



SANTA CLARA COUNTY
LIBRARY DISTRICT
JOINT POWERS AUTHORITY
RFID Analysis Committee
Final Report
October 27, 2005

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Santa Clara County Library District Joint Powers Authority

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Santa Clara County Library District Joint Powers Authority

RFID COMMITTEE EXECUTIVE SUMMARY

The Santa Clara County Library RFID Analysis Committee was formed in June 2004 to analyze whether Radio Frequency Identification (RFID) technology should replace barcode and electro-magnetic strip technologies used in the Library.

WHY CONSIDER RFID TECHNOLOGY? Currently, the Library's primary computer operating system, Horizon Integrated Library System (ILS) relies upon staff to electronically scan barcodes placed upon each library item to determine whether an item has been checked in or out. Theft deterrence is a separate function initialized by the placement of electro-magnetic strips in each item and the use of security gates at library entryways.

There are inherent problems in this system. Not only is it labor-intensive but barcode scanners read one item at a time and only if the code is correctly aligned to the scanners. The theft deterrent strips must be sensitized and desensitized each time an item is checked out and in. Electronic items such as cassette tapes and DVDs can be damaged by the equipment used to turn the electro-magnetic strips on and off.

Staffing levels have not kept pace over the last five years with increased usage and demand for library services. The RFID technology solution will allow a staff static in size to cope with an ever increasing volume of circulating materials. It will not replace staff, but will allow today's staff to better manage an ever-increasing public demand for the diverse resources on a wide variety of subjects and viewpoints offered by Santa Clara County Library.

WHAT IS RFID? The RFID system consists of one tag (containing a chip that stores data and a small antenna) installed on a library item, readers, new or modified Self-Check units and security gates and inventory control devices

RFID improves material handling. It is fast, accurate and allows multiple items to be read at the same time. The faster read rate benefits the public at self-service machines or when being assisted by staff. It also speeds a number of different manual operations where the status of items needs to be updated. RFID will allow the Library to conduct periodic inventories of its collection using hand held readers. These devices can also be used to efficiently locate materials on search lists.

RFID is not problem free. CDs and DVDs require specially shaped tags which have limited read ranges. As with barcode technology, items with multiple pieces such as talking book audio cassette sets, require individual pieces to be tagged or manually checked for all pieces upon check-in. Tags are still largely incompatible between the different vendors' RFID systems since there are no standards for how data is stored on a tag or the security bits used.

A complete cost/benefit analysis of RFID is required, but the statistics needed for this evaluation are difficult to obtain. Two local libraries are starting research studies that should help in the development of a valid cost/benefit analysis.

RECOMMENDATION The Committee recommends that the Library not implement RFID at this time, but to continue use of barcode and magnetic strip technologies. However, under the assumption that we should and will ultimately use RFID, the Committee concluded that any of certain triggers should prompt a reconsideration of RFID implementation:

- When the library needs to make a significant investment in replacing barcode equipment;
- When the cost drops to \$.50 or less per RFID tag;
- When data written to an RFID tag is readable by readers and software of all vendors;
- When a cost benefit analysis indicates that an RFID solution is a fiscally prudent investment.

SCCL 10/27/05

SANTA CLARA COUNTY LIBRARY DISTRICT

JOINT POWERS AUTHORITY

RFID Analysis Committee

Final Report

October 27, 2005

1. INTRODUCTION AND BACKGROUND

“The Santa Clara County Library provides diverse resources on a wide variety of subjects and viewpoints and helps people to use these resources.”

Santa Clara County Library Mission Statement, rev. November 1994.

In order for the Santa Clara County Library to provide resources to all users, it is critical that the status of these resources be accurate at all times in the Horizon Integrated Library System (ILS) which underlies the Library catalog. Santa Clara County Library has a collection of 1.6 million items and an annual circulation of almost 10 million. Many library activities affect the status of materials besides circulation functions of check-in and check-out: receiving, cataloging and processing of new materials; filling of holds requested by library users; and the transit of materials among nine locations to fill holds or return an item to its owning location.

