

**A STUDY OF LINKED SYSTEMS
WITH RECOMMENDATIONS FOR THE FUTURE
OF THE CLSA STATEWIDE DATA BASE**

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**California Library Services Board
and the
California State Library**

by

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I. Policy Summary

The principal finding of this study of California Linked Systems Projects is that the technology needed to link local library systems for resource sharing purposes is available and working today.

The Linked Systems Projects funded by the California Library Services Board have proved the concept--it is now possible for users to interact directly with remote library catalogs, to search for and retrieve needed information, to see bibliographic records and current, detailed holdings and status information, and in some cases to go beyond searching to send interlibrary loan requests or place a hold on desired material. The "virtual catalog" is no longer just a theoretical possibility.

Proposed Statewide Data Base Strategy

The Board has already endorsed the Library of California. From the citizen's perspective, the best automated resource sharing scenario would be one that allowed a patron to enter any library—in person or over the Internet--present a library card, and search for what he/she wants. The Statewide Data Base system would then help to locate and provide the requested material, automatically. Ideally, the system would also offer—but not insist upon--the assistance of a trained librarian along the way.

The technological approach with the greatest potential for fulfilling this vision is a statewide server (or group of servers) that would connect users to both a virtual catalog of all library materials in the state and a full range of extended circulation functions. Such a server would allow both direct and interlibrary loan transactions to be processed "live" by interacting with local automated systems and retrieving bibliographic, holdings, and patron information as necessary.

Unfortunately, all of the tools and standards that are needed to implement this approach have not yet been completed. What is proposed therefore is a strategy for improving the Statewide Data Base now while paving the way for this or other desirable options in the future.

More than twice as much bibliographic and holdings information describing California libraries' collections is currently stored in local automated systems than is stored on OCLC. The Linked Systems Projects have demonstrated that by linking those local systems together into a virtual catalog it is possible to achieve significant improvements in both the amount and quality of resource sharing information that is made available to the public. These Linked Systems Projects--and the majority of other promising data base development

options--begin with the implementation of Z39.50 server software on local automated systems.

It is recommended therefore that the CLSB adopt as its CLSA Statewide Data Base strategy:

- to encourage libraries to make their collections accessible via Z39.50 searching,
- to encourage cooperative library systems to implement regional resource sharing servers to link Z39.50-enabled local systems,
- to continue to offer an OCLC access subsidy, in recognition of OCLC as a valuable tool for locating materials owned by California libraries whose collections are stored on OCLC but are not accessible via regional Z39.50 search, and
- to require that any library or cooperative library system that accepts funding under this program agree not to charge a fee for lending material to another California library.

It is also recommended that the CLSB, in its capacity as the LSTA Advisory Council, support projects designed to accelerate the implementation of this new CLSA Statewide Data Base strategy.

Recommended CLSA Funding

It is recommended that CLSA Statewide Data Base funds be used primarily to provide an ongoing incentive for public library participation in the virtual catalog. Recommended funding levels are as follows:

Payments to Individual Public Libraries:

Current level of \$65 for OCLC access

or

\$ 500/year towards the ongoing costs of opening up access to the local catalog via Z39.50

It is not known exactly how many libraries are currently eligible to receive this new, higher level of funding. A reasonable estimate would be approximately 30% of all California public libraries. That would result in a total initial cost of approximately

- \$29,000/year for libraries qualifying at the new level, plus
- \$8,000/year for libraries qualifying at the old (OCLC only) level.

It is also recommended that multiple libraries be allowed to pool these funds if desired to support larger regional linking projects.

Maximum annual cost once all libraries become eligible for funding at the higher level would be \$88,000/year.

Payments to Cooperative Library Systems:

\$5,000/year towards the ongoing costs of operating a regional resource sharing server

It is also recommended that multiple cooperative systems be allowed to pool these funds if desired to support larger regional linking projects.

Total initial cost is estimated at \$40,000/year. Maximum annual cost once all cooperative systems become eligible for this funding would be \$75,000/year.

Targeted One-time Funding

It is further recommended that each year the balance of CLSA funds not expended on payments to individual libraries and cooperative systems as described above be used for discretionary data base building projects--either statewide, regional or local.

Detailed information in support of these recommendations is provided in the following report.

II. Introduction

The California Statewide Data Base Program

The California Library Services Act (CLSA), adopted in 1977, includes a number of provisions designed to support and promote resource sharing among California libraries. One such provision calls for the establishment of a Statewide Data Base: “The state board shall establish and maintain a computerized data base of bibliographic records and locations of all materials acquired by public libraries in this state, for the purpose of carrying out the legislative policy of enabling libraries to share resources efficiently.” (*Education Code 4, Title 1, Division 1, Part 11, Chapter 4, Section 18767*)

In the earliest years of CLSA, this requirement was satisfied by the creation and distribution of a microform union catalog, known as CATALIST. As library technology evolved and online access to large amounts of bibliographic data became more feasible, the Statewide Data Base was redefined. Since 1980, the CLSA Statewide Data Base has consisted of such California public library bibliographic records as have been contributed, either directly or by tape load, to the Online Computer Library Center, Inc. (OCLC) in Ohio.

In the eighteen years since OCLC was selected as the repository for the CLSA Statewide Data Base, the technology available to libraries has changed substantially. Recognizing the potential of new techniques for data base building and resource sharing--particularly since the advent of the Internet, the World Wide Web and a standard protocol for system linking known as Z39.50--the California Library Services Board has invested in the exploration of the most promising new technologies. Since 1995 the Board has authorized the expenditure of a portion of CLSA Statewide Data Base funds to support various Linked Systems Projects.

The Linked Systems approach offers a new Statewide Data Base concept—the “virtual” data base. With CATALIST and again with OCLC, all of the records that made up the Statewide Data Base were prepared locally and then forwarded to a central location for access and storage. By contrast, Linked Systems technology allows records to be stored and used locally and accessed from anywhere, over the Internet.

The purpose of this report is to provide an overview of the technology that supports Linked Systems Projects, an assessment of Projects that have been funded to date, an evaluation of the effectiveness of the Linked Systems approach in meeting resource sharing goals, and recommendations for the future of the CLSA Statewide Data Base program.

Consultants for this Project

Principal Consultant for this project was Joan Frye Williams, M.L.S. For more than twenty years Joan has been a librarian, consultant, vendor, planner, designer, evaluator and user of library and information services. She is also a former CLSA Program Coordinator, and is now President of a consulting firm specializing in information technology planning, management, and marketing. Assisting Joan as special technical advisor for this project was Mark Hinnebusch. Mark is Associate Director of the University of Florida's multi-campus automated library system and statewide data base for academic libraries. He is an internationally recognized authority on standards for linking disparate library systems and has served for many years as chairman of the Z39.50 Implementers' Group (ZIG).

Study Methodology

The first phase of this project focused on gathering information about what has already been accomplished by the Linked Systems Projects and what can be expected in the future. The consultant first collected and reviewed existing material (including grant proposals, reports, regulations, studies, budgets, schematics, data generated by automated systems, etc.) to create an overall picture of the environment in which the Linked Systems Projects have been developed and a preliminary description of each project.

The next task was to review the current state of the art in system linking and resource sharing technology, the feasibility of Internet links and the current status of Z39.50 standard implementation. This information was assembled from the consultant's own extensive files, supplemented by literature review, Internet searching and selected telephone interviews. The full text of this review is attached to this report as an Appendix.

The consultant then visited Linked Systems project sites. On the site visits library and technical staff were interviewed in order to verify and complete the data already assembled, assess implementation progress to date, discuss project successes and challenges, and gather information about suggested Statewide Data Base programs and policies. Linked systems were also accessed and searched whenever possible. This information was used to complete the inventory profile for each project. Draft profiles were then reviewed for accuracy by the project participants.

The second phase of the study concentrated on comparing different strategies for meeting CLSA Statewide Data Base goals. Using assessment and inventory data, observations from the site visits, more general experience and

knowledge of library services and technology, and information from interviews with State Library staff, the consultant described the current approach to Statewide Data Base implementation, developed alternate feasible scenarios, compared the available courses of action and prepared the policy recommendations that are outlined in this report.

In formulating these recommendations, special attention was given to issues of standards compliance and uniformity of access, to accessibility of services by a diverse user population, to integrating Statewide Data Base building activities with local library services, to providing incentives for local participation, and to building on available resources wherever practical.

Following submission of this report, there will be a one-day forum in Sacramento, at which Linked Systems Project participants and other stakeholders will have an opportunity to ask questions about the study findings, review and critique the report, and make recommendations regarding future directions for the Statewide Data Base. At their May 6, 1998 meeting the consultant will make a formal presentation of the project report to the California Library Services Board, with additional information on the comments recorded at the one-day forum.

III. The Technology that Makes Linked Systems Possible

Traditionally, automated library systems were worlds unto themselves. Many free-standing, disconnected sites installed many different types of automated systems, each providing access to the collections of the local library only. If patrons could not find what they needed locally they traveled to other libraries or called on the services of their interlibrary loan department. The interlibrary loan staff in turn consulted specialized, staff-oriented finding tools.

Ever since libraries first began to offer computerized catalogs there has been an interest in linking those catalogs together to make it easier for patrons and staff to find the materials they need. For a long time, the desire to connect far exceeded the availability (and affordability) of the technological tools needed to do so. The dream of self-service, online catalog "one stop shopping" has persisted, however, and recent years have seen the introduction of a number of powerful new linked systems technologies and standards. The most important of these are described briefly in the following sections. (For a more in-depth discussion of the state of the art of library interconnectivity, please see the Appendix to this report.)

Telnet

The first widely available catalog linking tool was a communications protocol called telnet. Telnet allows a user to instruct the local automated system to connect to a remote system and, once connected, to perform as if it were a local terminal on the remote system. Telnet is not a new technology but it is still a widely used method for searching the online catalogs of remote libraries. For example, telnet is the access method used by many of the libraries participating in Inland Library System's VIRL Project (described in the Profiles section of this report).

To use telnet, the user leaves his/her own local interface and then connects to one remote catalog at a time. Since each separate local catalog has its own variation on the user interface, a patron in library A using telnet to reach library B has to be familiar with the user interfaces of both systems A and B. Even when both systems are the same basic product from the same vendor, they often present dissimilar patron interfaces.

The World Wide Web (WWW)

An exciting new development in system linking technology is a loose connection of computer systems worldwide, known as the World Wide Web. The majority of the Linked Systems Projects profiled in this report use the World Wide Web to connect their patrons to remote catalogs.

World Wide Web connections are based on two standards, http (hyper text transmission protocol) and HTML (hyper text markup language). Http defines how information requesting software--Web browsers such as Netscape and Microsoft Explorer--can talk to information management software--Web servers. HTML is a set of rules about how to include formatting information in documents so that the Web browsers can read them properly. Documents encoded in HTML and stored on Web servers are usually called Web pages.

While World Wide Web technology is an important component of Linked Systems Projects, http and HTML alone cannot support the kind of searching needed to use library catalogs effectively. Most Web pages are fairly static collections of information--"electronic paper"--and World Wide Web search tools have been designed to retrieve and display those static pages one at a time, rather like pulling files out of a file cabinet.

In the library world, Web browsers are also used to access dynamic data, assembled on-the-fly by specialized software on the Web server. When the online catalog user submits a search request, the library server does not return a

previously created page of static data. Instead it retrieves a customized results set based on factors such as the exact combination of search terms employed, the identity of the requester, and constantly changing information about the availability of the various items represented in the library's data base. This is the fundamental difference between how the Web is used by general users--to retrieve static Web pages--and how it is used by Linked Systems users--to retrieve dynamic online catalog data.

One of the most significant features of the World Wide Web is that the user accesses all information via the same Web browser interface. There is no need to learn how to navigate different systems.

Z39.50

Meanwhile, in an effort that preceded and then paralleled the development of the World Wide Web, the library community was busy working out ways that library systems could communicate at a higher level than that offered by telnet or http. This work was done under the auspices of the National Information Standards Organization (NISO), which at one time was the American National Standards Institute (ANSI) committee Z39. The cross-system search and retrieval standard that was developed for NISO was the fiftieth NISO standard; it became known as Z39.50.

The goal of Z39.50 is to allow the user of any automated system to search the data base on any other system without having to know anything about how the remote system works. All of the communication between systems is meant to be transparent to the user, who never leaves his/her local system interface. Z39.50 technology is at the heart of the majority of the Linked Systems Projects.

The Z39.50 standard sees the world in terms of clients (origins) and servers (targets). The client is the software that sends a user's search to a server; the server performs the search of its data base according to the instructions provided by the client and then returns the results to the client; the client presents the results to the user. Z39.50 attempts to codify all the ways in which the client and the server can communicate meaningful information to one another in order to negotiate this transaction. The standard describes not just how the messages are formatted but what they actually say. This makes Z39.50 much more complex than procedural protocols such as telnet and http.

It should be noted that, since Z39.50 attempts to codify so much, and at such a high level, it was necessary to allow various levels of implementation to be offered. This was done by making many of the features in Z39.50 optional, by making the defined services modular, and by separating many of the parameters

from the body of the standard itself. In practical terms, this means that there may be considerable variation in legitimately “compliant” implementations of the Z39.50 standard.

The main focus of the most recent version of the standard is to support extremely powerful retrieval, far more powerful than that offered by the World Wide Web. Z39.50 provides a mechanism for the client to specify at a very detailed level exactly what components of a document it wishes to retrieve and in what format. This dynamic request facility gives Z39.50 far more power than the static document retrieval capability of the Web.

Z39.50 work is international in scope. There are more than fourteen projects underway in Europe, working to interconnect libraries across national boundaries, supporting multiple languages and character sets. In Australia, the ZedWeb project interconnects multiple libraries. There is Z39.50 development underway in libraries in Japan, Hong Kong, Taiwan, Singapore, and Korea.

Z39.50 is also used outside the library community. The Government Information Locator Service (GILS) specifies the use of Z39.50 to retrieve pointers to, and descriptions of, governmentally published material. The Committee on Earth Observation Satellites (CEOS) is using Z39.50 to link together the mass of material available from NASA, the European Space Agency, the Japanese Space Agency, and others. The museum and archive community, through the Committee for the Interchange of Museum Information (CIMI) has embraced Z39.50 to provide global access to the world’s cultural heritage. Several geographic information systems (GIS), such as the MIT Digital Orthophoto Browser, are incorporating Z39.50 to search images and other geospacial data.

Web-to-Z39.50 Gateways

In the last few years, vendors have been combining the best features of Z39.50 and the World Wide Web in software called Web-to-Z39.50 gateways. This technology has very great promise for Linked Systems projects. It allows an end user with only a standard Web browser to connect to the gateway software via the Internet. From there, the gateway connects the user to Z39.50 client software that allows him/her to search remote catalogs. From the user’s point of view, these connections are seamless.

Web-to-Z39.50 gateways eliminate the need to load Z39.50 client software on every patron's PC. This in turn makes the full power of Z39.50 searching available in the home or office. For examples of currently operating

Linked Systems Projects based on Web-to-Z39.50 gateways, see MOBAC and South Bay/SVLS in the Profiles section of this report.

The Web-to-Z39.50 gateway approach does require a relatively large server, with plenty of telecommunications “bandwidth” and the capacity to support high volumes of search transactions. Also, there are some discontinuities between the static interface style of Web browser software and the dynamic style of Z39.50 client software. The most obvious of these is that the “Back” button on the browser can no longer take the user to a previous “page” of information, there being no such page in the dynamic Z39.50 environment. Nonetheless this is a very useful technology for expanding online catalog access outside the walls of the library.

