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CLUSTER POWER – LIBRARY INTERNETWORKING IN THE ELECTRONIC INFORMATION AGE

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History of Interlibrary Cooperation and Networking

Library networking and partnership are neither new concepts nor new practices in the United States. Literature promoting interlibrary cooperation and collaboration dates back to the late 1800s[1]. Melvil Dewey wrote about it in an 1886 article of *Library Journal*[2]. Over the years, interlibrary symbiosis has become common in every operation as a means of extending library services and resources beyond localized facilities.

Circumstances, however, have varyingly prioritized library joint ventures at different periods in history. The first major wave of interlibrary cooperation occurred in the 1960s. Following implementation of the first generation of library automation systems, development of bibliographic databases, and generous federal funding to academic libraries, the rush was on to form partnerships, to share expertise and resources about library automation, and to work in tandem on projects such as union cataloging, retrospective conversions, collaborative acquisitions and interlibrary lending[3]. From the early '60s to the early '70s more than 100 academic library consortia were born (accounting for more than 90% of all consortia at that time)[4].

The remainder of the '70s and on into the '80s saw little furtherance or new explosion of interlibrary synergy, as libraries were now preoccupied with development of bibliographic utilities such as OCLC and WLN, along with local implementation of their integrated library systems[5]. What was the vanguard or "big bang" of ten years prior was now being worked out in minute detail.

Moving into the '90s, the pace of library consortial activities began to accelerate once again[6]. Driving forces this time were technologically as well as economically motivated. Development of network-based information services dramatically transmogrified the landscape of library services and the ways in which patrons seek information as of today. In a wired world, physical distance between resources shrinks and becomes less germane as more information and library services come online electronically and by extension, remotely. With continued quantum strides in networking and telecommunications technologies, fueled in no small part by the Internet, library systems are now being interconnected through common protocols and universal standards. New cooperative potentials and opportunities are thus spurred.

Concomitantly, escalating subscription costs of print and electronic services are requiring libraries to find alternative means of acquiring resources cost-effectively. With ever-easing

feasibility of internetworking library systems, group purchasing and essential resource sharing offer an attractive course of action. Three reasons cited by Barbara McFadden Allen and Arnold Hirshon summarize the increase of library cooperation at this time period perfectly[7]:

1. To leverage resources and share existing collections through virtual union catalog / collection development / document delivery.

2. To reduce the cost of member library operations.

3. To affect the future as to how information will be created, marketed and purchased.

The '90s moreover have been a milieu where many existing library consortia and individual libraries undertook to reexamine and redefine their roles and the future of consortia generally. Towards this mission, they are analyzing and evaluating new information technologies as "tools" to leverage consortial resources and to enhance consortial functions. Traditional consortial tasks including union catalog, resource sharing, collaborative cataloging and collection development will continue to play pivotal roles. However, new opportunities and solutions are emerging.

This crucial need for guidance in consortial formation and function prompted the Interlibrary Cooperation and Networking Section of the Association for Cooperative and Specialized Library Agencies (a branch of the American Library Association) to publish two books to assist libraries in planning and participating in common-interest ventures[8]. In recent years several library journals have published issues devoted specifically to the topic of library cooperation[9]. Another important milestone has been the formation of an organization for library consortia. First established informally in 1997, the International Coalition of Library Consortia (ICOLC) quickly expanded to 79 consortia in North America as well as several foreign countries[10]. Small, local member meetings grew into large, international biannual symposia joined by publishers and vendors. The main functions of ICOLC are to facilitate communications and discussions among consortia, electronic information producers and vendors.

