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## Road Map to Build Global Info ATMs

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### Abstract

*This paper advocates and proposes the task of engineering and architecting Global Info ATMs. By applying and using this conceptual framework, the components, approaches, the process for building and development of comprehensive tools, technologies, techniques, support systems and possible methods of harnessing the concept of "Global Info ATMs" are discussed. The role of the new search engine-WebLib with Browser-Knowledge Navigator (KN) is put forth. The paper also outlines Global Info ATMs concept towards formation of Local/National/Global Digital Libraries Network.*

**Keywords :** Global Info ATMs, Info ATMs, Knowledge Navigator, Search Engine, Digital Library Network, Extreme Digital Library, Digital Library Consortia, DLN

### 0. Introduction

The proliferation of electronic resources in a networked society has resulted in the development of "shared subscriptions", "Local/National/Global Digital Libraries Network-based subscriptions and online databases" or "consortia-based subscriptions" to journals everywhere in the world<sup>[1]</sup>. In an advanced IT environment, shared subscriptions to electronic resources through digital library, network-based or consortia of libraries is a feasible strategy to meet the pressures, such as diminishing budgets, increased user demands, and rising costs of journals.

There are many barriers to the development of worldwide digital libraries (DLs). These barriers are of particular concern in the context of digital library support for collaboration on research and education between pairs of nations with very different languages and cultures<sup>[2,3,4,5]</sup>. The opportunities provided by digital library technology and digital library networks affect all organizations. These opportunities need to be harnessed coherently to manage data and information for Global Info Access through a proposed **Global Info ATM** based on convergence of powerful digital library environment as discussed below:

### 1. Extreme Digital Libraries: Future Info ATMs

The revolution in the information technologies and emergence of the Internet, particularly the World Wide Web (WWW) as a new information delivery medium, triggered proliferation of web-based full-text online information resources. The Internet is being used globally by an increasing number of publishers to further promote their publications to the international community of scientists and technologists. The libraries and information centres will benefit greatly from this technology-driven revolution. Cooperation amongst institutions for sharing their library resources has been practiced for decades. The mode of cooperation has been transformed with the infusion of information technology. The following components indicate that a framework of an extreme (powerful) digital library environment exists. The "Extreme" Digital Library is empowered by these components, which would eventually leads to the concept of Global Info ATMs as may be promoted by the convergence of technologies outlined below:

### ❖ Convergence of Technologies

- CD-ROM/DVDs/ LAN/Web-Based CD-ROM Databases
- Web-held OPACs/ Web-held Digital Resources
- Online Databases/ Online Digital Information Resources
- Digital Libraries Network as Consortium
- Local/National/Global Digital Libraries Network-Based Licenses for electronic journals, online databases and digitized collections
- Local/National/Global Consortia-Based Licenses for electronic journals, online databases and digitized collections Consortia-based Collections
- WebLib: A Search Engine for Librarians/ Info Scientists
- Knowledge Navigator for Librarians/ Info Scientists
- Local/National/Regional/Global Digital Libraries Network
- Artificial Intelligence-Based Digital Library Network Tools as Info ATMs
- Expert System-Based Digital Library Network Tools
- as Info ATMs

## 2. The Components and Approaches for Building the Global Info ATMs

The components, approaches and the process for building and development of comprehensive tools, technologies, techniques, support systems and better methods of harnessing the concept of "Info ATMs" is depicted in Fig 1. The model depicts the concept of collaborating and building Global Info ATMs. This model has been developed on the basis of the concept of the Building the Competitive Intelligence Knowledge, <sup>[6]</sup> but it is different than it. The paper recognizes the need for the best building approaches of Info ATM and sustainable, sophisticated extreme digital libraries network, which will eventually emerge as Global Info ATM. This is an effort in that direction.

