

The use of RFID (Radio-frequency Identification) in UK Libraries

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Abstract

The pressure of staff costs on library budgets and the need to meet changing service demands from users and external management are major forces affecting UK libraries. They create a move towards self-service operations and other means of improving efficiencies. The use of RFID technology is a major factor in the response to these demands. RFID is being installed in academic and public libraries. The technology and its uses will be described with examples drawn from various libraries. The papers to be presented at a conference in London in early November on RFID in Libraries will be reviewed.

Introduction

After a brief introduction I will describe the technology and the importance of standards before describing the benefits for libraries of RFID technology and its use in the UK. I will conclude with some thoughts on possible opportunities for Russian libraries. I will focus on public and academic libraries in the UK.

There are some significant differences between UK and Russian libraries in the economic context in which they operate, the level of technological support, and the demands of users and management. This has resulted in differences in service provision by libraries in the two countries. Typically, UK libraries are open access lending libraries; interactions with users and all aspects of stock management are through the OPAC - Online Public Access Catalogue backed by a computer-based library management system; there is pressure for increased opening hours extending to 24/7 operations in universities. Equally there is pressure on staff costs. The cost of library staffing as a proportion of library expenditure has been steadily increasing whilst the proportion spent on stock has been declining to the extent that the purpose and functions of libraries have been questioned. "Why do we need the library when everything is on the Internet and we have Google and Amazon?" is a challenge that is increasingly being put and has to be rebutted both by argument and continuous changes in services and how they are provided.

The Technology

RFID is not a new technology: it was in use during the 2nd World War to identify aircraft as either 'Friend' or 'Foe'. It is now used in many industries for identifying and keeping track of products in the logistic supply chain.

The technology consists of three components – a tag and a reader connected to a computer. The tag is a tiny radio device sometimes referred to as a transponder, smart label or radio barcode. It consists of a simple microchip connected to a flat radio antenna which is then mounted and encapsulated in a form suitable for its intended application. Tags may be active, with a small battery attached, or passive. Active tags have a larger range and are typically used for tracking large transport

containers. Library tags are passive and the radio power comes from the reader via its antennae that enables it to transmit and receive data to and from the tag and thereby interact with the host computer. Passive tags transmit only over a short distance and have a smaller memory capacity. They are also less expensive. The chips used on the tag may be Read-only chips that are programmed to store a unique identification number or they can be Read-Write chips that can have additional data written to them whilst in use. RFID is available over three frequency ranges. Library tags operate in the Medium Frequency range at 13.56 MHz.

Standards for RFID

One of the reasons for the expansion of RFID is the development of International Standards in a number of areas. ISO 18000 enables the tag to interact with a non-contact reader. ISO 15693 is a key standard for describing the data on the chip and SIP2, developed originally by the 3M company, but now adopted as Z39.83 provides a standard for library management systems to interact with the chip data. The 'Danish' code provides another standard for additional bibliographic data which may be recorded on the RFID tag. More information on standards is available at www.aimuk.org.

Benefits of RFID

For identification purposes RFID can be compared with the use of barcodes where they have a number of advantages. RFID does not require a line of sight between the reader and the tag and multiple items can be read at the same time. RFID tags can be read with greater accuracy and the technology can be built into automatic processes. RFID tags can identify a single unique item and several k-bytes of information can be recorded on the tag.

RFID can also operate as a security tag. They offer dual-security status in that they can be turned on and off. They can be compared with Electro-Magnetic technology for security purposes. The tags, however, could also be masked or removed to defeat the security system.

The use of RFID for both identification and security offers increased economic benefit in that only one type of tag is required. However, RFID tags are considerably more expensive than barcodes and EM tags. Their cost is coming down generally and high-volume users can usually obtain advantageous prices.

RFID in Libraries

RFID use in libraries began as recently as 1998 in the USA and Singapore and 4 years ago there were still less than 50 installations of RFID in libraries throughout the world (Palmer, 2005). There are now a growing number of installations in the UK in Public and Academic libraries. A conference on RFID in Libraries held in London last week attracted over 200 delegates with representatives from over 50 universities and over 60 public library systems plus other organisations.

This interest derives from the potential of RFID to offer significant advantages to libraries in four principle areas:

- Self Service
- Security

Stock Management
Linkage to other RFID systems.

This needs to be balanced by concerns with regard to cost and privacy issues.