The Linked Systems Marketplace

The introduction of these new linking technologies has had a tremendous impact on the library automation marketplace. Librarians, encouraged by the promise of seamless cross-system searching, made it clear to vendors that they were ready to invest in new linking products. In their rush to get these new products to market, however, many vendors underestimated how long it would take to deliver stable client and server software. Many vendors also announced new product specifications and pricing prematurely, and were forced to revise several times before settling on a consistent package of information. Vendor implementation assistance in this emerging area has also been, to put it tactfully, evolving. As one Linked Systems Project participant said, “In the beginning we didn’t know anything about Z39.50—and neither did our vendor!”

One of the most common misconceptions about Linked Systems technology is the expectation that the approval of a new linking standard will automatically lead to the development of simple, affordable commercial products that implement the new standard. It is very important to note that the actual linking products that are currently available for purchase by libraries are still in a process of development and have not yet matched the full potential represented in the standards. Linked Systems technology is relatively complex, and development takes considerable time and effort. Nevertheless, it is fair to say that we are through most of the initial “shakedown cruise” phase with a number of these new products, and segments of the market are beginning to settle down. Most automated library system vendors now offer linking products.

Of course, not all of the linking products used by libraries originate in the library community. Connecting to the Internet and the World Wide Web means buying high speed data communications service, routers and other communications management equipment, Internet server software, security

software, etc. Librarians are, as a rule, unfamiliar with the commercial networking marketplace and vendors in that sector have not yet packaged their products and services in ways that are useful to libraries.

IV. Developments that May Affect Computerized Resource Sharing in the Future

Technology Trends to Watch

In addition to the technologies and standards noted above, there are a number of promising Linked Systems tools still in earlier stages of development. The following are areas worth monitoring over the next several years:

Further Work on the Z39.50 Standard

As useful as Z39.50 technology has been to Linked Systems, there is still work to be done on this standard. One of the current challenges for Z39.50 developers is the delivery of detailed library holdings and circulation status information. When this requirement was first tackled it was assumed that detailed holdings would be transported between systems using the MARC Standard for Holdings and Locations (MFHL). However, MFHL does not handle detailed serials holdings information well, nor does it carry circulation status information, and users really want to know exactly which issues of journals are checked in and whether desired material is available for loan.

Various stopgap solutions (including the long awaited Z39.50 version 3) have been tried; none of them is entirely satisfactory. The Z39.50 implementer community is currently working to rewrite this part of the standard, and we may see an update of the protocol some time later this year.

Interlibrary Loan Standards

Interlibrary loan is, of course, a fundamental component of the CLSA Transaction-Based Reimbursements Program, and technical developments in this area may have a major impact on the way CLSA-subsidized activities are managed by California libraries. For some years now, the Interlibrary Loan Protocol Implementers' Group (IPIG), under the auspices of the International

Standards Organization (ISO) has been working to develop a standard protocol for computerized interlibrary loan transactions.

The draft interlibrary loan (ILL) standard, designated ISO 10160/61, addresses the data elements and message protocols needed to support a full range of cross-system ILL activities, including extensive tracking of fees for service. Funds management is a critical--and at times controversial--element of ISO 10160/61. This standard seems to emphasize the financial side of interlibrary loan transactions, perhaps because so many of the committee members represent academic institutions where complex ILL fee structures are common. Nonetheless, portions of this standard have good potential for use in California libraries' Linked Systems Projects.

The international standards making process differs from the U.S. process in one very important way. Every time there is a proposed change to the draft standard—even error corrections—the whole thing must go through the complete review and balloting procedure. This results in a relatively slow process. ISO 10160/61 also differs from standards such as Z39.50 in that it is prescriptive; very few options are left open for local adjustment or interpretation. In the long run this approach may promote uniformity but it does make it somewhat more difficult to achieve consensus.

Some vendors have found it profitable to begin implementation of the draft version(s) of the ISO ILL standard, and to modify their products as the standard matures. Though several vendors already advertise their interlibrary loan products as “ISO compliant” we are at least one to three years away from the adoption of an official version of this standard. Meanwhile we should watch carefully to see how ISO 10160/61 develops.

Extended Circulation Standards

“Extended circulation” is a name coined recently to describe the computerization of the services that the California Library Services Act calls Universal Borrowing. Extended circulation differs from interlibrary loan in that the patron interacts directly with the remote library, rather than having his/her home library borrow materials on his/her behalf. By enabling local automated systems to “borrow” patron records and related information from one another, extended circulation software would make it possible for a patron to use any library just as if it were his/her home library--on a walk-in basis or over the Internet—without having to re-register. This would certainly help to automate the resource sharing components of Linked Systems Projects.

Z39.70 was the first NISO standard that attempted to address requirements for extended circulation. Early versions of the Z39.70 standard did not define a complete transaction-oriented communications protocol but did

identify the data elements required for remote circulation activity. In this "partial" form, the proposed standard has not balloted successfully and vendors have indicated that they are not ready to adopt it. However, there is currently interest in reviving Z39.70 and doing the work necessary to make it a full-fledged communications protocol. If that happens, it will be worth watching carefully to see if Z39.70 is adopted as the standard for extended circulation.

New Web Standards

XML is the name of a developing standard that may offer new searching power to users of the World Wide Web. XML grew out of frustration with the lack of descriptive capability in the current standard, HTML. HTML focuses primarily on presentation, i.e. how to display the information. All description of the content of a document is carried in the header only. XML provides a method for marking up Web documents with both presentation and content tags used throughout, so that documents and portions of documents can be searched more effectively according to the information they carry.

There is much interest in developing a standard procedure for searching documents marked up in XML. This work will be undertaken by a committee under the auspices of the World Wide Web Consortium (W3C). It is not yet clear what form this new searching mechanism will take nor what its impact on the library community will be. Experienced Z39.50 developers are attempting to gain seats on the standards making committee so that work already done on Z39.50 will not be ignored.

Some developers believe that gateways between Z39.50 and XML-based searching will be relatively easy to construct, melding the Z39.50 accessible holdings of the world's libraries with the emerging information available via the World Wide Web. This is definitely a standard to watch.

Future Prospects

Looking somewhat further ahead, there are trends that show good potential for making the use of remote online catalogs even easier. Both combine the user friendliness of the Web browser interface with the power of Z39.50 searching. These are (1) the development of Z39.50 clients as Web browser applets, and (2) the inclusion of Z39.50 clients in desktop application programs.

The new Java programming language has the ability to support the downloading of data-specific applications software from a Web server to a standard browser. Theoretically, a Z39.50 client could be developed in Java and placed on a library's home page. By clicking on an icon or on a hyperlink, the

user could download the Z39.50 client applet into his/her browser. The applet could then initiate a connection with any Z39.50 server and provide full Z39.50 searching power. This would avoid some of the static vs. dynamic search issues that can be problematic with Web-to-Z39.50 gateways, yet would still require the library to support only a single piece of software.

Another probable development will be the inclusion of Z39.50 client capabilities in end-user software, where search and retrieval are not the primary functions but are important side functions. Examples of this are catalogers' workstations, word processing packages for scholars, bibliography generators, and coursework software for computer-mediated instruction.

Linking Projects to Watch

There are several high profile Linked Systems projects currently underway that may yield results of interest to Statewide Data Base planners. The Committee for Institutional Cooperation (CIC), consisting of the Big Ten universities and the University of Chicago, has undertaken the development of a Virtual Electronic Library. This involves not only the creation of new electronic materials and the retrospective conversion of print materials to electronic format, but also attempts to produce a virtual union catalog of the holdings of the member libraries.

The National Library of Canada is underwriting a similar project to link eighteen Canadian libraries using nine different vendors' systems. The Virtual Canadian Union Catalog (vCuc) project is particularly interested in resolving issues relating to the delivery of holdings information via Z39.50 and testing techniques for transmitting ILL messages.

Electronic Commerce

Not all of the trends of interest to Statewide Data Base planners originate in the library community. The dramatic success of Internet book retailers such as Amazon.com and the appearance of pay-per-use Internet access kiosks in public places such as airports provide instructive models for how citizens are becoming accustomed to finding the books and information they need. Electronic commerce in general, and electronic information retailing in particular, are trends deserving our continued and careful scrutiny.

V. Linked Systems in California

Criteria for Computerized Resource Sharing

Given the current resource sharing state of the art and state of the marketplace, where should we be setting our sights? The Board has already endorsed the vision of the Library of California—full, direct access by all citizens to the rich resources of all types of libraries throughout the state. The question is how best to get from here to there.

A good way to approach the problem is to look at it from a user's point of view. The following checklist outlines the types of functions needed to support the resource sharing goals articulated in plans for the Library of California. Though no currently available solution meets all of these criteria, they provide a useful measure of how close we are to our ultimate goal.

Cross-system Search and Retrieval Functions

Can the user connect to remote catalogs

- via telnet?
- via the World Wide Web?
- installed by the same vendor as used in the local library?
- installed by other vendors?
- from workstations in the library?
- from home or office?
- when the library is closed?

Is the user interface

- friendly and easy to use?
- multi-lingual?
- age appropriate?
- integrated with the local online catalog?

Can the user choose which data base(s) to search

- one at a time?
- in groups or clusters for "broadcast" search?

Can the user find bibliographic records

- by author/title/subject?
- by keyword?
- by browsing?

Can the user find non-bibliographic data, such as

- full text?
- hypertext?
- images?

Can the user manipulate search results to

- limit/refine initial results?
- back up to a prior result?
- sort results?
- merge/de-duplicate results?
- mark/save/download selected information?
- redirect his/her search from the content of a record via hypertext links?
- link to other Internet sites referenced in the record?

Can the user view item level information for retrieved bibliographic records such as

- location?
- local call number?
- circulation status/availability?

Interlibrary Loan Message Functions

Can the user request materials by

- sending email?
- initiating an interlibrary loan transaction?
- placing a hold in the owning library's circulation system?

Can the system log search and request traffic

- so that users can track the status of requests?
- so that staff can monitor borrowing trends and system performance?

Extended Circulation Functions

Can the system authenticate/authorize users

- for searching licensed/restricted data bases?
- for initiating requests for materials?
- for placing holds on remote systems?
- for borrowing materials in person from other libraries?

Can the system manage diverse local policies and restrictions

- on who can access which data base?
- on who can request which materials?
- on which materials will be loaned?
- on when privileges will be blocked due to delinquency, etc.?
- on how and when fines and replacement fees are to be collected?
- on how sensitive patron data will be kept confidential?

Can the system help to equalize access

- so that no library is overburdened?
- so that every patron in every branch of every library can take advantage of the system's capabilities?

The following chart outlines the types of library-oriented linking products currently available, who can provide them, and what standards (if any) pertain to the functions to be performed. There is not yet a product and/or a standard for every linking function. In this chart,

Ameritech RSS; Pigasus Wings = new computerized interlibrary loan products

CPS URSA = a new computerized interlibrary loan product, in use at the North Bay Cooperative Library System (more details on page 46)

IOLS = Integrated Online Library System

MARC = Machine Readable Cataloging

MFHL = MARC Standard for Holdings and Locations

OCLC First Search = a new user-friendly interface to the OCLC data base (more details on page 78)

Web-to-Z39.50 Gateways = products that link home users to Z39.50 client software (more details on page 10)

Current Availability of Linking Products

Function	Who Can Provide	Relevant Standard
Convert/store:		
bibliographic data	Local IOLS OCLC Local cataloging systems	MARC (Machine Readable Cataloging)
branch holdings	Local IOLS Local cataloging systems	MFHL (MARC Standard for Holdings and Locations)
item/circ status	Local IOLS	
patron records	Local IOLS	
Cross-system search and retrieve:		
bibliographic data	Local IOLS Web-to-Z39.50 gateways OCLC First Search CPS URSA	Z39.50
branch holdings	Local IOLS (same vendor) Web-to-Z39.50 gateways CPS URSA	Z39.50
item/circ status	Local IOLS (same vendor) Web-to-Z39.50 gateways CPS URSA	Z39.50 "OPAC record schema" (in development)
patron records		possibly Z39.70 (in discussion)
ILL messaging	Some Local IOLS (same vendor) OCLC ILL CPS URSA Ameritech RSS Pegasus Wings	ISO 10160/10161 (in development)
Extended circulation	CPS URSA Some Local IOLS (same vendor)	possibly Z39.70 (in discussion)

California's Linked Systems Projects—General Observations

This study included an investigation of the California Linked Systems Projects that have been supported with CLSA or LSCA/LSTA grant funds since fiscal year 1994/95. These projects are quite diverse. In addition to data gathered for each project, however, a number of general observations can be made about the program as a whole:

The technology needed to link disparate systems for resource sharing purposes is available and working today.

These projects have proved the concept--it is now possible for users of one library catalog to interact directly with other library catalogs, to search for and retrieve needed information, to see current, detailed holdings and status information, and in some cases to go beyond searching to send interlibrary loan requests or place a hold on material in a remote library. The regional "virtual catalog" is no longer just a theoretical possibility.

Some but not all of the standards needed to support linking are in place.

The most important standard for these projects is the NISO Z39.50 standard for search and retrieval, which is well established but continues to evolve. A standard for interlibrary loan transactions, ISO 10160/61, is available in draft form. A possible standard for extended circulation functions, NISO Z39.70, shows promise for the future. In the absence of official standards—especially in the area of patron information--some of the Linked Systems Projects have devised ingenious work arounds and others have implemented custom software.

There is more than one viable way to link systems.

These projects differed in approach, sometimes substantially. Some concentrated on sophisticated searching; others gave priority to interlibrary loan, still others tested Web-to-Z39.50 technology. They used a wide variety of commercial products and each group devised its own unique local communications network. None has failed. All of them have managed to create functional links between systems.

Different linking products have different functional strengths.

Some products do a particularly good job of supporting data base storage, others are better at searching and retrieval, ILL messaging, or extended circulation; no one vendor's solution is the best in all categories. Nor is any one product the easiest to link in all circumstances. A system that was first to link properly in one project was the source of greatest difficulty in another.

To some extent, every project is a custom project.

There are many local variables involved in linking, even with systems from the same vendor, and what worked in one setting is not necessarily going to work everywhere else. Certainly there are general guidelines, and experience with projects to date has yielded much valuable information, but it is unrealistic to assume that each implementation will not include a fair amount of very specific local troubleshooting and tinkering before all of the links function properly.

This is especially true when setting up new communications networks. All of the Linked Systems Projects use the Internet to connect to the participating libraries' catalogs and all of them experienced some initial difficulty with connecting and configuring routers. Those projects that implemented security firewall software had trouble setting it up and/or penetrating the security software with authorized searches after the firewall was in place. Projects in which the server is housed and supported by a local academic institution's data processing department have somewhat better access to telecommunications expertise and have had fewer problems in this area.

Linked systems products are just coming out of their initial test phase and into mainstream production.

For these projects, libraries were given beta and even "pre-beta" versions of new products to use. Many project participants had to revise their plans as they went along, in response to new software releases and changing information from the vendors. Almost all of the projects experienced delays—sometimes substantial delays—simply in acquiring necessary hardware and software because their vendors could not deliver finished products as quickly as promised. This situation has improved recently but these are still not "plug and play" implementations.

Linking systems from the same vendor is currently less difficult than linking systems from different vendors.

