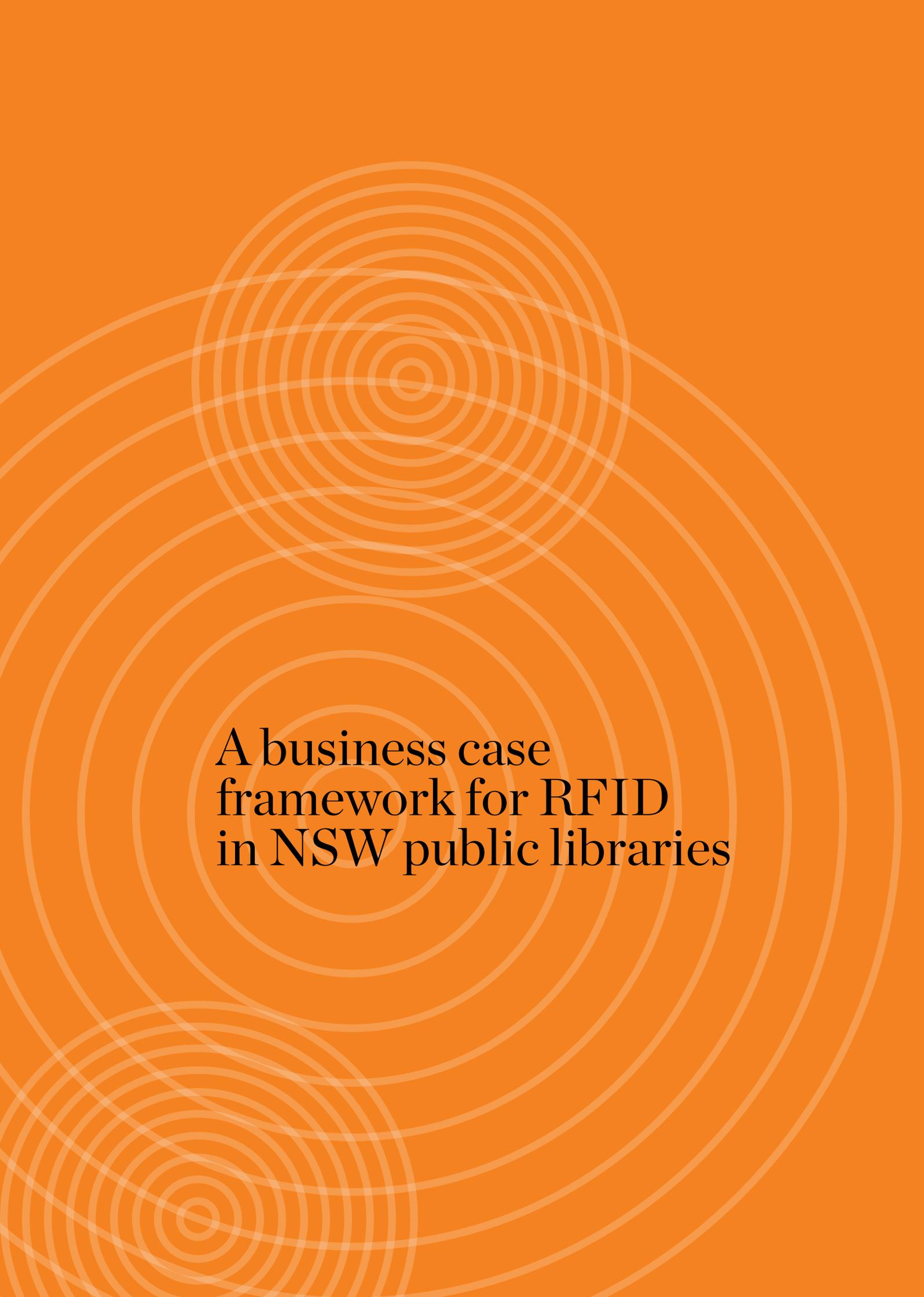


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A business case framework for RFID in NSW public libraries



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STATE LIBRARY OF NSW
MACQUARIE STREET
SYDNEY NSW 2000
TELEPHONE (02) 9273 1414
EMAIL: LIBRARY@SL.NSW.GOV.AU
WWW.SL.NSW.GOV.AU

A BUSINESS CASE FRAMEWORK FOR RFID IN NSW PUBLIC LIBRARIES

THIS PROJECT WAS COMMISSIONED BY THE STATE LIBRARY OF NSW ON THE RECOMMENDATION OF THE NSW PUBLIC LIBRARY NETWORK RESEARCH COMMITTEE FOR THE LIBRARY COUNCIL OF NSW AND WAS UNDERTAKEN BY HUEGIN CONSULTING

FOR FURTHER INFORMATION ON A BUSINESS CASE FRAMEWORK FOR RFID IN NSW PUBLIC LIBRARIES AND AN ONLINE VERSION OF THIS PUBLICATION, PLEASE VISIT WWW.SL.NSW.GOV.AU

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Foreword

The State Library of NSW, on behalf of the NSW Public Library Network Research Committee, commissioned and funded a project to undertake a cost benefit analysis of using Radio Frequency Identification (RFID) in NSW public libraries.

