

## I. Policy Summary

The principal finding of this Linked Systems Study Update is that California is making steady progress towards the creation of a virtual catalog for resource sharing purposes. Libraries are moving from demonstration of the feasibility of the linked systems concept to practical implementation of linking technology on a regional basis.

Some Linked Systems Projects have encountered implementation problems along the way; recommendations for addressing those problems are detailed in this report. None of these implementation problems is sufficiently serious to warrant any change in the overall statewide database strategy.

In the course of this study, it became clear that Linked Systems Projects represent just one part of the technology infrastructure necessary to support electronic resource sharing statewide. This report identifies twenty components of a proposed Library of California Technology Infrastructure, including:

1. Commitment
2. Local MARC Databases
3. Local Online Catalogs
4. Management-level Understanding of Basic Networking Issues
5. Technology Project Management Skills
6. Local Wiring and Data Communications Networks
7. Local Network Maintenance and Troubleshooting Skills
8. Internet Connections
9. Web-ready PCs for Internet Searching
10. Policies for Managing New Electronic Services
11. Internet Skills
12. Local System Upgrades to Web Browser-based Catalogs
13. Local Implementation of Z39.50 Client and Server Software
14. Regional Broadcast Search Systems
15. Interlibrary Loan Messaging System(s)
16. Interlibrary Loan Management and Extended Circulation System(s)
17. Materials Delivery and Return System(s)
18. Patron Authentication System(s)
19. Electronic Collections
20. Self-service Electronic Borrowing

For each of these twenty components, this report offers a brief description, assesses progress to date, indicates any problems encountered, notes programs that currently support efforts in this area, and recommends additional activities for moving forward. This information is summarized in a chart at the end of this Policy Summary.

By developing future statewide technology policies and initiatives in the context of the proposed Library of California Technology Infrastructure, it should be easier to

- move everyone forward by assisting libraries that are currently at different stages of implementation;
- reward innovators without widening the “digital divide” or leaving anyone behind;
- identify and address gaps in technology development statewide;
- coordinate the purchase of new computer hardware, software and services with the skills needed to use them effectively;
- develop programs that yield important benefits to local libraries as well as to cooperative projects, and
- coordinate federal, state and local investments in technology to maximize the return on available funds.

*It is recommended* therefore that the Library of California Board adopt the twenty components of the proposed Library of California Technology Infrastructure as a framework for developing future technology policies and initiatives.

This recommended policy action has no fiscal impact. Proposed expenditures for specific activities in support of some or all of the twenty components will be presented to the Board for separate action.

## Implementing the Library of California Technology Infrastructure

	<b>Component</b>	<b>Programs Supporting This Area</b>	<b>Additional Recommendations</b>
1	Commitment	Ongoing communications to library directors	<ul style="list-style-type: none"> <li>• Document and publicize patron response to virtual catalog access, and patron satisfaction with new resource sharing tools.</li> <li>• Measure short and long term workflow and workload impacts of new resource sharing techniques.</li> </ul>
2	Local MARC databases	Retrospective conversion grants	
3	Local online catalogs		<ul style="list-style-type: none"> <li>• Conduct a statewide “technology census”.</li> <li>• Offer targeted grant funding for public libraries for local online catalog system purchase and installation.</li> </ul>
4	Management Level Understanding of Basic Networking Issues	Stanford-CSL Institute workshops InFoPeople training	

	<b>Component</b>	<b>Programs Supporting This Area</b>	<b>Additional Recommendations</b>
5	Technology Project Management Skills	State Library technology planning training  Stanford-CSL Institute workshops  InFoPeople training  Gates Library Initiative training	<ul style="list-style-type: none"> <li>• Begin development of a comprehensive technology project management curriculum.</li> <li>• Investigate ways to link trainees with experienced mentors.</li> <li>• Investigate options for technology project manager certification.</li> </ul>
6	Local Wiring and Data Communications Networks	eRate discounts  California Teleconnect Fund discounts  PLF discretionary funds  Possible library bonds	
7	Local Network Maintenance and Troubleshooting Skills		<ul style="list-style-type: none"> <li>• Offer public libraries a 50% funding match for library vendor-provided training</li> <li>• Alternatively, sponsor vendor-provided training events at locations throughout the State.</li> </ul>

	<b>Component</b>	<b>Programs Supporting This Area</b>	<b>Additional Recommendations</b>
8	Internet Connections	InFoPeople Project grants Linked Systems Project grants Gates Library Initiative grants eRate discounts California Teleconnect Fund discounts	<ul style="list-style-type: none"> <li>Investigate one time incentive funding for installation of high speed telecommunications lines in public libraries</li> </ul>
9	Web-ready PCs for Internet Searching	InFoPeople Project grants Linked Systems Project grants Gates Library Initiative grants PLF discretionary funds	
10	Policies for Managing New Electronic Services	State Library technology planning training Technology planning grants InFoPeople training Gates Library Initiative training	<ul style="list-style-type: none"> <li>Develop tools for research/ survey of user response to electronic services.</li> </ul>

	<b>Component</b>	<b>Programs Supporting This Area</b>	<b>Additional Recommendations</b>
11	Internet Skills	InFoPeople training Gates Library Initiative training	
12	Local System Upgrades to Web Browser-based Online Catalogs	Linked Systems Project grants (some) PLF discretionary funds	
13	Local Implementation of Z39.50 Client and Server Software	Linked Systems Project grants Library of California local Z39.50 server subsidies	<ul style="list-style-type: none"> <li>• Organize a California Z39.50 Users Group and establish an Internet listserv .</li> <li>• Develop a California Z39.50 resource web site.</li> <li>• Sponsor a Z39.50 institute to share information and work out solutions to issues of mutual concern.</li> <li>• Package institute proceedings as an implementation toolkit for use by California libraries.</li> </ul>

	<b>Component</b>	<b>Programs Supporting This Area</b>	<b>Additional Recommendations</b>
	Local Implementation of Z39.50 Client and Server Software, cont.		<ul style="list-style-type: none"> <li>• Distribute the 49-99/Joe Ford Z39.50 toolkit to other libraries and provide training in its use.</li> <li>• Sponsor training based on Z39.50 implementation aids developed in other states.</li> <li>• Provide grants to help pay for reindexing of local databases to facilitate Z39.50 access.</li> </ul>
14	Regional Broadcast Search Systems	<p>Linked Systems Project grants</p> <p>Library of California regional server subsidies</p>	<ul style="list-style-type: none"> <li>• Conduct response time tests to gauge system performance, identify network bottlenecks, and propose solutions.</li> <li>• Offer grant funding for consulting and assistance from vendors.</li> <li>• Offer grant funding for travel to vendor-sponsored regional broadcast search system users group meetings and/or training events.</li> </ul>

	<b>Component</b>	<b>Programs Supporting This Area</b>	<b>Additional Recommendations</b>
15	Interlibrary Loan Messaging System(s)	Linked Systems Project grants (some)  Transaction Based Reimbursements (TBR)	<ul style="list-style-type: none"> <li>• Offer grants for demonstrating and evaluating new ILL messaging products.</li> <li>• Distribute the MOBAC Web2 enhancements to other users statewide.</li> </ul>
16	Interlibrary Loan Management and Extended Circulation System(s)	North Bay Linked Systems Project grant	<ul style="list-style-type: none"> <li>• Prepare a detailed, systematic analysis of SuperSearch project activities, costs, system performance, and service and workflow impacts.</li> </ul>
17	Materials Delivery and Return System(s)	Regional communications and delivery grants	<ul style="list-style-type: none"> <li>• Fund demonstrations/ evaluations of innovative delivery techniques, load management systems, tracking systems, etc.</li> </ul>
18	Patron Authentication System(s)		<ul style="list-style-type: none"> <li>• Survey the state of the art, identify relevant projects already underway, and monitor the emerging patron standard.</li> <li>• Fund demonstration(s) of regional or state level patron authentication techniques.</li> </ul>

	<b>Component</b>	<b>Programs Supporting This Area</b>	<b>Additional Recommendations</b>
19	Electronic Collections	Digitization grants Rand database demonstration	<ul style="list-style-type: none"> <li>• Evaluate the use and benefits of Rand database access and explore other options for regional or statewide access to commercial databases.</li> </ul>
20	Self-service Electronic Borrowing	Linked Systems Project grants Library of California regional server subsidies	<ul style="list-style-type: none"> <li>• Survey the state of the art, identify relevant projects already underway, and begin developing a basic working knowledge of options in this area.</li> <li>• Fund libraries and/or regions that offer programs in this area to measure user response to and satisfaction with electronic self-service.</li> <li>• Measure the effects of electronic self-service borrowing on library staff workloads and workflows.</li> </ul>

## **II. Introduction**

This follow-up study provides updated information about the California libraries and cooperative library systems that have undertaken to link their local catalogs for regional resource sharing purposes. It assesses progress in implementing a “virtual catalog” for the Library of California and makes recommendations about how to proceed to ensure maximum benefit from Linked Systems connectivity.

The findings in this report are based on site visits and interviews with California Linked Systems Project participants, library software vendors, library standards developers, library policy makers in other states, and representatives of other projects employing similar system linking technologies.

## **III. Progress in Achieving the Virtual Catalog**

### **The Linked Systems Concept**

The concept of providing regional or statewide access to multiple library collections has long been a cornerstone of library resource sharing policy. Over time, the tools employed to provide this extended access have changed, moving from union card catalogs to microfiche to online databases and now Internet-based search aids. Such changes have always been undertaken in an effort to offer faster, more convenient, and more comprehensive service to library patrons. Linked Systems Projects are simply the latest strategy to be employed in pursuit of this goal.

Linked Systems Projects attempt to connect what are by far the richest repositories of current information about California library collections—local library online catalogs. These catalogs include continually updated information about individual titles and items (copies) in local collections, including location and circulation status (availability for loan) information, providing details down to the branch level.

California’s Linked Systems Projects have been designed to create an environment in which the library user who does not find what he/she needs in the local online catalog can easily search a “virtual database” made up of the online catalogs of neighboring libraries. Under a variety of funding programs, the Library of California Board and the California State Library have assisted libraries in the exploration of system linking technology as one step on the road to a virtual statewide database.