While the Z39.50 standard has always had as a goal the interoperability of systems provided by many different vendors, each vendor's implementation of the standard is a bit different. Furthermore, it is relatively easy to convince a single vendor to address problems encountered when linking his/her own products; arranging cooperation between competing vendors to resolve cross-vendor linking difficulties is more challenging.

The market for these new linking products is not yet fully established.

While linking products have been developing, prices have been all over the map. One vendor sells basic Z39.50 server software for as little as \$500; another sells an integrated suite of Z39.50 client and server software for upwards of \$40,000. New distribution channels for linking products are also developing; many vendors are not yet set up to sell and service products for libraries that are not "regular" automated system customers.

Basic technological readiness to implement varies greatly from library to library.

Many libraries do not have the technical expertise or resources necessary to proceed with complex linking projects on their own. Others have some local expertise but could use specialized assistance in particular areas, notably telecommunications. In fact, participants in almost every project expressed a need for more technical help with both planning and implementation.

The most successful Linked Systems Projects draw upon both local and regional technical expertise.

These are groundbreaking projects and they require fairly sophisticated planning and implementation support. Library directors do not always have a clear sense of what their implementation options are, or how various approaches to linking would tie in with their overall plans of service; many are leaving the responsibility for representing the library in the linking project to their local automated system managers. These system managers, while quite capable and willing, are already very busy looking after local applications. Nor has their training in librarianship or local automated system management prepared them for solving networking problems or troubleshooting cross-system search failures.

Projects that had both significant time commitments from managers and system staff in the participating libraries and access to regional level technical

expertise were implemented much more quickly and efficiently than projects that relied on local staffing alone. When there was an assigned technical person with regional level responsibility to shepherd the implementation along, fewer problems arose. When there were cross-system problems regional level personnel were better able to negotiate successfully with multiple vendors.

These are multi-year projects.

The vast majority of the Linked Systems Projects have taken at least two years to implement. Even without vendor delays—of which there have been many—one year is not enough time to work out all the technical issues and reach closure on new resource sharing procedures and policies.

Because almost all of the Linked Systems Projects took longer than originally planned, many encountered additional delays caused by overlap with other large projects such as building remodeling and local system upgrades. In several of these long term linking projects, staff turnover was also a problem. Managers need to schedule implementation in smaller, more manageable phases and plan for multi-year commitments from the outset.

Most projects are using the new linking technology as a catalyst for changes in resource sharing policies.

Not everyone automatically shares the same vision of resource sharing. Differences of opinion about the desirability of unlimited, universal access to library materials and unmediated patron self-service were not a problem when such services were not technologically feasible, but times are changing. By implementing a Linked Systems Project, participating libraries create an occasion for serious discussion of the policies and conditions under which materials will be loaned (and delivered and returned and charged for, etc.) across jurisdictional lines.

At present, the interlibrary loan policies of California public libraries vary widely. This is especially noticeable in the area of local fees. Some libraries do not charge their patrons anything for requesting an interlibrary loan. Some charge a nominal fee for postage and handling. Others charge as much as \$10 or even \$20 to request an item from another jurisdiction.

It is important to note that, even when library directors support the development of these new resource sharing tools, that support is not always shared by line service delivery staff. Some staff are apprehensive about possible changes in workflow or increases in workload. While the reference staff that were interviewed for this study were generally quite positive about the benefits of increased access to remote catalogs, interlibrary loan staff in some participating

libraries expressed doubts about the desirability of having to change established procedures by adding "one more place to look." More field information about the actual day-to-day workplace impact of these new techniques is needed.

The most controversial issue encountered in the Linked Systems Projects to date is patron-placed holds.

The jury is still out on this one. Some librarians are concerned that allowing patrons to request materials directly from other libraries will result in excessive loan traffic, increased local workload, and the denuding of local shelves by outsiders. Others worry that bypassing the reference interview process will result in poorer service, and that patrons will request interlibrary loans because they do not realize that the information they need is available immediately in some other source or format in the local library.

It is not yet clear how offering patron self-service interlibrary loan will affect overall service patterns. Those projects that allow patron-placed holds have not been running long enough to yield sufficient data for analysis. North Bay, which has the greatest experience to date in this area, reports both increases in interlibrary loan traffic and reductions in per-unit staff costs for handling that traffic. More data will be available when the NBCLS project goes into full production later this month.

The availability of grant funds has accelerated the adoption of linking technologies in California libraries.

Project participants universally reported that it was the availability of grant funds that provided the incentive they needed to explore this new technology. In fact, early entry into the Linked Systems arena has moved California libraries ahead of resource sharing initiatives in many other states.

The Board's investment in Linked Systems Projects has accelerated California public libraries' connection to the Internet and the move to World Wide Web-accessible catalogs, and has stimulated plans for delivering more and better services directly to patrons. Linked Systems Projects have also proved to be attractive to non-public libraries, many of which already had Z39.50 server software on their local systems and have joined as partners in regional projects without receiving grant funding.

The most promising results to date have been from projects that employ regional Web-to-Z39.50 servers (such as MOBAC and SVLS) or regional ILL super servers (such as NBCLS).

Allowing the earliest Linked Systems Project participants the flexibility to explore many avenues has yielded a great deal of practical information about what does and does not work well in particular circumstances, and which approaches to linking offer the greatest potential for enhanced resource sharing.

When the Linked Systems Projects were initiated, links were made directly from one local system to another. The most successful of those links were made using products based on the Z39.50 standard. Searching was easiest between systems from the same vendor. More recently, regional server products--based on a combination of Z39.50, the Web browser interface, and proprietary transaction-handling software--have improved cross-vendor searching and allowed users to "broadcast" searches to many catalogs at once. These products and the projects that employ them represent the current Linked Systems state of the art.

Linked Systems Project Profiles

The following profiles detail the linking strategy employed by each Linked Systems Project, the software products used, their current implementation status, and their greatest challenges and successes to date.

Each profile is accompanied by a chart that indicates which resource sharing functions are supported. An "X" on the chart means that a function is currently (as of April 10, 1998) operating in one or more project libraries. A "P" on the chart indicates that the function is planned as part of the current year's project but is not yet implemented.

Similarly, linked libraries listed as "Planned" in the profiles are planned for the current year; many projects expect to expand participation beyond these lists in the future.

Grant recipient:	Bay Area Library & Information System
Award(s) made FY:	1996/97 (CLSA)
Linked libraries:	
Current	Alameda County Library (testing) Contra Costa County Library (testing) Livermore Public Library (testing) San Francisco Public Library (linked with Silicon Valley Library System's regional server)
Planned	Alameda Free (City) Library Berkeley Public Library Hayward Public Library Oakland Public Library Richmond Public Library (see also South Bay/Silicon Valley and PLS/Region II)

Types of local systems linked:

Currently accessible	DRA (SF link with Silicon Valley)
Planned	CARL (testing) Dynix Inlex (testing) Innovative Interfaces (testing)

Brief description of project:

BALIS libraries have used grant funds primarily to strengthen local capabilities in preparation for linking. Each jurisdiction has added Z39.50 server software to its local system. The Contra Costa County Library used its grant to help offset the purchase of CARL Web client software.

Three BALIS libraries that were well along in their local Z39.50 implementation—Alameda County (Innovative), Contra Costa County (CARL), and Livermore (Inlex)--have initiated the Tri-Valley Project. The intent of the Tri-

Valley Project is to link the three catalogs using the different Z39.50 client software supplied by their respective vendors and to provide access to these linked catalogs at selected branches.

Linking software used: Local vendor-specific Z39.50 clients from Innovative, CARL and DRA/Inlex

Current status:

The Tri-Valley project is still in testing, but results to date have not been encouraging. Local vendor-specific Z39.50 clients do not seem to work well in cross-vendor linking situations.

Given this result, BALIS libraries have changed their initial strategy and are now cooperating with other libraries in Region II to link with the Silicon Valley regional server and use the OCLC Web-to-Z39.50 gateway. San Francisco Public Library has already done so.

Greatest difficulty or challenge encountered:

The BALIS Tri-Valley experience has demonstrated the main limitation of local Z39.50 client software: it can be used successfully to connect to other catalogs from the same vendor but does not always give acceptable results in cross-vendor situations.

Greatest benefit or result (to date) of project:

This project has contributed substantially to the readiness of BALIS libraries to participate in a regional virtual catalog.

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Resource Sharing Functionality: BALIS

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	X	X	X
Search other libraries, same vendor	X	X	P
Search other libraries, different vendor(s)	P	P	P
“Broadcast” search many catalogs at once	P	P	P
See branch location information	P	P	P
See local call number information	P	P	P
See shelf status information	P	P	P
Complete online ILL request form(s)			
Forward ILL request to other library(ies)			
Place hold in another library’s circulation system			
Track progress/status of ILL transactions online			

Grant recipient: **Black Gold Cooperative Library System**

Award(s) made FY: 1994/95 (CLSA), 1997/98 (CLSA)

Linked libraries:

Current
 Blanchard Community Library, Santa Paula
 Lompoc Public Library
 Oxnard Public Library
 Paso Robles Public Library
 San Luis Obispo Public Library
 Santa Barbara Public Library
 Santa Maria Public Library
 Ventura County Library Services Agency

(see also SJVLS)

Types of local systems linked:

Currently accessible Dynix

Brief description of project:

The first phase of the I-CAN (Independent Californians Access Network) project focused on making the resources of four separate Dynix systems—Black Gold, Oxnard, Ventura County, and SJVLS—directly accessible to patrons. Dynix Gateways software was mounted on each local system. PC workstations in each participating library were connected to their local Dynix systems, then to the remote Dynix systems via the Internet. This allowed staff and patrons to use these workstations to search the local catalog first, then to select “Other Libraries” from the main Dynix menu and branch out to each of the other Dynix catalogs in turn.

The linked Dynix systems cannot share a common patron data base. Therefore, patron-placed holds in the remote systems are accomplished by means of a work around procedure: each system provides a set of special “remote patron” i.d. numbers to borrowing libraries. To place a hold, a patron must request one of the remote patron i.d. numbers from local library staff, who in turn must keep their own local record of which patron has used which special i.d. number. Essentially, the lending libraries are registering the borrowing libraries as if they were local users, and staff at the borrowing libraries are

keeping track of which patrons have used their (the borrowing library's) "card" to reserve materials on interlibrary loan.

Some of the participating libraries have encouraged patrons to search and place holds in remote systems themselves; others have preferred to have staff mediate all or part of the interlibrary loan transaction.

Shipping procedures and delivery routes have also been modified to accommodate new loan traffic between the participating systems.

Black Gold is now in the process of extending the I-CAN Project to allow simultaneous, one-step searching of the Black Gold (6 libraries) and Ventura County catalogs. This involves adding Z39.50 server software and PCs with Dynix PAC for Windows software to these two local Dynix systems. In addition to supporting broadcast searching of the Dynix catalogs, the move from Dynix Gateways software to Z39.50 server software will ultimately allow the I-CAN libraries to begin to link with neighboring non-Dynix libraries.

Linking software used: Dynix Gateways
Dynix PAC for Windows (planned)

Current status:

The project is currently operating successfully in the work around mode. There is considerable variation among the participants in terms of how independently patrons may search and place holds in remote systems.

Progress is being made towards implementing the local Z39.50 server software at Black Gold. However, the Ventura County Library Services Agency has not upgraded its HP operating system to the level needed to support Dynix PAC for Windows. Until this computer is upgraded, Ventura County will not be able to complete its part of this phase of the project.

Greatest difficulty or challenge encountered:

Black Gold reports a number of hardware configuration, compatibility and fine tuning problems that they attribute to attempting to plan such a complex networking project in a relatively short period. Most of these problems were eventually solved, but more time for detailed planning and ongoing testing and troubleshooting would have made for a smoother implementation.

Greatest benefit or result (to date) of project:

The Black Gold Linked Systems Project permits patrons and staff of Black Gold member libraries to search for needed items in the collections of all seven Black Gold libraries. In the past Black Gold had an “off-line” union catalog—first in book form, later on microfiche and microfilm and still later on CD-ROM. This project makes it possible for patrons and branch staff to go beyond the capabilities of those earlier union catalogs to place holds on desired items and to search and request items from neighboring library systems.

Project contact:

Judith Segel, System Director

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805-650-7732

fax:

805-642-9095

email:

jsegel@rain.org

Resource Sharing Functionality: Black Gold

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	X	X	X
Search other libraries, same vendor	X	X	
Search other libraries, different vendor(s)			
“Broadcast” search many catalogs at once	P	P	
See branch location information	X	X	
See local call number information	X	X	
See shelf status information	X	X	
Complete online ILL request form(s)			
Forward ILL request to other library(ies)			
Place hold in another library’s circulation system	X	X	
Track progress/status of ILL transactions online			

Grant recipient: **49/99 Cooperative Library System/
Central Association of Libraries**

Award(s) made FY: 1997/98 (LSTA)

Linked libraries:

Current	None
Planned	CSU Stanislaus Library Columbia College Library Delta College Library Modest Junior College Library Stockton-San Joaquin County Public Library University of the Pacific Library

Types of local systems linked:

Currently accessible	None
Planned (1997/98)	Best-Seller DRA Geac Advance Innovative Interfaces

Brief description of project:

49-99/CAL is devoting this year to installing and testing local Z39.50 server software in a group of pilot libraries. Once these pilot libraries have installed the necessary Z39.50 server software, a future phase of the project will focus on implementing a shared regional server to manage search traffic between system members.

This year's plans also call for installation, testing and evaluation of local client software at selected libraries and, if possible, testing of links between 49-99/CAL libraries and libraries in other regions of the state.

Linking software used: To be determined

Current status:

This project was only recently funded. Hardware and software necessary to enable local systems for Z39.50 searching have been ordered, and planning for future phases of the project is underway.

Greatest difficulty or challenge encountered:

49-99/CAL indicates that the greatest challenges associated with this year's project have had less to do with hardware and software than with cooperative planning and service issues. Implementation of linking technology is requiring participants to approach problems as a group instead of as separate members.

Another concern is how to find secure long term funding for individual libraries to participate in this project. The pilot libraries are moving forward because they are the ones with the greatest resources and robust Internet connectivity. How can smaller libraries participate and not be left behind?

Greatest benefit or result (to date) of project:

49-99/CAL reports that this project has already brought the system together. Members are interested in and committed to linking, and feel they will benefit from the project.

Project contact:	Darla Gunning, System Director
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fax:	209-937-8292
email:	gunnid5@stockton.lib.ca.us

Resource Sharing Functionality: 49-99/CAL

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	P	P	P
Search other libraries, same vendor	P	P	p
Search other libraries, different vendor(s)	P	P	P
“Broadcast” search many catalogs at once	P	P	P
See branch location information	P	P	P
See local call number information	P	P	P
See shelf status information	P	P	P
Complete online ILL request form(s)			
Forward ILL request to other library(ies)			
Place hold in another library’s circulation system			
Track progress/status of ILL transactions online	P		

Grant recipient: Inland Library System

Award(s) made FY: 1995/96 (CLSA)

Linked libraries:

Current

Beaumont Library District
 Cal State San Bernardino
 La Sierra University
 Loma Linda University
 Loma Linda University Medical Center
 Rancho Cucamonga Public Library
 Riverside Community College Library
 Riverside County Library System
 Riverside Public Library
 University of California at Riverside
 University of Redlands

Types of local systems linked: Not applicable

Brief description of project:

This project is different from the other Linked Systems Projects, in that it does not use Z39.50 links or attempt to connect disparate library systems to one another for "transparent" operation. Instead, Inland has created the Virtual Inland Reference Library (VIRL), a shared Web page with hypertext links to member libraries' home pages, library catalogs of local and regional interest, government resources, ready reference resources, and other reference topics.