The aim of the project was to explore and document the costs and benefits of using RFID in a variety of contexts relevant to the NSW public library network. The project sought to provide a guide to NSW councils considering RFID and enable an informed comparison to be made between service models using RFID and not using RFID.

This report of the project offers a practical business case framework which libraries can use to ascertain the most effective and cost efficient service model for circulation and stock management, in a variety of contexts.

Acknowledgements

The Public Library Network Research Committee members for this project were:

Jill Webb, Ryde City Library

Linda Horswell, Mosman Library

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Paul Scully, Liverpool City Libraries

Alexander Mills, Singleton Public Library

Jo Carmody, Richmond Tweed Regional Library

Frances Sims, State Library of NSW

Cameron Morley, State Library of NSW

Leanne Perry, State Library of NSW

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The State Library thanks Huegin's Richard Buller and Ben Petschel, and also the libraries that agreed to be case studies for the research.

Frances Sims

Director, Public Library and Community Learning Services

State Library of NSW

Executive Summary

Approach

In consultation with the State Library of NSW, Huegin undertook interviews with a selection of libraries across the State that had existing Radio Frequency Identification (RFID) systems installed for the circulation management of their library collections. These libraries had previously made the decision to invest public funds in installing an RFID system. We sought to understand how each library considered the options (and the costs and benefits of these) available to them prior to deciding to install RFID.

Supported by a literature survey on RFID in public libraries and in consultation with the State Library, we proposed that it would be beneficial to establish a robust business case framework around which future RFID purchases could be made. This would place the onus onto a tender team to provide correct and current cost and benefit data for the business case, rather than use a model that would quickly become out of date.

We assessed the influence of RFID on circulation management in libraries and sought to define the cost drivers and benefits which will aid the design and configuration of future installation options. We also sought to provide NSW public libraries with a means to carry out benefit and key performance indicator tracking.

Results

Our investigations of RFID systems in existing NSW regional libraries found limited quantification of the installation costs and little quantification of benefits. It was evident that it was going to be difficult to establish a robust costs and benefits model that could be used for future purchases.

Through interviews with libraries that currently operate RFID, we established the key costs and benefits of RFID systems for public libraries. We used these as the basis of a business case framework to be used for making future purchases of RFID systems.

Huegin recommend that the business case framework would provide a sound basis for making prudent and efficient decisions about the investment of public funds in library infrastructure projects. We demonstrated a business case framework through the use of examples of RFID system installations.

To support the business case we have provided a means to also assess the longer term benefits of RFID systems.

Recommendations

The key recommendations from this report are:

- That the State Library makes available a business case framework to help develop prudent and efficient cases for installing RFID systems.
- That public libraries track the direct and indirect staff costs associated with the more efficient processes that RFID can deliver. It is recommended that these should be calculated prior to any future purchase to be able to truly represent any efficiency improvement that an upgraded circulation system may bring.
- Two means of tracking desired outcomes should be implemented during and following RFID installation. The first is monitoring the long term generation of quantitative benefits by tracking planned benefits versus actual benefits achieved. The second is using KPIs to enable control of performance through effective feedback.

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1

Introduction

We are primarily investigating the costs and benefits, and overall return on investment for RFID tagging of library collections. We interviewed a number of libraries to understand how they decided to invest to maximise that return on investment. We sought to understand how each library considered the options available to them, prior to deciding to install RFID and use it as part of a circulation management system*.

In this section we propose that it would be more beneficial to establish a robust business case framework around which future RFID purchases could be made.

** We use the term "circulation management system" to describe any system related to check-in, sorting, shelving, item location, reservations, check-out and security (as illustrated on page 27). This is different to collection management which manages the lifecycle of an item from purchase to disposal or archive.*

RFID in the NSW library network

Public libraries play important roles as information resource providers and community hubs. Library usage statistics indicate that public libraries are highly valued by their communities, with the 2012 figures showing more than 35 million visits to NSW public libraries, almost 48 million loans and over 52,000 public programs and events (source: State Library of NSW Public Library Statistics 2011/12).