The Santa Clara County Library RFID Analysis Committee (Appendix A) was formed by the Library Joint Powers Authority (JPA) Board in June 2004 for the purpose of analyzing RFID Technology as a replacement to currently used barcode and electro-magnetic strip technologies. The Committee was asked to make a recommendation to the JPA at their October 2005 meeting.

The Committee has met ten times since its initial meeting of September 2, 2004. The Committee has developed Goals (Appendix B) and an Evaluative Matrix (Appendix E). The Committee members have engaged in the following activities to educate and inform themselves about RFID technology:

- Visited the Santa Clara City Library for a demonstration of RFID technology and automated materials handling system on October 7, 2004;
- Attended RFID seminars and exhibits at the California Library Association Annual Conference held in San Jose November 12-15, 2004;
- Participated in RFID vendor demonstrations by TechLogic, Libramation, 3M, FKI Logistex, Checkpoint and VTLS in February and March 2005.

The Committee has regularly reported on its progress to the JPA.

2. PROBLEM STATEMENT

Status of materials is currently updated by barcode readers interfacing with the Horizon system. Theft deterrence is provided by electro-magnetic security strips applied to each item.

Barcodes have been placed on all materials owned by Santa Clara County Library. Different models and types of barcode readers are used to read these barcodes to update the status of the item.

Security from theft is provided by the placement of an electro-magnetic strip in items and the installation of alarm gates at library entrances that beep when a sensitized strip goes through the gate.

Barcodes and barcode readers have some inherent problems. A barcode needs to be correctly aligned to be read by a barcode reader. A single barcode is read at a time. Barcode readers do not always correctly read the barcode being scanned. If a staff member notices the misread, the barcode is re-scanned. If the misread is not noticed, false data is received by the Horizon ILS. Barcode readers need to be regularly re-programmed to prevent misreads.

Barcodes and security overlays can be placed on CDs and DVDs, but there are some complaints that these affect their playability. Multiple piece sets such as audio cassette talking books need to be checked by staff for all pieces when returned.

Staff is also affected by the use of barcode readers. Repetitive motions involved in the positioning of items and barcode readers for successful reads have the potential for physical injuries, such as carpal tunnel syndrome and neck and back strain.

Barcode technology cannot assist library staff when staff searches shelves and shelving carts for materials on request and on claimed returned and missing status. Barcodes cannot be used to locate items that are mis-shelved.

The use of electro-magnetic security has its own set of problems. A physical process separate from reading the barcode is required to sensitize/de-sensitize library materials during check-out and check-in. Magnetic materials can be ruined by the sensitize/de-sensitize equipment. Special strips have to be applied and special sensitize/de-sensitize equipment used with video and audio cassettes, computer disks and other magnetic media. Electro-magnetic security gates produce false alarms from three ring binders, wire bound notebooks, baby strollers, cell phones, etc.

3. DEFINITION OF RADIO FREQUENCY IDENTIFICATION (RFID)

Radio Frequency Identification (RFID) is an alternative to the use of barcodes and electro-magnetic security. RFID technology has been in use in other sectors for more than 20 years. It has been in use in libraries for five years. Santa Clara City Library has been using RFID since 2000. There are approximately 10 Library RFID companies that currently provide RFID products and support services.

A RFID solution in a library consists of tags (containing a chip that stores data and a small antenna), readers, tagging equipment, self-check units, security gates and inventory control devices. RFID tags do not have batteries. RFID readers contain antennas which power the passive tags by transmitting electro-magnetic waves to them. The RFID chip in the tag uses that power to send its tag data back to the reader.

4. ADVANTAGES AND DISADVANTAGES OF RFID TECHNOLOGY

RFID technology has significant advantages over the older barcode and electro-magnetic technologies. A single RFID tag replaces both the barcode and the electro-magnetic strip. This tag does not damage magnetic media such as video and audio cassettes. RFID also does not produce the many false alarms from the security gates common with electro-magnetic technology.