Grant funds also helped Inland member libraries to establish local Internet connections, and provided PCs and training so that library staff could connect to VIRL. Especially in the smaller libraries, access to VIRL has improved the ability to answer reference questions locally.

VIRL may be found at <http://www.inlandlib.org>

The VIRL home page provides telnet (and a few Web) links to a selected list of library catalogs. The user accesses VIRL via the Internet, using a PC and Web browser software. Once the user is connected with a particular catalog of interest, he/she may search but must use whatever local interface is provided by the target library. The level of holdings detail available varies from catalog to catalog.

Linking software used: Not applicable

Current status:

This project is up and running. At such time as additional Inland libraries bring up Internet-accessible online catalogs, links to those catalogs will be added to VIRL.

Greatest difficulty or challenge encountered:

Inland reports that the greatest difficulty they had to overcome was a lack of technical skill. Experienced staff at the County of Riverside Network (CORNET) did the actual home page construction. However, staff at Inland and in the libraries that were to use VIRL as a reference tool did not have the necessary expertise to troubleshoot local hardware and software problems, either during installation or on an ongoing basis. Nor was the initial training on Internet searching sufficient for staff at all participating libraries; in some cases, intensive, one-on-one training would have been more effective.

Geography also added a degree of difficulty to this project. It was more difficult to train and troubleshoot at very remote sites, and some outlying libraries do not have local node access to Internet service.

Greatest benefit or result (to date) of project:

This project has spurred interest in the Internet as a reference tool.

Project contact: Kathleen Aaron, Executive Director

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email: kaaron@inlandlib.org

Resource Sharing Functionality: Inland

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	X		X
Search other libraries, same vendor			
Search other libraries, different vendor(s)			
“Broadcast” search many catalogs at once			
See branch location information	X		X
See local call number information	X		X
See shelf status information	X		X
Complete online ILL request form(s)			
Forward ILL request to other library(ies)			
Place hold in another library’s circulation system			
Track progress/status of ILL transactions online			

Grant recipient: **Monterey Bay Area Cooperative Library System**

Award(s) made FY: 1996/97 (CLSA), 1997/98 (CLSA)

Linked libraries:

Current Dudley Knox Library, U.S. Naval Postgraduate School
Monterey County Library
Santa Cruz City/County Library
Watsonville Public Library

Planned Cabrillo College
California State University, Monterey Bay
Gavilan College
Harrison Memorial Library (Carmel)
Hartnell College
Monterey Bay Aquarium
Monterey Bay Research Institute
Monterey Peninsula College Library
Monterey Public Library
Pacific Grove Public Library
Salinas Public Library
San Benito County Library
University of California, Santa Cruz

(see also PLS/Region II)

Types of local systems linked:

Currently accessible DRA
Inlex
Dynix
Sirsi

Planned Endeavor
InMagic
Innovative Interfaces
Library Corporation
VTLS
Winnebago

Brief description of project:

MOBAC used its initial CLSA grant to install Z39.50 server software at the Monterey County, Santa Cruz, and Watsonville libraries, and to begin evaluation of Web-to-Z39.50 gateway software. DRA Web 2 gateway software has been licensed on a limited basis and mounted for testing on the NT server at Watsonville. MOBAC is comparing this product with other vendors' gateway offerings, including OCLC WebZ (used at Silicon Valley) and CPS URSA (used at North Bay). Requests for Information and Quotation have also been sent to Ameritech and Endeavor.

While the gateway software is being evaluated, project staff have given special attention to preparing staff at the local level to use the new linking technology. Basic training in Windows 95, the Internet and the World Wide Web, and how to use DRA Web 2 has been provided to staff at the linked libraries.

Once the evaluation process is complete and Web-to-Z39.50 gateway software has been selected, the plan is to implement a dedicated regional server to be the central engine of the MOBAC virtual catalog. Where this server will be housed is still under discussion; it is possible that it will be integrated with the campus network of one of the participating academic institutions.

The primary emphasis of this project is on search and retrieval, but DRA has incorporated an interim feature into Web 2 in order to facilitate interlibrary loan messaging. When a desired item is located, the user has the option of selecting a "Request Form" from the full record display. This brings up a Netscape e-mail form with the address of the target library's interlibrary loan department already filled in on the "To:" line. The user can copy and paste to insert bibliographic data in the e-mail message space, and then launch the message. Since only library staff currently have access to the virtual catalog, this is an acceptable work around.

Linking software used:

DRA Web 2 (testing)

Current status:

Only MOBAC staff and ILL staff at the four participating libraries currently have access to the test version of the Web-to-Z39.50 gateway. Once gateway software has been selected and mounted on a central server, there will be sufficient capacity for increased activity, and staff in all member libraries will be able to search the virtual catalog.

At this stage of planning, patron access is still considered optional but several of the MOBAC libraries are enthusiastic about opening up a Web-based regional catalog to the public.

MOBAC has issued a Request for Information/Quotation to the five candidate gateway software vendors and expects to complete its evaluation and selection process in May.

Greatest difficulty or challenge encountered:

MOBAC reports delays, both in the local system upgrades necessary to begin linking and in the delivery of new beta versions of the gateway product.

An earlier release of Web 2 gave unacceptably slow search times but the current release of the product and a major upgrade of Santa Cruz City/County Library's local system have improved performance.

Greatest benefit or result (to date) of project:

This project represents a major step towards providing true equality of access to all libraries in the region, regardless of size or technological sophistication.

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fax:	408-646-4111
email:	ejs1213@aol.com

Resource Sharing Functionality: MOBAC

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	X	P	P
Search other libraries, same vendor	X	P	P
Search other libraries, different vendor(s)	X	P	P
“Broadcast” search many catalogs at once	X	P	P
See branch location information	X	P	P
See local call number information	X	P	P
See shelf status information	X	P	P
Complete online ILL request form(s)	X		
Forward ILL request to other library(ies)	X		
Place hold in another library’s circulation system			
Track progress/status of ILL transactions online			

Grant recipient: Mountain Valley Library System

Award(s) made FY: 1995/96 (CLSA), 1997/98 (LSTA)

Linked libraries:

Current	El Dorado County Library
Planned	Auburn-Placer County Library (testing) Folsom Public Library Sacramento Public Library Sacramento County Law Library Sierra College Library Sutter County Library Woodland Public Library

Types of local systems linked:

Currently accessible	Inlex
Planned	Dynix, Geac

Brief description of project:

MVLS has identified an “early implementers” group of member libraries to initiate the process of establishing Z39.50-based access in the region. Those libraries that are most ready to proceed are bringing up Z39.50 server software on their local integrated systems, one at a time. This staged approach is intended to allow subsequent implementers to learn from the experiences of the early group.

Original plans called for concurrent installation of Z39.50 client software at all member libraries; this was to have allowed all MVLS members to search the Z39.50-enabled catalogs of the early implementers group. Delays in the local implementation of Z39.50 server software and the subsequent introduction of new Web-to-Z39.50 linking products have resulted in this strategy’s being abandoned.

Instead, while those libraries that are ready to do so are implementing Z39.50 server software locally, all MVLS members have been participating in a selection process to acquire Web-to-Z39.50 gateway software. This gateway software will be mounted on a shared server and accessed via Web connections in all member libraries.

Linking software used: Selection pending

Current status:

To date, one library has successfully mounted Z39.50 server software locally and one is in testing. MVLS members have finished their evaluation process and will be officially selecting a Web-to-Z39.50 software vendor in the next few weeks.

Greatest difficulty or challenge encountered:

Up to this point, the greatest challenge faced by MVLS has been involving multitype libraries in the process and bringing all of them together into a single plan.

Greatest benefit or result (to date) of project:

MVLS reports that the timely availability of grant funds got members planning and thinking about this new technology earlier than might otherwise have been the case.

Project contact: Gerald Maginnity, Coordinator

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828 I Street, suite 524
Sacramento, CA 95814-2508

telephone: 916-264-2722

fax: 916-441-3425

email: mvls@ns.net

Resource Sharing Functionality: MVLS

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	X	X	X
Search other libraries, same vendor	X	X	X
Search other libraries, different vendor(s)	P	P	P
“Broadcast” search many catalogs at once	P	P	P
See branch location information	P	P	P
See local call number information	X	X	X
See shelf status information	X	X	X
Complete online ILL request form(s)	P	P	P
Forward ILL request to other library(ies)	P	P	P
Place hold in another library’s circulation system	P	P	P
Track progress/status of ILL transactions online	P	P	P

Grant recipient: **North Bay Cooperative Library System**

Award(s) made FY: 1996/97 (LSCA)

Linked libraries:

Current	Benicia Public Library Belvedere-Tiburon Community Library Marin County Library Mendocino County Library Mill Valley Public Library Napa City-County Library Napa Valley College Library St. Helena Public Library San Anselmo Public Library San Rafael Public Library Sausalito Public Library Solano Community College Library Solano County Library Sonoma County Library Sonoma State University Library
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Planned	(see also PLS/Region II)
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Types of local systems linked:

Currently accessible	CARL DRA Dynix Innovative Interfaces
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Brief description of project:

This is the only Linked Systems Project that uses a regional interlibrary loan server to connect the disparate library systems. Participating libraries connect to the NBCLS regional "super server" via the Internet. This server runs the CPS Universal Resource Sharing Application (URSA) software, which functions as a Web-to-Z39.50 gateway and as a remote circulation/interlibrary loan messaging and transaction server.

URSA allows users to search all of the participating libraries' catalogs simultaneously, see local holdings and circulation status information, place holds on items in remote systems, and track the progress of their requests. This is the

only project that currently supports direct, unmediated patron placement of remote holds.

Although CPS states that they can write custom software (“middleware”) to connect any local catalog to the super server, they also indicate that the linking process is made much easier when the local catalog has Z39.50 version 3 server capability. The participating NBCLS libraries have added Z39.50 server software to their local systems.

The CPS URSA software goes beyond the searching functions described in the Z39.50 standard. It uses customized scripts and Java applets to support a range of intercommunications needed to coordinate cross-jurisdictional circulation. It verifies (authenticates) patrons’ eligibility for service, respects local restrictions regarding material eligibility for loan, manages request routing and load leveling algorithms, and keeps statistics on request and loan traffic.

When the user cannot find what he/she wants in the local catalog, he/she can choose to leave that catalog and connect to the regional ILL server—what NBCLS calls SuperSearch. If the desired material is found in the SuperSearch virtual catalog, the user clicks to request a hold and indicates the desired pickup location in his/her home library. URSA then places a title level hold on the first target lending system, according to previously established parameters.

Staff at the lending library pull the item and scan its barcode, thus associating a particular item with the request, and send the material on its way to the pickup location. The lending library’s circulation system shows the item as on loan to the URSA gateway.

When the item is received at the borrowing library, staff there scan the barcode again and assign a temporary barcode. The URSA software automatically creates an “on the fly” bibliographic record for the item and checks it into the borrowing library. The local circulation system is then used to circulate the item to the patron.

When the item is returned, barcodes are scanned again and the process is reversed. The URSA software automatically updates the borrowing library’s circulation system (item is returned and “on the fly” bibliographic record is deleted.) URSA tracks all key steps in the request and loan process; statuses include pending, shipped, received, returned, renewed, etc.

SuperSearch is accessible on the Web at <http://www.nbcls.org>

Local workstations that will be used for patron access to SuperSearch in the member libraries have been equipped with CARL’s Everybody’s Menu Builder software and IKiosk interface security software. SuperSearch will appear as a menu choice on these workstations.

Linking software used: CPS URSA

Current status:

For the past year this project has been running a prototype version of the CPS URSA software for staff use. Since October, the SuperSearch prototype has also been accessible to patrons in two libraries—Solano Community College and Sausalito—as well as via the World Wide Web. Formal introduction of SuperSearch to the public in 12 of the 18 NBCLS member libraries, using Version 2 of the URSA software, is planned for National Library Week.

Concurrently with efforts to bring up the regional super server, NBCLS members have been reviewing and renegotiating all of their cooperative loan policies and refining their cost sharing formula to take this new technology into account. Increased interlibrary loan traffic associated with this project has also required an increase in courier delivery service; delivery costs for the coming year will be about 25% higher than this year.

Next steps include monitoring the impact of SuperSearch once it is in full production public access mode, and extending links to other libraries in the region.

Greatest difficulty or challenge encountered:

One of the key elements needed to make this a successful project is a regional server with sufficient capacity and sufficient telecommunications bandwidth to handle all of the searching and interlibrary loan traffic. NBCLS started out sharing a server with the SNAP (Sonoma, Napa and Partners) CARL system, but has now moved to a dedicated server housed at Sonoma State. Performance since the move has been somewhat slow at times but a new T-3 line to the super server should solve that problem.

Greatest benefit or result (to date) of project:

North Bay reports an enthusiastic response to this new tool, even among staff who were initially skeptical about automated ILL processing. Though NBCLS has a long history of cooperation, this new technology has made resource sharing much less labor intensive and seems to have increased members' willingness to open their collections still further.

Project contact: Annette Milliron, Administrator

address: North Bay Cooperative Library System
55 E Street
Santa Rosa, CA 95404-4728

telephone: 707-544-0142 extension 11

fax: 707-544-8411

email: annetnbc@sonic.net

Resource Sharing Functionality: North Bay

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	X	X	X
Search other libraries, same vendor	X	X	X
Search other libraries, different vendor(s)	X	X	X
“Broadcast” search many catalogs at once	X	X	X
See branch location information	X	X	X
See local call number information	X	X	X
See shelf status information	X	X	X
Complete online ILL request form(s)	X	X	X
Forward ILL request to other library(ies)	X	X	X
Place hold in another library’s circulation system	X	X	X
Track progress/status of ILL transactions online	X	X	X

Grant recipient: **San Anselmo Public Library**

Award(s) made FY: 1997/98 (CLSA)

Linked libraries:

Current San Anselmo Public Library
(see also North Bay)

Types of local systems linked:

Currently accessible Innovative Interfaces

Brief description of project:

This project enabled San Anselmo to become a full partner in the Innovative Interfaces system shared by the MARINet Consortium of Libraries. San Anselmo has contributed bibliographic and holdings data to MARINet for many years, but did not have a local automated system. The City of San Anselmo purchased the hardware and software necessary to implement the Innovative Interfaces system in the library, and grant funds were used for telecommunications links and to pay the startup fee to connect San Anselmo to MARINet.

As part of the MARINet automated system, San Anselmo is now linked to the North Bay Cooperative Library System's SuperSearch server and is actively participating in automated resource sharing.

Linking software used: CPS URSA (via MARINet and NBCLS)

Current status:

This project is up and running. Through MARINet, San Anselmo is now also connected to the North Bay SuperSearch server. SuperSearch access for patrons will be offered soon.

Greatest difficulty or challenge encountered:

San Anselmo reports that their greatest difficulty was finding technical assistance at the time it was needed. During the early part of the project the

director's position at MARINet was vacant, and San Anselmo had to look elsewhere for the kind of networking expertise that was not available in the library or in town government. They found the help they needed in the Marin County Data Processing Department, and have been very pleased with the relationship.

Greatest benefit or result (to date) of project:

San Anselmo is a small town, not always enthusiastic about rapid change, but local patrons have embraced the changes brought by this project. The services that the library can now provide have increased dramatically as a result of being fully automated.

