

Information superhighway. A one-way road.

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Abstract: The paper makes an attempt to specify the basic tendencies in the building of the information superhighway. Some important contemporary technologies have been considered. In our opinion they will play a significant role in the Common Information Space.

Key words: Information society, information superhighway, semantic networks, XML standard, RDF model, XML based catalogues.

INTRODUCTION

The world is on the verge of a new stage in its social development – the Information society, that will be built on three basic pillars – Information superhighway, Digital revolution and Globalization (fig.1).

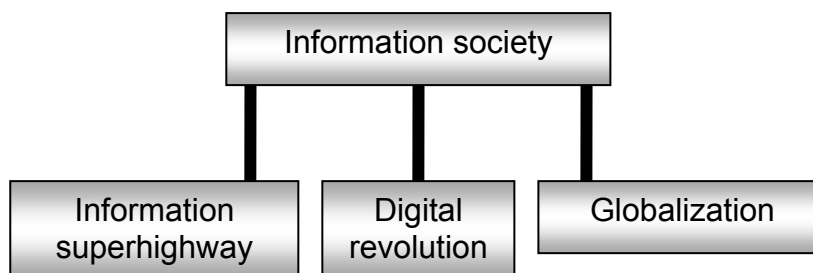


fig.1 The structure of Information society

The paper concerns some of the basic tendencies in the building of the Information superhighway.

INFORMATION REVOLUTIONS

The Information revolutions are fundamental changes in the sphere of information processing. They modify qualitatively the social relations.

A. Toffler first introduces the term “Information revolutions”. According to this theory of the three revolutions, mankind has already gone through the agrarian and industrial, and now it is at the threshold of the information one.

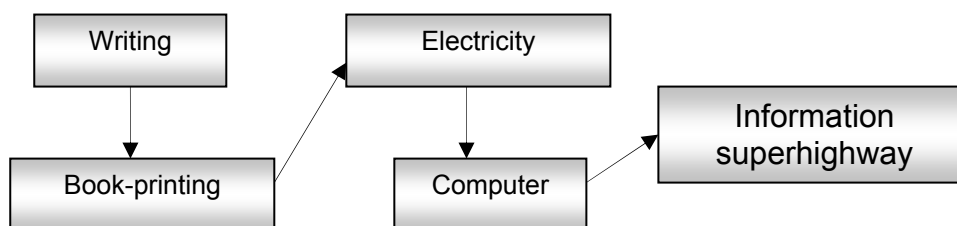


fig.2 Stages of development of information processing

- The invention of writing (thousands years ago) makes it possible for knowledge to be transferred from generation to generation. It lays the foundations of various information technologies (fig.2).
- The invention of book-printing (the middle of XV c.) radically changes the society – its culture and the ways in which all social activities are performed. During the XVI c. the amount of the printed books doubles at every seven years. Literacy gradually becomes accessible to all and it is no longer a privilege of the elite.

- The invention of electricity (the end of XIX c.) assures possibilities of remote exchange of information. The telegraph, the telephone, the radio and other means of mass communication appear.
- The appearance of the microprocessor technology and the PC (1970^s) opens unlimited possibilities for processing, exchanging and storing information in all spheres of social life. A new industry comes to the fore – the information industry, which concerns the development of technical and program devices, methods and technologies for information products.
- The next revolution is the Information superhighway. In his book “The road ahead” Bill Gates writes about it:

" ...the epoch of the PC-s provoked a genuine revolution, affecting millions of people. It led us to unimaginable places. Today we start on a new remarkable journey. Nobody is able to predict where that road leads, but I'm sure that the revolution will affect more and more people and will improve the society. Before all, cardinal changes will be made in the scope of human civilization." [1]

INFORMATION SUPERHIGHWAY

The merging of the communication and the computer infrastructures leads to the creation of the Information superhighway, that will change significantly lifestyle and human communication.