Self-Service

Self-service, in varying degrees, is a common occurrence in many aspects of life in the UK: to obtain petrol, pay for many types of travel tickets, the selection of goods in shops of all types. In libraries, self selection of books from open shelves has been the normal mode of service. Self-return of loans through a posting box in the library wall or to a special bin or shelf inside the library was the first initiative in providing self-service to the loan service (Richardson, 2003). The introduction of self-issue was dependent upon the development of appropriate technology. Self-service equipment to read the barcodes present on a user's library card and in books to be borrowed has been introduced in a number of university libraries with up to 50% of loans being dealt with by self-service. The procedure is regarded as too complex for general application in public libraries. RFID tags can be read without the need to locate the book precisely in a particular position and this has allowed self-service applications to be extended. In some specific contexts 100% self-service has become possible. The new Central Library in the London Borough of Sutton is 100% RFID-controlled self-service operation and the new Jubilee library in Brighton, in addition to winning the prize for the best new library building, also uses RFID. Nottingham Trent University has installed RFID in all its three main libraries and the University of Middlesex has installed RFID in its new central library and will gradually extend it to its 7 other campuses. Self-service is being used to allow staff to be redeployed to other services; to extend opening hours and to enable library services to be provided in new locations, frequently on a multi-functional basis.

Security

Open access to the stock requires security measures to be in place to prevent the theft of stock and ensure that all loans are properly recorded in the library management system. Loss of stock may also arise from the non-return of borrowed books. The problem of delayed return or non-return of books can be addressed through fines or other sanctions but some level of loss is regarded as inevitable. The extent of loss is difficult to determine and the only UK national survey was published in 1992 (Home Office, 1992). This found an annual average loss across libraries of various types of 4.4% of stock. Accurate figures in a particular library can only be determined by a full stock check. This is difficult to conduct and estimates based on sampling may have to suffice.

Electro-magnetic technology using strips or tags, frequently secured in the spine of a book with associated detector gates at the entrance to the library is the current preferred technology.

Stock Management

The RFID tag can perform the essential functions needed to ensure a secure lending and return process for all types of stock but it also provides other advantages. Self return of stock can be linked to automatic sorting of the stock to aid return to the correct shelf. Scanning of the stock can also display the relative shelf

position of each item speeding up the process and providing encouragement for it to be undertaken on a frequent basis with a significant improvement in the availability of stock to the users. Ease and speed of scanning enable the exact location of stock to be recorded on the library management system at all times. Special displays or exhibitions of stock can be created easily with the status of all stock being recorded. The ability to scan books on the shelf enables partial or full stock checks to be undertaken rapidly. Misplaced books which might be considered to be lost can be found rapidly and correct sequencing can be carried out more accurately. A developing feature in many UK libraries is a section near the entrance to the library containing popular books in high demand. Ease of scanning books enables these collections to be actively monitored and replenished with new or other books chosen by the librarian. The use of RFID readers in the form of a Portable Digital Assistant is of great benefit in this respect.

Linkage to other RFID systems

RFID technology is in use in 'Smart cards' which are now in widespread use, particularly as stored pre-payment systems for use on public transport or entrance to other facilities. On London's transport system, there are now over 3 million RFID 'Oyster' cards in use. Many systems are investigating how the cards can be extended for automatic small-value payments to a range of service suppliers. A linked pre-payment system could be of great value to libraries, particularly when associated with self-service functions. Cornwall County Council has introduced RFID Smart Cards for user identification in order to access libraries and other cultural services throughout the region.

Privacy

Privacy concerns have been raised, particularly in the USA, about the use of RFID in libraries. The fears appear to relate to future possibilities rather than to present or proposed usage. Covert scanning of the books carried by a person is a possibility but the close range required to perform this task and the implementation of sensible procedures by libraries to ensure privacy serve to limit or even eliminate this potential threat. The separation of bibliographic and personal data is readily achieved through separate identification of each type of data e.g. through the book tag and a reader's card. These data should only be brought together in the library management system and the appropriate access security measures are required at this point irrespective of the identification system in use.

Benefits for Russian Libraries

I don't know whether RFID is already in use in any Russian library. The presence of exhibitors offering RFID solutions here and at the Crimea conference for at least 2 years indicates that they think that Russian libraries are ready for RFID. RFID has been described as a 'disruptive technology' - one that changes the way an organisation operates. Libraries have had to deal with changes resulting from disruptive technologies many times: from storing papyrus scrolls to paper manuscripts; from manuscripts to books; card indexes to computers; etc. In management terminology the effective use of RFID will require libraries to undertake 'business process re-engineering'. RFID can enable Russian libraries to provide the sort of services that will be required of them by their customers in the future. Open access to the most recent materials or those in high demand, whether for lending or

use only in the library. This must be fully supported by web-accessible electronic catalogues and comprehensive library management systems. RFID can make secure self-service possible but it is in the changes in stock management and the release of professional staff from routine work that will be the main benefits. RFID will require significant investment as part of a well-considered strategy for library development. Without careful planning of all aspects of library development the benefits from this investment will not be achieved. Open international standards are now in place to enable Russian libraries to gain the benefits from the experience of libraries elsewhere.

References

- Home Office, 1992. Theft and Loss from UK Libraries. Laycock, G. (Ed). Home Office Police Research Group, 1992.
- Palmer, 2005. RFID - A technology whose time has come? Palmer, Martin. Library & Information Gazette 21 October 2005. p 1.
- Richardson, 2003. Self services: the present state of play. Richardson, Leigh. SCOUNL Newsletter 28 Spring 2003 18-21.