Project contact:

Sara Loyster

address:

San Anselmo Public Library
110 Tunstead Avenue
San Anselmo, CA 94960

telephone:

415-258-4656

fax:

415-258-4666

email:

sloyster@marinet.lib.ca.us

**Resource Sharing Functionality: San Anselmo (as connected to NBCLS
via MARINet)**

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	X	X	X
Search other libraries, same vendor	X	P	X
Search other libraries, different vendor(s)	X	P	X
“Broadcast” search many catalogs at once	X	P	X
See branch location information	X	P	X
See local call number information	X	P	X
See shelf status information	X	P	X
Complete online ILL request form(s)	X	P	P
Forward ILL request to other library(ies)	X	P	P
Place hold in another library’s circulation system	X	P	X
Track progress/status of ILL transactions online	X	P	P

Grant recipient: San Joaquin Valley Library System

Award(s) made FY: 1995/96 (CLSA)

Linked libraries:

Current

- Beale Memorial Library (Kern County)
- Coalinga-Huron District Library
- Fresno Central Library
- Hanford Library (Kings County)
- Madera County Library
- Mariposa County Library
- Porterville Public Library
- Tulare Public Library
- Visalia Library (Tulare County)

(see also Black Gold)

Types of local systems linked:

Currently accessible Dynix

Brief description of project:

This project is a companion to the I-CAN project implemented by Black Gold. By installing a PC in the interlibrary loan department of each of the nine participating libraries, SJVLS has enabled branch-level staff to search and place holds in remote Dynix catalogs.

The work around procedure for placing a hold in another Dynix system is the same in SJVLS libraries as in Black Gold. Staff use a specially assigned "remote patron" (also called "pseudopatron") i.d. to place the hold in the remote system, and then keep track of which local patron has been assigned to which "remote patron" card.

As this project was originally conceived, patrons were to do their own searching and holds placement, and would then submit a simple written form that would enable staff to link the patron's library card to the "remote patron" i.d. that he/she used to place the hold. As the project is currently implemented, however, patrons are not placing their own holds; remote system interlibrary loan transactions are performed by staff.

Linking software used: Dynix Gateways

Current status:

Staff at seven of the nine sites are currently using the equipment for in-system loans. Two--Visalia and Hanford—are testing connections to Black Gold.

Detailed policies regarding inter-jurisdictional loan policies have been developed by the SJVLS Circulation Committee and forwarded to the SJVLS Administrative Council for approval.

Greatest difficulty or challenge encountered:

SJVLS reports a number of delays in acquiring hardware and software. Progress on the linking project was also slowed by a major upgrade to the SJVLS Dynix system and communications network, which required the full attention of all available technical staff.

Even with coordination of delivery routes to allow exchange between SJVLS and Black Gold, shipping of loaned materials between systems has been slow—as much as two and a half weeks in some cases. Participating libraries have therefore begun to mail these items; it is not clear what effect this will have on local budgets.

Greatest benefit or result (to date) of project:

Though this project has not yet reached its original goal of patron self-service interlibrary loan, SJVLS reports increased awareness of valuable neighboring resources and progress towards a more fully developed set of cooperative loan policies.

Project contact:	Judi Hill, Branch Coordinator
address:	Tulare County Free Library 200 W. Oak Visalia, CA 93921
telephone:	209-733-6954
fax:	209-737-4586
email:	jhill@sjvls.lib.ca.us

Resource Sharing Functionality: SJVLS

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	X	X	X
Search other libraries, same vendor	X	X	
Search other libraries, different vendor(s)			
“Broadcast” search many catalogs at once	P	P	
See branch location information	X	X	
See local call number information	X	X	
See shelf status information	X	X	
Complete online ILL request form(s)			
Forward ILL request to other library(ies)			
Place hold in another library’s circulation system	X	P	
Track progress/status of ILL transactions online			

Grant recipient: **Santiago Library System**

Award(s) made FY: 1997/98 (CLSA)

Linked libraries:

Planned	Fullerton Public Library Orange Public Library
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Types of local systems linked:

Planned	Geac Inlex
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Brief description of project:

The Fullerton and Orange Public Libraries are near neighbors. Because of commuting patterns in Orange County, patrons often visit more than one library in their search for information. These libraries hope to facilitate inter-jurisdictional direct loan service by installing local Z39.50 server and client software on their respective systems, and establishing a cross-vendor link. The goal is to allow patrons to search the neighboring catalog easily whenever needed materials cannot be found in the local collection.

It should be noted that other libraries that have attempted to establish cross-vendor searching using only the vendors' own local client software have not been entirely satisfied with the results. Most have modified their linking strategy to incorporate Web-to-Z39.50 gateway software. However, none of the projects to date has used this particular combination of client software; project test data should be useful to other Geac and Inlex libraries.

Even if the direct cross-vendor link is not 100% successful, this project will leave both libraries well positioned to participate in other regional projects based on Z39.50 linking strategies.

Linking software used: DRA Find (Planned)
GeoPac (Planned)

Current status:

This project was only recently awarded and the necessary hardware and software have not yet been installed.

Once the link between Fullerton and Orange Public is established, project participants hope to connect with other nearby Z39.50-enabled libraries, including Anaheim, Chapman University, and Cal State Fullerton.

Future plans also call for the investigation of Web-to-Z39.50 gateway software and interlibrary loan software.

Greatest difficulty or challenge encountered: Not applicable

Greatest benefit or result (to date) of project: Not applicable

Project contact: Susan McGlamery
address: MCLS Reference Center
3675 East Huntington Drive, suite 100
Pasadena, CA 91107
telephone: 213-228-7568
fax: 213-228-7579
email: mclsref2@mclsys.org

Resource Sharing Functionality: Santiago

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	P	P	
Search other libraries, same vendor			
Search other libraries, different vendor(s)	P	P	
“Broadcast” search many catalogs at once			
See branch location information	P	P	
See local call number information	P	P	
See shelf status information	P	P	
Complete online ILL request form(s)			
Forward ILL request to other library(ies)			
Place hold in another library’s circulation system			
Track progress/status of ILL transactions online			

Grant recipient: **Serra Cooperative Library System**

Award(s) made FY: 1995/96 (CLSA), 1996/97 (CLSA)

Linked libraries:

Current	Carlsbad Public Library Chula Vista Public Library Escondido Public Library (testing) National City Public Library (testing) San Diego County Library (temporarily withdrawn) San Diego Public Library
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Types of local systems linked:

Currently accessible	DRA Dynix (testing) Inlex
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Brief description of project:

The first phase of this project involved loading Z39.50 server software on two DRA (San Diego County and San Diego Public) and two Inlex (Carlsbad and Chula Vista) local systems. Servers and PCs at each location were networked via LAN and connected to the Internet.

DRA Find client software was licensed for in-library use and installed on online catalog workstations—PCs and terminals--at each of the four libraries. DRA Find allows users to search other Z39.50-enabled DRA and Inlex catalogs and see full holdings and shelf status information.

For the second phase of this project, two Dynix libraries (Escondido and National City) are being added. Z39.50 server software and WebPAC client software have been loaded on these local Dynix systems so that all six systems can eventually connect. Cross-vendor searches (e.g. DRA to Dynix) will display only title level information.

This project has also used grant funds to address network security issues, adding router and server hardware to segregate interlibrary telecommunications traffic, installing OnGuard or Ameritech NetConnect firewall software on local servers, and installing Fortres workstation security software on local PCs.

Linking software used: DRA Find
 Dynix WebPAC
 DRA Web 2 (planned)

Current status:

Z39.50 searching between the DRA and Inlex systems has been successfully implemented. Searching between the two Dynix systems and the Phase 1 DRA and Inlex systems is currently being tested. Configurations will need to be fine tuned before reliable two-way links and patron self-service searching are available.

Since the project's initial implementation, San Diego County has ended its partnership with the City of San Diego in a shared automated system. While the County implements its own local system, it has temporarily withdrawn from the linking project but expects to rejoin within the year.

Future plans also call for the replacement of the DRA Find software used in the first phase of the project with a newer and somewhat friendlier client, DRA Web 2. The transition to Web 2 has been delayed by changes in vendor specifications, release dates and pricing as the product has been developed.

Greatest difficulty or challenge encountered:

Serra reports that this project moved well in the first year, when there was a knowledgeable member of San Diego Data Processing Corporation (contracted data base managers for both the City and County of San Diego) assigned to implementation and troubleshooting tasks. Since that individual's reassignment, progress has been less steady. Not all local libraries have the technical networking skills needed to identify and resolve linking problems and to negotiate successfully with the different vendors. Even those with highly knowledgeable staff find cross-vendor linking to be a time-consuming and complex project.

Greatest benefit or result (to date) of project:

Significant progress has been made on the System's ultimate goal of linking all 13 public library members, now that 6 of the largest members are linked, or close to it. This is a big step for Serra since the system has not previously had a shared data base between more than two members. The majority of patrons in the San Diego County area will now have access to holdings information at neighboring libraries.

Serra staff also report that working on this project has created a cohesive working body of member library staff, pooling technical expertise for a common

goal. This close working relationship made the successful meeting objectives possible and is now in place for future projects.

Project contact: Susan Swisher, Coordinator

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5555 Overland Avenue, building 15
San Diego, CA 92123

telephone: 619-694-3600

fax: 619-495-5905

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Resource Sharing Functionality: Serra

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	X	X	
Search other libraries, same vendor	X	X	
Search other libraries, different vendor(s)	P	P	
“Broadcast” search many catalogs at once			
See branch location information	X	X	
See local call number information	X	X	
See shelf status information	X	X	
Complete online ILL request form(s)			
Forward ILL request to other library(ies)			
Place hold in another library’s circulation system			
Track progress/status of ILL transactions online			

Grant recipient: **South Bay Cooperative Library System (now Silicon Valley Library System)**

Award(s) made FY: 1995/96 (LSCA), 1996/97 (LSCA)

Linked libraries:

Current	Mountain View Public Library Palo Alto City Library Santa Clara City Library Santa Clara County Library
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Planned	San Jose Public Library Sunnyvale Public Library
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(see also PLS/Region II)

Types of local systems linked:

Currently accessible	Dynix Innovative Interfaces
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Planned	Inlex Horizon
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Brief description of project:

South Bay/Silicon Valley member libraries have added Z39.50 server software to their local automated systems. A frame relay network connects the local systems to a regional server that runs Web-to-Z39.50 gateway software (OCLC WebZ). This gateway software allows patrons and staff to use Web browsers to "broadcast" search the holdings of participating libraries with a single command, and to view local holdings and circulation status information.

Implementation expertise and assistance is provided to this project on a contract basis by San Mateo Community College District Information Technology Services, with staff from Strata Information Group (SIG). They are the host site for the regional network server.

Of special interest is this project's work on user friendliness issues. A sub-committee of public service staff (adult and children's) has worked with the technical team for this project to redesign the user interface screens that come

standard with the WebZ product. Their suggestions have helped to create screens that are usable and understandable for both the public and library staff.

South Bay's regional web catalog—now known as the Silicon Valley Catalog--may be visited at <http://www.sbcls.lib.ca.us:8000/>

Linking software used: OCLC WebZ

Current status:

This project is up and running. Current efforts are focused on integrating additional Z39.50-enabled catalogs with the Silicon Valley Catalog by linking them to the regional WebZ server.

Greatest difficulty or challenge encountered:

Project staff report difficulty with troubleshooting cross-vendor links. Same vendor searching worked well from the beginning, but there were many difficulties—failed searches, incomplete or erroneous data--with cross-vendor searching. Problems originally identified as Dynix Z39.50 compliance deficiencies have now been diagnosed as index mapping issues; new Dynix indexes are being built in hopes of improving search success and consistency.

Greatest benefit or result (to date) of project:

Project staff also indicate that the difficulties encountered during the implementation process have contributed to a greater understanding of how bringing up new technology requires patience and endurance. It is not easy to be a beta site.

Project contact: Linda Crowe, Administrator

address: Silicon Valley Library System
25 Tower Road
San Mateo, CA 94402-4000

telephone: 650-349-5538

fax: 650-349-5089

email: crowel@pls.lib.ca.us

Resource Sharing Functionality: South Bay/Silicon Valley

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	X	X	X
Search other libraries, same vendor	X	X	X
Search other libraries, different vendor(s)	X	X	X
"Broadcast" search many catalogs at once	X	X	X
See branch location information	X	X	X
See local call number information	X	X	X
See shelf status information	X	X	X
Complete online ILL request form(s)			
Forward ILL request to other library(ies)			
Place hold in another library's circulation system			
Track progress/status of ILL transactions online			

Grant recipient: **South State Cooperative Library System**

Award(s) made FY: 1994/95 (CLSA)

Linked libraries:

Current County of Los Angeles Public Library
Pasadena Public Library

(see also Torrance)

Planned Palmdale City Library

Types of local systems linked:

Currently accessible DRA
Geac Advance

Planned Dynix

Brief description of project:

The libraries in this early linked systems project planned to install local Z39.50 server and client software on their respective systems, and to establish cross-vendor links between their online catalogs. The goal was to allow patrons to search neighboring catalogs easily whenever needed materials could not be found in the local collection.

Originally, designated PCs in each library were configured with the local client software. Over time, as online catalog terminals have been replaced with PCs, client software has been added to more OPAC workstations. When searching across vendors using a Z39.50 client, patrons see bibliographic level data only.

Linking software used: DRA Find
Dynix WinPAC
Dynix WebPAC (planned)
GeoPAC (initially)
GeoWeb (replaced GeoPAC)

Current status:

This project is up and running in two of the three libraries. Los Angeles County and Pasadena successfully mounted Z39.50 server software on their local systems. After some fine tuning, both also succeeded in using their respective local clients to access one another's—and Torrance's—online catalogs.

Since the initial grant period, Pasadena has replaced its GeoPAC software with the newer GeoWeb client from Geac.

Palmdale, the third participant in this grant, encountered a number of difficulties with installation of their Z39.50 server. Then, when the staff member responsible for the project left for another job, the linked systems effort was put on hold. Palmdale is currently involved in both a building project and an automated system upgrade, but replacement staff have been hired and plans for linking are back on the agenda.

Greatest difficulty or challenge encountered:

It is probably fair to say that Palmdale attempted to do too much, too soon, with too few staff resources. They were the first public library to attempt to install the Dynix Z39.50 server software and the first library of any kind to install the initial release of Dynix WinPAC. Neither staff members nor vendor representatives were prepared to implement these “bleeding edge” products.

Greatest benefit or result (to date) of project:

Participating libraries report good staff and patron response to extended catalog access.

Project contact:

There really is no primary contact for this project. Many of the key staff involved in the original grant have now moved on to other things. Information about current activities can be obtained by contacting each of the participating libraries directly.

Resource Sharing Functionality: South State

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	X	X	X
Search other libraries, same vendor	X	X	
Search other libraries, different vendor(s)	X	X	
“Broadcast” search many catalogs at once			
See branch location information			
See local call number information			
See shelf status information			
Complete online ILL request form(s)			
Forward ILL request to other library(ies)			
Place hold in another library’s circulation system			
Track progress/status of ILL transactions online			

Grant recipient: **Torrance Public Library**

Award(s) made FY: 1994/95 (CLSA)

Linked libraries:

Current	Los Angeles County Library Pasadena Public Library Torrance Public Library
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Types of local systems linked:

Currently accessible	DRA Geac Advance MELVYL
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Brief description of project:

Torrance has mounted Z39.50 client and server software on its DRA system, and offers its patrons connections to the County of Los Angeles, Pasadena and MELVYL catalogs as menu choices on its local online catalog. With the County of Los Angeles, also a DRA customer, Torrance has traded DRA "policy" files, thus giving users of both catalogs the ability to see what is on the shelf at branch locations in both jurisdictions.

