them. So, the system information is organized in different hypertext graphs concerned to each kind of readers. The last one, the **Private annotation tool** allows users to incorporate private notes into the node's contents like illustrations, figures, comments, phrases. For doing this, a simple text editor and a graphic library are provided. With this tool, hypertext readers can enlarge the semantic (adding a personal flavor) of the nodes.

In order to evaluate the usability and adequacy of these tools and their influence in the global system, MHEF model was applied to a domain of data networks, creating an **HYPERMEDIA ENCYCLOPEDIA ON DATA NETWORKS** (a copy is available upon demand at the LINTI).

The look and feel of the added tools was designed carefully using the most of the visual interaction paradigms like direct manipulation, visual maps, colors, constraints, icons, gestures, etch [Petre95]. The next figure displays part of the visualization of the Key-word filter tool.



## Usability test

The usability-evaluation was performed over a range of thirty participants classified as novice and experienced users [Petre95] [Kara95]. They were compelled to solve five goals that constitute different types of search in the hypertext domain, analyzing the usability of the data retrieval tools.

The problems were:

Goal-1: *to search information related to an specific point,*

Goal-2: *to synthesize a topic,*

Goal-3: *to explore some theme exhaustively,*

Goal-4: *to inquire the most popular subjects consulted in the hypertext and,*

Goal-5: *to examine the global subject of the hypertext.*

Below, we present the Reference Table with the most appropriate (M-A), acceptable (A), not always admissible (N-A-A) (relying on the usage of the system), and unacceptable (U) tools determined per objective.

Objective	Navigation Tool	Guided Tour Tool	Key-word Filter Tool	Rec. Lecture Path Tool
Goal-1:	(A)	(N-A-A)	(M-A)	(N-A-A)
Goal-2:	(M-A)	(N-A-A)	(A)	(N-A-A)
Goal-3:	(A)	(N-A-A)	(M-A)	(N-A-A)
Goal-4:	(U)	(M-A)	(U)	(U)
Goal-5:	(A)	(N-A-A)	(U)	(M-A)

The responses obtained from the users were matched with this table and the results are listed below:

a) Results about Novice readers

For the goals *To search information related to an specific point* (Goal-1) and *To explore some theme exhaustively* (Goal-3) where the best choice was the *Key-word filters tool* only a 15 % and a 0 % accordingly of the novice readers used it. Overall, they choose **Navigation tool** (close of a 60 %) and **Recommended Lecture Path** (close of a 25 %).

For the goal *To synthesize a topic* (Goal-2) where the best choice was **Navigation tool**, a 60% used this appropriate tool. The rest of the readers selected the **Recommended Lecture Path tool** (33 %) and **Key-word filters tool** (7%) to perform this task.

For the goal *To inquire the most popular subjects consulted in the hypertext* (Goal-4) where the best option was **Guided Tour tool**, only a 20 % of the readers used it and about a 80 % of them can't perform the task.

For the goal *To examine the global subject of the hypertext* where the best tool was the **Recommended Lecture Path tool** a 60 % of the novice users selected it. The rest of the readers used **Navigation tool** (about 33 %) and **Key-word filters tool** (7%).

We conclude that the novice readers always use navigation and recommended lecture path tools for every given goals. They don't use the additional tools provided for the system that allow direct access to the hypertext information. They prefer to perform the task in an exhaustive way selecting the navigation tool or in a full guided way, so that the recommended lecture tool was mistakenly used. The later tool was largely preferred by novice readers, so we conclude that the

name chosen for this tool was very confuse for them. This is a static tool that always recommends the same tour without considering the users working sessions.

Another remark was the lack of use of the guided tour tool in any tasks. We consider that the problem possibly resides in a wrongly chosen name (that poorly describes its meaning) for this tool or in the user lecture's habits (they always prefer an exploration tool).

#### b) Results about Expertise readers

The behavior of the more knowledgeable readers was the expected. They usually use **Keyword filters** and **Guided Tour tools** for accessing directly to the adequate nodes. They use **Navigation tool** as a complementary mechanism to fulfill the goal, never as the primary data retrieval tool.

### Conclusions

We conclude that additional tools are very necessary for beginner and expert readers [Zelleweger91]. Novice users require supplementary support to avoid the problems of navigation like disorientation in the hyperspace [Simpson90], and the experts need tools that substitute navigational interaction with direct access to hypertext nodes.

Therefore, we have to analyze how to improve the wrong usage of the **Recommended Lecture Path tool**. Thus, we are conceiving two possible alternatives to solve this problem: a) An elementary solution is to change the name of the icon with a more explicit one, b) A more complex solution is to construct another tool such as a Context Recommended Lecture Path tool, that would assist the readers to chose the suitable accessible paths preventing cyclic and recurrent

ones. This tool could be required by demand or automatically when the system detects a possible user disorientation in the hyperspace.

Another problem to analyze is the seldom usage of the **Guided Tour tool** by novice readers. This tool shows the most popular nodes of the hypertext. We're creating new tests in order to investigate the sources of this user behavior and so, to propose a future improvement of this tool.

The evaluation performed will be continued in the future using not only direct observation but the log analysis of the different sessions. We understand that a continuous revision is needed mainly when using concepts so much dependent on the interaction schemes (regarding human factors & human computer interaction) as hypermedia.

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