DIGITAL LIBRARY AND INTEROPERABILITY :
A GENERAL PERSPECTIVE

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Abstract

This paper discusses about the Digital Library and its importance in interoperability while sharing piece of information in the networked digital library environment, different kinds of interoperability, their challenges and use, etc.

Keywords : Digital Library, Interoperability

1.   Introduction

There has been a dramatic change in the world of learning, scholarship, business and governance brought about by Information and Communication Technologies. The ways and means of creating, accessing, distributing and managing information not only text but other forms such as audio-video and multi media materials have undergone major changes. Consequently, today more and more information is created, managed and is available in digital form. Libraries and resource centers are increasingly moving towards digital content and collection management. The role of information managers and librarians also has undergone many changes. The most significant shift in building digital collections is greater interoperability among information systems across the country and internationally. Interoperability also applies to exchanging these within various components of a single digital library. From a slightly different perspective, interoperability in digital libraries is the ability to generate a single (virtual) view on many different library components without sacrificing autonomy.

2.   Interoperability

Interoperability is the ability of two or more systems to exchange information and to use the information that has been exchanged. Interoperability is highly dependent upon the ability to both a) conceptually map identical or similar elements of data structures, and b) consistently and reliably extract relevant information from within data structures. Numerous strategies can promote interoperability between multiple systems, but the simplest strategy is for the owners/operators of each system to employ similar data structures and to utilize similar or identical semantics and vocabularies as information is entered into these systems.

3.   Definition of Interoperability

Many attempts have been to define the concept of interoperability. A few examples are given below:

- "The ability of multiple systems, using different hardware and software platforms, data structures, and interfaces, to exchange and share data" (NISO 2004)

- "The ability of two or more systems or components to exchange information and use the exchanged information without special effort on either system" (ALCTS 2004)

- "The compatibility of two or more systems such that they can exchange information and data and can use the exchanged information and data without any special manipulation" (Taylor 2004)

4. Importance of Interoperability

Interoperability for digital libraries is more complex than for traditional libraries for several reasons.

- First, there are myriad technical and engineering issues associated with connecting together networks, databases, and other computer-based systems; while the World-Wide Web is a good start at linking the world's information sources, it is neither comprehensive nor organized well enough to provide real library service.

- Second, digital libraries will provide a greater array of services than do traditional libraries; for example, they already have sophisticated search engines, the ability to browse massive amounts of material quickly, and to reformat documents on-the-fly. Digital libraries can provide even greater services, such as negotiating rights to works (acting as proxies for human users), reformat queries into various natural languages, create composite works, and on and on.

- Third, the types of information available in digital libraries, and the format of this information, will be in much greater variety than is typically the case for traditional libraries. Consider, for example, that the World-Wide Web distributes video (in many forms), audio (also in many forms), (marked-up) text, computer software, and other forms of information. The trend is for this variety to become even greater.

- Fourth, and most importantly, digital libraries will be composed of a large number of loosely connected components. This is because the demand for both services and information can be expected to grow so large that it is not possible for a single corporation, professional organization, or government to provide all that is necessary for a digital library; the problem is exacerbated when digital libraries are considered on an international scale. Additionally, a large percentage of the information and services that will be made available through digital libraries will be privately held intellectual property, and it is unlikely that control over this property will be yielded to third parties. Thus, a large number of groups, some small, some large, will provide digital library content and services. Compounding this, interoperability is naturally an international issue, since users will demand content and services from anywhere in the world. Interoperability, while fundamental to digital libraries, comes in many forms.

5. Different types of Interoperability

a) Technical Interoperability

Technical interoperability is the most obvious and arguably the most straight forward aspect of interoperability. This is necessary to ensure that all the hardware and software components of networks and information system can physically communicate and transfer information successfully. In many ways the most straightforward aspect of maintaining interoperability, consideration of technical issues includes ensuring an involvement in the continued development of communication, transport, storage and representation standards such as Z39.50, ISO-ILL, XML, etc. Work is required both to ensure that these individual standards move forward to the benefit of the community, and to facilitate where possible their convergence, such that systems may effectively make use of more than one standards-based approach.

b) **Semantic Interoperability**

Semantic interoperability refers to the *meaning* of information to its human users, as opposed to the simple physical transfer of data. Interoperability at this level can fail if different users, or groups of users, use different terms for the similar concepts, or use similar terms to mean different things. Semantic interoperability presents a host of issues, all of which become more pronounced as individual resources each internally constructed in their own semantically consistent fashion — are made available through 'gateways' or union catalogues. Almost inevitably, these discrete resources use different terms to describe similar concepts ('Author', 'Creator', and 'Composer', for example), or even use identical terms to mean very different things, introducing confusion and error into their use.