Torrance and County of Los Angeles users can use DRA client software to see bibliographic records in the Pasadena (Geac) and MELVYL catalogs, but cannot see local holdings or shelf status information in non-DRA catalogs.

Unlike many of the other Linked Systems Projects, this one has focused more on direct loan than interlibrary loan. Los Angeles County borders Torrance on two sides, and patrons use the linked online catalogs to identify needed materials in nearby branches and then travel to retrieve them immediately. Many patrons carry cards for both libraries.

It is also worth noting that the Torrance Public Library collection is not represented in OCLC. Adding Z39.50 server software to the Torrance system has opened up online access to these resources to libraries throughout California.

Linking software used: DRA Information Gateway
DRAFind

Current status:

This project is fully operational. Torrance and the County of Los Angeles look forward to continued enhancements to the DRA software, including broadcast search capability. They have hopes of eventually connecting to other neighboring libraries that are currently installing Z39.50 server software.

Greatest difficulty or challenge encountered:

There have been some performance difficulties relating to parameters set locally by the Z39.50 target libraries. When retrieved sets exceed local limits (i.e. too many hits), most Z39.50 servers fail the search and return no results to the user. For this reason, a search that would be successful using the local "native" interface may yield only a "server error" message when performed as a Z39.50 search. To further complicate matters, MELVYL sets these limits dynamically; when server traffic is light, Z39.50 searches that retrieve large sets work well but when traffic is heavy they fail.

Greatest benefit or result (to date) of project:

Participating libraries report that patrons are extremely pleased to know what is currently available and on the shelf at neighboring branches.

Project contact:	Norm Reeder, Library Programs Administrator
address:	Torrance Public Library 3031 Torrance Boulevard Torrance, CA 90503
telephone:	310-618-5955
fax:	310-618-5952
email:	reeder.norm@mail.ci.torrance.ca.us

Resource Sharing Functionality: Torrance

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	X	X	X
Search other libraries, same vendor	X	X	
Search other libraries, different vendor(s)	X	X	
“Broadcast” search many catalogs at once			
See branch location information	X	X	
See local call number information	X	X	
See shelf status information	X	X	
Complete online ILL request form(s)			
Forward ILL request to other library(ies)			
Place hold in another library’s circulation system			
Track progress/status of ILL transactions online			

**Linked Systems Projects
Resource Sharing Functionality: Summary**

Top number = currently installed
P = planned as part of current project

Function	Available to		
	Staff	Patrons in Library	Patrons via WWW
Make local catalog records available online so they can be viewed by others	12 2 P	10 3 P	10 2 P
Search other libraries, same vendor	11 1 P	9 3 P	4 3 P
Search other libraries, different vendor(s)	6 5 P	4 7 P	3 4 P
“Broadcast” search many catalogs at once	5 6 P	3 6 P	3 4 P
See branch location information	9 4 P	6 6 P	4 4 P
See local call number information	10 3 P	7 5 P	5 3 P
See shelf status information	8 3 P	6 4 P	4 2 P
Complete online ILL request form(s)	3 1 P	1 2 P	2 1 P
Forward ILL request to other library(ies)	3 1 P	1 2 P	1 2 P
Place hold in another library’s circulation system	4 1 P	2 3 P	2 1 P
Track progress/status of ILL transactions online	2 2 P	1 2 P	2 1 P

Special Initiative – Linking Region II

Grant recipient:	Peninsula Library System (on behalf of Region II libraries)
Award(s) made FY:	1997/98 (LSTA)
Project participants:	Bay Area Library & Information System Monterey Bay Area Cooperative Library System North Bay Cooperative Library System Peninsula Library System San Francisco Public Library Silicon Valley Library System

Brief description of project:

Now that the cooperative library systems in Region II have made substantial progress towards linking their own member libraries, they are working to become a model for the Library of California by coordinating their linking efforts on a broader regional basis. Goals for the current grant year include:

- To complete the links between the libraries in PLS, SVLS, and the Tri-Valley region of BALIS,
- To link the NBCLS SuperSearch network with PLS and coordinate inter-system delivery through an intercept point at Richmond Public Library,
- To develop a regional linked systems training program, and
- To design a three-year plan for integrating all of the information networks of all of the libraries in the region.

Though each of the cooperative systems has heretofore pursued a somewhat different linking strategy, all have implemented products based on the Z39.50 protocol. It is hoped that servers supporting this common standard can be interfaced to create inter-system links and to open up even greater public access to the diverse resources of Region II. This is fairly new ground technologically, but the potential benefits make the effort well worthwhile.

In addition to working on region-wide goals, the participating systems are undertaking local development tasks as well. Plans for the current year include:

- Linking 6 additional libraries in MOBAC,

- Implementing a regional server strategy in BALIS to replace the original approach that was tested in the Tri-Valley Project,
- Linking San Francisco Public Library to the SVLS server (already done),
- Adding ILL messaging capability to the Silicon Valley linking project, and
- Installing DRA Find client software at San Francisco Public Library.

Linking software used: CPS URSA
DRA Web 2
OCLC WebZ

Current status:

The project oversight committee has begun to meet and share updates on individual system efforts, and to plan for future years. Work with the vendors on extending links between regional servers is moving ahead.

Project contact: Linda Crowe, Administrator

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25 Tower Road
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VI. Recommendations for the Future of the Statewide Data Base

Statewide Data Base Alternatives

There are a number of feasible ways in which the CLSB could meet its obligation to establish and maintain a computerized data base of bibliographic records and locations. This section outlines Statewide Data Base alternatives, with advantages, disadvantages and costs for each.

1. Current Approach - OCLC

Since 1980, the Online Computer Library Center, Inc. (OCLC) has been the official repository for the CLSA Statewide Data Base. The bibliographic records of libraries that use OCLC as a computerized cataloging tool are automatically added to OCLC's master data base as a byproduct of the local cataloging function. Attached to each title record in the OCLC master data base is a list of holdings codes representing the libraries that have used that record as a cataloging source—and therefore presumably own a copy of that title. Recent estimates put California public library holdings represented in the OCLC data base at 16.6 million entries, representing an estimated 27% of total California public library collections.

Over the years there have been several advantages to this approach to data base building:

- The data base is created as the automatic result of a necessary local function (OCLC cataloging) and takes no additional effort on the part of participating libraries.
- Management of the computer systems necessary to support the CLSA Data Base is handled by professional staff at OCLC, and only minimal local expertise is needed for local libraries to access the data base.
- Records are accessible online to any library with an OCLC account.
- One search accesses the records of many libraries.
- In addition to California records, the OCLC master data base contains the records of many thousands of libraries worldwide, a rich bibliographic resource.

There are also some disadvantages to this approach:

- Not every California public library contributes cataloging records to OCLC. Recent reports put the number of participants at 73%. As of December 1997, 112 California public libraries reported using OCLC as a cataloging tool. Since 1984, additional holdings have been added to the OCLC master data base by tape load or file transfer from four other approved cataloging vendors; as of December 1997, 16 libraries reported that they contribute records in that fashion.
- CLSA-funded participation in OCLC has only addressed the addition of records for currently acquired materials. No attempt has been made to capture information about older materials; however, these older items are often in high demand for interlibrary loan.
- Another important drawback to the OCLC approach is that the holdings codes that are attached to the OCLC title records represent the cataloging library only, and do not indicate the branch location at which the material is actually housed. Therefore OCLC cannot be effectively used as a finding tool in support of direct loan.
- Nor is OCLC data necessarily current. Once a library has completed the cataloging process, the OCLC record is copied into a local automated system, where it is stored and maintained for local use. After being copied from OCLC the record is often modified—sometimes substantially—to reflect the local call number and describe the materials more completely. And when a title is withdrawn from the local catalog, many libraries do not go back into OCLC to remove their holdings code from the master data base.
- OCLC data only changes when a library adds--or, less frequently, removes--its holdings code to/from a master title record. The records do not indicate the current status of the desired material: available, checked out, non-circulating, missing, etc. Any request sent to a library listed in OCLC is sent "blind." There is no way of knowing in advance if the material being requested is available to be loaned.
- OCLC as it is currently used for Statewide Data Base purposes is a "back room" tool. It is not generally made available to staff or patrons in public service areas. The standard OCLC interface is not suitable for patron self-service searching.

Currently, the CLSA program provides individual public libraries with a \$65 per year subsidy to help defray the costs of access to OCLC, and grants a \$220 tape load/file transfer fee to any public library that contributes its records to

OCLC in that way. All other costs of participation are borne by the individual libraries.

OCLC also offers an online messaging service so that interlibrary loan staff can transmit requests to libraries listed in the data base. Many California libraries use this service. A small to medium sized public library spends an average of \$1500/year of local funds to access OCLC for a resource sharing. Many pay that fee out of their CLSA transaction based reimbursements.

2. OCLC + First Search

The original OCLC interface was designed for use by trained catalogers and cannot be considered user friendly. Recently, however, OCLC has introduced First Search, a more easily navigated interface to its data base (now called WorldCat) as well as to a wide range of reference data bases, including full text periodicals files. In fact, most libraries that implement First Search consider it primarily as a reference tool; the availability of WorldCat as a potential resource sharing tool is seen as a less important feature of the product. First Search was specially designed for use by reference staff and the public, and can be made accessible via the World Wide Web.

This option has all of the advantages of the current Statewide Data Base strategy (#1 above), plus the added benefit of potential for direct patron access to both library holdings and reference data bases.

It also has most of the disadvantages of the current strategy. First Search improves access but does not overcome the aforementioned disadvantages regarding completeness, currency or level of detail provided by the OCLC data base. Records do not show branch location or circulation status. Furthermore, as currently implemented, First Search does not integrate directly with the OCLC online ILL messaging system. In many libraries that are using both services, First Search is used to print out request data, which is then re-entered by staff in the ILL system.

First Search access can be purchased on a bulk subscription basis or in increments of 250 searches for a flat rate of approximately \$.60 per search. There are additional fees for downloading journal articles equal to 2-3 search units per article. Library systems that use First Search spend an average of roughly \$10,000 per year on this service, usually out of System Reference funds. Libraries that offer First Search for direct patron use can spend substantially more.

3. Individual Library Catalogs Via the Internet

Approximately 75% of California public libraries have installed local automated library systems, and these local online catalog data bases currently represent--conservatively estimated--approximately 60% of all public library holdings in the state. Local online catalogs are the most complete and accurate source of information about what is actually in a library's collection and available for loan.

Many libraries have made their catalogs available for searching by remote users via the Internet. This requires that the library establish an Internet connection and install an Internet server—usually a PC “front end” to their local automated system. In most cases, patrons access these catalogs by telnet and search using a character-based interface, but recently libraries have begun to add local software that makes their online catalogs searchable by Web browsers.

The amount of local data made available to the remote user varies from library to library. Most Internet-accessible catalogs provide bibliographic information, branch location information, and local call numbers, with links to other information about the library and its programs. A good example of this approach to catalog access is the Inland Library System's VIRL Project, described in the Linked Systems Profiles section of this report.

The primary advantage of this approach is that catalogs are richly detailed and easy to access. And if all of the automated systems in the state were accessible in this way, more than twice as many holdings as are currently represented in OCLC would be made available.

The main disadvantage of this approach—and it is a big one--is that the user must log on and off one catalog at a time in order to search for needed materials; there is no “broadcast” search capability. Studies of search behavior indicate that most users will not look in more than three places for a needed title, and all greatly prefer “one stop shopping.”

Depending on the size of the library and the amount of traffic expected on the Internet server, costs for implementing this approach average \$5,000-\$25,000 per server. A high speed Internet connection to the server can cost another \$12,000-\$18,000 per year.

4. Regional CD-Style Union Catalogs Via the Internet

Many California cooperative library systems have combined their holdings into regional union catalogs. Most of these catalogs are published once or twice a year and distributed on CD-ROM. Recently, many of the vendors that provide CD-ROM catalogs have begun to offer Internet versions of them as an adjunct to

the CD-ROM version. North State Cooperative Library System's catalog is a good example of this approach. To see the North State Cooperative Catalog, visit <http://www.nscls.library.net>

Most of these catalogs offer detailed local holdings information, including branch location and local call number. User interfaces are simple and friendly, easily accessible using a standard Web browser. Holdings of all participating libraries are combined so the user needs to search in just one place to find everything in the region.

There are disadvantages to this approach, however. Because they are published relatively infrequently, these catalogs are not as current as other resource sharing tools. And since they are not connected to a "live" local automated system, they cannot display circulation status information, i.e. whether the desired material is actually available for loan.

Costs to produce a regional CD-ROM catalog vary by the size of the collections, and average \$25,000-\$30,000 per year per region, plus an additional \$5,000-\$12,000 per year to mount and maintain the Internet-accessible version.

5. Individual Library-to-Library Links via Z39.50

As noted earlier, Z39.50 has become the accepted standard for linking library catalogs over the Internet. Z39.50 client and server software make it possible for the user of a local library system to connect to a remote library system and search for information there without having to know anything about the user interface of the remote system.

Z39.50 connections are "live" and allow the remote user to see the most current bibliographic, branch holdings and local call number information available. In some cases, especially when the local library systems being linked are from the same vendor, local circulation status information is also displayed. For descriptions of Linked Systems Projects that have taken this approach, see the entries for BALIS, Santiago, Serra, South State and Torrance in the Profiles section of this report.

This option has all of the advantages of #3 above. It also gets high marks for powerful search capabilities, currency of information, and the convenience of using the same familiar interface regardless of which catalog is being searched. Furthermore, there are a number of very desirable catalogs--the Sutro Library's genealogy collection, for example--that are not available on OCLC but can be searched using Z39.50. (Sutro is on the MELVYL system.)

In practice, however, users of this approach to resource sharing have encountered some difficulties. Direct cross-vendor links are relatively difficult to

establish and do not usually support the display of circulation status information. More seriously, in most cases broadcast searching is not available and users must search remote catalogs one at a time.

Costs for making a local automated system accessible via Z39.50 vary significantly, primarily because of wide variation in the software license fees charged by the vendors. Average start up costs are somewhere in the \$20,000-\$35,000 range, but can be considerably higher or lower depending on the size of the library and the software licensing policies of the vendor.

6. Link Z39.50-accessible Catalogs via Resource Sharing Servers

This option is the same as #5, with one important addition—a resource sharing server that manages all of the traffic between the individual library catalogs and supports both direct Web access and full broadcast searching. With this approach, users see the most current records available, including branch holdings, local call number and circulation status information. Search results can be merged and may be manipulated by the user. Examples of Linked Systems Projects that have taken this approach are MOBAC and South Bay/Silicon Valley; details are provided in the Profiles section of this report.

In some cases, the resource sharing server also supports interlibrary loan messaging and/or extended circulation functions such as patron-placed holds. Products in this category are somewhat ahead of the standards curve, since ISO 10160/61 (interlibrary loan) has not yet been adopted and NISO Z39.70 (extended circulation, including patron data transfer) is still on the drawing board. One Linked Systems Project that has taken this approach is North Bay, also described in the Profiles section of this report.

Resource sharing servers can be used to link any group of libraries. The two most common models are to link all of the libraries in a region or to link all of the libraries that have a particular brand of local automated system. Same-vendor connections are less difficult to implement but recent improvements in Z39.50 technology have made the latter approach as technologically feasible as the former. Regional projects are also somewhat easier to match with other resource sharing infrastructure such as delivery networks.

