



## SEMANTIC DIGITAL LIBRARIES – COMPETENCY PROFILE FOR DIGITAL LIBRARIANS

**Dr. P. Venkateshwar Rao**

Assistant Professor (Asst. librarian)  
 Library and Information Science  
 Osmania University, Hyderabad  
 09533018881  
 venkatesh9pitla@yahoo.com

### ABSTRACT

*The Web is an interesting place for searching and browsing, but its real power derives from people finding what they need. Using Semantic Web technologies in digital library offers a new level of flexibility, interoperability and way to enhanced peer communication and sharing knowledge. It expands the usefulness of the digital libraries that will contain majority of data in future. Paper outlines the emerging concepts of social semantics digital library and explores the potential of using semantic web technologies for the digital libraries,*

*In the digital context the traditional functions of the library as well the roles of the digital librarians are undergoing a transition. In order to adapt to the changing scenario and effectively perform the new responsibilities expected of them, librarians need to equip themselves with the requisite skills and competencies which discussed in the paper.*

**Keywords:** Digital Libraries, Semantic Web, ICT, Librarian's Competencies, Skills for Librarians, Digital Librarians.

### INTRODUCTION

Libraries are treated as “Temple of Knowledge”, which is a store house of information and the librarian as its “Custodian”. Today libraries and librarians have witnessed a major transformation in their roles and the users are benefited due to this new source of information collection and are relying on internet based information for their day to day tasks and spend considerable time in finding information. Books and journals are already available in electronic form along with other resources on the net. Due to this change, libraries are also shifting their collections, services, facilities and practices based e-resources.

The Semantic web adds meaning to information so that human and computers can work together better. Berners-Lee et.al., (2001) describe the semantic web as “An extension of the current web in which information is

given well-defined meaning, better enabling computers and people to work in cooperation.

Currently information representation on the web has been designed for human understanding but not by machines, which leads to increase recall and lack of precision in result. Due to the lack of machine-readable structure and knowledge representation in web documents, programs are unable to comprehend webpage contents precisely and hence semantic information from web documents cannot be extracted. However there are significant number of semantic web applications either in terms of tools / portal / application is being developed and used in diverse areas, including electronic commerce, digital libraries and used in diverse area, including electronic commerce, digital libraries and e-learning, among others. All of these endeavors share the common belief that semantic web technology would significantly impact the use of the web, essentially in terms of increased task delegation to intelligent software agents ( Sycara et. At., 2003).

The library profession is constantly changing since the past two decades due to emerging trends, technologies and techniques which are used in libraries for information handling and providing services to users. It is possible for the libraries to use the information resources available over the internet in digital form.

The Library professionals have also noted these changes in the professional and academic environment. It is a challenge as well as an opportunity for libraries to adopt different policies to face the change in the profession to keep users' updated in their field of interest. This paper highlights these challenges and opportunities there in.

### **MEANING & NEED OF DIGITAL LIBRARIES IN SEMANTIC WEB CONTEXT**

According to Deegan, M. (2002) definition digital Library is:

1. A Digital Library is a managed collection of digital objects.
2. The Digital Library objects are created or collected according to the principles of collection development.
3. The digital objects are made available in a cohesive manner, supported by services necessary to allow users to retrieve and exploit the resources just as in the case of other library materials.
4. The digital objects are treated as long term stable resources and appropriate processes are applied to them to ensure their quality and survivability.

Digital Library Foundation defined digital Library (1998) as "Digital Libraries are organizations that provide the resources, including the specialized staff, to select, structure,

offer intellectual access to , interpret, distribute, preserve the integrity of and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities”. This definition involves three key components, which constitute the theoretical framework of digital libraries such as: people, information resources and technology.

The fundamental reason for building digital libraries using semantic web technology is that they provide better delivery of information that was possible in the past. However, the main purpose of digital libraries remains consistent with that of traditional libraries in that the purpose of digital libraries is to organize, distribute, and preserve information resources just as it is for traditional libraries. There

Digital Libraries promise new societal benefits. One is elimination of the time and space constraints of traditional “bricks-and-mortar libraries”. Unlike libraries that occupy building accessible only to those who walk through their doors, digital libraries reside on inter-networked data storage and computing systems that can be accessed by people located anywhere in the world. are two groups which are creating digital libraries. From 1994, libraries started converting their historic collections into digital format and building digital libraries and from 1998, major scientific publications started

becoming available online from both commercial and society publishers.

