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## **Integrating RFID into library systems – Myths and Realities**

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### ***Abstract:***

*Radio Frequency Identification (RFID) is an exciting new technology being applied within libraries. Today, more and more libraries are using RFID as it brings new functionality, such as multiple item checkout and check-in, rapid inventories on shelves, and book returns with instant item identification, automatic re-activation of the anti-theft function and database update. Recent notoriety about RFID has lead to a degree of confusion and misinformation surrounding the technology. This presentation exposes five of the current most pervasive RFID myths.*

### **Full Text:**

In my university days, a university librarian taught me one of my earliest lessons. It was the very simple lesson, not to judge a book by its cover. That is, removing the library metaphor, look past the surface of things to understand them better. I've learnt that this is a valuable learning, for business as well as life in general.

He taught this lesson in a most humorous way. Some of you may know of the character Conan the Barbarian. This was a fictional character, the brainchild of Robert E Howard, a pulp fiction writer of the 1920's and 30's. In the early 1980's a movie was made of the same name. Conan was played by a then, unknown actor, Arnold Schwarzenegger. It was his first movie – Conan the Barbarian.

My induction into University involved a detailed introduction to the university library and its use. A librarian by the name of Brian was guide to my group. Brian had a long distance runner's physic. He was wiry, balding and had glasses.

He introduced himself to us in this way:

Mistake me not for  
Conan the Barbarian  
For in fact I am  
Brian the Librarian  
Here to tell you what I can.

Initially, I was amused at the physical humor of this introduction. I still have a vivid image of the thin, spectacled Brian, imploring his student audience not to confuse him for Arnold Schwarzenegger. Brian the Librarian, not Conan the Barbarian. An interesting play on words.

Only later as my education deepened, did I recognize that Brian in making this humorous introduction had used an early form of Haiku poetry, called Tanka a closed form of poetry using a 31 syllable pattern consisting of 5,7,5,7,7 syllables.

Brian taught me not to judge a book by its cover. Firstly, it was a revelation to me that librarians could have a keen sense of humor, certainly this was inconsistent with the stereotype image of a librarian. Secondly, the simple ditty that he told was far more complex and interesting than it originally seemed, based as it was on an early Chinese form of poetry. So, beware of stereotypes, often they are more *myth than reality*.

My presentation today is also about myths and reality.

Myths and realities, as they apply to RFID an evolving new technology which is likely to influence many of the ways we live our lives, and very immediately influence the operations of libraries.

Specifically I wish to share with you 5 myths about RFID.

**Myth Number 1. - You can buy tags for 5 cents.**

There's a lot of confusion and misinformation about the cost of tags today. One of the most misleading claims is that you can buy a tag for 5 cents. The 5-cent tag is myth number one.

The conception of a five cent tag was first made by the MIT (the Massachusetts Institute of Technology) Auto-ID Center, a RFID research body. MIT set a goal of creating a 5-cent tag to enable the RFID to be used in the retail supply chain for one time use, disposable tags. There are two assumptions that MIT made in arriving at this target price. First, that the tags would be purchased in quantities of 10's of billions, and secondly, that the tag would be non reprogrammable, unique number tags. This later assumption allows for the RFID complexity to be reduced significantly.

The MIT announcement has gained significant notoriety recently. There have been front-page articles in the New York Times and Wall street journal. The Economist has also published a story

on this emerging technology. What has been widely reported is the possibility of a 5-cent tag, less widely reported are the assumptions behind this claim.

CEO/CFO's have become hooked and excited onto this target price, but the reality is that such a priced tag will not be available for between 6 to 10 years and then will be only applicable to some applications where one time use, disposable tags are require.

The vicious circle is that tag prices are expected to decrease when manufacturers secure high volume accounts facilitating mass production. But, high volume and mass tag production are difficult to achieve without widespread adoption of RFID systems, which is being hampered by price. So adoption is expected to be progressive over time, not dissimilar to the adoption of barcode which took some 25 years to be widely adopted.

Venture Development Corporation (VDC), a highly reputable analyst group have presented recent data suggesting that the average price of a battery-less (passive) RFID Tag is 99c in 2003, and project that this average price will fall to 89c in 2004 and 80c in 2005.

### **Myths # 2 - You should wait until a tag costs 5 cents before adopting RFID.**

The second myth is a corollary of the first. "You should wait until a tag costs 5 cents before adopting RFID."

There is nothing magical around this number of 5 cents. In my 7 years in this industry I have seen regular pronouncements of specific price points which would unlock the mass market. In the early 90's when battery powered tags sold for \$50, the magic number was \$5 dollars for a tag. The innovation of battery less tags achieved this price point just in time for a new goal of 50c to be set. Now that this level is being approached we hear of the magically 5-cent target. I am sure in a further 5 years time a half-cent target will be set.

While the price of PC's initially dropped dramatically, in the last few years prices have not moved so much, but functionality has increased dramatically. Only Ludites have refrained from purchasing and using personal computers, waiting for a better product at a cheaper price. These people have been left behind as others have adopted and benefited from the technology.

The same can be said of RFID, where the question is not how much a tag will cost but rather, what value is achieved by introducing RFID today at today's costs. What is the price end users are willing to pay for RFID systems? – Ultimately it will depend on the application, the items being tagged, and the application requirements (i.e., read range, environmental factors, number of readers, infrastructure. End users need to understand the value proposition of RFID.

