Smarttrack RFID White Paper
A cost-benefit analysis of RFID for
Museum and Art Gallery collections
November 2008

Introduction

This white paper outlines the cost vs benefit of implementing Radio Frequency Identification (RFID) technology for Museum and Gallery collections. The paper compares the costs of using traditional manual tracking (i.e. the physical recording of handwritten accession numbers), barcoding, and RFID systems. A scenario is outlined utilising a small-medium sized Museum collection containing some 50,000 objects.

RFID Cost-Benefit Analysis

While it can be difficult to accurately quantify the precise monetary benefits that an RFID system will bring over a barcode or number-only (manual) system there are undoubted gains in staff efficiency and accuracy, as well as significant reduction in the often hidden risks associated with large collections.

These risks include:

- Risk of losing objects – through misfiling, smaller items not being 'visible', or there being numerous items within a storage container (i.e. objects may get 'lost' when there are numerous similar items together)

- Reduced productivity due to inaccurate record-keeping

- Reduced productivity from the need to search for 'misplaced' collection items

- Errors in data due to repetitive data-entry tasks (i.e. loading inventory data into a collection management system (CMS)).

As an example the Australian Parliamentary Library recouped the cost of implementing RFID technology within 3 years purely through productivity gains in vastly reduced stock-taking and audit times. The Library estimates that the per annum ongoing costs will be significantly less than the per annum staff costs of a manual system.

The Vatican Library, which installed RFID in 2004, estimates that staff will be able to complete its annual inventory in less than a day, something that previously forced it to close for a whole month.

Manual systems

It is estimated that manual-only systems often have a 10% error rate, which can be caused by any one or more the following:

- Objects with incorrect/transposed numbers marked on the item

- Incorrect numbers recorded in paperwork/systems

- Incorrect numbers recorded when carrying out processes (e.g. loans, movements, inventories)
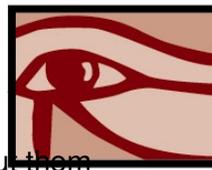
- Objects with no information recorded about them

- Mis-identifying an object(s)

- Repetition when dealing with large numbers of similar objects

Manual and barcode systems

In addition to the issues affecting manual systems outlined above, both manual and barcode systems can suffer from the following:

- Significant handling of an object is required to see number/barcode

- The number/barcode on the object can deteriorate or be degraded

- Mis-filed items are essentially 'lost' until a full stock-take is carried out

RFID benefits

The benefits that an RFID system can offer to mitigate these risk or error factors are:

- Greater accuracy of read – purported to be 100% in Library systems, leading to a significant decrease in failure of information lost

- A unique and permanent identifier

- No need to handle items directly

- Can find 'lost' items quickly and easily.

RFID cost-benefit

Taking all of the above factors into consideration, to quantify the benefit that an RFID system will bring to an organisation the following aspects need to be quantified:

- Time spent looking for lost, misplaced items

- Efficiency savings in Accessioning

- Efficiency savings in documenting collection movements

- Efficiency savings in documenting loans and items going on display

Real-life Collection Scenario

Let us assume a medium-sized, reasonably active museum/gallery collection containing 50,000 objects. It is estimated that up to 10,000 objects have their number 'read' each year for a variety of reasons - stock-takes, movements, object identification, loans, exhibitions, etc.

The estimated costs for managing these collection items are outlined in the following tables. These costs take into account the attachment of a number/tag, and linking this to a basic record in a collection management system, and also the time required to read the tag/number for a range of collection management tasks.

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Table 1. Attachment costs

Tag/number type	Estimated tag/number cost per item	Estimated time taken to attach tag/number	Estimated attachment cost per item*
Number only (Manual)	$0.02	5 minutes	$2.12
Barcodes	$0.10	1 minute	$0.52
RFID	$0.50	1 minute	$0.92

* Assumes an annual salary of $50,000

Table 2. Reading-time costs

Reading type	Estimated average reading time per item	Reading cost per item*
Number only (Manual)	5 minutes Includes time for opening boxes, handling objects, correcting 10% error-rate and manually loading data into CMS.	$2.10
Barcodes	1 minute Includes time for opening boxes, handling objects, and interacting with barcode reader (e.g. selecting location from a drop-down list). Assumes location data is automatically loaded to CMS.	$0.42
RFID	0.5 seconds Includes time required to interact with handheld reader (e.g. selecting location from a drop-down list). Assumes location data is automatically loaded to the CMS.	$0.0035

* Assumes an annual salary of $50,000

Combining the above two tables and using an example of 1 staff member needing to read 10,000 accession numbers per year over 3 years (for inventory, shelf checking, finding items, moving items to new storage, sending items out on loan, preparing items for display, etc), total costs for each system can be summarised as follows in Table 3.

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Table 3. Reading and attachment costs over 3 years

Reading type	Attachment cost per item*	Reading cost per item*	Estimated cost to read 10,000 items per year – YEAR 1 (attachment plus reading costs)*	Estimated cost to read 10,000 items per year – YEAR 2 (Reading costs only)*	Estimated cost to read 10,000 items per year – YEAR 3 (Reading costs only)*
Number only (Manual)	$2.12	$2.10	$42,200	$20,100	$20,100
Barcodes	$0.52	$0.42	$9,400	$4,200	$4,200
RFID	$0.92	$0.0035	$9,235	$35	$35

* Assumes an annual salary of $50,000

Summary

From the figures outlined above it can be seen that barcode and RFID technology are comparable in terms of price initially (even though RFID tags are more expensive), but RFID technology provides substantial cost-savings in subsequent years (and in perpetuity). Manual systems are clearly more expensive to operate, although it should be noted that most objects will still require a number to be physically attached (e.g. with Paraloid B72) using standard museological practices.

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