## **Z39.50: The Linked Systems Standard**

All of the Linked Systems Projects investigated for this study are based on a standard international data retrieval protocol known as Z39.50. The goal of the Z39.50 standard is to allow the user of any automated system to search the database on any other system without having to know how the remote system works. All of the communication between systems is meant to be transparent to the user, who never leaves his/her familiar local interface.

Z39.50 searching, unlike standard World Wide Web searching, is dynamic. The user does not receive static, pre-formatted Web pages, but customized search results, assembled in real time to match the criteria that accompany his/her request. Each Z39.50 search transaction is essentially an on-the-fly customized retrieval.

After a long development period and several editions or versions, the Z39.50 standard has now stabilized and the focus has shifted to implementation. Vendors are working to create and enhance Z39.50-based software products and libraries are working to implement them effectively.

## **Progress Since the Last Linked Systems Report**

Since the last survey of California Linked Systems Projects (*A Study of Linked Systems with Recommendations for the Future of the CLSA Statewide Database, May 13, 1998*), substantial progress has been made. Local Z39.50 server software and regional Z39.50 gateway software have been installed and links have been established for more than fifty additional libraries, including public, academic, school and special libraries. As a direct result of these projects, a number of libraries that have never been accessible via OCLC or any other resource sharing tool now offer their collections for searching over the Internet.

All of the Linked Systems Projects have achieved an operational level that allows for some staff and/or public searching. These projects have demonstrated that virtual catalogs based on the Z39.50 standard can be developed and accessed. While we continue to move forward overall, however, progress towards the virtual catalog has been uneven, and a number of implementation problems have been encountered along the way.

This study began as an effort to identify and solve problems specific to the implementation of Z39.50 connectivity, in order to achieve the best searching results for users. In the course of the investigation it became clear that California's progress in achieving the virtual catalog might best be discussed and

understood in terms of the larger context of the overall environment in which Linked Systems implementation is proceeding and the different components needed to create a Library of California Technology Infrastructure.

## The Implementation Environment

To understand the progress made and the problems encountered by the Linked Systems Projects, it may be helpful to consider the context in which these projects are being undertaken. The following chart summarizes local conditions that affect Linked Systems implementation.

### Conditions Affecting Linked Systems Implementation

Condition	Benefits	Challenges
Local libraries choose and implement their own online catalog system(s)	Local autonomy is preserved; tools are selected based on the needs of the library's primary clientele	Cooperative solution(s) must work in a wide variety of environments; many local variations must be reconciled
Library resources in California are extremely numerous and diverse	Expanding access to these resources has the potential for rich rewards to the library user	Solutions must work on a very large scale
Local libraries vary in their ability to implement new technology	Local budget and staffing priorities are set locally, in context with other needs	We need to identify a basic "entry level" for cooperative efforts, attainable by all without penalizing early adopters or abandoning those who lag behind

Condition	Benefits	Challenges
Funding for and interest in new technology often outstrip the expertise available for implementation	There are lots of opportunities for improving service by taking advantage of new tools	We need to develop much better technology project management and implementation skills in libraries
Relevant and useful new products are offered by many different vendors	Products evolve rapidly in an open and competitive marketplace	Pricing, functionality and quality vary widely; there is no one "best" product for all libraries and the choices can be confusing
Sophisticated standards are required for implementation of multi-library technology projects	Newly available standards support powerful, complex online transactions	Vendor implementation of new standards is uneven; substantial effort is required to implement and fine tune newly compliant products
More and more materials are coming "online" all the time	Users' chances of finding desired materials are improving	Finding a desired item is just the first step; we need to improve techniques for efficient loan management and materials delivery
Improving finding tools increases library use	Patrons receive more service	Libraries must handle more workload
Web-based self-service is now possible	Self service interlibrary loan is likely to be popular with many patrons	Self-service is not for everyone; completeness and quality of results are not as high as with professionally mediated service

The main point to be made here is that the creation of the virtual catalog is not taking place in a vacuum. Every policy decision involves trade-offs, and every increase in local autonomy or technological capability in turn adds to the challenge and complexity of statewide implementation.

## IV. Library of California Technology Infrastructure

This study identified twenty components that contribute to the technology infrastructure required for realization of the Library of California. While twenty may seem a large number, breaking the discussion into separate components helped to clarify the analysis of progress to date and to highlight those areas where there are gaps in development.

The twenty components that make up the proposed Library of California Technology Infrastructure are:

1. Commitment
2. Local MARC Databases
3. Local Online Catalogs
4. Management-level Understanding of Basic Networking Issues
5. Technology Project Management Skills
6. Local Wiring and Data Communications Networks
7. Local Network Maintenance and Troubleshooting Skills
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18. Patron Authentication System(s)
19. Electronic Collections
20. Self-service Electronic Borrowing

For each of these components, the narrative includes a brief description, progress to date, problems encountered, programs that currently support this area, and recommendations for moving forward.

*Note: In the following sections, estimated costs of recommended activities are expressed as unit costs, i.e. per library or per event. Actual project costs will depend on the number of libraries or events targeted.*

## **Component #1: Commitment**

Technology projects consist of more than hardware and software, and almost every person interviewed for this study mentioned commitment as the most important element for a successful Linked Systems implementation. It is clear that linking disparate automated systems requires patience and persistence, and only those participants who are committed to overcoming any obstacles they encounter are likely to see positive results.

### **Progress to date**

Though commitment to resource sharing generally and Linked Systems Projects specifically is not easily measured, it is fair to say that California has an established tradition of library cooperation and that activities in support of shared automation projects are understood to be an important component of modern library service. The Z39.50 protocol, on which Linked Systems Projects are based, is a recognized standard and librarians are looking forward to reaping the promised benefits of interconnectivity.

### **Problems encountered**

While library directors appear to be generally committed to the development of a virtual statewide database, line and support staff are not necessarily committed to the success of this program. There are two noticeable problems. First, some library personnel are feeling overwhelmed by recent technological changes and are reluctant to take on new technology projects of any kind. Secondly, the development and tuning of Z39.50 links can be a slow and exacting process, and staff sometimes lose heart when results are less than perfect or their efforts are not immediately rewarded. Not surprisingly, some see Linked Systems Projects in terms of increased local workload rather than improved regional service.

These reactions are analogous to the response of library workers in the 1970s to the introduction of the MARC (MACHine Readable Cataloging) standard for cataloging. Transition to new MARC cataloging methods was slow and often difficult, and those who were called upon to abandon familiar routines did not always enjoy the process of changing. Looking back, however, it is clear that the establishment of the new standard was worth the short term effort in exchange for long term benefits; the same could be said of Z39.50 implementation.

## Programs supporting this area

Though commitment is not something that can be directly funded or implemented, library directors do receive regular communications about the goals of the Library of California and the purpose and value of system linking. Grant program materials encourage participation, and project grants and ongoing subsidies reward early adopters of Z39.50 technology.

## Recommendations

The challenge is to communicate the value of system linking to more front line staff and to address concerns about increased workload. To that end, *the following activities are recommended:*

- Document and publicize patron response to virtual catalog access, and patron satisfaction with new resource sharing tools.

*Estimated unit cost: \$20,000*

- Measure short and long term workflow and workload impacts of new resource sharing techniques.

*Estimated unit cost: \$25,000*

## Component #2: Local MARC Databases

The key to any library's collections is its catalog, and the *de facto* standard catalog for a modern library is the MARC (MAchine Readable Cataloging) bibliographic database. Only by converting catalog information to a standard computerized format can a library participate fully in the statewide database and other resource sharing initiatives.

## Progress to date

An estimated 90% of California's public and academic libraries have created and continue to maintain MARC databases representing their collections. Smaller and rural libraries comprise the remaining 10%. School and special libraries lag somewhat behind, with an estimated 50-60% having completed this task.

## Problems encountered

Many of the libraries that have not yet created a MARC database want to move ahead but have not been able to muster the one-time funding needed for retrospective conversion.

Among libraries that have already converted most of their catalog to MARC, there also remain some collections of unconverted materials—often non-English, paperback, or local historical collections—remaining to be processed.

## Programs supporting this area

A State retrospective conversion grant program provides targeted funding in this area.

## Recommendations

By completing retrospective conversion tasks in a few of the remaining libraries each year, we should be able to approach comprehensive coverage in the virtual catalog. *Therefore, the following activity is recommended:*

- Continue the existing retrospective grant program.

## Component #3: Local Online Catalogs

Once a MARC database has been created, the next step is to mount it on a computer system that will allow the catalog records to be searched online by staff and patrons. Such local online catalog systems—a combination of locally installed hardware and software—are offered by more than two dozen different library vendors.

In order to accommodate local needs and preferences, California libraries have installed a wide range of online catalog products. The principle common denominator for all these products is the MARC database standard. Even so, online catalog software can vary considerably from vendor to vendor, and even from version to version of the same product. For example, some online catalogs allow searching by author, title, and subject only; others support searching by keyword, date, or format. Furthermore, libraries differ in their choices about which search functions to offer their users. For example, some libraries allow their patrons to interact with the catalog online to place a hold on desired

materials; others do not. Each local installation is unique, specially configured and tuned to meet local needs.

### **Progress to date**

Approximately 80% of California public libraries and 90% of academic libraries have installed local automated library systems with online catalogs. Figures for school and special libraries are lower, estimated at 35-45%.

### **Problems encountered**

The online catalog has been a standard library tool for more than fifteen years. As with retrospective conversion, the majority of the libraries that have not yet implemented an online catalog want to do so but have not been able to secure the funding needed for the initial purchase. In some cases, one time funds might be available but annual hardware and software maintenance and support fees are not.

### **Programs supporting this area**

Because most of the benefit of automating library functions accrues to the local jurisdiction, implementation of a local online catalog has long been considered a local responsibility. There are currently no funding initiatives targeting this area.

### **Recommendations**

Today the local online catalog is the primary means of linking library users with library materials. It is also one of the key elements of any Linked Systems Project. Without a local online catalog, a jurisdiction's participation in the Library of California will be extremely limited.

Providing state funding for implementation of local online catalogs would mean reversing a long-standing policy. However, at this point in development, the benefit to citizens who would otherwise be excluded from full participation in the Library of California seems to outweigh the disadvantages of providing monies to local libraries whose own jurisdictions have failed to support them.