RFID also improves material handling. The reading of an RFID tag is more accurate and faster than barcode scanning. Tags are read when within eight inches of a reader rather than only in line of sight as required by all barcode readers. In addition, multiple items can be read at the same time. This time saving in read rate benefits staff at a number of different operations in the library as well as the public at self service machines.

RFID technology can be used as a security system if there is a security bit that can be turned on or off at the point of check-out. The security bit triggers alarms in security gates if not turned off during check-out. The security gates can report which items are removed from library without being checked out. Barcode and electro-magnetic technologies do not have this capability.

Portable hand-held scanners can be used to inventory the entire collection of a library in a cost-effective manner. The Library currently cannot do a complete inventory because of the amount of staff time that would be involved in reading the barcode of each individual item. The scanners can also be used by staff to search shelves and shelving carts to locate specific items identified on a list stored on the hand-held device. This allows staff to efficiently hunt for items that have been requested, or have been claimed returned; or to inventory a collection and identify mis-shelved materials.

RFID technology can also be used with an automated check-in process that checks in an item as soon as it is placed in the return slot. RFID can also be used with an automated materials handling system that distributes returned materials to multiple bins or carts for shelving. An automated materials handling system speeds the return of materials to the shelf.

There are some problems with the use of RFID. Tags for CDs and DVDs have smaller antenna due to size and shape restriction for the tag necessitated by the format; they also have a much smaller read range than regular RFID tags. Different vendors have developed different methods for boosting the signal of these tags or of providing lock boxes for security, but these make the RFID tagging of CDs and DVDs more expensive than other material. Another problem area is items with multiple pieces such as talking book audio cassette sets; individual pieces have to be tagged as a member of a set or staff needs to check for all pieces when returned.

RFID standards have been established by the International Organization for Standardization (ISO) for some time. These standards primarily address frequency, range, performance, chip and reader compatibilities, transmission techniques and read / write ability. Some of the standards for RFID include ISO 14443, 15693, 17363-17368, and 18000. ISO RFID standards for Library applications are based on ISO 15693 and rapidly moving to the new ISO 18000 which is a superset of ISO 15693.

ISO standards primarily address the physical intercompatibility issues of RFID, but do not address standardization of data stored on RFID chips or applications like security bits. These items are still largely proprietary and incompatible between RFID systems of different vendors. The National Information Standards Organization (NISO) made reference to standardizing the security bit in RFID in 2002. More standards of this sort may be appearing as RFID becomes more widely deployed.

5. ISSUES AND CONCERNS

5.1. Privacy

Santa Clara County Library protects the privacy of its users now and will continue to do so in the future. RFID technology by itself does not endanger privacy of a library user nor increase the risk of surveillance.

Santa Clara County Library will implement RFID in a manner that protects the privacy of library users. The data stored on an RFID tag can be limited to an item number. The item number is a number assigned to each item by the Horizon system. The item number is never displayed to the public or to staff; it is a completely different number than the barcode number which is listed in the library catalog and in the item record seen by staff on the Horizon system. Encryption can be used to further protect the data stored on the tag. Even if future developments make longer range reading of tags possible, the information gained is meaningless outside of the Library ILS system.

5.2. Usage

Staffing levels have not kept up with increased usage and demand for library services over the last five years. The number of Santa Clara County Library full-time equivalent (FTE) employees has declined by 2% since 1999 while circulation has increased from 7.3 million to 9.9 million annually or 27%. Despite the libraries being open 16.8% fewer hours in FY 04/05, circulation and accompanying workload decreased by only 5%.

The greatly expanded 48,000 square foot Saratoga Library opened in June 2003 and the newly constructed 54,000 square foot Cupertino Library opened in October 2004. Both library facilities have experienced significant growth in visitors and in circulation. Saratoga Library circulation increased 20% in 2003 and 17% in 2004. Cupertino Library experienced an 11% increase in a five day operation over the prior year when it was open seven days a week.

