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From Automation to Integration: Changing library Services through cooperative Technological Networks

Gaikwad Bebi Arjun
Dr. Babasaheb Ambedkar Comm. and M.V.R.S. Arts College

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Abstract

This paper discusses the immense paradigm shift in the field of library science from localised automation of digital transformation of manual tasks to a holistic approach of systemic integration facilitated through the local cooperating technological networks. It examines the evolution of scholarly institutions beyond the body of isolated databases to include cloud-based interoperable and ecosystems with a focus on sharing of resources, linked data and unified discovery interfaces. Through an examination of the shift from Integrated Library Systems (ILS) to Library Service Platforms (LSP) a critical analysis is provided describing the important role consortia have in helping innovation flourish, whilst also covering the associated complexities in terms of data governance in a more networked environment.

Key word*: - Integrated Library Systems (ILS), Library Service Platforms (LSP)*

Introduction:

The Destruction of the Information Silo

For several decades library automation was an enterprise on its own. An individual institution would obtain a server, instal proprietary software, and its catalogue was maintained in and of itself. Such a paradigm is now outdated; the modern library is a node in an inter-institutional, global network.

The Problem Statement

The explosive growth of digital content combined with increasing costs of information products in the scholarly resources market has made the concept of "collection self-sufficiency" untenable. Libraries are forced to create integrative relationships with external partners if they are to be relevant in an age of ubiquitous connectivity.

Objectives of the Paper

- To trace the development from task centric automation towards an ecosystem-based integration paradigm.
- To zoom in on the network of technical infrastructure that supports these networks of cooperation
- To appraise how such networks have an effect on user experience and institutional efficiency.

Historical Context from Punch Cards through to Cloud

In order to understand where we are, we need to look at the three distinct "waves" of library technology.

Phase I: The age of Automation (1970s - 1990s)

In this stage of evolution the main focus was on replacing cards catalogues with OPAC (Online Public Acces Catlogues) and automation of circulation process.

Phase II: The Eras of Connectivity (2000s)

During this time, the internet created ease of simple resource sharing protocols, Z39.50, and the first interlibrary loan (ILL) systems were implemented.

Phase III: The Time of Integration (2010s to the Present)

The last phase has been through the transition to cloud-based solutions and the Library Services Platform (LSP) has emerged.

Address for correspondence:

Gaikwad Bebi Arjun,Dr. Babasaheb Ambedkar Comm. and M.V.R.S. Arts College
Email: ashayogi8015@gmail.com

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The core of technology: From ILS to LSP

The core point of this transformation is the shift away from the the traditional Integrated Library System (ILS) being purposeful. While the ILS worked admirably in the sphere of physical volumes, the ILS increasingly found it hard to accommodate the growing stream of electronic resources, colloquially referred to as "e-everything."

The Rise of the LSP

Unlike the ILS, an LSP is:

- Agnostic to Format: It assigns equal importance to a PDF file, streaming video file and a physical book.
- API-First: It makes use of Application Programming Interfaces to "talk" to other systems on campus (e.g., Registrar data or Finance) and other external vendors.
- Multi-Teant Cloud: There are multiple libraries using the same software instance hence provide instant updates and bug fixing.

Cooperative Technological Network: The "Network Effect"

A cooperative network goes far beyond the purchase of software by a collection of libraries; it is a collective infrastructure for collective functionality.

The Consortial Model

Shared LSPs can be used by contemporary consortia, such as Orbis Cascade or CARLI, to create a "Universal Catalog." Consequently, someone sitting at a small college can browse and request a book from a major research university as if it is already on his or her shelf.

Shared Technical Services

- Collaborative Cataloguing: Rather than having fifty different libraries cataloguing the same volume, one institution does it and the metadata from it is then shared across the network.
- Centralised Knowledge Bases: The upkeep of the connexions to millions of e-resources is an impracticable task for any individual library. By spreading this responsibility among the network, the burden on everyone that must be carried out is much lessened.

Metadata and Interoperability: Integration Language

Integration does not work when systems fail to communicate through a common protocol. In this section we consider the requirements at the basic mechanics level for libraries networking to be interoperable.

Linked Data and BIBFRAME

The traditional MARC (Machine - Readable Cataloguing) record is nothing but a flat file. The current direction in these days takes us towards Linked Data, where resources are identified by using URIs, where these are linked to the wider semantic web. This approach does make the holdings of libraries "searchable through external databases," for example, Google, and not just the institutional search interfaces.

Interoperability Standards

- OAI-PMH is used for harvesting the metadata.
- ISO 18626 is for the management of contemporary forms of resources sharing, promoting the ease of communing between the institutions attached.
- LTI (Learning Tools Interoperability): It is the method of being able to integrate library resources directly with learning management systems such as Canvas or Moodle.

The User Experience (UX): Luxury Findings

The ultimate goal of integration is to provide the "Google-like" experience to the user. In a fragmented system, patrons need to search separate catalogues and databases and with a unified discovery layer, a single search interface is enough for all resources.

Personalization vs. Concrete accessibility

Integrated environments will often have Single Sign On (SSO), which allows users to move between applications with ease, for example from the library catalogue to full text journal articles and not have to enter their credentials repeatedly.

Challenges and Barriers

The process of metamorphosis of the library systems is not without complexities and limitations.

- Loss of Local Autonomy: When the institutions enter a federated network, they are required to follow standardised protocols for entering data.
- Privacy Concerns: Also in a shared network environment, preserving reading histories of users across multiple institutions is a fairly major challenge.
- Technical Debt: Switching from a legacy system that has been in use for around two decades to a modern day network solution comes with a great deal of financial cost and requires a lot of personnel retraining.

Prospects of Transformation: Case Studies

- Ex Libris Alma/Primo: This platform is a great example of how the functions can be consolidated by large consortia with a common infrastructure.
- FOLIO: This open source, modular, integrated platform is an example of the ability for libraries to choose the functionality they need.
- OCLC WorldShare: The Business Application of the Internet: An Example Docs: OCLC

WorldShare is one true example of a global cooperative network.

The future: The Artificial Intelligence, Machine Learning and Big Data

Libraries as they federate across multiple data sources and become more interoperable are producing large and complicated data sets that require complex analytical tools.

Predictive Analytics: Using statistical and machine learning techniques, scholars and librarians can predict which volumes will be of interest and can be acquired ahead of time to balance supply and demand ahead. With this above-average approach to innovation, inventory is not only optimised, but the resources are also better planned.

AI-Enhanced Metadata: Advanced AI algorithms are being used for automatic assignment of subject headings to digital collections which can help in finding the digital content, make them more consistent, and findable in heterogeneous digital repositories. Such automated metadata generation increases the user experience as well as preserve scholarly rigour.

The "Library of Things": Adding non-traditional resources - tools, laptops, even seeds - into the cooperative network, libraries increase their ecosystems. This interdisciplinary platform promotes community engagement on a much wider level, and provides hands-on, experiential learning not found in the usual textual fare.

Conclusion

The shift from automation to integration means to a new paradigm from "my library" to "our network." By embracing cooperative technological ecosystems libraries are not just worshipers of information, they are becoming participatory, active players in a global interconnecting knowledge ecosystem.

Through embracing such synergistic networks libraries are no longer merely places for storing knowledge but informative and dynamic changes that can encourage interdisciplinary relationships and the dissemination of knowledge and permanent learning across institutional and cultural barriers.

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Conflicts of interest

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