Industry Cluster

The model of an "industrial cluster," widely employed by economists and policy makers in the business world to garner competitive advantages, was first formulated by Dr. Michael Porter of Harvard Business School. In his 1990 book "The Competitive Advantage of Nations," Porter studied economic strengths and successes of ten countries relative to each other. The economic competitiveness of a country, Porter found, is proportional to where industries are structured into agglomerations or clusters of similar, market-driven, internetworked companies within a particular geographic area[11]. Based on Porter's analyses, other researchers have followed up with empirical studies on various aspects of industrial clusters. Findings continue to reinforce what Porter suggests-- that cluster companies are more competitive; they innovate more; information, knowledge, and technology transfer efficiently among companies within a cluster environment[12].

Porter's insights into industry clusters are neither altogether new nor completely out-of-the-blue. Back in the 1950s, Swedish economist Erik Dahmen had already identified necessary links for future growth among companies in "industrial development blocks."[13] In the U.S., clusters of companies in specific industries have been forming naturally at various geographic sites for years. Famous industry clusters include: California's Silicon Valley of computing and information technology companies; Boston's Route 128 of software, computer, and telecommunications firms; and Detroit with its vast automotive industry. These naturally-formed clusters are not limited solely to industries in manufacturing and production sectors. Cluster phenomena is evidenced in service and even non-profit sectors. Some distinguished examples include: the tourism and recreation industries of Las Vegas and Orlando; the media and entertainment industries of Los Angeles and New York; the financial, insurance, and banking industries of greater New York, New Jersey and Connecticut; and the educational services sectors of the New York and Boston areas[14].

Clusters may also be set up purposefully or artificially by policy makers and government agencies to boost a region's economic growth and competitiveness. The Research Triangle in North Carolina and the optics industry in Tucson, Arizona are two such instances where clusters were deliberately invented by regional politicians to galvanize growth. The state of Connecticut even passed a legislative bill to fund cluster-based economic development in six key industries[15].

Characteristics of Industry Clusters

So what are the magic ingredients to an industrial cluster? A typical industry cluster contains the following key elements, identified by Porter and other researchers:

1. Cluster is integrated or linked, either vertically, horizontally, or both, with companies, common customers, suppliers, technology, and rivals in a specific industry.

2. Cluster is often allied with research institutions, universities, government regulatory and development agencies, as well as financial sources within the geographic confines. Furthermore, its size and prestige enable the cluster to attract talent easily.

3. Within the close-knit and symbiotic cluster relationship, participants share information and expertise freely, fluidly.

4. Economy of scale and leveraged power encourage clustered firms to invest in related and specialized technologies, information, infrastructure and human resources in ways fostering and diffusing efficiency and innovation.

5. Over time, positive feedback and reinforcement among member corporations promote continuous innovation and growth.

6. Technology and knowledge "spillovers" or "externalities" – Tangential benefits to society, interdisciplinary education spawned by inter-member exchange and cooperation; the cluster as a rich, fertile mix causing society to flower in sometimes unanticipated ways.

Library Network As Industry Cluster?

Although relatively disparate in set and setting, library networks evince certain qualities and characteristics of the synergetic relationship enjoyed by industrial clusters. Consortial projects such as system-wide electronic/digital libraries, joint electronic resources procurement, state-wide infrastructures for library networks and "server farms" all offer superior service through shared innovative information technology. However, library consortia are formed for multifarious reasons, with divergent philosophies, vision, missions and goals. Even at the cooperative level, activities and mechanisms among consortial members broadly differ. Structurally, library consortia range from loosely affiliated "buying clubs" to alliances with highly centralized governing bodies. Based on the degree of centralization and autonomy, Barbara McFadden Allen and Arnold Hirshon categorize library inter-networks into four generalized types: loosely-knit federations, multi-type/multi-state networks, tightly-knit federations, and centrally-funded statewide consortia[16].

In this paper we focus on two statewide academic library networks, one relatively young and the other well-established. The reasons we selected these two cases for examination are: first, each is highly structured and centrally administered with funding from the State, thus permitting heightened variation of consortial activities and interactions; second, collectively we have participated at one time or another directly or indirectly in these two consortia.