The Cities of Morgan Hill and Milpitas are planning to open new library facilities in 2007 and in 2008, more than doubling the square footage of their existing libraries. To accommodate anticipated increased usage at these new facilities, Library staff has provided member cities with specifications for space planning to accommodate RFID and automated materials handling systems (Appendix G).

RFID is a technology solution that will allow a staff static in size to cope with an ever increasing volume of circulating materials. It will not replace staff, but will allow staff to manage better the public demand for the diverse resources on a wide variety of subjects and viewpoints offered by Santa Clara County Library.

6. COST BENEFIT ANALYSIS

Preparing a cost benefit analysis of RFID is difficult. Too few libraries have had significant experience needed to develop base values. It is also difficult to calculate how RFID will change library operations. As an example, there should be a reduced cost per unit of circulation for staff since less time will be spent circulating each item. This will allow a refocusing of staff for improved, value-added service to the public as well as additional functions such as a collection inventory. Appendix F outlines some of the calculations and data required to develop a benefit analysis.

Local libraries are conducting research that will help Santa Clara County Library evaluate the use of RFID in library operations and prepare an accurate cost benefit analysis.

- San Jose Public Library has received a State grant to conduct a cost benefit analysis of materials handling. The results of this study will not be known until 2006-07.
- Contra Costa County Library has issued a Request for Proposals to conduct a Cost Benefit Analysis (CBA) for RFID technology. The results of this research will not be known until 2006.

7. RECOMMENDATION TO JPA BOARD

The RFID Analysis Committee was asked to make a recommendation to the JPA Board at the October 2005 meeting. While much progress has been made in RFID applications for libraries and more libraries have implemented this technology, the Committee recommends that the Library continue with the current barcode and magnetic strip technologies for the following reasons:

- RFID is a technology that is maturing rapidly.
- Current industry practices does not standardize the data stored on the RFID tags, making tags incompatible between hardware and software of different RFID vendors.
- The cost of RFID tags for libraries is expected to continue to drop in price as it has over the last five years.
- The cost of implementing RFID at this time is high. The library has a significant investment in barcode and electro-magnetic security equipment. It may not yet be cost-effective to replace the existing equipment.

At the same time, there are a number of strong arguments for investing in materials handling and asset management technology:

- Member cities are constructing new library facilities that are 2-3 times larger than existing facilities;
- Demand for library materials and services has increased 27% since 1999 and is expected to rise another 25% over the next 10 years;
- Funding for staff will decline steadily through 2015 as salary and benefits costs rise and revenues remain static.

The trend in libraries is toward RFID systems. The Committee recommends that that our Library wait for an appropriate time to follow that trend. Under what circumstances might the Library consider moving forward with RFID technology?

- When the Library needs to make a significant investment in the replacement of self-check machines, security gates or barcode readers.
- When the cost of RFID tags drops to \$.50 or less per tag.
- When industry standards for RFID tags define how data is written to a tag so that tag is readable by all RFID vendors readers and software.
- When a cost-benefit analysis for Santa Clara County Library indicates that RFID is a fiscally prudent investment.

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APPENDIX A

Committee Members:

Curtis Cole, JPA Board, Committee Chair and Los Altos City Council
Norman Kline, JPA Board and Saratoga City Council
Steve Williams, Networks Designer, Information Systems Department, Santa Clara County
Bill Marion, Director, Information Systems, City of Milpitas
John Gerich, Los Altos Library Commission
Karen Takle Quinn, Los Altos Library Commission
Ken Smith, CEO, Radwave Corporation
Sri Chaganty, CTO, Radwave Corporation

Staff Members:

Melinda Cervantes, County Librarian, County Library
Charlotte Doudell, Information Systems Manager, County Library
Dawn Valentine, Circulation Supervisor, County Library
Katie DuPraw, Circulation Supervisor, Cupertino Library