The above paradigm shift open a door to a new kind of digital libraries popularly known as ‘Semantic Digital Libraries’ (SDL) which integrate information based on different metadata, eg., resources, user profiles, bookmarks, taxonomies, provides interoperability as well as delivering more robust, user friendly and adaptable search and browsing interfaces empowered by semantics. The below Table 1 presents the transition face from Libraries to Semantic Digita Libraries.

**Table 1, Turning Traditional Libraries to Digital & Semantic Digital Libraries**

<b>Type of Library</b>	<b>Storage</b>	<b>Metadata</b>	<b>Interface</b>
Traditiional Library	Archive based on physical location	Bibliographic cards	Librarian
Digital Library	Database and Archive	Digital bibliographic descriptions	Full-Text Search
Semantic Digital Librart	Database and Archive	Semantic bibliographic descriptions	Search & Browsing on Ontologies

The idea of semantic web technologies for the digital libraries is easy to implement rather than its application to the web because web does not have metadata but libraries have

metadata to catalogue its resources. We simply must make them available in a machine understandable format. Semantic web provides the format RDF (Resource Description Framework) and it is easy to convert library specific metadata in RDF by using several semantic web tools such as DMOZ (<http://www.dmoz.org>), WordNet (<http://wordnet.princeton.edu>), MarcOnt (<http://dcpapers.dublinecore.org/pub/article/view/829>), SKOS (<http://www.w3.org/2004/02skoc>), OWL (<http://www.w3.org/TR/owl-ref>), SPARQL (<http://www.w3.org/TR/rdf-sparql-queries>) serves different functionalities and purpose.

### **THE SEMANTIC WEB APPLICATIONS**

Semantic web is not only the set of recommendation but it is becomes reality. There are many application have been developed such as for the semantic search domains which offers very innovative ways available to search the web using semantic search engines. A semantic search engine ensures more closely suggested relevant results based on the ability to understand the definition and user-specific meaning of the word or term that is being searched for. Semantic search engines are able to better understand the context in which the words are being used, resulting in smart, relevant results with more user satisfaction. Apart from the semantic search engines there are varieties of enabling technologies developed serve different purpose like for RDF storage:

Jena, YARS, for Reasoners :KAON, Racer; Editors: protégé, SWOOP, MarcOnt Portal; Editors: Protégé, SWOOP, MarcOnt Portal; Semantic wikis: Makna Semper Wiki, etc., These solutions are deployed in practice to build digital libraries that provides variety of semantic digital library services powered by semantics..

### **THE FIVE LAWS OF LIBRARY SCIENCE IN DIGITAL ENVIRONMENT**

Dr. S.R. Ranganathan, who is known as the “Father of Library Science in India” formulated the “Five Laws of Library Science” which provided the benchmarks for operating a library system (Ranganathan, 1931). These laws are still applicable in the Digital era. As follows:

- The First Law – Books are for Use – This focus on the selective use of information, for this there should be proper storage and dissemination of information. The Library automation and OPAC of the library system helps users in accessing bibliographical information from any where.
- The Second Law – Every Reader has His/Her Book – This is user oriented and till date no information center or no library is self-sufficient to serve all types of information to a particular client because of information explosion, budget crunches in the library and raising cost of the

primary resources. But through the network and the consortium approach of the E-journals, E-books, help to meet the needs of users.

- The Third Law – Every Book has its Reader – This is information oriented and the automated technical process of the library collection such as cataloguing, indexing, and abstracting, etc., helps user.
- The Fourth Law – Save the time of the Reader – This focus on the dissemination of information to users. With the advent of the concept of “Library without wall”, in the digital era, through broadband connections information can disseminated to users in no time.
- The Fifth Law – Libraries are Growing Organism – This focus on continuous change in library operations in order to meet the above four laws. The Internet Archive is building a digital library of web sites and other cultural artifacts in digital form. Like a paper library, it provides free access to researchers, historians, scholars and the general public. Its information collection contains more than 30 billion web pages. Its way back machine, which currently contains over 100 terabytes of data and is growing at a rate of 12 terabytes per month, is the

largest known database in the world.