MERLIN and MOBIUS

Launched in 1995, Missouri Education and Research Libraries Information Network (MERLIN) was founded as an inter-institutional consortium in the state of Missouri[17]. As a joint cooperative between public University of Missouri and private Saint Louis University, MERLIN serves five campuses geographically scattered across four Missouri cities: Columbia, Kansas City, Rolla, and St. Louis. With a centralized system server located at University of Missouri, Columbia, MERLIN contains over 6 million combined library holdings and supports direct, online patron borrowing of items from member libraries. To expedite the interchange of library materials, MERLIN runs a document delivery service among participant libraries. Beyond union cataloging, MERLIN coordinates purchasing of major electronic resources among its members. Currently, members jointly receive more than 30 databases as well as electronic journal services.

To facilitate communications among MERLIN constituents, six functional committees exist with representatives from each member library. These are Quality Control Committee, Reference Services Committee, Circulation/Reserves Committee, Acquisitions/Serials Control Committee, Interlibrary Loan Committee, and Network Managers Committee. Each committee meets monthly or quarterly to discuss issues and concerns at the central office of the University of Missouri, Columbia. Electronic discussion lists, a Web site and Web help desk are also in place to optimize information flow. Guidelines, standards, meeting minutes, system calendars, usage statistics, and major system parameters are all available through MERLIN's website.

Due to the intensifying importance and popularity of electronic resources, an Electronic Resources Licensing Librarian was hired to represent MERLIN and work with major vendors and publishers in dealing with licensing issues. This individual is responsible for identifying and arranging potential electronic resources for trial to member libraries. Indirectly, this person coordinates and facilitates collection development of electronic resources among consortial members.

Every year MERLIN holds a "Best-Practice" meeting for member libraries to share with each other their own procedures, anecdotes, tips and tricks in utilizing every conceivable function of the system. Information and experience are mutually purveyed and received while practices and processes are expressed, explained and discussed with relevant staff at the System office.

In light of MERLIN's success, Washington University, another major academic institution in Missouri, joined the consortium in 1997. Then in 1998 Missouri's state legislature approved a proposal to fund a statewide academic library network based on the MERLIN protocol. Named the Missouri Bibliographic Information User System (MOBIUS), this statewide consortium consists of 51 public and independent academic libraries as well as the Missouri State Library. MOBIUS also follows the OhioLINK model as a statewide library system with a common platform[18]. Administered through a central office at the University of Missouri, Columbia, MOBIUS will eventually operate a server farm hosting the union catalog of member libraries plus consortial, licensed electronic resources. Additionally MOBIUS will operate a document delivery service among members.

The essence of MOBIUS is its so-called Common Library Platform, in which all member libraries employ the same integrated library system. Benefits of locking into a single library system from a single vendor include standardization of system parameters, a single user interface, availability of system-wide direct patron borrowing, networked linking of all participating library systems, efficiency in training, system setup, and maximization of communal resources. In June 1998 the Missouri Legislature allocated $3.4 million to support the implementation of the Common Library Platform project. In September 1998 the MOBIUS Governing Council approved Innovative Interfaces as the software vendor for its Common Library Platform; then in December of this same year, the Library System Office at the University of Missouri, Columbia was selected as the host institution for the MOBIUS consortial system. Now as of this past January, MOBIUS union catalog was unveiled with the joint catalogs of MERLIN libraries and Washington University libraries. Presently MOBIUS plans to complete integration of all member libraries by July 2002.

OhioLINK

As one of the largest statewide consortiums in the United States, Ohio Library and Information Network (OhioLINK) serves as a library network model for many newer consortia. Following the tradition of funding the original OCLC (Ohio College Library Center) library network in the 1960s, the state passed a recommendation by the Ohio Board of Regents to fund a statewide electronic cataloging system in 1987. Today OhioLINK boasts 74 academic libraries and the State Library of Ohio with a total of 24 million library holdings in its union catalog[19]. Similar to

MOBIUS, OhioLINK and its members employ the same common library system vis-a-vis a single vendor, Innovative Interfaces. This arrangement enables each library to run its own local catalog as well as a centralized integrated catalog; in this way patrons can search not only local but statewide union catalogs online and request items from other libraries seamlessly. A commercial document delivery service is used to guarantee promptitude in the reciprocity of library material movement.

