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Towards Hypermedia Electronic Publishing

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The most important problem that decision makers face in today's ever increasing information flux is how to find efficiently and fast the useful information. Hypermedia Electronic Publishing systems, supporting active information distribution and offering hypertext browsing facilities, provide a promising solution to this problem. Nevertheless several issues, like value added services, retrieval and access mechanism, information marketing as well as financial and security aspects should be resolved before Hypermedia Electronic Publishing systems can be accepted by the information consumers and producers.

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Abstract

The most important problem that decision makers face in today's ever increasing information flux is how to find efficiently and fast the useful information. Hypermedia Electronic Publishing systems, supporting active information distribution and offering hypertext browsing facilities, provide a promising solution to this problem. Nevertheless several issues, like value added services, retrieval and access mechanism, information marketing as well as financial and security aspects should be resolved before Hypermedia Electronic Publishing systems can be accepted by the information consumers and producers.

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1 Introduction

Newspapers and magazine publications are traditionally the most widely spread methods for information distribution and dissemination. However the evolution of computer networks and the political and economical interests in the fast distribution and dissemination of information paved the way for the introduction of high quality real time multimedia services and what is known as *information highways*, *cyberspace* or *global information infrastructure* [1]. The World Wide Web (WWW) [2] and its exponential growth over the past couple of years is probably one of the best examples of the need and potential of high quality multimedia information access services. In order to fulfill this need and since modern newspapers and magazines already use computer assistance for the edition and printing, an increasing number of information providers, (newspapers and magazines) place electronic versions of their publications on the network. However due to lack of any added value the structure and information presentation of these electronic publications is more or less the same as the printed information. Having on-line electronic versions of printed material is not enough. The time spent for browsing and retrieving information is about the same as before.

In this paper we set the foundations for the design of a *Hypermedia Electronic Publishing (HEP)* system that will help the information consumer to minimize the time spent for information browsing and retrieval. The combination of hypertext techniques [3] with multimedia elements [4][5], called hypermedia [6], allows the better understanding of an information topic by focussing on the main ideas and

making available, upon request, explanations and commentaries of any nature (audio, video, reference articles, etc.).

2 From Yesterday to Tomorrow

In today's highly competitive environments (industrial, financial, government, research etc.) being well informed is the basis for success. Decision makers in these environments require accurate, exhaustive and up to date information that can be accessed easily and fast. However raw information, like the Reuters or Bloomberg news feeds, are not enough. Information must also be presented within an evolving context that includes references to the information evolution and related topics.

We can thus say that the two most important issues, from the point of view of the information consumer, in the distribution and dissemination of information are how and when the information is "published" and how it can be retrieved.

2.1 Static and active information

In a traditional paper based publication process editions are published on a regular predefined time interval basis. The information contained in these editions is considered *static* in the sense that it was valid at the time of publishing and nothing guaranties that it has not "evolved" by the time it is read. Any type of "evolution" of the information will only be traced in the next edition. On the other hand a new dimension can be given to information publishing if the events directly trigger the edition and publication of information. We call this type of information *active* since the articles presenting the information are dynamically updated following the evolution of the events. In television news broadcasts this notion already exists in news-channels like CNN. However in a HEP environment we can provide far more from what is offered by news channels by linking, for example, the "articles" together and providing access to the archived information giving this way to the reader a complete view of the evolution of the information topic.

In a hypermedia electronic publishing environment the concept of *edition* vanishes in favor of a *virtual newspaper* where articles appear, evolve and are archived almost at the same time the event happens, evolves and terminates. A first step toward "pure" active information publications can be implemented with the existing computer assisted news providers by providing active information as event triggered information between two static information editions.

2.2 Information Retrieval

Newspaper reading is a time consuming process due to the way information articles are presented. Decision makers in order to obtain an accurate view on a set of topics in which they are interested, must read or at least browse a large number of newspapers in a sequential way jumping from one subject to an other and filtering-out the irrelevant information (Figure 1).

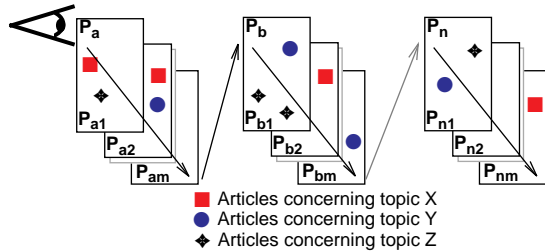


Figure 1 Traditional newspaper reading

Given the technological infrastructure that is now available many publishers offer on-line electronic versions of their newspapers [7][8][9][10] with relatively simple value added services, like feedback forms and keyword-based article retrieval. However extraction of information from the electronic versions is done in the same way as with the hard copies and it is finally as time consuming as reading the printed newspaper itself.

The major advantage that Hypermedia Electronic Publishing offers to decision makers is the drastic reduction of the time spent in retrieving "interesting" information. The task of browsing and selecting information entries in the electronic newspapers is handled by a HEP browsing tool. The tool will establish intra- and cross-newspaper hyperlinks to information topics and present the decision maker personalized electronic hypermedia newspaper in the form of hyperlinks to the different topics of interest (Figure 2).

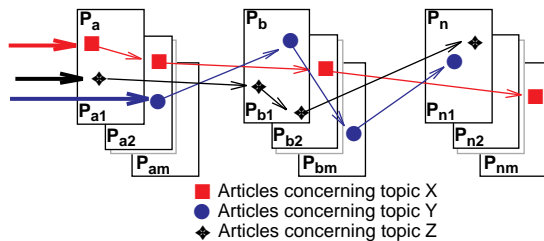


Figure 2 Hypertext based newspaper reading

The HEP browsing tool can be thought as an intelligent newspaper whose role is to provide the up to date and relevant information in a layout specified by the reader. The reader need only to subscribe to the information sources for given topics, sections of the newspaper, keywords, subjects, semantic definitions etc. according to his information interests' profile and let the browsing tool retrieve and present the information from the various information servers in the network.