### **SKILLS AND COMPETENCY FOR DIGITAL LIBRARIANS**

The digital librarians will act as follows:

- The Digital librarian is a bridge between digital resources and users (the role of facilitator, also remotely);
- The Digital librarian is an agent of innovation, of citizenship, of information literacy etc. (the concept for the digital librarian as a mentor, as a friend of the user, as a personal trainer, who guides the user);
- The social role of the librarian is still strong, even stronger in digital environment (the concept for social inclusion in digital environment);
- Pedagogical skills get stronger in digital environment (teaching digital librarian) – the concept of the digital library as a virtual classroom.
- The use of IT extends the core roles of the librarian, or helps the librarian to do these roles better;
- The competencies, skills, roles vary, dependent on the specific type of the library or information center, where the digital librarian works
- The digital librarian must has commitment to continuous learning and lifelong improving

of skills in all areas of digital applications, services etc.

Professional competencies have been defined in terms of knowledge, skills, and attitudes required performing a particular role, duty or function. The Oxford English dictionary defines skill as the ability to do something well or and an expertise while competency is defined as the ability to do something successfully or efficiently.

In earlier times, competence was considered in terms of the personal characteristics one had; but now the competence is considered more in terms of skill-oriented behavior and observable actions measured against quantitative standards; competence is judged on the basis of whether or not learned mental and physical tasks can be taught and measured.

The changing environment of libraries demands new competencies for digital librarians. For effectively playing the new role that the digital librarians are expected to play in this changing scenario, it is important for them to develop related skills and competencies for which it is important to identify them. There have been several efforts to identify the competencies required by digital librarians. Most of them have been by the library associations such as American Library Association, Association of College and Research Libraries, The Library and Information Technology Association, The Special

Library Association etc., who have presented sets of competencies during the last decade.

The specialists like Corbin (1993), Koenig (1993), Griffiths (!998), Bates (1998) have observed and listed all the competencies for digital librarians are classified as follows:

1. Traditional Skills
2. Technological Skills
3. Managerial Skills
4. Communication, Interpersonal and Soft Skills
5. Teaching Skills
6. Networking Skills

In 1999, Spink and Cool proposed a model curriculum for digital librarianship. They developed their content as a blend of LIS and Computer Science curricula to achieve a general digital libraries program of study. The following are their broad curricular headings and the content that might be offered under each heading: (Spink and Cool, 1999).

- Theoretical and Historical Foundations History of libraries;
- Human information behavior; Information retrieval theory;
- Development of digital collections and digital libraries Technical Infrastructure of the Digital Library Information retrieval engines;
- Database construction of digital libraries;
- Distributed collections;

- Multimedia formats and applications;
- Interoperability;
- Network technology;
- Web applications in digital library collections;
- Interface design; Communication protocols;
- Query languages Knowledge Organization in Digital Libraries Metadata;
- Indexing;
- Classification;
- Database integration;
- Document formats Collection Development and Maintenance Digital archives;
- Digital conversion technology;
- Digital preservation, Information Access and Utilization of Digital Libraries, Users and uses of digital libraries;
- Usability and evaluation research;
- Information behavior in digital libraries Social, Economic and Policy Issues Electronic publishing;
- Scholarly communication;
- Copyright issues and intellectual property rights in digital library collection;
- Costs of building digital library collections;
- Funding for digital environments Professional Issues Roles and responsibilities of the digital librarian;
- Management of digital libraries;

- Bibliographic instruction.

Choi and Rasmussen presented a paper at the 2006 Joint Conference on Digital Libraries (JDCL) in North Carolina on a survey they carried out.

