Abstract – Semantic Digital Library offers a service-oriented architecture that explicitly includes a semantic layer which gives primitive services to the applications construct on top of the digital library. From this layer, a specific component is described: the PIRATES framework. This framework assists end users to complete different tasks concerning the retrieval of the most applicable content with respect to a description of their information needs (like a search query, a user profile, etc). Techniques of user modelling, adaptive personalization and knowledge representation are exploited to build the PIRATES services for fill the gap existing between traditional and semantic digital libraries. We are designing and developing a digital platform that capable of maintaining the semantic meaning of each digital object and its content, of maintaining its authenticity and origin, and of retaining its interrelatedness.

Keywords — Digital libraries, Semantic layer, Service-oriented Architecture, PIRATES etc

I. INTRODUCTION

Typical digital libraries usually focus on categorizing and cataloguing resources. Information retrieval in such libraries relies primarily on text search engines and free browsing. This approach proved to be useful, however it suffers from ambiguity of natural language, neglecting the importance of metadata; it also does not engage users in the process of sharing knowledge. Simple searching still returns too many results which have to be filtered somehow. Page ranking algorithm helps with websites but cannot be easily applied to books or e-learning objects. On the other hand, having a look on a friend’s bookshelf can give us much clearer view on what is worth reading in a particular domain than digging through a thousand books or websites published this month. The Semantic digital library is an attempt to restore the collaborative approach to sharing knowledge. The semantic services help to interconnect systems and exchange data, while social services let people benefit from expertise of others. Together, they improve knowledge sharing in a digital library.

II. DIGITAL LIBRARIES (DL)

Computers have made revolutionary changes in every field of life; undoubtedly, the field of education and information has been no different. Importantly, conventional libraries moved to the concept of digital libraries, which ultimately made gaining knowledge more efficient and organised. However, a notable important fact here is that the digital library should stand for more than a well-organised centralised form of information. Furthermore, they should also embody the essence of communication, which was originally the aspect of face-to-face interaction between the people at a conventional library.

ADVANTAGES
1. People can access required information at any time of the day, as long as they have access to the internet.

DISADVANTAGES
1. Searching is not efficient, as it may not provide meaningful data to the user as a result of his command. In many cases, access to certain information is limited by copyright law.
2. Data is static; therefore, no users can contribute their views or share their knowledge with other participants.

III. FROM DIGITAL LIBRARY TO SEMANTIC DIGITAL LIBRARY

Following the advent of digital libraries in our lives, another innovative step followed. This step was made in relation to making the search more meaningful and direct. Essentially, it was concerned with refraining from the habit of searching all the things ‘everywhere’. The growth of Web 2.0 has given way to new
methods of accessing information and contributing opinions. Notably, semantic digital libraries enable the user to get the intended information concerning an object without the presence of the exact word in the search. This integrated form of information is based on different metadata which provides a more meaningful data. These libraries tend to provide a better and more convenient form of browsing interfaces.

ADVANTAGES
1. Semantic Digital Libraries make it easier to find information in the vast ocean of available data. This is facilitated by ontology-based search and facet search.

2. Access is not confined to only one digital library; to the contrary, it provides a mechanism of interoperability between different systems.

DISADVANTAGES
1. Existing metadata of the digital libraries have to be lifted to a semantic level.

2. Not all digital libraries, government agencies etc. maintain metadata.

IV. GENERIC ARCHITECTURE OF A SEMANTIC DIGITAL LIBRARY
We present a three-layered architecture of metadata management on top of a digital library system. Each layer enriches basic information gathered in a library with semantic annotations and provides additional capabilities to browsing and searching.

The bottom layer handles typical tasks required from a digital objects repository, that is, keeps track of physical representation of resources, their structure and provenance. With an extensive use of structure ontology the bottom layer provides a service for a flexible and extendable electronic representation of objects; it is especially significant in expressing relations to other resources.

The middle layer lifts up legacy bibliographic descriptions to a semantic level; it uses an extensible ontology capable of representing information originally provided in any of popular existing formats like Dublin Core, MARC21 or BibTEX. Services provided by the middle layer concentrate around storing, delivering and managing documents’ metadata. Furthermore, the middle layer offers information retrieval and identity management services. All the services are supported by semantic technologies; for example, the natural language queries take advantage of a social network specified using FOAF ontology.

The top layer in the semantic digital library stack utilizes benefits from engaging community of users into annotating and filtering resources. In today’s Internet the influence of user communities cannot be overestimated; collaborative efforts in information sharing and management proved to be the right way to go and led to the success of many of the Web 2.0 sites.
IV. EXISTING SEMANTIC DIGITAL LIBRARY SYSTEMS

Some of the Semantic Digital Library Systems are:

- **SIMILE3**: (Semantic Interoperability of Metadata and Information in unLike Environments) This system focuses on enhancing the integration aspect of metadata, services etc. to increase accessibility.

- **JeromeDL**: Can be considered as a social semantic digital library. Based on Semantic Web as well as social networking in order to promote collaborative activities along with other common uses of semantic digital libraries.

- **BRICKS**: This system focuses on the basic infrastructure of a digital library network so that information can be shared amongst users in the cultural heritage domain.

V. CONCLUSIONS

Traditional libraries have taken the shape of an interactive, accessible and efficient platform which is present for the user at any time of the day. The new forms of digital libraries, i.e. semantic digital libraries, have proved to produce more meaningful results for the user. Further developments in semantic digital libraries have evolved the concept of contribution of information and social interactivity between the contributors. Therefore, the future holds much more promising and efficient mechanisms for handling information.

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