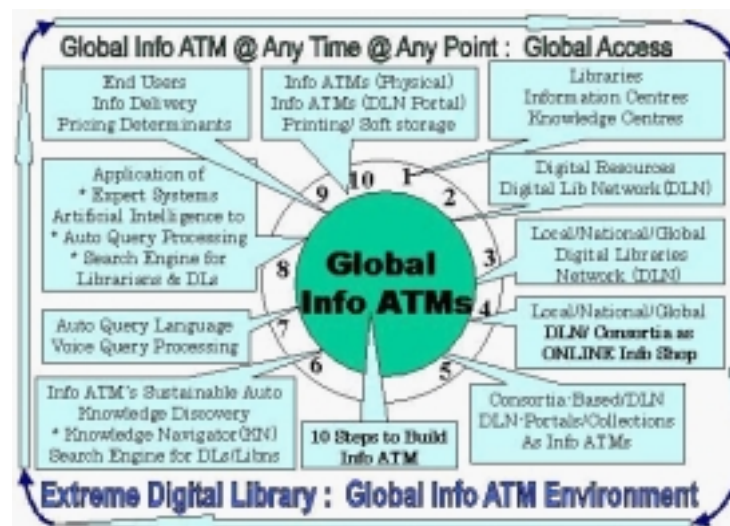


Fig 1. Collaborating and building Global Info ATMs – a concept

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## 2.1 Digital Library Network-Based / Consortia-Based Access to Digital Resources

An increasingly large number of Science, Technology, Social Sciences, Management, and Humanities electronic journals are appearing on the Web. The web-based electronic information products not only eliminate paper, physical storage, and transportation costs but also offer many other possibilities for incorporating multimedia and hyper-link features into electronic documents hitherto impossible on paper media. The availability of digital information resources, including e-journals, not only triggered a shift in the acquisition process from the policy of “just-in-case” to “access when you need it” but also encouraged the notion of “Local/National/Global Digital Libraries Network-Based shared subscriptions/ digitized collection” or “consortia subscriptions” amongst libraries.

## 2.2 Re-engineering the Digital Resources towards an Info ATM

Digitization of information resources is a big boom to the digital libraries and Web applications. Availability of digital and information technologies has triggered large-scale commercial and non-commercial digitization programmes the world over. The Libraries, Information Centres, Knowledge Centres, and Publishers have to re-engineer and engage in the Digital Libraries Network-Based shared subscriptions, digitized collection and online databases for *Info ATM*.

## 2.3 Engineering the Digital Libraries Local/National/Global Digital Libraries Network as Local/National/ Regional/ Global Info ATMs: A seamless Global Info ATM Prototype

The Digital Libraries and Digital Libraries Networks would link the homepages of the following types of institutions together in one single global digital library system with a coherent and consistent *Global Info ATM Interface*:

- National Libraries/ Digital Libraries Network
- National Archives / Digital Libraries Network
- Selective Museums of the World / Digital Libraries Network
- Selective International Organizations / Digital Libraries Network
- Selective Library and Information Networks
- Selective Local Digital Libraries

By linking them together in the Global Digital Libraries Network System, the user community can possible access any site by a simple click of the mouse, without having to search and open Info ATM site with the URL address of each location. This would give rise to a seamless web of interconnected coordinated and interdependent collections that are accessible to geographically distributed users- international networked collections.

## 2.4 Developing Global Info ATMs Interface and Infrastructure

Global Info ATMs Interface can be provided in two ways as also depicted in Fig 2.

1. Digital Library Network URL Addresses (DLN Portals)
2. Setting up physical Info ATMs in the form Bank ATM with help of Big Touch Screens

