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BENEFITS OF RFID IN LIBRARIES AND INFORMATION CENTRE

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What is RFID :

The concept of RFID (Radio Frequency Identification) technology was developed in 1948 but it has had to wait fifty years before it has been able to deliver on its original promise. The advent of tiny integrated circuits ("chips") allowed solution designers to add intelligence to the movement of goods through the supply chain and when a chip and an aerial were attached to a sticky label the RFID "Tag" was born. RFID was then conceived, as the name suggests, as a means of enabling tags to identify themselves to a radio receiver. The tags now come in all shapes and sizes and are attached to a staggering range of items with a wide range of applications from cars (electronic tolls) to earrings (brand protection). For some time now they have also been attached to library books. This document seeks to show how and why this has been done up to now, but more importantly how it might be done even more effectively in the future. This is a step by step guide, which will explain what RFID is, how it is used and the benefits which can accrue. It will also provide a realistic view of the issues around RFID, it will look at how it is best deployed and warn of any pitfalls so that libraries can access the necessary information to have meaningful conversations with suppliers. Libraries will then be able to invest in RFID technology appropriately to suit their needs and to maximize the available benefits.

The ability of RFID (Radio Frequency Identification) to read multiple tags at once and ability to read without line of site reduces repetitive tasks. Several books can be checked out or

in at the same time. The speed benefits of RFID over barcode during check-in and checkout tasks are incremental as using a self service RFID station will speed service by a few seconds compared to barcodes. RFID dramatically speeds up shelf management activities. RFID reduces the time and effort of taking inventory, weeding and finding missing and out of order books. RFID enables more rapid updating of the library database enabling improved availability and circulation.

Basic Function of RFID

The basics – for libraries.

An RFID system comprises three components; a tag, a reader and an antenna.

RFID Tag

The tag is paper thin, flexible and approximately 2"x 2" in size which allows it to be placed inconspicuously on the inside cover of each book in a library's collection. It consists of an etched antenna and a tiny chip which stores vital bibliographic data including a unique ID number to identify each item. This contrasts with a barcode label, which does not store any information, but merely points to a database.

RFID Reader & Antenna

These components are available in various shapes and sizes to suit respective applications within the library, and are often integrated into one enclosure for that specific purpose (ie patron self check-out machines, inventory readers).

The reader powers the antenna to generate an RF field. When a tag passes through this RF field, the information stored on the chip is decoded by the reader, and sent to the PC or central server which in turn, communicates to the Library Information System.

Key Attributes of RFID

Unlike barcodes, RFID tags can be read;through desktops and book covers (no line of sight is required).in any orientation to the reader/antenna while moving (ie while being deposited through a return chute)several at a time from distances of several inches to the antenna RFID

improves library workflow, staff productivity and customer service with these attributes. However, the ability to conduct inventory counts without removing a single book from the shelf, is what really separates RFID from preceding technologies such as barcodes.

Benefits of RFID

1 Self-service/Self-issue/Self-return

- •Self-service/Self-issue/Self-return is by far the most popular application among adopters of RFID technology. Analysis of circulation figures from a growing number of RFID-enabled libraries suggests that some are now achieving up to 70-90% of their transactions being processed via self-service
- Levels of use appear to be more heavily influenced by the library's commitment to self-service rather than by the actual devices used.
- Automated returns sorters can identify items by collection, status or other SIP-defined categories and deliver them to a trolley, bin or shelf location as required.
- In addition, self-service may be deployed to provide out of hours service, or to facilitate lending at unstaffed locations.

2 .Stock management

Stock management can be improved by using an RFID scanning device. These benefits are quite hard to quantify but they will enable a library to provide a better service and to be managed more efficiently. Some of the functions it may offer include:

• Taking inventory. In many libraries the annual stock-take has all too frequently been abandoned but with RFID technology libraries have found that stock taking becomes a task that may be carried out far more frequently. As FID technology improves in accuracy and reading range, stock-taking may becomes a simple walk through the shelves.

• Finding lost and missing items and identifying mis-shelved stock. Some RFID solutions can help with these problems although libraries will want to see this function at work in an existing library to prove its effectiveness.

• Identifying particular items e.g. for display or relocation.

3 Staff savings

Staff displaced by the transfer of circulation to the user population via self service may be redeployed to more pro-active activities, such as reader advisor, delivering both an improved service for the clients and greater job satisfaction for staff. As more operations are automated the number of staff required to manage them may also be reduced - although staff are still needed to cope when these normally reliable systems go wrong.

It is very important for libraries to plan how they will go about implementing these changes especially ensuring that staffs are comfortable with them. This will require planning, excellent communications and full staff involvement

4 Catalyst for change in how the library works

As the technology develops, and the issues of interoperability are overcome, RFID will begin to transform the way in which library services are delivered. In particular RFID, in combination with other technologies offers opportunities to take the library service out into the community for example:

RFID enabled book dispensers are currently being trialed in Singapore. Library users use their membership cards to identify themselves to a unit that can dispense the book of their choice and report the loan transaction to their LMS. By using the potential of RFID to store information on the items' and borrowers' tags a national network of library "stations" in public places – railway and bus stations in the town, community centers in the country – could allow library members to borrow a book in London and return it in Borrow dale – a truly national library service! Improved ambience e.g. attractive hardware With the ability to provide self issue and self return, combined with more attractive security gates, there will come the opportunity to reduce the size of the service desk or get rid of it altogether and to redesign the library to use the

space more effectively, some libraries have done this already. Staff can now be located at help points or as roving resources helping library users. This has a positive effect on the perception of both staff and users and helps to make the library a nice place to visit and work in. RFID is often implemented as part of a major refurbishment of libraries. Libraries should be aware that RFID is a significant IT project as well as part of a project involving servicing, workflow and refurbishment.