Digital library professionals in American academic libraries were asked questions about the new knowledge and skills required for digital library work. In their paper, Choi and Rasmussen identified three broad categories of digital library competencies:

- \* Technical,
- \* Library-Related, and
- \* Other Managerial Competencies

They developed a list of the top three competencies in each category, as ranked by respondents. Technical knowledge competencies that respondents thought important were the “systems” aspects of digital projects including Digital Library (DL) architecture and software, technical and quality standards, and markup languages. Library-related competencies respondents considered important included identifying user needs, digital archiving and preservation, and cataloging and classification. Special managerial competencies that were deemed important were communication skills, project management and leadership skills, and the ability to handle legal issues. Although traditional courses may include some of these skills identified as important for digital

librarianship, schools of library and information science in the United States are responding to the perceived need to provide course content that specifically focuses on digital libraries by establishing specific programs or concentrations in digital librarianship. Library and Information Science Education's Response to Skills for a Digital Environment By examining four schools in the U.S. that have established concentrations or programs of study to educate students to work with digital libraries (DL), we can get more

### **CHALLENGES**

**In Semantic Web:** There are many challenges associated with semantic web:

1. Focused Search Engines – evolution in the domain of search engines who have adopted faceted based search process significantly changed the approach of information seekers to access their resources, however they often lacks domain specific search and result is general rather than too specific.
2. Organization of the Web – The information representation on the web has been much simpler by HTML language. HTML cannot preserve the context of the term which plays major role at the time of retrieval on internet. Thus, it is a big challenge to have standard semantics available for general usage, which can be

applied directly to define 'things'.

3. Lack of Global Standard and Proven Frame works - There are only few international Standards/Schemes are available for domain mapping and knowledge representation in the web. RDF provides standard platform for knowledge representation of various resources using ontology languages. Therefore, Library specific data are ready to convert into RDF and enable library resources to get access ad retrieval using semantic enabled technologies or tool because library resources has enrich metadata.
4. Lack of Availability of Formal Domain Specific Ontology – Domain ontology (or domain-specific ontology) models a specific domain, which represents part of the world and developing the ontology for specific domain is challenge it self.

**For Digital Libraries:** There are many challenges associated with digital libraries:

1. The Internet is not the only Source of Everything required.
2. Digital Libraries are not the Internet.
3. The Internet isn't Free.
4. Libraries aren't Just Books.



5. Mobile Devices are not the end of Books or Libraries.
6. Libraries can Preserve the Book Experience
7. Eliminating Libraries would Cut Short an Important Process of Cultural Evolution
8. Curriculisability.
9. The Issue of Accessibility
10. Copyright and Intellectual Property Issue.

### **For Digital Librarians**

Librarianship and libraries have been rapidly changing under the influence of the developments of digital libraries, we are living in the digital environment and some of the challenges faced by the librarians and libraries are as follows:

1. Information explosion
2. The most revolutionary change – Ever-changing Digital libraries
3. Increase in the growth and usage of digital libraries
4. Dwindling financial resources and shrinking library budgets
5. Increased cost of documents – especially journals and other scholarly communication resources
6. Increased user expectations
7. Competition from other agencies such as Internet. Online book shops and commercial information services providers.

The survival and progress of library professionals depend on how far they are able to meet the standards of

professional competencies. What are the needs of professional competencies expected for a job in a particular library? How are these to be measured? These are some of the issues that need exploration.

### **CONCLUSION**

The emergence of semantic digital libraries offers a new level of flexibility, interoperability and way to enhanced peer communication and sharing knowledge. It expands the usefulness of the digital libraries that will contain majority of data in future e.g., machine navigation resources. One thing is clear that semantic digital libraries cannot stand without technologies and combine many technologies solutions, such as semantic integration of information based of different metadata, interoperability with other system, user friendly and adaptable search and browsing interfaces empowered by semantic. These solutions are deployed in practice to build digital libraries that provides variety of semantic digital library services powered by semantics.

Plethora of semantic solutions for the digital libraries available on the web in the form of spate portal or software solutions or tools that are geographically distributed. Most of these have some kind of collections that user can browse and search. Apart from the software solutions, some semantic and social tools available that can integrate with existing software communications. Some tools