After 15 years, rather than leave those few remaining public libraries behind, *the following activities are recommended:*

- Conduct a statewide “technology census” to document which libraries are not yet automated, and to gather important details about what product(s) are installed at each site that is automated.

*Estimated unit cost: \$40,000*

- Offer targeted grant funding for public libraries for local online catalog system purchase and installation, contingent on the library’s commitment to maintain the system and participate in resource sharing activities.

Because smaller libraries may not be able to staff their own computer systems, it is further recommended that any grant program in this area also support the applicant’s joining a neighboring library that already has an online catalog, in a shared system. Once we have full public library participation, assistance to other types of libraries might be considered as well.

*Estimated unit cost: \$25,000 – 50,000*

#### **Component #4: Management-level Understanding of Basic Networking Issues**

In recent years all kinds of computer systems, including those installed in libraries, have been evolving away from large, centralized installations towards smaller, more widely distributed elements. This fundamental change in computing has greatly increased the importance of the network that ties the various elements together. Successful planning and delivery of computerized library services now requires a basic understanding of how computer networks function, what kinds of network products are appropriate for libraries, and what general steps are involved in budgeting for, selecting, and implementing a local library network.

#### **Progress to date**

This is an area that is beginning to be understood in corporate and academic libraries; we have seen less progress in public and school libraries. Understanding of networking issues has not yet entered the library management mainstream.

## **Problems encountered**

Few librarians have a basic understanding of fundamental networking issues. Most do not distinguish between the detailed technical knowledge required to design and install a computer network—activities best left to specialists—and the broad management knowledge required to oversee the activities of an organization that relies on a network to deliver its services.

Library administrators are generally not aware of the non-technical techniques that could help make them effective consumers of network technology and services. They frequently have little control over the installations on which their libraries must depend. Any interaction with the network provider is considered a technical rather than an administrative responsibility, and is customarily delegated to the library's automated system manager.

When network-related funding is made available locally it is generally directed towards technical consultants, with whom management does not interact. Nor is there any clear guidance available to library administrators about which issues to delegate to technical staff and which to address at a management level.

This lack of administrative participation in key decisions relating to networking is not limited to California; it is common throughout the library community.

## **Programs supporting this area**

This area is now beginning to be addressed by the Stanford-California State Library Institute on 21<sup>st</sup>-Century Librarianship. Institute programs on how libraries can take advantage of changes in information technology are being designed to help develop a new generation of library leaders.

In the coming year, the InFoPeople Project will also be offering very pragmatic technology “best practices” workshops specifically designed for library administrators. These workshops will include training in network issues, with sample budgets, policies, calendars, tips for selecting network providers, staffing plans, etc.

## **Recommendations**

This is an area in which California can show important professional leadership. Development of an informed, engaged group of library administrators will help insure that sufficient local time, attention, and resources are devoted to

this vital component of the technology infrastructure. *The following activity is recommended:*

- Continue the planned initiatives in this area.

## **Component #5: Technology Project Management Skills**

It would be difficult to find a library that is not currently embarked on some sort of technology project. To give an idea of the range of technology projects now being pursued in California libraries, here are just some of the areas identified as important in the Technology Plan recently prepared by Library of California Region II:

- MARC database conversion
- Automation system selection and procurement
- Network infrastructure assessment, design and implementation
- Network support and maintenance
- System performance analysis
- Planning for ongoing system support
- Evaluation of electronic collections and resources
- Patron authentication
- Web design and development of Web-accessible resources
- Video conferencing
- Assistive (ADA) technologies
- Technology training

And there is ample evidence that the best guarantee of any technology project's success is the availability of a skilled project manager to shepherd it to completion. This is especially true of complex or multi-jurisdictional efforts, such as Linked Systems Projects.

Successful technology project management requires:

- library knowledge sufficient to give a clear understanding of the service goal to be achieved;
- technical knowledge sufficient to identify which kind(s) of technology might help to accomplish that goal;
- knowledge of best practices for implementing the chosen technology in a library setting;
- ability to negotiate vendor contracts and workplans;
- ability to identify and schedule the specific steps required to implement the technology;

- ability to identify and pursue relevant funding opportunities;
- ability to secure the cooperation and guide the efforts of all who are involved in the project, both within and outside the library; and
- ability to evaluate progress towards completion and adjust the project workplan as necessary to stay on track.

### **Progress to date**

All of the Linked Systems Projects have reported a direct correlation between their level of success and the availability of technology project management expertise. The best results were reported by projects that had ongoing, local access to such assistance. Unfortunately, there are currently very few individuals in the library community who have this combination of skills. Not surprisingly, those who do are in extremely high demand.

Until recently, library technology efforts were narrowly focused on online catalog implementation, and a library could get by with designating just one or two staff members to oversee all technology-related tasks. Now that there is a technology component to practically every library service, all management involves some degree of technology project management.

Only the larger academic libraries appear to be investing in the recruitment, development and retention of library staff with technology project management skills.

### **Problems encountered**

Demand for technology project management skills far outweighs supply. While most recent library school graduates do have a basic grounding in this area, there is a serious shortage of mid-level managers with the appropriate skills. Even when funding is available to hire technology-savvy staff, qualified candidates are scarce. And current staffing in this area is so thin that the departure of a single key employee can delay a project for months.

Furthermore, libraries are not able to compete with other employers who pay a premium for existing technology project management talent. Nor do vendor support staff or outside consultants entirely solve the problem; the real need is for regular library staff with ongoing, onsite responsibility for a project's success.

Library workers have generally not taken responsibility for their own professional development in this area. Many librarians do not consider technology-based projects to be part of their "real" job. The general expectation seems to be that somebody else should be brought in to solve technology

problems of all kinds—everything from unjamming a printer to managing the implementation of a Web-based catalog. This needs to change.

### **Programs supporting this area**

The State has provided introductory training in the technology planning process, as well as grants in support of regional technology planning efforts. These activities have focused on techniques for choosing which technology-based services to offer.

The Stanford-California State Library Institute on 21<sup>st</sup>-Century Librarianship has announced general plans to address vehicles for mid-career development for librarians; technology project management is likely to be one focus of this effort.

In the coming year, the InFoPeople Project will provide more “hands-on” technology project planning and management workshops. The emphasis will be on skills necessary for seeing a project through from conception to completion.

Also in the coming year, training supported by the Gates Library Initiative will include a unit on specific project management techniques for connecting libraries to the Internet.

### **Recommendations**

One of the most effective ways of moving the entire state forward would be a serious effort to teach technology project management skills to librarians. As long as there is more technology-based work to do than skilled staff available to do it, we will be slowed in our progress towards full implementation of the Library of California.

Since qualified staff are scarce, the recommended approach is to improve the skills of existing staff. This should help to guarantee a strong library service orientation in our project managers and should also help with retention of talented staff. Both local and cooperative efforts will be strengthened by this retooling. *The following activities are recommended:*

- Continue the planned initiatives in this area.
- Augment planned InFoPeople training to begin development of a comprehensive technology project management curriculum.

*Estimated unit cost:*    \$50,000

- Investigate ways to link trainees with experienced mentors, so that existing expertise can be shared.

*Estimated unit cost:*    \$ 15,000

- Investigate options for technology project manager certification, perhaps in conjunction with one or more of the graduate schools of library/information science.

*Estimated unit cost:*    \$ 10,000

## **Component #6:            Local Wiring and Data Communications Networks**

As noted earlier, libraries are gradually making the transition from centralized to distributed computing. That transition requires both local wiring to connect additional workstations and the creation of a local data communications network.

### **Progress to date**

Good progress is being made in this area. Almost all (90%+) academic libraries that have an online catalog have also installed a campus network. The figures are somewhat lower for public libraries—an estimated 60-70% of automated libraries have installed or are in the process of installing a local network, and more are being added all the time. In school and special libraries, the network installation frequently precedes implementation of an online catalog—an estimated 40% of schools and 85% of special libraries now have data communications networks in place.

### **Problems encountered**

Though librarians are generally not well versed in management issues relating to network utilization, they do not report serious problems with actual network installation. These tasks are generally performed by outside technical advisors who identify and install the necessary wiring, hardware and software.

The main challenge for the library is in communicating their overall needs to network designers (see component #4 above) and securing necessary local funding to pay for installation.

Wiring and network installation are often tied to remodeling projects; libraries in old or historically significant buildings may have trouble modifying walls and floors to accommodate wires and cables.

Libraries with facilities served by multiple phone companies may take longer to install and test a data communications network, simply because there are more contracts to negotiate, but they do ultimately manage to connect all locations.

### **Programs supporting this area**

Discounts on local network hardware, software, installation, phone lines, and ongoing support are available to school and public libraries through the federal eRate program. Additional discounts are available through the California Teleconnect Fund. The State Library monitors these programs and alerts libraries to special opportunities in this area as they become available.

Local wiring is not covered by these discount programs; many public libraries report using PLF funds for this purpose.

The library bond measure that will appear on the spring ballot may also lead to new funding for wiring and network upgrades, as elements of library building and remodeling projects.

### **Recommendations**

Though the State does not fund this component directly, libraries receive assistance in this area from a number of other sources. *The following activity is therefore recommended:*

- Continue informing California libraries of existing initiatives in this area.

## **Component #7: Local Network Maintenance and Troubleshooting Skills**

Installing a local network is a relatively straightforward process; the entire initial installation is often outsourced. Keeping the local network up and running after it is installed is more challenging, and calls for local availability of network maintenance and troubleshooting skills. The most successful technology projects have onsite—or very responsive on call—access to such expertise.

## **Progress to date**

Most libraries that have installed local networks have some sort of arrangement for ongoing technical support. These arrangements vary considerably, however, in the quantity and quality of assistance provided. The requisite skills are generally available, but not within the library.

Academic and corporate libraries seem to have recognized the need for skilled local network maintenance staff. School library networks are most often supported from the district office. Public libraries have made the least progress in securing adequate network maintenance and troubleshooting support.