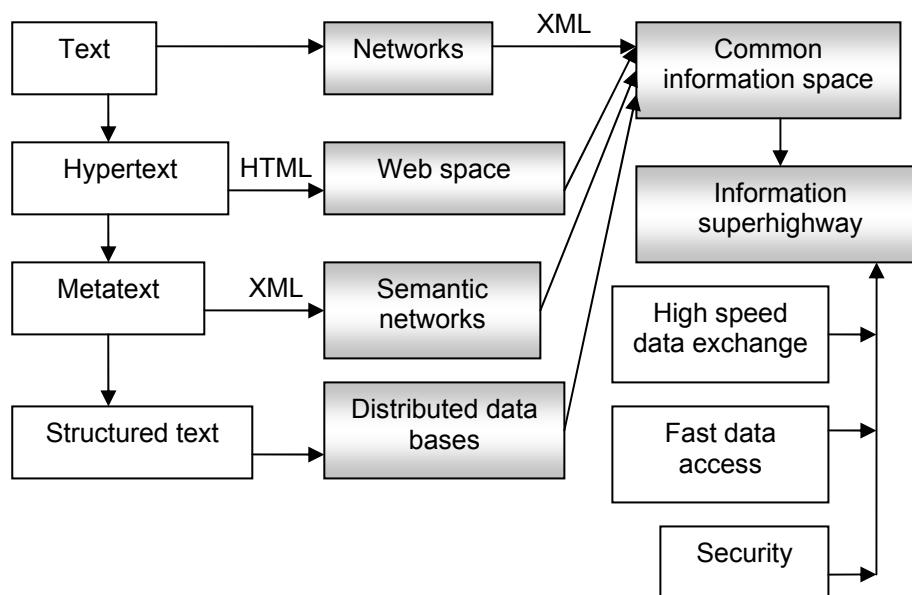


fig.3 The elements of the Common information space

Text

Without making a detailed survey of the philosophical aspects of human development, we could accept the idea that one of the main circumstances for this development is the human ability to create texts, i.e. to group words and expressions and thus to exchange information. The common text files are among the first used in data exchange. However, they had a lot of disadvantages and consequently they were replaced by easier for manipulating and more effective structures. Such small files are still used for recording different settings of applications, descriptions of products etc.

Hypertext

The appearance of it brought about new level of communication with abilities of creating of infinite data chains. The hypertext supports a more explicit and detailed representation of information in Internet. The abilities to change the context quickly and follow the internal contents of the words serve as basis of the hypertext, which is realized in Internet through HTML (fig.3). In the title section of a HTML document can be input descriptive information about the document itself: contents, author, organization, etc. that type of information is called meta information, i.e. information about the information.

Metatext

It sets the meanings (semantics) of the data. The text is no longer dependent of different formats and technologies of data transfer. The concrete results in that area are recently accepted as standards for data exchange – XML, and for description of resources – RDF [4]. XML is a specification characterized by strict syntactic rules, in contrast to HTML. It doesn't depend on any platform. Its task is just to describe data; the interpretation of data is made through several attendant XML technologies: XSL, XPath, XQuery, XForms etc.

Structured text

In the rules, defining the structure of a text are explicit and simple. We have a lot of abilities for quick processing of the text. When we deal with databases, we know in advance the length of the elements, used in a record, and hence the length of the whole record. Thus a random (inconsequent) access to the data is possible, which, in combination with the indexing, significantly increases the speed and the security in working with databases (DB). Because of the fact that DB in Internet increase, each of them is usually situated on different places of the Global network. Such databases are called distributed. This type of databases is (and probably will remain) one of the basic materials for the Common information space (CIS).

Semantic networks

By means of XML can be created the so-called semantic networks – networks that will consist of computers capable to “understand” the data with which they will work. The beginning of the evolution of the Global network to a Common semantic network, containing lots of allocated networks, is an established fact. The computers in that network will use the rules, set in it, and will be able to make more precise and self-dependent decisions.

Common information space

The semantic networks together with the allocate DB, the standard networks and the rest of the web space will be integrated in the Common information space (fig.3), which will be maintained by the Information superhighway. Important characteristics of that Information superhighway are: quick access to the information, high speed exchange and data security. The programs supporting the Information superhighway, will meet great requirements. Their interface must be of high quality: they must support various tools for sending messages to the user when necessary: through e-mail, information channels, to mobile devices, etc. Besides, these applications will communicate with various platforms, machines and allocated networks, which will be connected with Information superhighway.