In 2011, there were 99 public library services in NSW of which 24 had implemented Radio Frequency Identification (referred to herein as the “RFID systems” or “RFID”), and in 2012 the number increased to 31. Reasons for implementation included, among others, improvements in efficiency and customer service and the capability to expand in future while maintaining existing staffing levels. As can be seen on page 18, implementation of RFID was not limited to libraries serving a large population or with a high item turnover to staff ratio, with many small to medium-size RFID libraries and the smallest serving a population of just over 10,000.

Huegin was engaged to develop a cost and benefit model that would evaluate the installation of RFID book tagging systems used in public libraries across the State. The original intention was that the costs and benefits could then be combined in a model to calculate a return on investment (ROI). The many combinations of library types and possible RFID solutions meant that calculating any ROI will depend on the design configuration chosen and that a cost and benefits model needed to be comprehensive enough to cover all possible solutions.

Our investigations into RFID systems in existing NSW public libraries found limited quantification of installation costs and limited quantification of benefits. Some of our observations have been supported by literature. It was evident that it was going to be difficult to establish a robust costs and benefits model that could be used for future purchases. Instead we proposed to the State Library of NSW that it would be more beneficial to establish a robust business case framework around which future RFID purchases could be made. This would place the onus onto the tender team to provide correct and current cost and benefit data for the business case.

The need to establish prudent and efficient business cases

Considering the above, Huegin recommend that the basis for establishing RFID systems in a library context should start with the use of a business case framework. The business case framework establishes the pretext for the purchase of any RFID system within the context of costs, benefits, risks and optionality.

This report demonstrates how to build prudent and efficient business case for libraries who are considering installing RFID systems. By following the business case framework the decisions to invest public funds should provide a clear and concise means by which a RFID project can be deployed.

Establishing a hypotheses for the costs and benefits analysis of RFID

To establish the necessary data and information to build the business cases, Huegin sought to interview a number of libraries with existing RFID systems. Prior to starting this survey we established some key hypotheses that we set out to test.

1 To determine a ROI, the costs, benefits and risks need to be quantified.

We believe that whilst costs are relatively straightforward to define, the benefits will be less tangible. We believe that potential business risks in operating RFID systems have not been determined. The costs and benefits will depend on the breadth and depth of RFID deployment in different library contexts.

2 The full life-cycle of the system needs to be considered to truly understand the investment decision.

Installation options should be considered over a suitable multi-year life span. Additional lifecycle features of an RFID system should be considered such as obsolescence and vendor lock.

3 Full optionality needs to be considered in the investment decision including the do nothing option.

There may only be a few unique features of the technology that give it an edge over existing technologies. Where the features are similar then it will be difficult to demonstrate a clear financial advantage without concrete metrics to compare options.

4 Potential benefits are not necessarily realised.

Benefits will only be of long term success if the system improvements allow staff to be deployed elsewhere. These potential benefits will eventually be realised only if the deployment actually makes an improvement elsewhere and that this is measured.

The literature survey and our own investigations informed the hypotheses for RFID costs and benefits.

Defining costs and benefits of RFID in a NSW library context

Whilst the data that was gathered will be of benefit to the NSW Public Library network, it will be the ability to use a robust business case framework in which future RFID purchases are made that is important.

In establishing a business case framework we also made the following observations:

- There is a need to ensure any purchase of a RFID system should align with the strategic intent of the overall organisation.
- There is a need to consider whole of life costs and benefits and not just at the installation stage. This should include assessment of staff costs before and after installation.
- Risks should be considered from both a project and business perspective.
- Optionality of installation possibilities is an important part of the tendering process.

In consultation with the State Library, we undertook a number of interviews with a selection of libraries across the State that had RFID systems installed. These libraries had previously made the decision to invest public funds in installing an RFID system. As we are primarily investigating the costs and benefits, and an overall ROI for RFID, we interviewed the libraries to understand how they decided to invest to maximise this ROI. We sought to understand how each library considered the options available to them prior to deciding to install RFID.

The requirements of this costs and benefits project and where they are addressed in this report, are given in Annex A.

2

Literature Survey of RFID in the context of public libraries

The literature survey covers the typical and key costs and benefits of RFID systems for public libraries, and how these might provide a return on investment for the organisation.

Review of costs and benefits of RFID systems in libraries

There have been many studies of the costs and benefits of RFID in libraries and many different approaches to the analysis reviewed in this report. Some studies of note include a survey of 27 Californian public and academic libraries (Engel 2006), a technical analysis by the standards body for the UK book industry (Edwards & Fortune 2008) and an analysis of barriers to implementation in Australian academic libraries (Butters 2008).