## **Problems encountered**

Many public library administrators have not recognized the need to devote new resources to network maintenance and troubleshooting. It is incorrectly assumed that, once the new network is installed, the library's online catalog system manager should be able to handle all network-related tasks as well. Network maintenance is a highly technical job, for which experience managing an online library catalog does not provide much applicable background. Existing online catalog system managers, who are already being looked to as the only qualified technology project managers in the library, have neither sufficient time nor the appropriate technical training to take on these additional network tasks.

Some level of network technical support is often provided to a library by its parent jurisdiction. However, these technicians are not usually available during extended library hours, and do not always respond promptly to library requests. Nor do non-library personnel automatically understand and appreciate the library's desire for a relatively open network, suitable for direct use by the public.

Finally, there is a broad market outside the library community for network maintenance and troubleshooting skills, and effective network support is not cheap. Staff with the requisite skills are reluctant to come to work in the library, when both current pay and opportunities for advancement are better elsewhere.

## **Programs supporting this area**

There are currently no state funding initiatives targeting this area. Though properly functioning local networks are an important element of the overall Library of California Technology Infrastructure, these networks are local installations yielding primarily local benefits. Nor is there any new library technology to be demonstrated here. Local networking maintenance and troubleshooting should remain a local responsibility.

Most automated library system vendors do provide training on basic network “first aid.” This provides a sufficient skill level for most library staff, but does not substitute for access to a trained network specialist.

## **Recommendations**

The most practical approach in this area is not to attempt to bring full network support skills into the library, or to invest state dollars in what remains essentially a local staffing need. Instead the State should focus its efforts on helping library administrators understand and allocate resources for outsourced network support services, and teaching library managers to articulate network needs—for capacity, hours of service, open access, etc.—in terms readily understood by non-library staff. These activities are covered in components #4 and #5 above.

*In addition, the following activity is recommended:*

- Offer public libraries a 50% funding match for library vendor-provided training in basic network management techniques, up to a designated maximum allowance.

*Estimated unit cost:     \$2,000*

- Alternatively, sponsor vendor-provided training events at locations throughout the State.

*Estimated unit cost:     \$15,000*

## **Component #8:           Internet Connections**

The virtual catalog is made up of a large number of separate online library catalogs, connected “live” via the Internet. Connection to the Internet is a fundamental component of all Linked Systems Projects, and a cornerstone of the Library of California Technology Infrastructure.

An Internet connection consists of two basic parts—a contract with an Internet Service Provider (ISP) and one or more telecommunications connections (usually phone lines, preferably high speed) between the library and the ISP.

## **Progress to date**

California has made excellent progress in this area. More than 50% of all California library facilities have some sort of Internet connection, and more are being added all the time.

## **Problems encountered**

The main problem reported by libraries is that they cannot expand their Internet connections fast enough to keep pace with demand. Libraries that still have dial up or ISDN telephone connections would like to increase capacity and improve response time by upgrading to high speed lines.

## **Programs supporting this area**

The introduction of basic dial-up Internet access—startup hardware, software, connectivity and training—has been provided to California public libraries by the InFoPeople Project. Eligibility for InFoPeople grants has now been expanded to other types of libraries as well.

Network-level Internet connections have been funded as part of the Linked Systems Projects.

In the coming year, additional connections will be provided as part of the Gates Library Initiative.

Ongoing Internet connectivity and data lines for school and public libraries are discounted under the eRate program.

Telecommunications discounts are also available from the California Teleconnect Fund.

## **Recommendations**

*The following activities are recommended:*

- Continue existing initiatives in this area.
- Investigate one time incentive funding for installation of high speed telecommunications lines in public libraries, contingent on the library's commitment to maintain the line and participate in resource sharing activities.

*Estimated unit cost: \$ 3,000*

## **Component #9: Web-ready PCs for Internet Searching**

In order to search the Internet—and any virtual catalog delivered via the Internet—the library user needs a fairly recent vintage PC with Web browser software. Libraries are therefore replacing their old dumb terminals and first generation PCs with more modern workstations for both staff and patrons.

### **Progress to date**

Progress in this area has been steady. The need to upgrade library workstations is well understood and libraries of all types are doing so as quickly as local funding allows.

### **Problems encountered**

Some jurisdictions have not adjusted their budget policies to recognize equipment replacement as an ongoing cost of operation rather than a one time capital expense. Notwithstanding, libraries are managing to add PCs, though not always as quickly as they would like.

In some cases, existing facilities must be remodeled before additional PCs can be added. In some historically significant buildings, remodeling can be difficult.

### **Programs supporting this area**

The InFoPeople Project has provided more than 664 Internet-ready PCs to 530 public library sites throughout the state.

A limited number of PCs have also been provided under the Linked Systems grants.

In the coming year, the Gates Library Initiative will provide many more Web-ready PCs to California public libraries.

### **Recommendations**

The need for PCs for Internet access has been well demonstrated and local libraries can now be considered responsible for securing their own equipment. *Therefore the following activity is recommended:*

- Focus efforts in this area on the Gates Initiative.

## **Component #10: Policies for Managing New Electronic Services**

Before introducing any new service to staff and/or patrons, it is important to think through how the new service should be integrated with existing library operations, how it will be incorporated into the workflow, how it will be introduced to the public, how it will be supervised in the library, etc. This is particularly important for electronic services, since there are often accompanying changes to the physical layout of work areas as well as a fairly steep learning curve for new computer-related skills.

### **Progress to date**

California has made good progress in this area. Librarians are traditionally quite deliberate in their introduction of new services, particularly services that touch on unfamiliar areas such as new computer technology. Consequently, considerable care is being given to questions of how best to incorporate electronic services—including Linked Systems technology—into existing library offerings.

All of the regions and an estimated 60% of public libraries have done significant work on the development of new policies for electronic services. Most (80%+) academic libraries have also completed work in this area. Schools and special libraries are less likely to control policy development for their organizations; consequently they have been much less active in this area.

### **Problems encountered**

The main problem in this area may be one of excessive caution. In an effort to work out every implementation detail in advance and eliminate all possible risks, some libraries defer introducing new electronic services and continue to work instead on carefully crafted policies.

This is also an area where patron demand routinely outstrips the library's ability to respond. This means that policy development work does not always address patron needs and preferences but focuses instead on how to manage or limit access to popular but relatively scarce electronic resources.

### **Programs supporting this area**

The State Library has provided a broad range of programs in this area, including technology planning training and regional technology planning grants.

The InFoPeople project offers training and practical examples of policies relating to public Internet access.

In the coming year, training funded by the Gates Library Initiative will also target development of public access computer and Internet policies in public libraries.

### **Recommendations**

Efforts to develop new policies have been effective, but they could be more community driven. Therefore *the following activities are recommended:*

- Continue existing initiatives in this area, emphasizing user participation in the policy development and planning process.

### **Component #11: Internet Skills**

Linked Systems search results, as well as a broad range of other electronic library services, are delivered via the Internet. To make the virtual catalog a practical reality, library staff and patrons must learn how to find, request and deliver information over this powerful new medium.

### **Progress to date**

Progress in Internet skills development in California has been excellent. Since 1994, InFoPeople, the primary delivery mechanism for Internet skills training statewide, has trained more than 3,000 library users and staff. Many more libraries have pursued additional training opportunities made available from a variety of sources. A rough estimate would be that 85% of California libraries of all types have at least one full time staff member with good Internet skills; most have many more.

### **Problems encountered**

The main problem in this area is meeting the continuing demand for Internet access, equipment, and skills training.

## Programs supporting this area

The InFoPeople Project continues to be California's flagship program in this area.

In the coming year, training funded by the Gates Library Initiative will also target Internet skills.

## Recommendations

Though there appears to be no end to the demand for various kinds of Internet training, existing programs are doing a good job of addressing this area. *The following activity is recommended:*

- Continue existing initiatives in this area, continually updating training offerings to meet changing conditions and needs.

## Component #12: Local System Upgrades to Web Browser-based Online Catalogs

In recent years, the Web browser has become the *de facto* standard user interface for a wide range of computer systems, including library online catalog systems. All of the mainstream library automation vendors now offer new versions of their products designed to be accessible via the World Wide Web. Shifting from an older, character-based online catalog to a more modern, Web browser-based catalog usually requires an overall upgrade to the local library's primary hardware and software, sometimes even a total system replacement.

### Progress to date

Libraries have recognized the benefits of upgrading their local systems, and progress in this area has been steady. It is difficult to determine how many California libraries have already made the transition to a Web browser-based online catalog, but a rough estimate would be approximately 30-40% of libraries of all types.

### Problems encountered

Though Web-based catalogs are generally considered quite easy for patrons to use, the "back room" staff functionality of the new browser-based

software is not always comparable to older, character-based products. Since the older products are generally quite stable, there is no pressure to change; some libraries are waiting for the new offerings to develop further before switching.

Funding is also an issue; depending on the age and size of the library's current system, upgrading to a Web browser-based system can be quite costly.

### **Programs supporting this area**

Many of the original LSCA and LSTA Linked Systems Projects included funding to defray some of the costs of local system upgrades. However, maintaining and modernizing existing computer systems and improving searching for local patrons remain primarily local responsibilities. Many public libraries report using PLF funds for this purpose.

In some cases, vendors have bundled Z39.50 system linking software with the new browser-based version of their catalog, and sell a combined upgrade as one package. This has made it difficult to distinguish between products covered by Z39.50 server subsidies and those more appropriately purchased with local funds.

### **Recommendations**

*It is recommended* that local system upgrade to a Web browser-based online catalog remain a local responsibility.

## **Component #13: Local Implementation of Z39.50 Client and Server Software**

The Z39.50 data retrieval standard sees the world in terms of clients and servers. The client is the software that sends a user's search to a server. The server performs the search of its database according to specific instructions provided by the client and then returns search results to the client in the order and format requested. The client in turn communicates these results to the user interface.

Z39.50 software products from different vendors vary significantly in their approach to implementation of the standard. The Z39.50 standard attempts to codify all the ways in which the client and the server can communicate meaningful information to one another in order to negotiate an interactive search

and retrieval transaction. The standard describes not just how the messages are formatted but what they actually say. Since Z39.50 attempts to codify so much, and at such a high level, many of the retrieval features defined in the Z39.50 standard were made optional. In practical terms, this means that there may be considerable variation in legitimately “compliant” implementations of the Z39.50 standard.