Again breaking the stereotype, librarians are demonstrating themselves as leaders in the adoption of this technology. The library application is well suited to RFID today. Tags last the life of the book and are used many times during this life for a wide variety of different functions, checkout, check-in, inventory, and automated return. Each use of the tag allowing better amortization of the initial tag price. This is clearly not the case for one time use disposable tags, where the full value of the tag is amortized over a very short period, possibly one event.

The libraries which have adopted this technology today will develop know how and experience and be best positioned to maximize the value of the technology bringing new customer services and greater efficiencies to their libraries.

### **Myths # 3 – RFID Standards will bring interoperable systems.**

Standards will bring interoperability to libraries using RFID. This is presented as the third myth. Even if two different tag products both comply to RFID standards , this does not necessarily mean that one vendors tag can seamlessly replace another.

International Standards Organization (ISO) communities have been working on RFID communications protocol standardization for many years. This year the most comprehensive RFID standardization activity is expected to near its completion with the publication of elements of the ISO18000 series of standards.

Standardization activities are definitely very beneficial, but the success of these communities in achieving interoperability of tags, is however more questionable. Indeed so far standardization includes air interface, communication protocols and instruction sets. But it would also need to include the data organization in tags, security concepts, and additional tag functionality not considered, which are insufficiently standardized today to guarantee interoperability. What does all this mean ; just like PC's RFID is not necessarily "plug and play" between various vendors.

In short, only a few basic elements of an RFID system are the subject of international standardization.

An approach to address this limitation of the standardization activities, while maintaining tag vendor flexibility is to adopt a philosophy of multi-protocol hardware solutions. That is to say, implement RFID library solutions, which can be configurable to be flexible with various suppliers' tags.

### **Myths # 4 – Anyone can be an RFID supplier.**

The fourth myth is that anyone can be an RFID supplier. The reality is that it requires experienced trained companies to implement reliable RFID systems.

As RFID becomes more widely demanded, there will be a tendency to new inexperienced players to enter the business of supplying RFID library equipment. In theory RFID is easy. Laboratory RFID demonstrations, where the environment is clearly controlled, are relatively simple. However, deploying an RFID system into a live library can be a challenge if this has not been done before.

RFID system performance can be degraded by the presence of metal, and susceptible to electromagnetic interference. Interfacing of RFID to library management information systems requires specific expertise. It is important not to underestimate the obstacles, and minimize risk by working with experienced providers.

## **Myths # 5 - RFID memory size bigger is better.**

It is quite often heard that the memory size on RFID tags should be large, and the bigger the memory size the better. This is presented as the fifth myth.

E.F. Schumacher, in 1975 wrote a book titled, “Small is Beautiful”. The book was quite radical at the time proposing that less was often better than more. His philosophy could easily be applied to RFID for many applications.

Digital memory comes at a cost. Each additional memory cell on a tag requires additional space on the silicon chip, the heart of a tag. The silicon chip is but far the most expensive component of an RFID tag, and so more memory generally implies higher tag cost.

Small memory can be used very efficiently. As a quick guide it is worth remembering just how much information can be stored on small memory tags. With 64 bits of memory, which is a very modest size of memory, you could program 18,446,744,073,709,551,616 different tags all with a particular unique number. Or with 96 bits of memory, you could program 79,228,162,514,264,337,593,543,950,336 different tags all with a particular unique number. This is a bit of an over simplification, because generally libraries wish to program tags with various data formats, but it is illustrative of how it is possible to use memory efficiently.

A further issue with increased memory size is that it takes a longer time for the tag to communicate its full memory to a reader, thus slowing down the reading of a tag.

Think of a small house verses a big house. Small houses are generally less expensive to buy, less expensive to maintain and you have to be very efficient with storage of your belongings. . Bigger houses are generally more expensive, more expensive to maintain and you don't have to be as efficient with storage as you have more space – the more space you have, the more you tend to fill it with things you don't really need.

It is therefore important, when specifying an RFID solution for a library to deeply consider how much memory the tag is really required to have, and how to most efficiently use the memory on a tag.

## **TAGSYS**

TAGSYS has been designing and manufacturing RFID (Radio Frequency Identification) systems for over fifteen years and is today the industry's largest independent player for RFID products operating at 13.56 MHz, the frequency mostly used for item tracking applications around the world. TAGSYS has implemented RFID solutions in various market segments including libraries, medical, textile rental services, food production and automotive.

TAGSYS draws on many years of experience in RFID design, to offer a system that performs book identification and anti-theft, including multi-item processing in one single operation. In 1998, TAGSYS introduced the first RFID system at the National Library Board of Singapore, revolutionizing the security and management of library books and other media.

As of early 2003, TAGSYS had installed its RFID system at more than 40 libraries in North America, Europe and Asia, representing over 7 million books in circulation.

As an RFID product manufacturer and a provider of complete RFID systems, TAGSYS has invested significantly in developing and certifying an international communication standard for RFID and state of the art RFID systems offer.

TAGSYS provides an intelligent way for libraries to maximize their investment in RFID with optimized chip memory and built-in security features (EAS). And instead of providing basic solutions, TAGSYS offers cost-effective customizable RFID components that can be tailored to meet the architectural and logistic needs of any individual library.

TAGSYS has built strong partnerships with library software and automated system equipment providers to offer complete integrated solutions for libraries management (including self-service stations and automatic handling / sorting systems).

TAGSYS RFID integrates easily to the Library information system and to the existing infrastructure.