3 Key issues for a HEP system

The key issues related to the design and implementation of a Hypermedia Electronic Publishing system can be clas-

sified into two major categories. The first concerns the issues related to the information structure, access and presentation, while the second concerns the marketing aspects of electronic publishing.

3.1 HEP Information structure

The structure of the information provided by the HEP servers should facilitate the introduction of value added services that will help the information consumer in the retrieval and presentation of information. These value added services will provide to the information consumer the visible part of the HEP system and will define the requirements for the structuring of the information and the needed HEP mechanisms.

Value added services

The major factor that will establish HEP over static stand-alone electronically published newspapers will be the introduction of integrated cross-newspaper value added services. These value added services will employ hypermedia techniques and should be designed for active information retrieval and presentation. A basic set of value added services includes

- Setup of contextual custom layout of newspapers
- Definition of contextual interests of the information consumer in terms of keywords, semantic descriptions, terms and conditions of retrieval etc.
- Retrieval of cross-newspaper information
- Access to information archives and presentation of historical evolution of information

Triggering schemes for active information

An important issue in the design of active information concerns the way that the information notification is triggered. One method is to alert the information consumer as soon as a new information item is available and provide him with a pointer from where he can retrieve the information. This method is suitable for providing active information in a traditional static electronic newspaper publishing system. Between two publishing-issuing processes, new events of importance can become available to the interested readers before they appear in the printed issue.

A second method is when the article itself evolves according to the evolution of the events. The article remains the same (as far as the information consumer is concerned) but it is dynamically updated on an event driven basis.

Matching information requests and offers

The primary question in retrieving information is how we can automatically identify which information is relevant to a topic and which is not. The codification of the offered information and the requested information needs to be defined in open and consistent way.

3.2 HEP Marketing aspects

In a HEP system information is a consumer product and as such its commercialization must conform to certain marketing requirements. The most important of them concern the copyright of the information, the security and privacy of the related services, the financial aspects etc.

Rights of author

The major issue in the commercialization of intellectual

work is to guarantee the rights of the author. HEP will only be accepted if a copyright management system that guarantees the author's rights is setup. J. Ebersole of the Information Industry Association of the USA has defined in [11] that an electronic copyright management system must provide means for:

1. identifying each work¹ and its copyright status
2. assuring that conversion via scanning results in a digital form that includes the identity of the work, the copyright status, and whether permission for conversion has been granted
3. authenticating each work
4. protecting each work so that only an authorized recipient can receive it and perceive it
5. controlling and setting limits on specific uses (e.g. display only, print one copy, no downloading, etc.);
6. write protection of each work (so it can not be altered)
7. measuring usage
8. electronic contracting for access and use
9. billing and collecting payment
10. assuring that copyright identification and some means of control stay with every portion of a work when it is downloaded or otherwise transferred in digital form, or when it is printed

Security and privacy

For reasons of intellectual property protection, economically viable value added paying services, and secure digital payments for the received services, one must provide the means for securing the client - server interaction from external tampering. In addition one must be able to provide guarantees and verification methods that the received information originates from the information server from which it was requested and it has not been altered between transmission and reception.

Netscape [12], a WWW browser developed by Netscape Communications Corporation, has developed the SSL protocol [13] to address some of these problems. However in a HEP environment and in view of the commercial interests more sophisticated solutions might be needed.

Financial issues

In order that the HEP becomes viable on a commercial basis and for ensuring the quality and accuracy of the information, charging schemes for the provided services and information should be designed.

The information provider should be able to sell information on both a per information item basis and on a subscription basis. However in contrast to the printed newspapers where a consumer subscribes to the whole publication, electronic newspaper subscriptions can be more flexible by allowing the information consumer to subscribe to specific information items. For example one can subscribe only in a specific political commentary or the culture section of the newspaper or even subscribe for articles containing a keyword.

Advertisement provides an important revenue to the publishers of a newspaper. However the advertisement strategies in an electronic newspaper should be thought again from the start. The reason is that the target of an advertisement is to be seen by the information consumer.

1. The term *work* should be understood as a document in the broad sense (sound, video, images, text, etc.).

However in a HEP system it can be very easy for the information consumer to install a filter that will filter out all advertisement. On the other hand even if mechanisms that disallow the filtering of the advertisements are installed, we should consider providing advertisement-free information for information consumers that request it, at a higher price.

Other marketing issues that must be considered include the definition of standard access protocols that will allow the interaction between different providers and the information consumers, and the psychological effects that the introduction of electronic publishing will have on the people with possible negative reactions from different groups.

4 Conclusions

In this paper we described the major issues and considerations for the design and implementation of Hypermedia Electronic Publishing (HEP) system. The advantages of Hypermedia Electronic Publishing over traditional information publishing can be measured in terms of the accuracy of the provided information and the time saving of the decision makers in the retrieval of information.

The main problems in the implementation of a HEP system are the presently small number of available full scale information servers and the need to define standards for structuring the accessible information. Although in the near future more information providers will offer their services in the network, the adoption of a universal information structure standard is highly improbable. However in the long term de-facto, standards will appear (like for example the HTML [14] language for WWW documents) boosting the evolution of HEP. Nevertheless a reduced capabilities version of a HEP system can be implemented today retrieving information from existing information sources (like the ones available on the WWW).

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