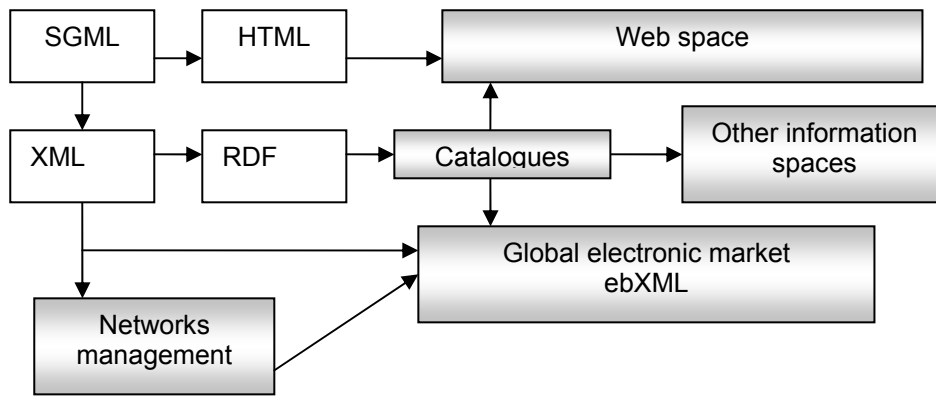


fig.4 The position of the catalogues in the information space

The management of the allocated networks and systems is a difficult process, because the devices and the programs are located on different places. The difficulties come from the fact that we operate with different operating systems, which are often incompatible. The lack of common standards is an obstacle for practical realization of the idea of an XML based Global electronic market. That idea is initiated by some of the biggest companies in the computer industry – e.g. Microsoft. In the future the users will be able to profit from the services in different information spaces, not only web, by entering given portals. The data in these portals will be structured in RDF catalogues and will send to the exact place.

CATALOGUES

Because of their hierarchical structure, the XML files are ideal means of creating catalogues. If we try to describe something through a list of items, subsections, etc., the best technology for their storage under the form of DB is XML. As compared to a standard relational DB, the XML oriented one is able to store the hierarchical data without losing disc space. Another advantage is that the modern browsers are increasingly XML oriented. Soon it will be possible to work with XML DB without complicated scripts and special applications that require expensive environments. For the time being such a tendency to facilitation (e.g. to make compatible web pages with DB) is not observed. Also, there is no a common standard of DB; different companies offer different solutions and the developer has to know the specific features of a certain DBMS (Database Management System) to access it and to exploit it.

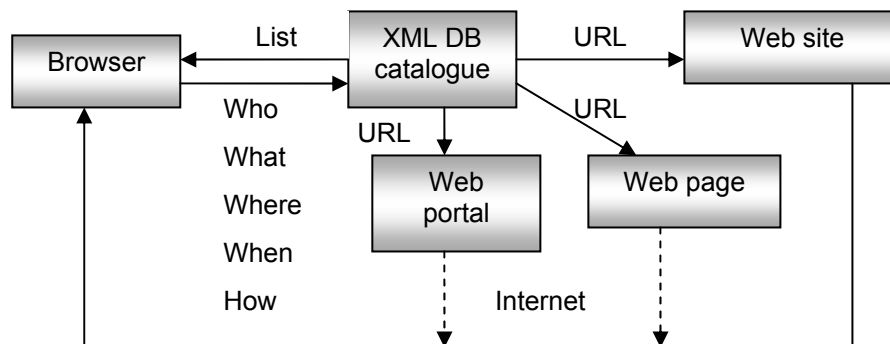


fig.5 Sketch of working with XML based catalogue in Internet

Let us consider the following example (fig.5). The user is searching information in a portal with a well-structured XML DB (catalogue). The data are ordered in conformity with

the simple and unambiguous questions: who, what, where, when and how. These will be the first questions for the user to answer. They will be connected respectively to:

- Who - the author;
- What - the process related to the wanted resource (publication, sale, etc.);
- Where - the area to which the resource belongs;
- When – the dates, concerning the resource;
- How – the creation of the resource and respectively its type.

The browser will contact DB through a request and as a result, will display a list of addresses of web sites, related to the wanted information. On condition that the web designers have at their disposal some XML attending technologies (e.g. XSLT – for retrieving and formatting data) the received results could be unrestrictedly formatted and thus to be presented in a form suited to the user. Owing to the new language XForms they could be visualized on different devices, including PDA computers and cellular phones.

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