It should be noted that Z39.50 client and server software is used by libraries for purposes other than Linked Systems Projects. It is often employed to support remote catalog access by a library’s own users, access to online reference materials or commercial databases, etc.

### **Progress to date**

It is difficult to determine how many California libraries have installed local Z39.50 client and/or server software. A very rough estimate would put the numbers at 60-70% for academic libraries, 20-30% for public libraries, and perhaps 10% for school and special libraries. This is an area where a technology census (as described in Component #3 above) would supply much needed planning data.

### **Problems encountered**

Most of the problems encountered in this area can be traced to variations in vendor implementations of the Z39.50 standard and in local library implementations of their online catalogs. This is a standard that, for better or worse, allows plenty of implementation leeway. As a result, each local installation is essentially unique, and it can be difficult to achieve consistent links between different systems.

Problems most often encountered include:

- difficulty retrieving detailed item and/or holdings information from other vendors’ systems;
- difficulty formatting detailed item and/or holdings information from other vendors’ systems;
- difficulty distinguishing ownership in multi-library databases. For example, items belonging to Folsom, Sutter County, Woodland and Sacramento public libraries cannot be separately identified on their shared automation system;
- difficulties moving Z39.50 search traffic back and forth across local network firewalls; and

- incompatibilities resulting from differences in local choices about database indexing. Cross-system Z39.50 search results are often improved by the inclusion of the same MARC fields in the linking libraries' keyword index(es).

It is important to note that the occurrence and severity of these problems varied substantially from product to product and library to library. It is not possible to state conclusively that a particular vendor's client or server software is "better" than any other—in many cases, the same product performed quite well in some of the libraries and projects surveyed for this study, and not in others.

Because each local installation of Z39.50 software is unique, it is not possible simply to create a standard implementation map or set of instructions that can be followed by all libraries. Implementers must currently use a fair amount of trial and error to achieve successful connections between systems of different types.

The ability to derive satisfactory search results appears to relate to the way the Z39.50 software is installed and configured locally, the way network connections are installed and configured locally, and the age of the online catalog systems to be linked. In general, the older the local online catalog, the more difficult it is to get the Z39.50 software working properly.

This is not to say that the software vendors have done all they could do to provide the detailed information needed to streamline configuration of Z39.50 connections, particularly connections to other vendors' systems. Library staff must spend large amounts of time trying different combinations of settings and attributes in an attempt to optimize Z39.50 search performance. As a result, many implementers feel that they are pioneers, working without adequate technical support.

It is also important to note that the problems encountered in California are typical of Z39.50 implementation problems elsewhere. Essentially, this is a new standard and there is still a fair amount of work to be done to make implementation more consistent and predictable.

### **Programs supporting this area**

Purchase of Z39.50 server software has been funded by Linked Systems Project grants and by Library of California Z39.50 server subsidies.

Recognizing that Z39.50 client software primarily benefits a library's own patrons, Linked Systems grants have funded some but not all of the costs of purchasing new client software for local libraries.

Linked Systems grants have also included funding for some consulting assistance to libraries that are installing new software. However, the difficulty of fine tuning Z39.50 connections has been greater than anticipated, and additional “hands on” assistance is needed at the local and regional levels.

Library vendors do offer Z39.50 implementation training, manuals, and information on their web sites. Though useful for optimizing their own products, these resources are weaker on issues relating to cross-vendor connections. Most vendors also offer Z39.50 implementation consultation and technical support on a fee basis.

And in June of 1999, the State Library approved an LSTA project with the 49-99 Cooperative Library System to develop a Z39.50 Implementation Toolkit. This project, undertaken by Joseph Ford and Associates, has developed, tested, documented and presented a toolkit of procedures, methods, and products that will assist 49-99/CAL libraries in the testing and maintenance of Z39.50 links and the operation of their regional virtual catalog.

## Recommendations

For Z39.50 server software, this problem of inconsistent implementation of the standard is being addressed on an international level, with the creation of a commonly agreed Z39.50 implementation profile. At the time this report was being prepared, the *Bath Profile for Library Applications and Resource Discovery*—which consists of a core subset of required attributes, including holdings—was about to be made available for wide public review. *It is strongly recommended* that the State Library participate in the review of the Bath Profile, to ensure that the implementation issues and problems discovered by the Linked Systems Projects are addressed.

Until the Bath Profile is adopted and implemented by the vendors, it may not be possible to standardize Z39.50 client-server mapping; there is simply too much variation between vendor implementations of the standard and between local implementations of the same online catalog product. At this point, therefore, *it is not recommended* that the State invest in extensive efforts to create cross-system attribute maps. This will disappoint implementers, who have been hoping for clear guidance in this area; however, the kind of detailed guides they have requested simply are not likely be feasible until after a uniform implementation profile has been adopted.

That said, we need not wait for review and adoption of a standard Z39.50 implementation profile to continue to move forward with solving system linking problems. Now that there is a core group of experienced Z39.50 implementers in California, the State should support mechanisms that put these implementers in touch with one another and with librarians who are embarking on Z39.50

installation. As one project participant said, “I feel as if I don’t know anywhere near enough about this stuff, but somebody who is just starting a project called me the other day and I was surprised by how much I had to say.” *The following activities are recommended:*

- Organize a California Z39.50 Users Group and establish an Internet listserv to help end the isolation of staff involved in these projects, assist with problem solving, communicate with one voice to the vendors of Z39.50 products, and provide a forum for sharing implementation successes and advice among technical staff who are responsible for configuring clients and servers.

*Estimated unit cost: \$20,000*

- Develop a California Z39.50 web site, designed for non-technical librarians, with copies of—or links to—relevant background materials, Internet resources, and project management guides.

*Estimated unit cost: \$5,000*

- Sponsor a 2-3 day Z39.50 institute to bring together Linked Systems project staff and managers, State Library representatives, consultants, technical experts, standards makers, experienced implementers from other states and projects, and vendors in a cooperative environment to share information and work out solutions to issues of mutual concern.

*Estimated unit cost: \$75,000*

- Package institute proceedings as an implementation toolkit for use by California libraries.

*Estimated unit cost: \$3,000*

- Distribute the 49-99/Joe Ford Z39.50 toolkit to other libraries and provide training in its use.

*Estimated unit cost: \$3,000*

- Sponsor training based on Z39.50 implementation aids developed in other states, notably William Moen’s “Guide to Implementing Z39.50 to Meet Your Objectives” (GIZMO) and Robert Gaines’ interoperability testing scenarios for Z39.50 clients.

*Estimated unit cost: \$3,000*

- Provide targeted grants to help pay for necessary reindexing of local databases to facilitate Z39.50 access.

*Estimated unit cost:*    \$1,000

## **Component #14:        Regional Broadcast Search Systems**

Z39.50 client and server software make it possible for a library user to connect to a single remote library system to search for information. If the information is not found on that remote system, the user connects to another system and tries again, repeating the search until the desired item is found. To streamline this process, the Linked Systems Projects have installed regional broadcast search systems. These resource sharing servers manage search traffic between the individual library catalogs. They support both direct Web access to and simultaneous searching of multiple local catalogs. With this approach, search results from several libraries can be merged and may be manipulated by the user.

### **Progress to date**

Progress in the deployment of regional broadcast search systems has been slow but steady. All of the projects have established functional links, many of the functions identified as “planned” in last year’s profiles are now up and running, and more libraries of all types are now connected to the regional servers.

### **Problems encountered**

The most frequently reported problem in this area is that Z39.50 broadcast search results are not consistent with results of direct “native” searches using the local system online catalogs. Discrepancies between Z39.50 broadcast searching and local system searching of the same database(s) are significant, and understanding how a Z39.50 engine, as opposed to a local system, processes searches, is critical to effective use of and appreciation for this technology.

Z39.50 broadcast searches often retrieve fewer items than direct searches of the same catalogs. This usually happens because Z39.50 software ignores any cross-system communications that are not fully understood by both client and server. Furthermore, because Z39.50 search transactions are conducted against continually changing files over a continually changing Internet, and

because search results are assembled “on the fly,” the same request may yield different responses if performed at different times.

Slow response times for broadcast searches have also been a problem at some sites. Two factors appear to be involved. The first is slow Internet connections: T-1 appears to be the minimum acceptable link speed for successful broadcast searching. The second is computer resource allocation: a local system may temporarily give a higher priority to intensive local processing, thereby slowing its response to “external” searches. In a few cases, an older local system is too underpowered even to keep up with day-to-day demands for local processing, much less with new loads related to broadcast searches.

Some projects also report interrupted searches. In those cases, the regional server initiates sessions with several local systems at once, then searches each local system in turn before assembling the broadcast search results. Individual local systems, particularly those that are heavily used, may “time out” and drop their connection to the regional server while the other systems are being searched. This appears to be in part a software design problem, and the vendors involved are aware of the need to make improvements.

Regional broadcast search system products are still being developed and enhanced by library vendors, but not always quickly enough to meet the needs of California Linked Systems Projects. Some regional gateway products support links to the most popular online catalogs but not to all of the online catalogs currently used in California libraries. In at least one case, a Linked Systems Project has commissioned its broadcast search system vendor to program an additional desired link.

It is also important to recognize that this is groundbreaking technology, and nobody could predict how much time and effort it would take to test, configure, and fine tune these systems. Progress in achieving the virtual catalog has been good, but some project participants are suffering from technology “battle fatigue.”

### **Programs supporting this area**

Funding for regional broadcast search system hardware and software has been provided by Linked Systems grants and Library of California regional server subsidies.

In the coming year, regional broadcast search system testing and management activities will be supported by the 49-99/Joe Ford Z39.50 toolkit and training (described under Component #13 above).

However, to date there has been little funding directed at post-installation configuration, troubleshooting and fine tuning of regional broadcast search systems.

## **Recommendations**

Until now, the primary focus of California Linked Systems Projects has been on the establishment of virtual catalog links. It is time to provide more support for refinement and enhancement of broadcast searching. *The following activities are recommended:*

- Conduct detailed response time tests to gauge system performance, clearly identify network bottlenecks, and propose solutions as appropriate.