5. Customers picking books from shelves using PDA readers

Some libraries may wish to offer customers the use of hand held RFID-capable PDAs to help find books and other items. Some RFID solutions are used to enable blind or partially sighted users to locate items and to navigate around the library.

As the technology develops applications of this type will probably become more prevalent although there are issues with reliability, security etc.

6 .Servicing Savings

There is some debate amongst librarians as to whether RFID will offer the opportunity to reduce the amount of servicing on library books. If books are to be issued on a self service basis and identified and shelved using hand-held PDAs then can books do without some of the cards, stickers and numbers which make up most servicing formulae?

For most companies which provide book-servicing for libraries, the advent of RFID has seen a major new negative impact on their margins resulting, presumably, in higher charges. As each library using RFID may have a different RFID provider using a different data model and possibly different data requirements within that model, the servicing company may find itself with an ever-increasing workload as a result. This often requires additional hardware and software and more space needed to programme the tags to all the different customer specifications.

To try and reduce costs libraries have considered whether they wish to continue using barcodes as well as tags. This needs careful thought. If the library authority offers a multi-site

service within which stock circulates freely and some sites are not using RFID there will be no choice but to continue to use barcodes.

In a single site library where all the stock is tagged barcodes may not be required. However libraries would need to be very confident that the information stored on the tags can be accessed or transferred should they change RFID suppliers in the future. Many libraries have opted to keep barcodes as a safety net for dealing with this possibility.

A more complex set of problems arises when libraries form consortia for purchasing and loans. The barcode will need to remain until all consortia members adopt a common standard. The consensus at present seems to be that while there could be a potential saving in the future once fully standardized RFID solutions are universal, in the meantime there are no savings because libraries need to continue to have their traditional servicing and library suppliers (and servicing companies have to continue to cope with differing specifications.)

Benefits for library staff:

- Time saving devices free them to help customer better
- Labor saving devices free them from doing repetitive, physically stressful tasks
- Can have flexible working schedules

Benefits for library patrons:

- Self check-in and self check-out facilities
- Check-in and check-out of all types of items (books, audio tapes, video tapes, CDs, DVDs, etc.) at the same locations
- More staff available for assistance
- Quicker service such as payment of fees, fines, etc.
- Better inter-library facilities, more efficient reservation facilities, etc.
- Faster and accurate re-shelving means patrons can find items where they should be, hence quicker and more satisfying service

- Height adjustable self check-in/out tables are liked by children and Physically disabled persons who use the library

Demerits of RFID Systems

High cost

The major disadvantage of RFID technology is its cost. While the readers and gate sensors used to read the information typically cost around $1,500 to $2,500 each; and the tags cost $.40 to $.75 each.

Accessibility to compromise

It is possible to compromise an RFID system by wrapping the protected material in two to three layers of ordinary household foil to block the radio signal. It is also possible to compromise an RFID system by placing two items against one another so that one tag overlays another. That may cancel out the signals. This requires knowledge of the technology and careful alignment.

Removal of exposed tags

RFID tags are typically affixed to the inside back cover and are exposed for removal. This means that there would be problems when users become more familiar with the role of the tags. In Indian libraries this is a major challenge to keep the tags intact.

Exit gate sensor (Reader) problems

While the short-range readers used for circulation charge and discharge and inventorying appear to read the tags 100 percent of the time, the performance of the exit gate sensors is more problematic. They always don't read tags at up to twice the distance of the other readers. There is no library that has done a before and after inventory to determine the loss rate when RFID is used for security.

Invasion of User Privacy

Privacy concerns associated with item-level tagging is another significant barrier to library use of RFID tags. The problem with today's library RFID system is that the tags contain static information that can be relatively easily read by unauthorized tag readers. This allows for privacy issues described as "tracking" and "hotlisting".

Tracking refers to the ability to track the movements of a book (or person carrying the book) by "correlating multiple observations of the book's bar code" or RFID tag. Hotlisting refers to the process of building a database of books and their associated tag numbers (the hotlist) and then using an unauthorized reader to determine who is checking out items in the hotlist.

Reader collision

One problem meet with RFID is the signal from one reader can interfere with the signal from another where coverage overlaps. This is called reader collision. One way to avoid the problem is to use a technique called time division multiple access, or TDMA. In simple terms, the readers are instructed to read at different times, rather than both trying to read at the same time. This ensures that they don't interfere with each other. But it means any RFID tag in an area where two readers overlap will be read twice.

Tag collision

Another problem readers have is reading a lot of chips in the same field. Tag clash occurs when more than one chip reflects back a signal at the same time, confusing the reader. Different vendors have developed different systems for having the tags respond to the reader one at a time. Since they can be read in milliseconds, it appears that all the tags are being read simultaneously.

Lack of Standard

The tags used by library RFID vendors are not compatible even when they conform to the same standards because the current standards only seek electronic compatibility between tags and readers. The pattern of encoding information and the software that processes the information

differs from vendor to vendor; therefore, a change from one vendor's system to the other would require retagging all items or modifying the software.

Conclusion

RFID in the library speeds up books borrowing, monitoring, books searching processes and thus frees staff to do more user-service tasks. But the performance varies with respect to the vendors of RFID readers and tags. The efficient utilization of the technology also depends upon the information to be written in tag. Experimental results with respect to effectiveness of RFID reader position, tag position are presented in the paper. The work is in progress to setup the same in CDAC library. Developments in RFID technology continue to yield larger memory capacities, wider reading ranges, and faster processing.

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