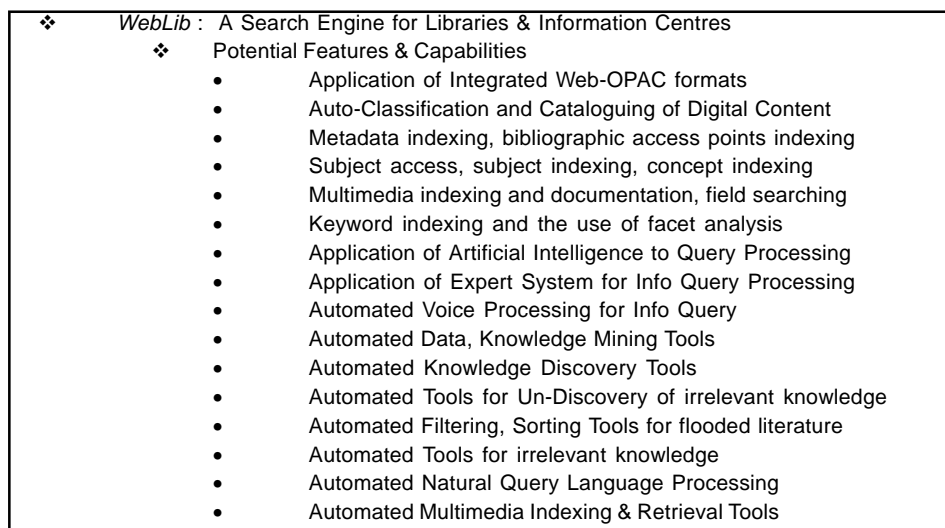


**Fig 2: Global Info ATM Interface with possible features and capabilities**

Every Library should have an Info ATM Interface infrastructure for accessing the Digital Libraries Network for local, national, regional and global access to digital information resources. This Info ATM should be like Bank ATM with facilities like Printing, Storage, Downloading, Printing Facilities, Big Touch Screen with integrated access to library resources and DLN-based digital resources.

## 2.5 Engineering a Search Engine exclusively for Librarians in the context of Global Info ATMs and Digital Library Network

Browsers provide a uniform framework for communicating, structuring and sharing information on the Web. The present Web browsers are not designed for Library specific resources and their retrieval from the long-standing points of access. A software prototype browser *Knowledge Navigator* (KN) is to be developed [7]. This prototype should also facilitate the specification of text, image, video and sound data to access and retrieve on the Web in addition to long-standing points of access. KN should also provide natural language interface for navigation and browsing over the Web.



**Fig 3: The Concept of Knowledge Navigator (KN) with WebLib**

## 2.6 Architecting Knowledge Navigator (KN) for Librarians in the context of Digital Libraries and Info ATMs

The KN could be an alternative to the existing browsers (e.g. Internet Explorer and Netscape Navigator), which are designed by the computer scientists, of the computer scientists and for the computer scientists, but not for the exclusive library use of the global library society.

The WebLib KN should be engineered and developed to facilitate the bibliographic access points such as title, author, keyword, ISBN, ISSN, publisher, place, and date. These access points are able to provide the concept indexing, and subject indexing rather than word-by-word indexing on the Web. The KN could also facilitate to catalogue and classify the digital documents, and digital content on the Web because there is a need to find the content from the digital libraries and electronic knowledge houses; navigate digital knowledge globally; display and access to Web-held OPACs; find global bibliographical information; access to full-text databases from the WWW; retrieve Web-held information and CD-ROM databases; discover the digital content and knowledge from the global electronic libraries and global digital libraries [7,8].

❖	<p>Knowledge Navigator : Potential Features &amp; Capabilities</p> <ul style="list-style-type: none"> <li>• Data Mining and Data Mining Techniques</li> <li>• Knowledge Mining from Knowledge Warehouse</li> <li>• Knowledge Discovery from Global Digital Libraries</li> <li>• WebLib: A Search Engine for Librarians/ Info Scientists</li> <li>• KN: Knowledge Navigator for Librarians/ Info Scientists</li> <li>• Application of Artificial Intelligence to Query Processing</li> <li>• Application of Expert System for Info Query Processing</li> <li>• Automated Voice Processing for Info Query</li> <li>• Automated Data, Knowledge Mining Tools</li> <li>• Automated Knowledge Discovery Tools</li> <li>• Automated Tools for Un-Discovery of irrelevant knowledge</li> <li>• Automated Filtering, Sorting Tools for flooded literature</li> <li>• Automated Tools for irrelevant knowledge</li> <li>• Automated Natural Query Language Processing</li> <li>• Automated Multimedia Indexing &amp; Retrieval Tools</li> <li>• Automated Integrated Web-OPAC Discovery</li> <li>• Beyond Z39.50 Protocols</li> <li>• Integrated Discovery of All Digital Formats irrespective of Software</li> </ul>
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**Fig 4: The Concept of Knowledge Navigator (KN)**