*Estimated unit cost: \$6,000*

- Offer grant funding for direct implementation consulting and configuration assistance from broadcast search system vendors to regional project implementers.

*Estimated unit cost: \$7,500*

- Offer grant funding to support travel by project implementers to vendor-sponsored regional broadcast search system users group meetings and/or training events.

*Estimated unit cost: \$2,000*

## **Component #15: Interlibrary Loan Messaging System(s)**

Though the virtual catalog is a fundamental resource sharing tool, finding a desired item via Z39.50 searching is just one step towards meeting an information need. Once an item has been located online, users also want to be able to request it online. In library parlance, the user wants to initiate an electronic interlibrary loan (ILL) request. Once an electronic ILL request has been generated, library staff want the ILL messaging system to track that request until it is filled and to provide management statistics about loan traffic.

## **Progress to date**

In almost all of the Linked Systems Projects, the regional broadcast search system also supports interlibrary loan messaging, usually via some version of electronic mail. Though there is an official international standard for interlibrary loan (ISO 10160/61) not all ILL software products are based on the ISO standard. Those products which do comply with the ISO standard generally offer additional functionality in areas not addressed by the standard. A number of different electronic ILL messaging systems are currently being tested in California.

## **Problems encountered**

Regional ILL messaging technology is still in the early stages of development, and product offerings do not always compare favorably with OCLC's ILL subsystem for staff functionality or ease of staff use. Staff who are accustomed to OCLC ILL do not necessarily want to change messaging systems, especially if the new system does not promise considerable savings of staff time and effort.

On balance, staff and patrons who have never had access to OCLC and are not ILL specialists appear to be responding favorably to new messaging products. It should also be noted that regional broadcast search systems have the potential to connect users—staff and patrons—with more of the library collections in their region, and to integrate with other Library of California resource sharing services such as direct loan and regional delivery.

## **Programs supporting this area**

Linked Systems Project grant funds initially focused on the goal of creating a regional virtual catalog, though many projects have now moved beyond that goal to address issues of electronic ILL messaging as well. For example, the Monterey Bay Area Cooperative Library System (MOBAC) has commissioned programs to accompany the DRA Web2 product in an effort to streamline ILL message input tasks.

Some projects also report using state Transaction Based Reimbursement monies to support interlibrary loan messaging systems.

## **Recommendations**

This area needs increased attention. *The following activities are recommended:*

- Offer grants for demonstrating and evaluating new ILL messaging products.  
*Estimated unit cost: \$5000-50,000, depending on the product and the scope of the demonstration*
- Distribute the MOBAC enhancements to other Web2 users statewide.  
*Estimated unit cost: \$500*

## **Component #16: Interlibrary Loan Management and Extended Circulation System(s)**

“Interlibrary loan management” and “extended circulation” are not precise terms, but they are used here to distinguish those systems that go beyond the simple transmission of ILL requests. Interlibrary loan management and extended circulation systems automate many of the resource sharing tasks currently performed by library staff: verifying patrons’ eligibility for ILL service, checking local restrictions regarding material eligibility for loan, managing request routing and load leveling algorithms, automatically placing holds on items requested for ILL, and keeping detailed statistics on request and loan traffic.

The National Information Standards Organization (NISO) has addressed the need for standards in this area by convening a committee to work on requirements for a new Circulation Interchange Protocol. Such a protocol should help to regularize cross-system borrowing, including both direct borrowing and the interface between interlibrary loan systems and circulation systems. To date, the committee has developed a set of principles and guidelines that it will use in drafting the full standard; these were recently posted for initial review and comment at <http://www.niso.org/drafts/Z3982v1.html>

### **Progress to date**

One California Linked Systems Project typifies progress in this area—North Bay Cooperative Library System’s SuperSearch service combines elements of interlibrary loan management and extended circulation. (Details are provided in the Profiles section of this report.)

SuperSearch has been enthusiastically received by member library staff and patrons, and the system has supported a substantial increase in interlibrary loan traffic between North Bay libraries. Since the introduction of SuperSearch, more of North Bay’s interlibrary loan needs are met locally; fewer requests must go out of the region or the state to be filled.

### **Problems encountered**

Because SuperSearch is based on Z39.50 broadcast searching, this project has had the same experience with incomplete or inconsistent search results that other projects have reported. Nevertheless, use of the system is rapidly and increasing, and users report high levels of satisfaction.

SuperSearch has also experienced network slowdowns, and Internet connections have been upgraded on more than one occasion in order to improve response times. Fine tuning is an ongoing process, but it is still not clear how scalable this system is, or how it should be configured to optimize performance.

### **Programs supporting this area**

The primary State level investment in this area has been NBC's Linked Systems grant, supplemented of course with local funds.

### **Recommendations**

There is still much to be learned from the SuperSearch project. *The following activities are recommended:*

- Continue to monitor the SuperSearch project as the service is refined and expanded.
- If feasible, prepare a detailed, systematic analysis of SuperSearch project activities, costs, system performance, and service and workflow impacts to date.

*Estimated unit cost: \$25,000*

### **Component #17: Materials Delivery and Return System(s)**

A complete resource sharing transaction also includes the delivery—and usually the return—of library materials to and from the requester's home library. Therefore any increase in loan traffic resulting from improved catalog searching or automated ILL request processing will increase materials delivery and return loads.

## Progress to date

Cooperative delivery has long been a part of regional resource sharing in California. Different regions employ different delivery methods, including UPS, US Mail, private courier, and system owned delivery vans. In general, as loan traffic has increased, cooperative library system member libraries have either increased their contributions to the cooperative delivery budget or have renegotiated the level and frequency of delivery service to match available funds. There has been little recent investigation of delivery, delivery routing, or delivery tracking options.

## Problems encountered

Linked Systems Projects report few problems in this area—yet. As more regional catalogs are made available to the public, however, we can expect demands on existing delivery systems to increase dramatically. For example, since offering SuperSearch access to the public, the North Bay Cooperative Library System has experienced nearly 30% annual increase in delivery traffic. In NBC's case, increased delivery costs have been funded by local library contributions. However, it is not clear how much more loan traffic California libraries can afford, using current delivery methods.

## Programs supporting this area

Regional communications and delivery grants have long been a part of state level support for resource sharing.

## Recommendations

In light of expected increases in demand for delivery service, steps should be taken now to prepare for the additional traffic. *The following activities are recommended:*

- Continue existing funding programs in this area, being careful to monitor increases in the volume of delivery and return traffic.
- Fund demonstrations/evaluations of innovative delivery techniques, load management systems, tracking systems, etc.

*Estimated unit cost: \$5,000-50,000, depending on the scope of the project*

## **Component #18: Patron authentication System(s)**

The more virtual our library services become, the more challenging it is for a library to identify its patrons. There are no library cards in cyberspace. In order to achieve the free and open access to library services envisioned for the Library of California, we need to develop reliable mechanisms for determining whether a patron who “enters” a library via the Internet—or simply walks into a library other than the one where he/she was originally registered—is currently an eligible borrower in good standing. This electronic eligibility check is called patron authentication.

The most common use of patron authentication technology in libraries is to limit access to materials for which the library is charged a subscription fee based on the size of population served, e.g. full text periodicals databases. Patron authentication is also the first step in “extended circulation” services such as patron-placed holds.

Basic patron authentication consists of verifying the location and/or identity of the user, usually by checking the IP address of the computer from which a user request is initiated (for example, is this a computer on the campus network?) and/or the user’s email address or other patron identifier(s) such as barcode number, password, or PIN number. For many library services, particularly those related to borrowing, there is also a second authentication step—looking beyond the basic identity/eligibility of the user to make certain he/she has not exceeded any thresholds for number of items checked out, overdues, fines owed, etc.

### **Progress to date**

There is little detailed information available on library implementation of patron authentication technology. Academic libraries have taken the lead in this area, and many are now using various patron authentication strategies to extend electronic services to authorized students, faculty and staff. Other types of libraries have been slower to adopt this technology, though most public libraries that offer Web-based online catalogs do have the option to use patron authentication to support patron-placed holds and renewals. At this time, the only California Linked Systems Project with a fully implemented regional patron authentication component is North Bay Cooperative Library System’s SuperSearch. Other projects plan future work in this area.

Meanwhile, there are some interesting authentication models coming out of the world of Web commerce; it remains to be seen whether “credit card” style authentication will become the dominant approach.

## Problems encountered

Local patron authentication is a relatively new technology for libraries, and regional level patron authentication is largely unexplored territory. As yet there is no clear standard for patron authentication, and authentication software from different vendors is likely to be incompatible.

Patron authentication also raises concerns over privacy and confidentiality of patron records. Many librarians would like to preserve opportunities for users to consult library materials without having to identify themselves. Librarians are also anxious to secure the patron data used in authentication transactions in order to prevent information about patrons' reading or borrowing activities from being used for non-library purposes.

Resources required for patron authentication are also difficult to estimate. Because there are few large-file authentication systems currently operating in libraries, it is not yet known how much computer processing power will be needed to support this activity.

## Programs supporting this area

There are currently no State Library funding initiatives in this area.

## Recommendations

Even though there is no clear standard for patron authentication, it is important to start working on this issue now. *The following activities are recommended:*

- Survey the state of the art, identify relevant projects already underway, and monitor the emerging patron standard, to begin developing a basic working knowledge of options in this area.

*Estimated unit cost: \$20,000*

- Fund one or more demonstrations of regional or state level patron authentication techniques.

*Estimated unit cost: \$50,000-250,000, depending on the scope of the project*

## **Component #19: Electronic Collections**

It is well known that library collections are no longer limited to printed materials, and that many libraries now offer a broad range of information resources in electronic form. Library databases have moved beyond bibliographic records and indexes to incorporate the full text of reference sources and periodicals, image files, audio archives, etc.

Conversion of existing print collections—particularly rare and valuable materials not suitable for loan—to electronic form helps both to preserve the original materials and to make them accessible to many more users throughout the state.

### **Progress to date**

California libraries are making steady progress in the development of electronic collections, both by licensing commercially available materials such as periodicals databases and by digitizing locally owned materials such as historical photo archives.