APPENDIX B

2004-05 Goals of the RFID Analysis Committee

- Draft a white paper including a cost-benefit analysis of RFID technology applications for the Santa Clara County Library
- Make a recommendation to the Library JPA Board at the October 2005 meeting

Possible Strategies

- Conduct an exhaustive search of the professional and trade literature on RFID technology and library application of the technology
- Conduct site visits of libraries already using RFID technology to gather information on best practices
- Invite RFID industry representatives to provide presentations to the Committee
- Attend RFID seminars and exhibits at the California Library Association Annual Conference to be held in San Jose November 12-15, 2004

Goals of Implementing RFID

- Patron satisfaction with Library service will be increased
- Library materials will be more accurately accounted for and handled more efficiently
- Library staff will be more available to assist patrons
- Work related staff injuries will be reduced
- Prudent spending of Library resources on a proven technology

RFID Library Site Visits

APPENDIX C

Date	Committee member/staff	Location	Annual Circulation	ILS	Vendor/Products
7-Oct-04	RFID Committee	Santa Clara City Library (CA)	2 million	Innovative Interfaces	Checkpoint/Tech Logic
7-Jul-05	Charlotte Doudell Katie DuPraw Sarah Flowers Rosanne Macek	Seattle Public Library (WA)	6 million Main + 2 branches	Sirsi/Dynix Horizon	Tech Logic
7-Jul-05	Charlotte Doudell Katie DuPraw Sarah Flowers Rosanne Macek	King County Library System (WA)	17 million at 43 branches	Innovative Interfaces	FKI Logistex
9-Aug-05	Katie DuPraw	Eugene Public Library (OR)	2 million Main + 2 branches	Gaylord Polaris	Tech Logic
22-Aug-05	Dolly Barnes Karen Boyle Andy Cammisa Melinda Cervantes Charlotte Doudell Katie DuPraw Maona Grabscheid Cheryl Houts Rosanne Macek Bonnie Natsuhara Dawn Valentine Mary-Ann Wallace Lani Yoshimura	Livermore Public Library (CA)	1 million Main + 2 branches	Innovative Interfaces	Tech Logic

RFID Demonstrations Conferences

APPENDIX D

Company	CLA 2004	Date of Demo	Age of Corp	No. of Installations	Type of Tags	Security Used	Notes
Tech Logic	Yes	2/10/2005	8 yrs	45	Non-proprietary	On/Off security bit	RFID/Barcode & sortation systems
Libramation	Yes	2/10/2005	4 yrs	USA 14 N. America 40 Europe 20	Proprietary	On/Off security bit	RFID products & sortation systems
VTLS	Yes	3/10/2005	20 yrs	14	Proprietary	On/Off security bit	RFID products & equipment
CheckPoint	Yes	3/10/2005	30+ yrs	150+	Proprietary	Interacts w/ILS	RFID products & Partners w/Tech Logic for sortation systems
3M	Yes	3/10/2005	100+ yrs 30 years in library service	100+	Non-proprietary	On/Off security bit	RFID/Barcode products & equip
FKI Logistex	No ALA 2005	3/10/2005			N/A; works w/ any tag vendor		RFID/Barcode ortation systems
Bibliotheca	Yes	7/28/2005	8 yrs	USA 10 Europe 20	Non-proprietary	Interacts w/ILS	RFID products & sortation systems
ITG	Yes						
TagSys	Yes						
Library Automation Technologies	Yes						

2004 California Library Association Annual Conference, San Jose.

Committee Members Attending: Steve Williams, Norman Kline, Karen Takle Quinn, Charlotte Doudell, Melinda Cervantes and Dawn Valentine