RFID is used in various industrial applications. RFID systems in libraries have been in existence for more than a decade (Butters 2010 p6) with the first Australian implementation being as early as 2002 (Butters 2008 p198). The major alternative technologies are barcodes (for item identification) and electromagnetic (EM) strips (for detection, also known as "tattle-tape").

RFID tags can be used for both identification and detection, alone or in conjunction with barcodes and/or EM. An important feature of RFID is that "the radio waves generated during the reading process are able to penetrate many materials and so can be employed where tags are not visible to the eye" (Butters 2010 p5).

The key points are given to the right.

- 1** *Libraries have different priorities according to their local requirements (Butters 2008 p200). Since each library is different, with different goals, variations in size, collections, staff, labour costs, opening hours and ways of providing service, there cannot be one single formula for determining what costs and benefits could be obtained that is applicable to every library. (Engel 2006 p8).*
- 2** *Many of the costs and benefits are intangible, for example Engel (2006) considers costs vs savings and benefits vs detriments. In particular, "Reported benefits such as reducing lines at the circulation desk, patron satisfaction and staff satisfaction are best treated as quality improvements, and can be as important to a library as cost savings. These need to be included in any cost/benefit analysis even though they cannot be easily quantified." (Engel 2006 p37-38).*
- 3** *As a relatively new and rapidly evolving technology, costs may vary considerably (Engel 2006 p6) and the time period of useful life of the equipment may be unknown (Engel 2006 p39).*
- 4** *Correspondingly, some of the benefits may be not fully realised or considered as future possible benefits (Engel 2006 p21, Edwards & Fortune 2008 p17).*
- 5** *Some of the benefits can potentially be realised through other technologies (Edwards & Fortune 2008 p9, Ayres 2012 p17).*

Identifying the key cost drivers with RFID

Defining the cost drivers

The studies categorise the costs in a manner similar to that of (Engel 2006):

- Implementation (one-off)
 - Equipment and supplies
 - Conversion
 - Other (training, installation, pre-implementation research and planning)
- Maintenance (ongoing)
 - Tagging
 - Equipment maintenance

Engel (2006, p28-33) reported the range of costs observed by the Californian libraries that had implemented RFID at the time of the study. They note that "There is no way to give the 'typical' cost of a system, because costs vary between vendors, and the needs and goals of each library are different".

Typical equipment costs include (Engel 2006 p31):

- Book tags
- AV tags and cases
- Security gates
- Staff check-out / check-in station
- Self-check stations
- Tag programmer
- Inventory scanner

Similarly the study found significant differences in the cost of labour for tagging, due not only to the size of the collection but also who did the tagging (staff, volunteers or temporary personnel) and what tasks were associated with tagging.

For example, the study found that "The time to tag an item varied in the way it was reported as did the tasks associated with tagging. Some libraries reported the time it took to get the item from the shelf to the tagging station, tag it and return it to the shelf. Others counted only the time it took to tag the item once it was at the station. A number of libraries used the opportunity, with the item in hand, to assess it for condition and possible weeding, which lengthened the time spent per item." (Engel 2006 p31). Estimates varied from 5 seconds to 2 minutes per item.

Similarly, difficulties were encountered in estimating the duration of the tagging effort, being dependent on "the size of the collection, how many staff or volunteers are tagging, how many

hours a day tagging is done, whether the tagging is continuous or stop-and-start, and what the deadline is." (Engel 2006 p32)

The study also performed a cost comparison for electromagnetic (tattle-tape) security versus RFID (Engel 2006, p30) by estimating the cost of equipment and supplies for a hypothetical library with 60,000 items, finding that the costs were broadly similar with RFID being slightly higher due partly to the cost of RFID tags at the time.

Ongoing costs

The study found that ongoing tagging costs were often very close to the conversion costs on a per-item basis (Engel 2006 p34), whereas equipment maintenance costs were typically a percentage of the installation contract.

The study noted that it is too soon to estimate the longevity of RFID equipment, with factors such as durability of equipment and ease of upgrade being currently unknown.

Identifying the key benefits delivered by RFID

Each study approached its benefits analysis differently and found different specific potential benefits. Butters (2008, p200) describes the expected benefits of RFID according to a common set of positive outcomes desired by most libraries:

- Productivity
- Work Health & Safety
- Collection management
- Security
- Customer service
- Image

These “categories” are overlapping and interlinked. Each of the specific potential benefits listed in other studies broadly fit within one or more of the above categories; for example Engel (2006 p40-41) considers one-time benefits realised during the conversion process (weeding, inventory, locating missing/mis-shelved items) and on-going benefits (circulation staff cost reduction, increase in service and productivity, theft prevention and location of materials, reliability and quality improvements).