Costs of implementing a regional resource sharing server can vary substantially, but the portion that is not attributable to implementation of local Z39.50 software in preparation for linking (\$20,000-\$30,000 per library) usually totals \$75,000-\$150,000 per region, with the median close to \$90,000.

7. Link Z39.50-accessible Catalogs via Statewide Resource Sharing Server

In some smaller states, all of the public libraries are being linked via a single resource sharing server. This may not be a practical approach in California, where it would be difficult to implement a server with sufficient transaction capacity and communications bandwidth to handle the entire state. When asked about the feasibility of this approach, several vendors expressed interest but declined to venture an opinion (or a price!) about when they might be able offer the systems and the implementation support needed to accomplish such a massive project. As server and communications technology improve, however, this may become a feasible option. And if the statewide resource sharing server could support interlibrary loan and/or extended circulation functions, that would be more attractive still.

8. Multi-Tier Approach

In a state as large and diverse as California, it also makes sense to consider a multi-tier approach to resource sharing. It might, for example, be feasible to link several regional servers (as described in option #6 above) to permit larger regional or even statewide broadcast searching. The PLS/Region II Linked Systems Project described at the end of the Profiles section of this report intends to demonstrate this concept.

Another approach would be to implement a number of regional resource sharing servers (option #6) and then link those servers in turn to a statewide server (option #7). Data from the PLS/Region II project will also help to model this solution.

Or, it should be feasible to provide backup to the regional servers (option #6) for out-of-region searching via OCLC (option #1) or OCLC + First Search (option #2). This would require a two-step search process and would not allow for extended circulation functionality outside the regional area. However, if linked servers or statewide servers do not prove to be feasible or cost effective it may be a way of improving regional access to more current and detailed data without sacrificing access to the resources of the rest of the state.

Proposed Statewide Data Base Strategy

Knowing what we currently know, what should we adopt as a Statewide Data Base strategy?

The Board has already endorsed the Library of California. From the citizen's perspective, the best automated resource sharing scenario would be one that allowed a patron to enter any library—in person or over the Internet--present a library card, and search for what he/she wants. The Statewide Data Base system would then help to locate and provide the requested material, automatically. Ideally, the system would also offer—but not insist upon--the assistance of a trained librarian along the way.

The technological approach with the greatest potential for fulfilling this vision is a statewide server (option #7) or linked regional servers (option #8) with an extremely high speed/high capacity connection to the World Wide Web. This server or servers would support both a statewide virtual catalog and a full range of extended circulation functions. Both direct and interlibrary loan transactions would be processed "live" via standard protocol links back to local automated systems. The server would retrieve relevant local bibliographic, holdings, and patron information as necessary.

Unfortunately, all of the tools and standards that are needed to implement this approach have not yet been completed. What is proposed therefore is a strategy for improving the Statewide Data Base now while paving the way for this or other desirable options in the future.

More than twice as much bibliographic and holdings information describing California libraries' collections is currently stored in local automated systems than is stored on OCLC. The Linked Systems Projects have demonstrated that by linking those local systems together into a virtual catalog it is possible to achieve significant improvements in both the amount and quality of resource sharing information that is made available to the public. These Linked Systems Projects--and the majority of other promising data base development options--begin with the implementation of Z39.50 server software on local automated systems.

It is recommended therefore that the CLSB adopt as its CLSA Statewide Data Base strategy:

- to encourage libraries to make their collections accessible via Z39.50 searching,
- to encourage cooperative library systems to implement regional resource sharing servers to link Z39.50-enabled local systems,

- to continue to offer an OCLC access subsidy, in recognition of OCLC as a valuable tool for locating materials owned by California libraries whose collections are stored on OCLC but are not accessible via regional Z39.50 search, and
- to require that any library or cooperative library system that accepts funding under this program agree not to charge a fee for lending material to another California library.

It is also recommended that the CLSB, in its capacity as the LSTA Advisory Council, support projects designed to accelerate the implementation of this new CLSA Statewide Data Base strategy.

Impact of the Proposed Data Base Strategy on other CLSA Components

If the proposed strategy is effective, interlibrary loan traffic will increase substantially in the coming years. On the whole, increases from search-only access have been moderate and manageable. However, giving staff and patrons the ability to place holds directly in remote systems can have a much more dramatic effect on interlibrary lending. During its patron access test period, North Bay saw ILL transactions more than triple in the first three months of operation. Increases of this magnitude may put a serious strain on existing CLSA Communications and Delivery and Transaction Based Reimbursement programs.

Full funding for TBR has always been difficult to achieve and maintain. Special attention should be paid to the analysis of loan statistics as the Linked Systems Projects begin to come into full production; budget projections will most likely need to be revised upward.

In the light of expected new demands, the time may also be right to revisit the whole issue of Communications and Delivery techniques. Though Statewide Communications and Delivery is an unfunded CLSA component, it may be appropriate to initiate one or more demonstration projects in this area in preparation for the Library of California. Many of the most exciting cooperative projects underway in other states—Michigan, Minnesota, Ohio, Wisconsin, and others--have as their centerpiece the implementation of a high speed statewide library communications network, backed up by a statewide materials delivery contract. The recent decision to privatize the State of California's \$300 million CalNET telecommunications system is another development in this area worth watching closely.

Once Web-accessible regional resource sharing infrastructure is in place, it also makes sense to exploit those channels to provide access to other information resources such as periodicals data bases. Many of the cooperative systems that have launched Linked Systems Projects have plans to expand in this area. Statewide contracts for connecting users over the Web to data base aggregators (Ebsco, IAC, OCLC First Search, Ovid Technologies, etc.) are another avenue worth investigating and perhaps demonstrating. Agreements negotiated by UC and CSUC for such services might provide a useful model.

Proposed Modular Approach to Implementation

One of the main lessons learned from the Linked Systems Projects is that linking disparate automated systems is a very large and complex undertaking. Implementation could be smoothed and overall accountability improved by dividing the process into manageable segments and assisting participants with clear guidelines for step-by-step achievement of linking goals

Analysis of the Linked Systems Projects indicates that implementation activities tend to follow a natural schedule, and divide naturally into levels or phases. *It is recommended* therefore that the California Library Services Board and the State Library approach the implementation of the Statewide Virtual Data Base in terms of the following building blocks:

Level 1 – Local Preparation

Experience with Linked Systems Projects to date makes it clear that there are certain basic “ingredients” needed by all participating libraries. The State can provide detailed guidelines for what needs to be accomplished locally before undertaking a linking project. Level 1 activities include:

- converting local catalog records to machine readable form
- installing the current release of local operating system software
- installing the current release of local integrated system software
- alternately, joining a neighboring library’s automated system
- installing LAN cabling/Ethernet to the desktop
- installing networked PCs [or Macintosh] operating Windows 95(or current release) [alternately, Windows NT] and Web browser software

- establishing server-to-Internet connectivity (inbound and outbound) at a minimum speed of 56 Kbps
- establishing control over workstation, system and network security
- training staff in basic library automation terminology, personal computer use, Windows 95 [NT, Macintosh] and Internet and World Wide Web searching
- initiating discussion of local and regional service plans to address changes that will accompany the implementation of linked systems technology

Level 2 – Local Z39.50 Implementation

Libraries that have completed Level 1 preparations are ready to move ahead with making their local catalogs available for linking. Level 2 activities include

- installation of Z39.50 server software on the local automated system
- assignment of at least 5% of total available ports/sessions for incoming access by remote users
- agreement that borrowing libraries will not be charged a fee for requesting materials (policies on fees to local borrowers are a matter of local discretion)
- training staff in Z39.50 technology and search techniques
- work on revisions to local and regional service plans to reflect the availability of new searching capabilities

Level 3 – Regional Linked Systems

Once at least 50% of cooperative library system members (or, alternately, libraries representing at least 50% of the holdings in the region) have completed Level 2 activities, they are ready to undertake a regional Linked Systems Project. Level 3 activities include

- identification of regional-level technical expertise, either assigned or contracted
- assignment of knowledgeable technical staff in each library who can devote 2-4 hours per week to the project during implementation

- negotiation of arrangements for housing and management of a regional server
- installation of a regional resource sharing (Web-to-Z39.50 and/or interlibrary loan) server. The definition of regional server would include single-vendor shared automated library systems (as in Black Gold, SJVLS and PLS), provided those systems meet the other Level 3 criteria
- establishment of high speed Internet connections to the regional server
- establishment and testing of links between the regional server and participating libraries' Z39.50 servers
- introduction of direct patron access to combined holdings of the participating libraries via broadcast search—from within the library and over the World Wide Web. Search results must include bibliographic information, branch level holdings information, and circulation status information
- completion of revisions to local and regional service plans to reflect the availability of linked systems searching and to address related services (e.g. delivery, common loan policies, etc.) that support resource sharing among project participants
- establishment of mechanisms for gathering and analyzing detailed statistical information on server usage and borrowing patterns

Level 4 – Linking Technology Demonstrations

Levels 1-3 describe activities that are relatively well understood and based on existing standards. Level 4 is made up of activities for which standards are still emerging and/or more data is needed to assess the impact of the new linking technologies and products. Level 4 activities include (but are not limited to)

- In-depth evaluation of the feasibility and impact of patron self-service interlibrary loan at the local, regional and statewide levels
- Demonstration of new “patron request” client software such as Pigasus
- Demonstration of links between Level 3 regional servers
- Demonstration of other strategies for handling requests that cannot be filled using a Level 3 regional server
- Possible future demonstration of Z39.70 technology

- Demonstration of statewide communications and delivery techniques
- Demonstration of regional and/or statewide Z39.50 access to reference content such as full text periodicals data bases

Recommended CLSA Funding

It is recommended that CLSA Statewide Data Base funds be used primarily to provide an ongoing incentive for public library participation in the virtual catalog. Recommended use of existing funding is as follows:

Payments to Individual Public Libraries:

Current level of \$65 for OCLC access

or

\$ 500/year towards the ongoing costs of opening up access to the local catalog via Z39.50

To be eligible for the \$500 annual grant, a public library must have completed Levels 1 and 2 of Linked Systems implementation as described above. *It is also recommended* that multiple libraries be allowed to pool these funds if desired to support larger regional linking projects.

It is not known exactly how many libraries are currently eligible to receive this new, higher level of funding. A reasonable guess would be approximately 30% of all California public libraries. That would result in a total initial cost of approximately

- \$29,000/year for libraries qualifying at the new level +
- \$8,000/year for libraries qualifying at the old (OCLC only) level.

Maximum annual cost once all libraries become eligible for funding at the higher level would be \$88,000/year.

Payments to Cooperative Library Systems:

\$5,000/year towards ongoing costs of operating the regional resource sharing server

To be eligible for the \$5000 annual grant, a cooperative system must have completed implementation of a Level 3 linked systems project as described above. *It is also recommended* that multiple cooperative systems be allowed to pool these funds if desired to support larger regional linking projects.

Total initial cost is estimated at approximately \$40,000/year. Maximum annual cost once all cooperative systems become eligible for this funding would be \$75,000/year.

Targeted One-time Funding

It is further recommended that each year the balance of CLSA funds not expended on payments to individual libraries and cooperative systems as described above be used for discretionary data base building projects--either statewide, regional or local. Recommended projects include (but are not limited to) :

- development of detailed instructions and checklists for libraries to use during Level 1 Preparation
- incentives for Level 2 Z39.50 implementation
- incentives for Level 3 Regional Server implementation
- training and technical assistance for system linking activities at all levels
- retrospective conversion of collections of special need or interest, for libraries that are working to complete Level 1

Initial funding available for targeted projects is estimated at \$100,000. This amount will be reduced in future years as more libraries and cooperative library systems become eligible for ongoing subsidies as described above.

Recommended LSTA Funding

It is recommended that LSTA grant funding be used to accelerate implementation of a statewide virtual catalog. To that end, recommended LSTA projects include:

- grants to local libraries for Level 1 Preparation in cases of special need

- grants to local libraries for Level 2 Z39.50 implementation
- grants to regional cooperative systems for Level 3 Regional Server implementation
- grants for Level 4 demonstration projects

It is important that the evaluation of grant proposals recognize local investment and initiative in pursuing these new resource sharing technologies. Care must be taken, however, not to create a hierarchy of Linked Systems haves and have nots. *It is recommended* that some targeted LSTA funds be used to bring libraries that would otherwise be unable to participate in the CLSA-funded program up to qualifying levels.

State Library Leadership in Linked Systems

The State Library has played a pivotal role in the implementation of new Linked Systems technology and the expansion of access to library materials for California citizens. In order to build on successes to date, *It is recommended* that the State Library take a leadership position in the following areas:

Vendor Negotiations

California public libraries represent a powerful market segment in a marketplace that is still finding its range. The State Library is well positioned to represent this segment to the vendor community in a number of ways:

- preparation of vendor-certified specifications checklists of items/capacities needed to run Z39.50 products on local systems
- negotiation of discounted statewide contract (CMAS) prices for Z39.50 server software, Web-to-Z39.50 gateway software, ILL software, etc.
- serving as ombudsman to help resolve cross-vendor problems or disputes
- possible negotiation of future contract(s) for statewide linking projects

Resource Materials Development

Now that we have a fair amount of experience with the linked systems approach to resource sharing, the State Library can help libraries that have not yet implemented by preparing and distributing resource materials such as:

- detailed implementation checklists and guidelines
- sample job descriptions/task lists for technical staff, with advice on how to find the right kind of assistance
- sample project calendars
- lists of issues to be addressed in service plans; sample technology plan elements
- sample resource sharing agreements for linked systems
- sample cost sharing formulas
- assessments of the effect of linked systems on staffing, workflow, and public service
- information on techniques for making these new services universally accessible e.g. to users with visual impairments
- perhaps a Linked Systems Project implementers' listserv

Technology Tracking

The State Library can also play a key role in keeping California libraries up to date on developments in the following areas:

- statewide and national telecommunications initiatives
- standards developments, particularly ISO 10160/61 and Z39.70
- new Linked Systems products and techniques
- Linked Systems efforts at the University of California and the California State Universities

Staff Development and Training

Staff in many California libraries still do not have the skills they need to assume responsibility for technology projects. The State Library can help libraries to develop self-sufficiency in this area in a number of ways:

- commission development of a “Technology for Managers” curriculum for library professionals
- explore possible cooperative relationships with the library school(s) and vendor(s) to create “System Manager” and/or “Network Manager” certificate programs to accompany the MLS degree
- launch a technology apprenticeship program to enable librarians to learn on the job from experienced technical staff
- extend InFoPeople Advanced Searching/Z39.50 training to offer Level 1 and 2 skills for interlibrary loan staff
- consider funding travel expenses and replacement staff time to allow library staff in geographically isolated areas to take better advantage of training opportunities

Linked Systems Projects have already accomplished a great deal, and there is excellent potential for accomplishing much more. A coordinated statewide approach to implementing this new technology is the best strategy for improving library access for all of California’s citizens.

VII. Appendix

The State of the Art of Library Interconnectivity

The state of the art of interconnectivity between library systems and between patrons and various sources of intellectual material has undergone radical change in the past few years. This brief paper attempts to outline the current options available to libraries and their patrons, to identify the strengths and weaknesses of each option, and to suggest some future potentialities.

Traditionally, automated library systems were worlds unto themselves. The landscape consisted of many free-standing, disconnected sites running many different automation products, each providing access to the bibliographic descriptions and holdings information of the library. If patrons needed to discover the holdings of other libraries, they used printed materials, traveled to the library of interest, or called on the services of their interlibrary loan department.