KN could provide the features such as improved search options; better display system with bibliographic access points; concept indexing, subject indexing, and multimedia indexing and documentation; content filtering, better filtering options; and keeping up with trends to meet the challenges of modern digital information retrieval.

## 2.7 Application of Artificial Intelligence, Knowledge-Based Systems & Expert Systems to Auto Query Processing, Search Engine, Knowledge Navigator to Engineer the Global Info ATMs

Expert systems, Knowledge-Based Systems, Neural Networks, and Artificial Intelligence must be applied to the concept of Global Info ATMs. The Knowledge Navigator (KN)'s areas of application of these systems including Artificial Intelligence to Query Processing; Expert System for Info Query Processing, Voice Processing for Info Query, Data, Knowledge Mining Tools, Knowledge Discovery Tools, Un-Discovery of irrelevant knowledge, Filtering, Sorting Tools for flooded literature, Natural Query Language Processing,

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Multimedia Indexing & Retrieval Tools, Integrated Web-OPAC Discovery, Integrated Discovery of All Digital Formats irrespective of Software.

The other areas of application for engineering a search engine for Librarians and digital libraries network must also be applied. These application areas include; Application of Integrated Web-OPAC formats; Auto-Classification and Cataloguing of Digital Content; Metadata indexing, bibliographic access points indexing; Subject access, subject indexing, concept indexing; Multimedia indexing and documentation, field searching; Keyword indexing and the use of facet analysis

A number of commonly used Artificial Intelligence Techniques and their applications in engineering the information systems such as knowledge-based systems, neural networks, fuzzy logic and generic algorithms can be applied to engineer Global Info ATMs, Search Engine and Knowledge Navigator. Artificial Intelligence<sup>[9,10,11,12]</sup> are beginning to play a more prominent role in complementing the conventional approaches to improve the efficiency of the solution process. The integration of AI techniques with conventional formal techniques and the combination of neural networks and hidden Markov models are quite useful in speech recognition for auto-processing of Information Query.

### **3. Collaboration among Digital Libraries Network : Key to Global Info ATMs Development**

The availability of IT-based electronic information products is exerting ever-increasing pressure on libraries which, in turn, are committing larger portions of their budgets for either procuring or accessing Web-based online full-text search services, CD-ROM products, or online databases. The libraries and information centres, with their diminishing (or at best static) financial allocations, have to consider new ways to consolidate global resources in order to maximize their limited financial resources. These developments gave impetus to the formation of "Local/National/Global Digital Libraries Network-Based shared subscriptions" or "Digital Libraries Network-Based subscriptions" to journals worldwide and Digital Libraries Network-Based sharing for digitized collections.

There are many challenges for Librarians and Information Professionals in the process of engineering the Global Info ATMs. These challenges and collaborations include creating Info ATMs Interface infrastructure, application Artificial Intelligence, Experts Systems, Knowledge-Based Systems and the Development of Info ATMs Technologies, Tools and Reengineering the Digital Libraries Network Consortiums at Local, National, Regional and Global level. The other challenges include creating global collection sharing, technical, legal, political challenges, and architectural issues of global approach. Librarians and Information Professionals must collaborate their resources, expertise in the creating Info ATM in every Library to provide global access to the end-user.

Though there are many challenges, especially regarding global collections and user communities, there are also exciting opportunities. If we organize our efforts around architectural levels, and deal with interoperability and distributed repositories by re-engineering Digital Libraries as Global Info ATMs, we may effectively support Global User Access through Extreme Digital Libraries.

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