### **Problems encountered**

Standards for storage of and access to electronic collections are still being developed, and there is a risk of incompatibility from one product or project to another. In California, this issue has been addressed by state level initiatives to coordinate digitizing activities statewide.

Another concern raised by the move to electronic versions of commercially published materials is that pricing of commercial databases is often based on total population served and/or number of times the database is accessed. Given such pricing, open, unlimited access to an electronic resource can be difficult if not impossible to maintain, and statewide licensing of commercial databases to guarantee access for all may be prohibitively expensive.

### **Programs supporting this area**

The State Library has offered both leadership and grant funding for digitization projects, with special attention to the development of uniform standards for creating records for electronic collections.

As a demonstration of statewide access to a commercial database, Library of California funds have been used to make the Rand database available for searching statewide.

## Recommendations

*The following activities are recommended:*

- Continue the existing program to fund digitization projects.
- Evaluate the use and benefits of Rand database access and explore other options for regional or statewide access to commercial databases.

*Estimated unit cost:*     \$25,000

## Component #20:        **Self-service Electronic Borrowing**

In the past, tools to support electronic borrowing were developed for use by library staff only. Opportunities for patrons to use their own library via electronic self-service were limited, and opportunities for patrons to use regional resources via electronic self-service were extremely rare. Since the advent of the World Wide Web, patron interest in and demand for independent Internet access to a full range of library services has increased significantly.

Self-service electronic borrowing is within our reach. There are now mainstream library products that support direct patron interaction with all of the components of the Library of California Technology Infrastructure. The challenge is to create an environment that supports their implementation.

### **Progress to date**

Though statistical data for this component are not available, the concept of electronic self service is well established in academic and special libraries, and it is common for users to search for and request materials online and have them shipped to them at remote locations. Many public libraries have begun to extend circulation-related services via the Internet, though in most cases the borrower must come to the library to pick up desired material. School libraries are not active in this area, but a few are beginning to experiment.

Regional level electronic self service for resource sharing is much rarer – North Bay's SuperSearch, which allows direct patron placement of holds on titles owned by other libraries, is the best developed example among the Linked Systems Projects.

Patrons who do have access to electronic self-service of any sort seem to be enthusiastic about it. Despite the known limitations of Z39.50-based retrieval,

it is fair to say that users are at least as interested in the convenience afforded by electronic self-service as they are in the completeness of search results. The tremendous success of the World Wide Web seems to indicate that the general public—as contrasted with the library community—has a relatively high tolerance for imprecision, and that users are not dissatisfied with variable or incomplete results as long as they are able to find something useful on their own.

### **Problems encountered**

Software products designed for patron self-service are not usually as functionally rich or powerful as staff-oriented tools. Nor will a generic World Wide Web browser support as many sophisticated search and sort options as specialized library software. And, as we have seen with the regional broadcast search tools, new Z39.50-based software products may not always perform as accurately and consistently as other information retrieval tools already in place. This lack of consistency and functionality is troubling to many librarians, who do not want to offer new services for independent patron use that are less complete or precise than the mediated services already available.

Implementation of electronic self-service has also been impeded by staff concerns over anticipated workload increases. Some librarians indicate that they are reluctant to offer self-service for any one component of resource sharing, e.g. patron-initiated ILL requests, until all steps in the process have been fully automated. Otherwise it may be easy for patrons to demand service but difficult for libraries to provide it. Some librarians have also expressed the concern that the additional search transactions resulting from remote Z39.50 queries might degrade local computer system performance and response times for their primary clientele.

### **Programs supporting this area**

Linked Systems Project grants and Library of California regional server subsidies target this area, though primarily as an optional element.

### **Recommendations**

While public acceptance of more modest results is no reason to relax library standards of quality, perhaps electronic self-service should be reconsidered in light of its utility as a shortcut—not as a substitute for assistance from a trained professional who has access to more specialized tools. For example, rather than hesitating to offer broadcast searching to the public because it is not perfect, perhaps we should be advising patrons to try a broadcast search first and then to look directly at individual catalogs and/or

consult a librarian if broadcast searching does not yield the information they need.

Similarly, there is the broad question of whether it is good library service to allow patrons to interact with the library entirely via electronic means. If a loan request comes in over the Internet, should the patron be required to visit the library to pick up the item or is it acceptable to process the loan electronically and ship the material directly to the patron? To help answer that question, perhaps we should begin to experiment with shipping requested materials directly to borrowers, even if that means they will miss an opportunity to discover even more items by coming to the library in person.

Instead of worrying about the possible effects of electronic self-service borrowing, we should be offering it on a pilot basis and measuring the actual effects. *The following activities are recommended:*

- Survey the state of the art, identify relevant projects already underway, and begin developing a basic working knowledge of options for self-service electronic borrowing.

*Estimated unit cost: \$20,000*

- Fund libraries and/or regions that offer programs in this area to measure user response to and satisfaction with electronic self-service, with an eye to developing resource information on user needs and preferences.

*Estimated unit cost: \$5,000*

- Measure the effects of electronic self-service borrowing on library staff workloads and workflows.

*Estimated unit cost: \$25,000*

## V. Updated Linked Systems Project Profiles

The following profiles provide updated information about the linking strategy employed by each of this year's Linked Systems Projects, 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 September 25, 1999) 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:** **49/99 Cooperative Library System/  
Central Association of Libraries**

**Linked libraries:**

Current	Amador County Library Calaveras County Library Columbia College Library CSU Stanislaus Library San Joaquin-Delta College Library Lodi Public Library Merced College Library Merced County Library Modesto Junior College Library Stanislaus County Free Library Stockton-San Joaquin County Public Library Tuolumne County Library University of the Pacific Library
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**Types of local systems linked:**

Currently accessible	Best-Seller DRA Dynix Geac Advance Geac Plus Innovative Interfaces Sirsi
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**Brief description of project:**

Using a combination of local and grant funds, 49-99/CAL members have installed local Z39.50 server and client software and have begun implementation and testing of a shared regional server. This was the first Linked Systems Project to achieve 100% participation of its automated members in a virtual catalog.

**Linking software used:** DRA Web2

**Current status:**

All Z39.50 links have been active since May/June 1999—active testing continues, with an emphasis on refining search results. This project has not yet gone into full production with the regional virtual catalog.

**Greatest difficulty or challenge encountered:**

49-99/CAL indicates that their greatest difficulties this year have centered on delays in the installation of T-1 lines at the host library, Stockton-San Joaquin County Public Library. Until the T-1 line to the regional server was installed—early in September 1999—response times on the regional broadcast search system were not acceptable for anything but testing.

Turnover in technical project management and support staff at the host library where the regional system is housed has also been a challenge.

**Greatest benefit or result (to date) of project:**

49-99/CAL commissioned Joseph Ford and Associates to develop, test, document and present a toolkit of procedures, methods, and products that will assist libraries in the operation of their regional virtual catalog. This Z39.50 Implementation Toolkit includes basic software tools—NeoTrace, NetNetic, and BookWhere2000—and instructions for using them to test and troubleshoot Z39.50 links in libraries. This library-oriented package should prove useful to Linked Systems Projects throughout the state.

<b>Project contact:</b>	Darla Gunning, System Director
address:	49-99 Cooperative Library System/ Central Association of Libraries 605 N. El Dorado Street Stockton, CA 95202-1999
telephone:	209-937-8630
fax:	209-937-8292
email:	djg.4999@usa.net

**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	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)	P		
Forward ILL request to other library(ies)	P		
Place hold in another library’s circulation system			
Track progress/status of ILL transactions online	P		

**Grant recipient:** **Metropolitan Cooperative Library System/ Santiago Library System**

**Linked libraries:**

Current	None
Planned	Fullerton Public Library Long Beach Public Library Mission Viejo Library Orange Public Library Palos Verde Public Library San Marino Public Library Torrance Public Library  (10 additional libraries planned for year 2)

**Types of local systems linked:**

Currently accessible	None
Planned	DRA Classic DRA Inlex DRA Taos Dynix Geac

**Brief description of project:**

To date, this project has concentrated on documenting member library needs and selecting regional broadcast server software. Actual implementation activities will begin soon.

**Linking software used:** Ameritech RSS

**Current status:**

At the time of this study, MCLS was in contract negotiations with the regional server software vendor.

**Greatest difficulty or challenge encountered:**

MCLS reports that their greatest challenge has been coordinating the schedules of all the individuals involved with this project.

**Greatest benefit or result (to date) of project:**

So far the greatest benefit of this effort has been increased knowledge of the regional gateway and interlibrary loan software products available in the market, and how they compare to one another.

**Project contact:** Ray Sharma

address: Metropolitan Cooperative LS  
3675 East Huntington Drive  
Suite 100  
Pasadena, CA 91107

telephone: 626-683-8244

fax: 626-683-8097

email: rsharma@mclsys.org

**Resource Sharing Functionality: MCLS/SLS**

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)	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

\* The regional server software MCLS has selected has the capabilities described above; however, local policies may override overall system policies.

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

## Current

Cabrillo College Library  
 California State University, Monterey  
 Bay Library  
 Carmel Public Library (Harrison  
 Memorial Library)  
 Defense Language Institute  
 Dudley Knox Library, U.S. Naval  
 Postgraduate School  
 Monterey Bay Aquarium Library  
 Monterey County Free Libraries  
 Monterey Institute of International  
 Studies  
 Monterey Peninsula College Library  
 Monterey Public Library  
 Pacific Grove Public Library  
 Salinas Public Library  
 San Benito County Free Library  
 Santa Cruz City/County Library  
 University of California, Santa Cruz  
 Watsonville Public Library

## Planned

San Juan Bautista (by Spring 2000)  
 Hartnell College (Winter 1999/2000)  
 Gavilan College (Spring/Summer 2000)

**Types of local systems linked:**

## Currently accessible

DRA  
 Dynix  
 Endeavor  
 Inlex  
 Innovative Interfaces  
 Library Corporation  
 Sirsi  
 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 was licensed on a limited basis and mounted for testing on the NT server at Watsonville. MOBAC compared this product with other vendors' gateway offerings, including OCLC WebZ (used at Silicon Valley), CPS URSA (used at North Bay), and Ameritech RSS. DRA Web2 was finally selected, primarily because it met the functional requirements defined for the project while offering the most cost-effective solution.