RFID has the potential to improve productivity by reducing the staff time required to process items in circulation. This is regarded as probably the most common motivation for implementing RFID (Butters 2008 p 201, Engel 2006 p17, Edwards & Fortune 2008 p11). RFID can improve productivity through:

- Easier / more efficient handling of items
- Self-check facilities
- Self-return
- Sorting

Handling of items is potentially much more efficient than with previous systems such as barcodes, which require the user to locate the barcode (possibly inside the book) and align it with the infrared beam on an item-by-item basis (Engel 2006 p17). In contrast, RFID tags can be scanned simultaneously without alignment and with the book or multimedia case closed.

Self-service is often seen as the “quickest win” for significant cost savings, with the methodology being very similar to that employed by self-service systems for barcoded stock for over 25 years (Edwards & Fortune 2008 p11). For example, “RFID’s possibilities for faster check out for circulating materials and easy to learn self-check out appealed to libraries that will need to do more with the same level, or perhaps even less, staffing.” However Edwards & Fortune (2008 p9) also notes that “many libraries appear to have invested in RFID in the belief that it was their only means of deploying self-service, only to discover later that they need not have done so.”

Productivity gains can also be realised through self-return and assisted sorting. Self-return systems vary and include a modified self-check unit (with the user instructed to place the returned items

in bins or on shelves), an RFID-enabled chute (that invisibly executes the check-in) and a secure returns slot (where the system checks first that the item belongs to the library and is a complete set). Some libraries have automatic sorting via conveyors and bins.

The ways that individual libraries utilise the productivity gains can range from redeployment of staff time toward value-added services, to downsizing or budget reductions (Butters 2008 p201, Engel 2006 p17).

Butters (2008 p201) considers the productivity cost/benefit calculation and argues that libraries with high circulation and small collections may find it easier to justify the expense of converting to RFID for reducing the burden on circulation staff. However Ayres (2012 p17) states that "based on how high-circulating libraries use RFID today, they are often much better off purchasing an AMH system (automated check-in system with three or more sorts) if their objective is to reduce operating expenses ... RFID implementations typically cost hundreds of thousands of dollars ... a small AMH system can be had for under \$50,000."

Identifying the key benefits delivered by RFID

Work Health & Safety

RFID systems have the potential to reduce staff injury. This is expected to be achieved mainly through reduction in the frequency of repetitive motions used in checking out materials (Engel 2006 p20 and 37). The Californian study noted that most libraries had this as a goal and several libraries yielded benefits in this area.

Collection management

RFID has the potential to facilitate tasks previously considered impractical and introduce new ways to manage collections, such as reducing the time taken for inventories from months to hours or days, or locating items for customers.

This is perhaps the least well-understood potential benefit of RFID.

The Californian study (Engel 2006 p19) found that most of the libraries surveyed had purchased RFID with the ability to perform inventories as a primary or secondary goal, although only one library reported actual experience in using RFID for inventory.

Other studies note that RFID-based stock management "... is an area of operation that offers both the potential for greatest innovation and greatest disappointment" (Edwards & Fortune 2008 p14) and "the reducing need for access to printed materials and the large collection sizes within academic libraries essentially mean that RFID is a very expensive collection management solution if it is the only benefit sought, and potentially one with a slowly diminishing value" (Butters 2008 p202).

Security

RFID has the potential to improve security in libraries.

The Californian survey (Engel 2006 p19) found that 'tattle-tape' solution that has been dominant for the past decade or more was seen as unsatisfactory to most of the libraries interviewed." With RFID systems, some libraries benefited from fewer false alarms (and consequently fewer bag searches) and knowledge of which items set off the alarm. Furthermore one library stated that the self-check system was more secure than their previous system where it was possible for patrons to turn off the security tag without checking out the item.

On the other hand, some authors state that RFID-based security is not as effective as that provided by EM-based security (Butters 2008 p203) - for example RFID tags may be easier to find and remove than EM security strips. However libraries that have only part of their collection secured may benefit: "the public library position that an 80% effective solution covering all materials is still better than a 100% solution covering 40% of the collection may still be sound".

Customer service

RFID has the potential to improve patron satisfaction through various means such as improved efficiency, reduced lines at check-out, a reduction in the number of false alarms or bag searches.

Interestingly, the Californian survey noted that, given the controversies about RFID and privacy, "among the libraries surveyed, most have patrons that are happy with the system" (Engel 2006 p24).

Image

Some studies have noted that image may be a factor in the RFID decision: for example, it may be expected that the profile of the library will be enhanced through the implementation of RFID (Butters 2008 p200).

Identifying the risk associated with RFID systems

Many authors discuss at least some of the risks or concerns associated with implementing RFID systems. In particular, the studies by Butters(2010) and Edwards & Fortune(2008) cover many risks from a technical perspective and discuss ways to avoid common pitfalls.