RFID Feature Comparison

To be filled out as part of RFQ process

APPENDIX E

Features	3M	Bibliotheca	CheckPoint	FlashScan (LAT)	ITG	Libramation	TAGSYS	VTLS
Circulation Systems								
<i>Which of the major circulation system interface protocols are supported</i>								
SIP 1 Protocol								
SIP 2 Protocol								
NCIP Protocol								
Existing Integration								
<i>Which circulation systems has the vendor successfully integrated with their RFID system</i>								
Book Systems								
Dynix								
Follett								
GIS Information Systems								
InfoVision								
Inovative Interfaces								
VTLS								
RFID Tags								
<i>Does the vendor provide an RFID tag solution for the following media</i>								
Books								
Magazines								
CD								
DVD								
VHS								
Other Media								
Tag Vendors Supported								
<i>Which tag vendors are supported</i>								
CheckPoint								

To be filled out as part of RFQ process

APPENDIX E

Features	3M	Bibliotheca	CheckPoint	FlashScan (LAT)	ITG	Libramation	TAGSYS	VTLS
Phillips								
TagSys								
T.I.								
Other								
Standards Compliance								
<i>To what standards does the product comply</i>								
NISO Z39.83-2002								
ISO 15693								
ISO 18000-3								
ISO 9000-1								
Optical (bar code) capable								
Accessories								
<i>What additional accessories are available from the vendor</i>								
Self Check-out								
Self Check in								
Book Drop Sensor								
Entry/Exit Sensor								
Staff Reader Station								
Programming Station								
Portable Reader/Scanner								
Portable Tagger								
Sorting Systems								
Patron Card Printer								
Self Check-out Media Kiosk								
Security								
<i>How does the vendor implement security</i>								
Encryption								
Security Bit/Active Check								
Tattle Tape-Capable								

To be filled out as part of RFQ process

APPENDIX E

Features	3M	Bibliotheca	CheckPoint	FlashScan (LAT)	ITG	Libramation	TAGSYS	VTLS
Operational Features								
<i>Which operational features does the product support</i>								
Multiple item check-out								
Multiple item check in								
Pre-programmed tags								
Programmable tags								
RFID Patron cards								
Bar coded Patron cards								
Fine hold/block								
Fee & Fine Collection								
Performance Metrics								
<i>For comparison purposes, list the following metrics for an operational system</i>								
Tag Read Distance								
Check-out Stack Depth								
Check-out Read Rate								
Check in Read Rate								
Security Gate Width								
Security Read Rate								
Read Rate Errors								
On-Going Support								
<i>What are the annual recurring maintenance costs</i>								
Hardware								
Software								
Additional Equipment								

COST BENEFIT ANALYSIS OF RFID TECHNOLOGY

- Why Change?

In October 2000, Library staff conducted a study of RFID and asked the question, “Why evaluate the current technology now?” Findings included an aging electro-magnetic tape technology used for security of library materials, improved asset management, significant growth both in population served and in library facilities and rising labor costs. Four options were considered: status quo, upgrade current 3M Security System, convert all libraries to RFID or convert single libraries to RFID as appropriate. The final recommendation was to maintain status quo, test and repair existing security systems and revisit RFID technology in two years when the industry had matured and more libraries had implemented RFID technology.

It is now five years later and the RFID industry and more specifically RFID applications for libraries have improved, the increase in circulation has spiked as predicted in Saratoga and Cupertino since opening their new, significantly larger libraries and personnel costs have exceeded all projections largely due to rising health and benefit costs. The Milpitas and Morgan Hill Libraries are in design development with openings planned for 2007 and 2008 respectively. The Library has managed some of this growth with the addition of one or more Self-Check machines in each library and the implementation of multi-directional scanners installed at check-in stations much like supermarket scanners. On average, 50% of all circulation is done through self check-out today versus 25% in 2000 with Cupertino up to 95% circulation through self check-out. This last figure was achieved with the installation of eight 3M Self-Check machines at a library with an annual circulation of 2.4 million items, an aggressive patron training program and a new facility designed to accommodate this service model. It would take an additional 13 Self-Check machines at the other seven libraries to achieve this same rate of self check-out by patrons.

- Could the same funds be applied to on-going operational expenses?

It is important to note that the policy of the Santa Clara County Library Joint Powers Authority has been not to spend one time funds on on-going operational expenses such as personnel.