Additional CLSA and LSTA grants enabled MOBAC to implement a dedicated regional server as the central engine of the MOBAC virtual catalog. The server is hosted by the Watsonville Public Library under contract with MOBAC, and is supported by Watsonville staff. With grant funds and local library contributions, MOBAC is now able to link to sixteen of its twenty members, broadcast a search to all libraries and retrieve a merged list of titles. When provided by the local online catalog vendor and supported by DRA Web2, holdings-level data is also accessible.

The emphasis of this project is on search and retrieval for both staff and public, and message management for ILL staff. The functionality available is provided partly by the DRA Web2 software and partly through local customization.

**Linking software used:** DRA Web 2

**Current status:**

Primarily ILL and public service staff have been using the regional catalog. Some participating libraries have begun to provide access to the public as well. Promotional and instructional materials to introduce the catalog to the public are currently in development.

**Greatest difficulty or challenge encountered:**

Inconsistencies in search results have caused frustration for staff and concern about public response to the system, and identifying the appropriate server configuration for maximum accuracy of results has been a laborious process.

MOBAC also reports that not all of the online catalog vendors represented in their libraries have implemented the display of item-level data. This additional inconsistency (i.e., some servers provide it, some don't) can be confusing to the user and diminishes somewhat the effectiveness of the technology.

**Greatest benefit or result 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. The project has brought a new dimension to the cooperation already in existence in the system, identified the technology skills present at the member libraries, and helped to create a team of very skilled and talented technology resource people.

Options for linking that are commonplace in urban areas are not easily accessible or affordable in rural areas. This project has overcome significant barriers imposed by geography and inequality of local resources.

**Project contact:** Judith Sulsona, Connectivity Facilitator

address: Monterey Bay Area Cooperative Library  
System  
MPC Library Building  
980 Fremont Street  
Monterey, CA 93940

telephone: 831-646-4256

fax: 831-646-4111

email: [mobac@mobac.org](mailto:mobac@mobac.org)

URL: <http://www.mobac.org>

**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	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		
Forward ILL request to other library(ies)	X		
Place hold in another library’s circulation system			
Track progress/status of ILL transactions online	X		

\* functionality varies depending on local library vendor’s Z39.50 server product

**Grant recipient:** **Mountain Valley Library System**

**Linked libraries:**

Current	American River College Auburn-Placer County Library California State Library Cosumnes River College CSU Sacramento Dixon Public Library El Dorado County Library Sacramento City College Sacramento County Law Library Sierra College Library Yuba College
Planned	Folsom Public Library Nevada County Library Roseville Public Library Sutter County Library Woodland Public Library

**Types of local systems linked:**

Currently accessible	DRA Classic DRA Inlex DRA Taos Dynix Endeavor Innovative Interfaces SIRS Mandarin Sirsi
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**Brief description of project:**

MVLS was able to take advantage of the early CLSA grants for linked systems and two member libraries initiated the process of establishing Z39.50-based access in the region. 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 resulted in this strategy's being abandoned.

The next step was an LSTA grant for the MVLS Electronic Connectivity Project. During the course of this project costs of server software and hardware decreased significantly and some funds were able to be redirected to selected libraries to implement Z39.50 server hardware and software. MVLS also acquired a regional Z39.50 gateway software and server. All member libraries and the general public can now access this gateway server to do broadcast searches on participating libraries.

The MVLS regional server is located at: <http://mvls.org>

**Linking software used:** DRAWeb

**Current status:**

Ten MVLS member libraries are successfully linked. The State Library is also accessible via the MVLS server. More public libraries are installing Z39.50 connections and should be linked by the end of 1999.

**Greatest difficulty or challenge encountered:**

MVLS also reports inconsistent holdings and shelf status implementations by local vendors, as well as difficulties troubleshooting configuration problems at local libraries. Technical support staff in some jurisdictions do not always give their Z39.50 connection a high priority and links can be “down” for long periods.

Sacramento Public Library, which shares its Geac online catalog system with three other libraries, established a Z39.50 connection to the regional server in late 1998. This link has been removed because Z39.50 searches were not able to differentiate the holdings of the separate jurisdictions. Sacramento Public Library will be migrating to an Innovative Interfaces online catalog early in 2000. Meanwhile, options for offering true holdings displays for their multi-jurisdiction system are being evaluated.

**Greatest benefit or result (to date) of project:**

Grant funding has significantly increased the number of MVLS members with Z39.50 connections in a short period of time, and new resources are now accessible to the public. Dixon Public Library’s collections are available for searching by MVLS members for the first time ever.

MVLS also reports that contracting with Sacramento Public Library for maintenance of the MVLS server has proved to be cost effective.

**Project contact:** Gerald Maginnity, Coordinator

address: Mountain Valley Library System  
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)	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)	P	P	P
Place hold in another library’s circulation system	P	P	P
Track progress/status of ILL transactions online	P	P	P

\* not consistent among all local online catalog vendors

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

**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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Linked for requesting only	Lake County Library Pacific Union College Rancho Cotati High School Richmond Public Library Travis Air Force Base
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**Types of local systems linked:**

Currently accessible	CARL DRA Dynix Innovative Interfaces TLC
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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.

The CPS URSA software goes beyond the searching functions described in the Z39.50 standard. 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.

SuperSearch is accessible on the Web at <http://nbcls.org/>. A user who is not an eligible borrower in an NBCLS library may login as "Guest."

**Linking software used:** CPS URSA

**Current status:**

This project is up and running successfully, and patrons are accessing SuperSearch in member libraries and via the World Wide Web. Some libraries in the region are using SuperSearch for interlibrary borrowing, but do not yet offer their own catalogs for searching, in some cases because they are not yet automated.

It should be noted that increased interlibrary loan traffic associated with this project has continued to require increases in courier delivery service, with delivery costs moving 25%-30% higher each year.

**Greatest difficulty or challenge encountered:**

North Bay reports that this project has tested the limits of online catalog vendors' implementations of the Z39.50 standard. Project participants continue to urge their local vendors to enhance their product offerings to improve retrieval consistency. That said, SuperSearch is nonetheless a very popular service.

This project has also had some problems with response time, which appear to be resolved now that SuperSearch has its own router and a higher priority Internet connection.

**Greatest benefit or result (to date) of project:**

North Bay continues to report 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.

**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](mailto: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	P
Forward ILL request to other library(ies)	X	X	P
Place hold in another library’s circulation system	X	X	X
Track progress/status of ILL transactions online	X	X	P

**Grant recipient:** **Peninsula Library System**  
(on behalf of Region II libraries)

**Project participants:** Bay Area Library & Information System  
Monterey Bay Area Cooperative Library System  
North Bay Cooperative Library System  
Peninsula Library System  
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 interconnect their linking efforts on a larger region-wide basis.

**Linking software used:** CPS URSA  
DRA Web 2  
OCLC WebZ

**Current status:**

The link between NBCLS and PLS has been established and staff have been working to fine tune the system, with the goal of making it available to the public in both systems in the near future. While OCLC's development of a stand-alone ILL management system has been indefinitely delayed, project staff are taking this opportunity to conduct training with library staff and improve efficiency of the system. Project staff at MOBAC and SVLS will be experimenting with linking their virtual catalogs to evaluate the feasibility of implementing Z39.50 on a statewide level.

**Project contact:** Gail McPartland, IT Manager (PLS)

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

telephone: 650-358-6714

fax: 650-358-6706

email: [mcpartla@pls.lib.ca.us](mailto:mcpartla@pls.lib.ca.us)

**Grant recipient:** Silicon Valley Library System

**Linked libraries:**

Current	Mountain View Public Library Palo Alto City Library Santa Clara City Library Santa Clara County Library
Planned	San Jose Public Library (testing) Sunnyvale Public Library

**Types of local systems linked:**

Currently accessible	Dynix Innovative Interfaces
Planned	Inlex Horizon (testing)

**Brief description of project:**

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 shelf status information.

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

The project upgraded to the Java-based OCLC WebZ 4.02 last year, which brought noticeable improvements in the user interface and in system performance. Staff has noted a marked increase in system reliability and the project is receiving positive reactions from the public.

Silicon Valley Catalog may be visited at <http://www.svls.lib.ca.us>

**Linking software used:** OCLC WebZ 4.02

**Current status:**

This project is up and running. Current efforts are focused on refining search results by reviewing local index mapping and Z39.50 attributes. The goal of this phase will be to increase accuracy of search results to better reflect local holdings and to create indexing guidelines for libraries new to Z39.50 projects. Efforts are also continuing to integrate additional Z39.50-enabled catalogs with the Silicon Valley Catalog by linking them to the regional WebZ server.

**Greatest difficulty or challenge encountered:**

While initial difficulties focused on differences in vendor implementation of Z39.50, project staff have had considerable success in resolving larger technical issues. The project is now challenged by library staff unwilling to use Z39.50 searching unless search results more accurately reflect local holdings.

**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. Project staff feel that they now have a lot to offer to their colleagues who are just undertaking a project of this type. It is rewarding but not easy to be a pioneer.

**Project contact:** Gail McPartland, IT Manager (PLS)

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

telephone: 650-358-6714

fax: 650-358-6706

email: [mcpartla@pls.lib.ca.us](mailto:mcpartla@pls.lib.ca.us)

**Resource Sharing Functionality: Silicon Valley Library System**

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	P	P	P
Track progress/status of ILL transactions online	P	P	P

## Conclusion

California is making steady progress towards the creation of a virtual catalog for resource sharing purposes. Libraries are moving from demonstration of the feasibility of the linked systems concept to practical implementation of linking technology on a regional basis. And while some Linked Systems Projects have encountered implementation problems along the way, none of these problems is sufficiently serious to warrant any change in the overall statewide database strategy.

At this point it makes sense to consolidate our gains and continue to fine tune these projects, documenting and sharing implementation experience and addressing specific problems on a systematic basis. It is also time to look beyond the virtual catalog and begin exploring interlibrary loan management, materials delivery, patron authentication, electronic collections, and self-service electronic borrowing.

As we break new technological ground we should also continue to invest in resource sharing technology at several levels, so that no libraries, whatever their current stage of development, are left behind.