Business risk

Associated with any project is a risk of poor investment return. Libraries “wonder whether the expense is worth the presumed gains in efficiency” (Engel 2006 p9). Butters (2008, p6) suggests that the important questions to consider are these:

- Do we really know what we want RFID to deliver in our library or can we devise a process to find out?
- Are there systems on the market that can deliver what we want?
- Can we construct a positive & realistic business case to demonstrate that the benefits justify the cost?
- Do we have the skills and experience (or access to them) to make the right system evaluation/selection?

For example, “we have an environment where there are significant differences in the strengths and weaknesses of vendor’s RFID solutions ... This means that the library must have a very clear vision of what those success factors are *before* approaching the market. To do otherwise is to risk having the success factors influenced by the pitch of a specific vendor. This is a particular risk when the knowledge gap between the systems supplier and the library is great” (Butters 2010 p17-18).

Safety and privacy

There are “perceived health risks” associated with electromagnetic fields at UHF frequencies employed in newer RFID technology (Butters 2010 p15), however the health risk is considered low compared to devices such mobile phones (Butters 2010 p4).

There are concerns about borrower privacy (Engel 2006 p9), however it is noted that various technical reasons make malicious surveillance impossible at medium to long range and while short range covert scanning may be technically possible, there are numerous things that libraries can do to mitigate the risk (Butters 2010 p8-9).

Risk of obsolescence needs to be considered for long term solutions

There is a risk that the technology does not perform to expectations or becomes obsolete.

Libraries are concerned that “the still-evolving technology may leave them with yesterday’s product that no longer works with a new generation of equipment” (Engel 2006 p9).

In particular, “with many RFID suppliers now in the market ... RFID is an area in which standards are particularly important... libraries will need RFID systems which can successfully interoperate with each other” (Edwards & Fortune 2008 p7).

It is suggested that current International Standards Organisation (ISO) standards go some way to address the needs of libraries but do not address data security and interoperability (Butters 2010 p9-10). Edwards & Fortune (2008 p8-9) note that some RFID suppliers are now claiming to be able to read any tag format, however they recommend some points to consider carefully before opting for this approach, including:

- How many different data models ... can be accommodated by a Library Management System (LMS) before the systems performance becomes unacceptably slow?
- How easy will it be to switch LMS or RFID provider in the future if the new provider does not support the solution being used?

Edwards & Fortune (2008 p7) also discuss issues in responsibility for managing data - while it should not really be a concern for libraries, they “should simply be aware that RFID and LMS suppliers need to co-operate and provide libraries with solutions that work.”

Primary References

Ayre, Lori Bowen (July 2012), “Chapter 2: RFID Costs, Benefits and ROI”, *Library Technology Reports*, vol 48 no 5 pp17-19, <http://www.alatechsource.org/ltr/index>

Butters, Alan (September 2010), “Radio Frequency Identification (RFID): an introduction for library professionals”, *Sybis Whitepaper*, [http://www.sybis.com.au/Sybis/RFID Whitepaper Ed 2.pdf](http://www.sybis.com.au/Sybis/RFID%20Whitepaper%20Ed%202.pdf)

Butters, Alan (September 2008), “RFID in Australian academic libraries: exploring the barriers to implementation”, *Australian Academic & Research Libraries*, vol 39 no 3 pp 198--206,

Edwards, Simon and Fortune, Mick (November 2008), “A guide to RFID in libraries”, *BIC e4libraries project*, [http://www.bic.org.uk/files/pdfs/090109 library guide final rev.pdf](http://www.bic.org.uk/files/pdfs/090109_library_guide_final_rev.pdf)

Engel, Elena (July 2006), “RFID implementations in California libraries: costs and benefits”, *BIC e4libraries project*, <http://kcoyle.net/RFIDCostsBenefits.pdf>

3

Case studies

Through interviews with libraries who currently operate RFID-based systems, we consolidated our views on the key costs and benefits of RFID systems for public libraries. Our investigation found that, whilst robust tender processes were followed, a business case framework would be useful in assessing future purchases of RFID systems.

Case study overview

In the case studies our aim was to understand the experiences of a representative selection of libraries that had already implemented RFID technology. In particular, we sought to understand how the libraries operate their circulation management system using the RFID technology. At some point in the past these libraries have made the decision to invest public funds in installing an RFID system. As we are primarily investigating the costs and benefits, and overall return on investment for RFID, we interviewed the libraries to understand how they decided to make the investment. We sought to understand how each library considered the options available to them prior to deciding to install RFID as this technology is not necessarily the only means by which a circulation management system can be upgraded. RFID does have its drawbacks so we sought to understand how the libraries considered these and whether they were overcome.