Important aspects while crating semantic interoperability are:

- Careful consideration of who the potential users of information systems are and the language that is necessary to communicate with them.

- Agreement on the standard thesauruses and lists of terms to be used in metadata systems.

- Consistent use of existing coding systems endorsed nationally and internationally.

c) **Political/Human Interoperability**

Apart from issues related to the manner in which information is described and disseminated, the decision to make resources more widely available has implications for the organisations concerned (who may see this as a loss of control or ownership), their staff (who may not possess the skills required to support more complex systems and a newly distributed user community), and the end users. Process change, and extensive staff and user training are rarely considered when deciding whether or not to release a given resource, but are crucial to ensuring the effective long-term use of any service. While crossing organization to organization the interoperability has to be discussed and agreement signed properly. The participating organizations have to establish a discussion forum to facilitate sharing of information in interoperability and related issues.

d) **Inter-community Interoperability**

As traditional boundaries between institutions and disciplines begin to blur, researchers increasingly require access to information from a wide range of sources, both within and without their own subject areas. Complementing work in the library sector, important initiatives are also underway in related information providing communities such as museums and archives. In many cases, both goals and problems are similar, and there is much to be gained through adopting common solutions wherever feasible.

Many factors are contributing to the blurring of boundaries between communities. Digital Libraries between different communities have to be specified clearly while crossing the community's access and limitations. As a result it is increasingly important that information systems can interoperate across these boundaries. In the area of resource discovery, one of the main mechanisms for facilitating this interoperability is the metadata Standard and harvesting system which provides for consolidated resource discovery across all inter-communities.

e)   ***Legal Interoperability***

While the Internet makes it easy to physically publish and access information, there are many important legal aspects which constrain and influence how information can and should be made available and used. These include laws related to copyright, content regulation, privacy, freedom of information, telecommunications regulation, e-commerce and trade practices. Activities which may be legal in one context or jurisdiction may not be permitted in another.

f)   ***International Interoperability***

Each of the key issues identified, above, is magnified when considered on an international scale, where differences in technical approach, working practice, and organisation have been enshrined over many years. Online technologies facilitate access to resources from anywhere in the world, and make resources available to an international audience. However, this brings with it a need to ensure that interoperability issues are addressed in an international as well as particular country level. This introduces increased complexity to many of the above aspects, for example on semantic interoperability and different legal jurisdictions and frameworks. It also highlights new aspects such as language differences and cross-cultural issues.

6.   Challenges

Digital libraries have gained acceptance in many scientific and technical disciplines. However, most of these Digital Libraries are implemented in systems and protocols specific to the discipline they support. As such, interoperability between Digital Libraries has yet to be achieved on a large scale. The challenges to interoperability are: (a) the integration should be flexible enough to allow individual digital libraries to add/modify features and at the same time give the user an impression of a single library, and (b) relocation of individual digital libraries should be transparent to users.

A truly interoperable organisation is able to maximise the value and reuse potential of information under its control. It is also able to exchange information effectively with other equally interoperable bodies, allowing new knowledge to be generated from the identification of relationships between previously unrelated sets of data. Changing internal systems and practices to make them interoperable is a far from simple task. The benefits for the organisation and those making use of information it publishes are potentially incalculable. The success of Digital library will depend on the successful interoperability and its consistent application of standards regarding such matters as protocols, metadata formats, catalogue rules, subject heading, etc. while sharing the information. Since the Digital Libraries are getting momentum, it is necessary that all the Digital Library initiatives/agencies/bodies/organization have to work co-operatively at international level to achieve real goals of the Digital Library.

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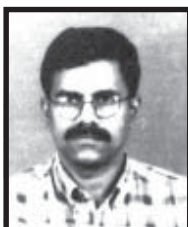
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