Telnet

As library automation systems became the norm instead of the exception, and as the Internet began to develop, the possibility of allowing remote access to library systems became a reality. Using a protocol called *telnet*, it became possible for a patron to instruct the local system to connect to a remote system over the Internet and to look like a local terminal device to the remote system. The use of telnet preceded, to a great extent, the introduction of PCs into libraries and into patrons' homes and offices. This meant that the use of telnet always involved not only the library system that the patron wished to access but also the system in the library where the patron was standing. Very few individuals had the equipment or know-how to use telnet from their homes. Since each library system had its own user interface, a patron in library A using telnet to reach library B had to be familiar with the user interfaces of both systems A and B. Even when both systems happened to be the same product of the same vendor, they were often locally customized and therefore presented dissimilar patron interfaces.

The introduction of telnet into library automation systems did provide a significant service in that it allowed patrons to access many different collections housed in libraries worldwide. Even though telnet is fading in prominence as newer technologies arise, it is still available in many systems and still provides a fundamental fallback when other technologies are unavailable.

The World Wide Web (WWW)

The next step up in functionality over telnet is provided by a loose connection of computer systems worldwide, known as the *World Wide Web*. These connections are based on two standards, *http* and *HTML*. *Http* is a protocol defining how requesting software, called a Web browser, can talk to software, called a Web server, that provides access to information stored on the same computer that the server runs on. *HTML* is a set of rules about how to encode formatting information within documents so that the browsers can apply the formatting as desired by the document author. Documents encoded in *HTML* and available via Web servers are often called Web pages. Web pages are static collections of information offered by individuals, corporations, government agencies and educational institutions. The information is created once, is always the same regardless of who requests it, is independent of the context within which it is accessed, and is unchanged regardless of when it is accessed. It is "electronic paper", nearly as static as real paper.

Another use of the Web is to provide access to dynamic data, created on-the-fly by software in the Web server. Most Web access to library automation systems is in this dynamic mode. The content of the information sent from the Web server to the browser is highly context sensitive. For instance, the results of a search of bibliographic data files in the server vary greatly depending on the submitted search, often depending on the identity of the requester, and change as new bibliographic data meeting the search criteria are added to the server's data base.

The fundamental difference between the use of the Web to retrieve static Web pages and to retrieve dynamic data causes some discontinuity which can be very confusing. Most library automation systems are *stateful*, meaning the system retains knowledge of what each specific user has done during a session. This allows the system to handle requests for information very efficiently within the context of the user's session. The user can request additional results of a search without the system's having to re-execute the search. Some systems allow the user to refine or manipulate search results, performing searches in which previous results are logically ANDed or ORed with each other or with additional search terms. In many systems, the user can retrieve, modify, and re-execute searches. All of these functions combine to provide a highly robust searching environment with significant searching power. These capabilities depend on the system's knowing about previous activity; that is, depend on the server's being stateful.

The World Wide Web was designed for use with static data. Since access to static data does not require the server to know anything about the context of the request for a specific page, a *stateless* model works well for Web searching. The standard Web browsers, such as Netscape Navigator and Microsoft Internet Explorer, are designed for the stateless model. Use of the browsers to access a

stateful server, such as most library automation systems, can cause operational anomalies. The most visible, and most serious, of these is that often the use of the navigational features of the browser--such as the forward and back buttons--when connected to a stateful server, will not do what the user expects. Clicking on one of these buttons will often return strange results or even cause the user to become lost within the server's state space. Because of this, many library automation system Web servers caution the user to refrain from using the browser's navigational features. But, of course, many people do not read the instructions and since most people's first experience with the Web is to view static pages from stateless servers, they do not understand why they can't use the back button; they often view the stateful Web service as "broken."

The Web has grown not only in availability, as PCs with built-in browsers have become the norm, but also in sophistication. Originally, the Web was designed to support primarily text, with only marginal support for graphics. However, the Web browser offers a unique opportunity to systems designers in that it easily supports new types of data using additional software, called plug-ins. This ability has been aggressively utilized and today's Web offers not only textual material but also an extensive graphics capability, support for sound, animation, real-time video, and even the delivery of software applications, called *applets*, which are loaded into the browser by the server and are run by the browser on the user's PC.

This strong growth of non-textual material available on the Web means that some of the low-end browsers--such as Lynx, which only supports textual material, yet is usable on older, pre-386 PCs--have fallen out of favor. Very few Web material creators still concern themselves with ensuring that their pages are viewable with text-based browsers. Since library systems currently overwhelmingly provide text, Lynx and other text-based browsers are still relatively usable when searching library resources, but as patrons become familiar with the Web at home, such browsers will likely be viewed as obsolete and insufficient. Another factor limiting the use of text-based browsers is the clear direction in digital library projects to provide the content in formats that are not flat text, like Adobe's pdf or in SGML tagged format, with images and text embedded in the same document. As pre-existing printed material is captured for electronic delivery, it is, to a great extent, being scanned, saved as an image of the printed page, and delivered to the browser as an image, not as text. All of these factors combine to sound the death knell of text-based browsers as a viable library system access alternative.

Z39.50

In the late 1980's and early 1990's, much effort was expended on working out ways that library systems could communicate at a higher level than that offered by telnet. These efforts preceded the rise of the Web and took for granted

the stateful model that was, and is, ubiquitous in all significant systems offering access to large quantities of information. The work was done under the auspices of the National Information Standards Organization (NISO), which at one time was American National Standards Institute (ANSI) committee Z39. The cross-system information search and retrieval standard that was developed for NISO was the fiftieth NISO standard; hence it became known as *Z39.50*.

Z39.50 contains a model of clients (called origins) and servers (called targets). A client sends a user's search to a server; the server performs the search and returns the results to the client; the client presents the results to the user. *Z39.50* codifies how the search is to be represented, how the results are to be returned, and mechanisms to allow the client and the server to negotiate various ancillary parameters, such as how many results to return for any one request, whether or not the user can ask to have multiple search sets stored on the server, or, in the case of proprietary data, the userID and password, or other identification, of the user. The *Z39.50* standard operates at a *semantic* level rather than the procedural level of telnet and http. This means that *Z39.50* attempts to give the user, the client software and the server software ways to discuss not just the format of data, but also the meaning of data. As one might guess, this makes *Z39.50* much more complex than procedural protocols like telnet and http. It also means that the software development effort needed to produce useful *Z39.50* products is significant.

The availability of *Z39.50* interfaces to library automation systems is almost universal but sophistication and flexibility vary greatly from program to program. Since *Z39.50* attempts to codify so much, and at such a high level, it was necessary to ensure that various levels of implementation could be offered. This was done by making many of the features in *Z39.50* optional, by making the defined services modular, and by abstracting many of the parameters.

One example of the flexibility in the standard, and the problems that this necessary flexibility may cause, is how *attributes* are handled. The access points (indexes) of a data base on a *Z39.50* server are identified by attributes which are used by a client to describe how it wants the server to interpret the search terms. For example, if a client wants to express an author search for Mark Twain, it might associate with the term "Twain, Mark" a group of attributes that indicate that the author index of the data base is to be searched, that the term is a name already normalized by the client (or the user), that it is not to be considered a truncated term, and that it should appear in the index as a left-anchored phrase. While theoretically and technically possible, it is highly unlikely that any one server will support all possible combinations of attributes. In some cases, a vendor's *Z39.50* server won't even support the same search attributes as does the underlying search engine when viewed through its local interface. This mismatch of attributes and the problems it causes for clients and those responsible for configuring clients, is a major problem being faced by the *Z39.50* implementer community. An additional difficulty is that interpretation of attribute combinations,

or missing attributes, is at the discretion of each client and server designer. NISO has convened a committee of experts to try to place some structure on attributes to resolve some of the difficulties inherent in trying to resolve semantic meaning. This work is just beginning and it is improbable that results will be reflected in Z39.50 products within the next two years.

In spite of the attribute muddle, the searching of bibliographic data bases using Z39.50 has been relatively successful. No one would claim that the current state of affairs is perfect. Few implementations of Z39.50 servers offer the full range of capabilities found in their underlying search engines and available via the native interface. This, coupled with the almost impossible task of matching attributes in a client offered by one vendor with those in a server offered by a different vendor, pretty much guarantees that a remote user using a client from one vendor will never get the same exact functionality from another vendor's server as is available from the server's native user interface. However, this may well not be necessary. Perhaps Z39.50 has been oversold; maybe we need to revise our expectations. If Z39.50 is understood to be a useful adjunct to, rather than a replacement for, more sophisticated local searching, that may be sufficient.

While Z39.50 has always had as a goal the interoperability of systems provided by many different vendors, its greatest success has been in the use of the standard by individual library system developers to build client/server proprietary systems and to link their customer libraries together. This is not surprising since it is relatively easy for a single vendor to coordinate the attributes in their client with those supported by their server. If both client and server are developed by the same vendor, private extensions to the protocol are not only possible, they are overwhelmingly tempting to implement, even though this endangers cross-vendor interoperability. Many of the library automation vendors have enhanced their product lines by taking advantage of Z39.50 as the fundamental mechanism for communicating between their clients and their servers, while using private, non-standard means to provide additional, related services. Some of the most popular "Z39.50" features are not based on Z39.50 at all.

One of the current challenges for Z39.50 developers is the delivery of library holdings information. When this requirement was first tackled, in the early 1990's, it was assumed that detailed holdings would be transported using the MARC Standard for Holdings and Locations (*MFHL*). The library automation vendor community has uniformly declared an unwillingness to accept this approach, citing as the most compelling reason the inability of MFHL to carry circulation information. The original plan for transporting holdings via Z39.50 offered an alternative to the MFHL record. However, this alternative was intended as a stopgap, for use only at the monograph or summary serials level; it fails when a large amount of detailed information is required to describe a serial holding. The Z39.50 implementer community is currently developing a solution to

this problem, which will probably be advanced and accepted as part of the standard in late spring 1998. Vendors have voiced an eagerness to begin work on implementing this solution, so it is probable that products will begin to appear in late 1998 that will support both detailed and summary holdings information between multiple vendor systems.

Traditional library systems and other information providers, such as the online data base industry, have long offered ancillary services in addition to basic search and retrieval. Examples are the ability of a user to request a hold on an item of interest in a remote library's collection, the ability to save and later execute a search, the ability to print the results of a search, and the ability to request a copy of a document discovered in a search of an abstracting and indexing data base. Z39.50 provides the mechanism for supporting many of these functions in a linked systems environment, but the investment of software development resources that would be necessary to provide these functions has resulted in few library automation systems' offering such services via Z39.50. By contrast, the online data base industry has widely implemented these Z39.50 *extended services*.

Much of the mechanism in the most recent version (Z39.50-1995) of the standard is intended to support extremely powerful retrieval, far more powerful than that offered by the World Wide Web. Specifically, Z39.50 provides a mechanism for the client to specify at a very detailed level, exactly what components of a document it wishes to retrieve and in what format. This dynamic request facility gives Z39.50 far more power than the static document retrieval capability of the Web. However, this power comes at a cost, the cost of software development resources. Since the library community has not yet seen the need to invest in this kind of power and since the types of data sources for which it is useful are only now beginning to appear, the support for this kind of retrieval in vendor offerings is spotty. The current state of the art for retrieving complex documents is to use Z39.50 to discover and retrieve the bibliographic description of the item and to then use a URL, usually found in the MARC 856 field, to retrieve the static material. This way, a Z39.50 client has all of the retrieval power of Web browsers, but little more.

Web-Z39.50 Gateways

In the last couple of years, vendors have been offering programs called *Web gateways* that sit between the user and a Z39.50 client. These gateways make the client look like a Web server. Thus, a patron can use any Web browser to connect to the gateway and then do Z39.50 searching against a broad array of resources. While Web gateways avoid the need to load a Z39.50 client on each patron's PC, they do introduce the stateful/stateless problem of the Web into the Z39.50 equation. Even so, the advantage of supporting only a single piece of

software for an entire patron population, as opposed to providing a copy of client software for each patron, makes the gateway a very attractive alternative.

The Future

When considering the advantages and disadvantages of Z39.50 and of the Web, a couple of directions appear fruitful. These are (1) the development of Z39.50 clients as Web browser applets, and (2) the inclusion of Z39.50 clients in desktop application programs.

A new and very powerful development in the Web community is the ability of the Java programming language to support the downloading of data-specific applications software from a Web server to a browser. While there are trade wars between Sun Microsystems and Microsoft as to how this will all be done, the functionality is so self-evidently desirable that it should become the standard method of network based computing within the next two years, regardless of the outcome of the Sun/Microsoft battle.

A Z39.50 client could be developed in Java and placed on a library's home page. By clicking on an icon or on a hyperlink, the user could download the Z39.50 client applet into the browser. The applet would initiate a connection with the library's Z39.50 server and provide full Z39.50 power. This would avoid the state issues that are so pesky in Web-Z39.50 gateways, yet would still require the library to support only a single piece of software. Java-based clients should be on the market within the next six months; some will be freestanding clients, some will be applets.

Another probable development will be the inclusion of Z39.50 client capabilities in end-user software, where search and retrieval are not the primary function but rather are important side functions. Examples of this are a cataloger's workstation, an ILL workstation, word processing packages for scholars, bibliography generators, and coursework software for computer-mediated instruction.

Ongoing Work

There are a couple of high profile projects underway attempting to improve the interconnectivity available using Z39.50. The Committee for Institutional Cooperation (CIC), consisting of the Big Ten Universities and the University of Chicago, has undertaken the development of a Virtual Electronic Library, which involves not only the creation of new electronic materials and the retrospective conversion of print materials to electronic format, but also attempts to produce a virtual union catalog of the holdings of the member university libraries using Z39.50. This project will identify, in addition to numerous other metrics,

combinations of attributes needed to provide a robust search service for the VEL. Hopefully, this will drive the vendor community to provide this set of attribute combinations so that consortia of libraries worldwide will benefit.

The National Library of Canada is underwriting a similar project linking 18 Canadian libraries using nine different vendors' systems. The Virtual Canadian Union Catalog (vCuc) project has identified as serious issues needing resolution the delivery of holdings information, the matching of attributes between clients and servers, and the integration of Z39.50 and ILL systems.

Z39.50 is finding application in several non-bibliographic applications areas as well. The Government Information Locator Service (GILS) specifies the use of Z39.50 to retrieve pointers to, and descriptions of, governmentally published material. The Committee on Earth Observation Satellites (CEOS) is using Z39.50 to link together the mass of material available from NASA, the European Space Agency, the Japanese Space Agency, and others. The museum and archive community, through the Committee for the Interchange of Museum Information (CIMI) has embraced Z39.50 to provide global access to the world's cultural heritage. Several geographic information systems (GIS), such as the MIT Digital Orthophoto Browser, are incorporating Z39.50 to search metadata associated with images and other geospatial data.

Z39.50 work is international in scope. There are more than 14 projects underway in Europe, working to interconnect libraries across national boundaries, supporting multiple languages and character sets. In Australia, the ZedWeb project interconnects multiple libraries, and the Australian government just announced a Government Information Locator Service based on Z39.50. There is Z39.50 development underway in Japan, Hong Kong, Taiwan, Singapore, and Korea. All of these systems throughout the world, in conjunction with systems already existing in North America, will not only eventually interoperate in their national and geographic areas but also will result in a worldwide international intellectual infrastructure for the search and retrieval of the intellectual and cultural heritage of our global society.