The interviews were conducted in a structured way. We used a standard agenda for each case and visited the libraries in person. The interview agenda and particulars are in Annex B.

To assess costs and benefits, we chose a representative selection from as diverse a range of contexts as possible, including:

- small, medium and large library services
- urban and rural environments
- stand-alone, multiple-outlet, collaborative and regional implementations
- basic, intermediate and advanced RFID features implemented

The following libraries were selected in consultation with the State Library NSW:

Library	Local government classification	RFID implementation	RFID notes
Ryde	Urban Metro	2008	Large metro library
Sutherland	Urban Metro	2008	Very large metro library
The Hills	Urban Fringe	2003	Early uptake with auto-sort capabilities
Leeton	Rural Agricultural	2007	Early uptake and small standalone
Riverina	Mixed (Urban/Rural)	2009	Large regional implementation
Great Lakes / Greater Taree	Urban Regional Town/City	2010	Collaborative implementation

General observations of libraries and RFID in NSW

A snap-shot of RFID libraries in NSW

The libraries interviewed covered a diverse range of locations which serve populations sizes from 12,000 to 220,000. The libraries serve either rural or urban populations. Rural services are notable for low population density and large distances between branches whereas urban libraries tend to serve large concentrated populations. Included was the Riverina Regional Library service which has 14 service points, including 12 branches and a mobile library, and serves 9 member local councils. See callout box.

Library funding sources

All libraries have their operational expenditure primarily funded by the local councils with subsidies from State Government averaging 8% statewide, and ranging from 3% to 30% depending on the size of the Local Government area population (Source: Public Library Statistics 2011/12). On the other hand, capital expenditure for projects such as RFID implementation are funded by any combination of council grants, internal budgets/reserves and State Library of New South Wales grants. The purchases of the RFID systems were managed through the Local Government Procurement process.

Callout box - Riverina Regional Library

Riverina Regional Library provides headquarter services in the city of Wagga Wagga by providing centralised information systems, technology support, management and governance. Riverina does not have jurisdiction over how the RFID technology is used but is involved in the acquisition and deployment.

Who has RFID in NSW libraries?

The current uptake of RFID technology in NSW libraries does not necessarily follow any particular trend by library feature. Neither the size of collection, staff numbers nor serviced population are clear drivers of the need to update to RFID (as illustrated on the following page). It seems that the needs driving the requirements to upgrade circulation management systems to the RFID technology depend on specific local circumstances.

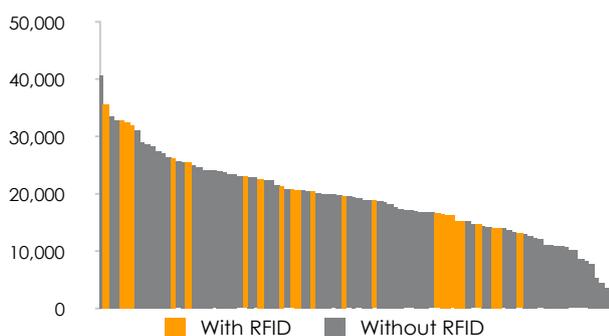
Reasons to invest in RFID

Many of the libraries were seeking to move their strategic focus to end-user benefits (such as Riverina's "collections to clients" strategy initiated in 2005) while at the same time reducing the burden on circulation staff. This created the need for robust self-check loaning by the customer and an equally robust security system to support it.

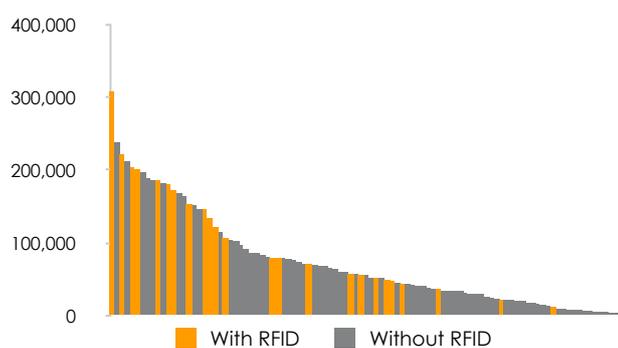
Whilst libraries were considering this, there were other issues of obsolescence that needed addressing such as speed of lending, accuracy of returns, ease of items location and simplified and rapid stocktaking. The prevailing view among the interviewed libraries was (and still is) that tattle-tape security is "old technology" and that RFID is the way of the future with many more potential applications involved in the acquisition and deployment.