Another major function of OhioLINK is to license electronic resources for the entire consortium, including bibliographic databases, full-text reference resources and journals. The system office hosts servers of some of the licensed databases. Currently 67 research databases are provided in differing subject areas from various vendors. OhioLINK also developed its own common search interface thereby eliminating discrepancies in search features across vendor-disparate databases. This system further provides links from database citations to full-text articles. The OhioLINK System Office moreover developed its own patron-authentication mechanism allowing affiliated patrons access to consortial resources from non-OhioLINK IP addresses such as commercial dial-up accounts.

Library Consortium = Industry Cluster

Today's library services and users rely increasingly on powerful automated systems to provide, search and retrieve information just in time, all the time. Meantime, library resources in electronic format continue to supplant traditional print-based publications. Major information sources and interconnected computerized networks and telecommunications are making the virtual/digital library a reality. Information, networking and client/server technologies, telecommunications topologies and digitization have effectively laid the groundwork for today's library inter-cooperation or, dare we say, clustering.

The two examples of library consortia discussed above mirror many of the features of an industry cluster. Member libraries along with their patrons are close-knit symbionts in the agar dish of an integrated library system. A central office works side-by-side with suppliers of hardware, software, and Internet service providers to insure smooth performance of the whole internetwork. It also negotiates with various vendors of electronic resources for optimal licensing and pricing deals for the consortium at large. Finally, it fosters connections and communications with overseeing government funding agencies, local, regional, or national library consortia, and other relevant parties.

As for members within the consortium, interaction and communications are continually facilitated and supported. Regular meetings and training opportunities, electronic discussion groups, site visits, and personal contacts are just some of the many strategies adopted. Through interaction and discourse, members are able to identify issues, problems, solutions and recommendations related to their system. They also learn from each other and share experience and practices. Innovations and distribution of knowledge flow freely and fluidly among member libraries.

Ultimately there result invaluable externalities and technology spillovers of this exciting, cluster-like endeavor. Librarians as well as patrons gain research and computer skills from exposure to resources unaffordable to any single library. Campus infrastructures, due to requirements of networking with a central integrated library system, are upgraded for speedier transmission, broader bandwidth, and expanded remote dial-up access. An improved campus network benefits everyone, not just the library. The dedicated network connection from each institution to the consortial server can be shared and used for accessing other Internet-based resources such as government documents. Requisite upgrading of computer and networking equipment and software applications empowers not only personnel from the library and computing center support staff with advanced skills and knowledge, but all campus-wide users[20].

Just like companies in an industry cluster, joining consortiums provides a win-win chance for libraries to maximize their resources while minimizing operating expenses and risk. Each library is able to access collective technology and skilled human assets otherwise prohibitively expensive and precarious to obtain solo. Furthermore, by leveraging local resources each library gains access to burgeoning shared information and expertise, while the tangential benefits radiate far beyond the walls of any given institution. Cluster power truly pays off.

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[9] For example, the Fall 1996 double issue of *Library Hi Tech*, State-of-the-State Reports, offers 352 pages of reports on the statewide library networking and resource-sharing activities from 46 states; the Winter 1997 issue of *Library Trends* discusses the topic of resource sharing in a changing environment; the March 1998 issue of *Information Technology and Libraries* is dedicated to the topic of library consortia.
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[15] See the Connecticut Industry Cluster Home Page at http://www.state.ct.us/ecd/clusters/industry.htm
[16] Allen, 38.
[17] See MERLIN Web site at http://merlin.missouri.edu/
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