There are two major reasons to consider RFID technology as a solution to the large volume of materials handled by library staff. First, RFID may allow staff to be more productive. Second, it may be possible for the Library to sustain quality service with the same level of staff when library facilities double and triple in size and usage continues to rise 8% per year on average.

APPENDIX F

As recently as 2002, the Santa Clara County Library operated nine libraries and a headquarters operation in 187,740 sf. Today, the Library operates nine libraries and a headquarters operation in 235,240 sf, or 20% more space. Add to that a 22% growth in circulation over the same period with the same or lower level of staffing and one can see why a technological solution is needed for check-out and check-in of materials.

RETURN ON INVESTMENT (ROI)

RFID will increase the speed and accuracy for material checked out and checked in and for shelf searching for items, and will make inventory control possible.

The factors to be considered to determine the ROI are complex. In addition to the above costs there are many hardware considerations. The benefits are in efficiencies that are not always easy to quantify. A consultant should be retained for this purpose.

Hardware considerations include:

- Age and life expectancy of current security gates and their replacement costs
- Age and life expectancy of existing Self-Check machines and their replacement or modification costs
- Number of Self-Check machines
- Number of staff check-in machines
- Number of staff check-out machines
- Modification costs of new check-in machines being bought. The new check-in machines being installed in FY 2005-06 will be upgradeable to work with RFID tags.
- Cost of new equipment such as shelf searching scanners
- Cost of RFID smart tags for materials

In order to study the efficiencies, the following should be considered:

- Capacity of RFID vs. barcode check-out machines--will fewer be needed?
- Capacity of RFID vs. barcode check-in machines—will fewer be needed?
- Time spent by staff on check-in with RFID vs. barcode
- Time spent by staff on check-out with RFID vs. barcode
- Error rate with RFID vs. barcode
- Current shelf reading costs vs. RFID shelf reading costs
- Inventory with RFID vs. inventory with barcodes

APPENDIX F

Statistics that could be gathered prior to the hiring of a consultant include:

- Shelves read per hour currently
- Current "Request Pull List"—number of items searched
 - Number of items found
 - Time it took to search
- Number of items put on trace in a given period of time
 - Number of trace items found
 - Number of trace items not found
 - Time it took to search
- Number of barcode reading errors per day
- For on-the-shelf item at another library, length of time until the hold arrives at the requesting library

APPENDIX G

DESIGN RECOMMENDATIONS FOR NEW LIBRARY FACILITIES INCORPORATING RFID TECHNOLOGY

The Santa Clara County Library District Joint Powers Authority (JPA) will provide specifications for Radio Frequency Identification (RFID) to each member city constructing a new library facility. As with all technologies, specifications are subject to change. The Library operates facilities in nine locations and, as such, provides a wide range of technological support. Asset management is essential for an operation where almost 10 million items are checked in and out each year. In June 2005, the JPA approved the purchase and installation of an automated materials handling system for each of four libraries in Cupertino, Los Altos, Milpitas and Saratoga; other libraries will receive materials handling systems either in their already planned new libraries or in their existing facilities when possible. It is the goal of the Library to fully automate check-in and sorting of materials in seven locations by 2008.

New library facilities will be required to dedicate space to accommodate an appropriately sized system that includes conveyance equipment, barcode and/or RFID readers, bins or carts for sorting and 2-4 book return drawers for the exterior and 2-4 drawers for the interior of the facility. Book returns must drop materials directly into the book sorting room to increase efficiency and reduce overall costs of operation. Any deviation from this recommendation (including purchase, installation and ongoing maintenance) will become the expense of the city and not the JPA.

- Minimum of two book return drawers embedded in exterior and interior walls for automated check-in of returned materials by patron
- Minimum of one manual locking book return drawer as back-up to automated book return drawers in the exterior wall for returned materials by patrons
- Theft detection gates capable of handling barcode and RFID technology to be installed at all entrances to new library facilities and considered permanent
- Minimum of one self check-out machine per 250,000 annual circulations