In 2011/12 there were 99 library services in NSW of which 24* use RFID

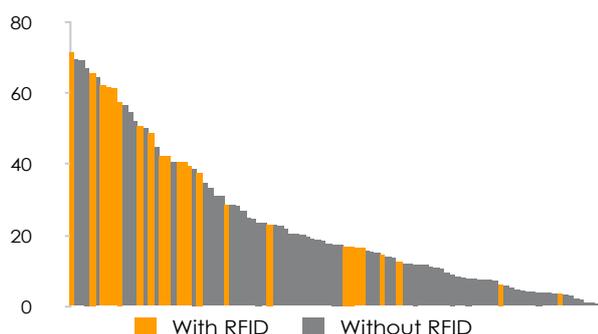
Item annual circulation per staff member



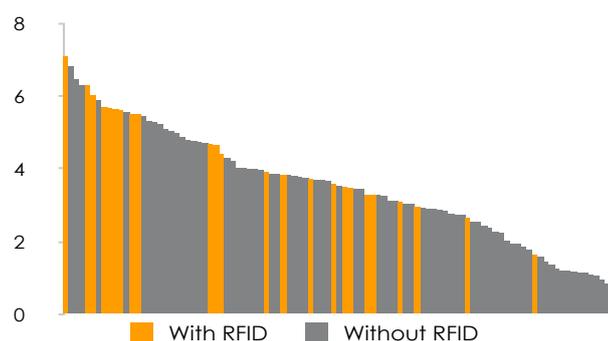
Population served by library



Staff full time equivalents per library



Item turnover frequency per annum



Source: NSW Libraries using RFID 2011 (State Library NSW) and Public Library Statistics 2010/11 (State Library NSW)

*At the time this study was published in 2013, there were 31 out of 99 libraries using RFID.

The transition made from non-RFID to RFID in libraries

Prior circulation management systems

The main incumbent technologies for circulation management were barcodes for item identification and electromagnetic strips for detection, also known as “tattle-tape”. Barcoding allows computerisation of item data and hence electronic management of customer accounts but on its own does not provide security as the exit devices cannot read the barcode. If the system is coupled with tattle-tape then the exit devices can detect secured items but cannot determine which items set off the alarm. Several of the libraries had no security or had placed inactive “dummy” gates as a deterrent measure. The remainder of the libraries had tattle-tape security systems, with several service points using customer self-check machines (vendor 3M).

The feedback from the interviewees was that existing technology had reached the limits of its usefulness in various ways. The libraries with no electronic security were looking to upgrade, and some libraries were opening new branches or moving into new buildings. Some libraries had experienced a high rate of false alarms (though this was not the primary motivation to switch security methods).

Where self check was not available, library staff were required to scan items at the circulation desk. One library had determined that there were 32,000 loans per staff member per annum creating significant work-place pressure, and most of the libraries described a need to either tighten operational budgets or expand services within the existing budget.

Additionally, barcoded collections required significant effort for stock take of the inventory. For one case this took approximately 3 years to complete across all branches and another had not performed an inventory for 10 years.

How RFID has been implemented by libraries in NSW

Typical configurations

Implementation of the RFID systems generally began with retrospective tagging/conversion of the collection followed by installation of the equipment at the central library, and later purchases of additional upgrades or rollout to other branches in the network. Most of the interviewed libraries have retained the barcodes as a backup system or to assist the tagging process (one is planning to phase out the use of barcodes), however none still use tattle-tape as an additional security measure (some libraries had considered a dual RFID/tattle-tape system but found it much too expensive).

After funding had been approved, implementation of the RFID systems jointly purchased by Greater Taree and Great Lakes took approximately 6 months from negotiation to installation. This included tagging of the entire collections, although RFID systems were installed only at the central libraries at Taree and Forster where the bulk of the loan transactions occur. The remaining branches still use barcodes, with rollout of RFID systems planned for the near future.

For the case of the Riverina Regional Library the implementation of RFID was performed initially at Wagga Wagga and then rolled out to the branch network over 3 years in a significant project management undertaking. Only two very small Riverina branches were not fitted with RFID technology; the mobile library has a staff-check station but no security gates due to signal interference from metal in the bodywork of the truck.

The typical equipment installation configurations include:

- Customer self-check service points
- Staff-check stations at the circulation desk
- Internal return chute with an optional RFID-enabled bin
- External return chute with an optional RFID-enabled shutter
- Tag programming stations for new items
- Portable scanners for item location and inventory checks
- DVD unlockers which accept up to 3 DVDs per multimedia case
- A combination of barcode and RFID tags which use the barcode item number (sometimes to ISBN). Combined tagging helped with quality control during the conversion process.

The libraries with self-check kiosks often differed in their approach to self-check: some give customers the option to check at the desk and others (especially the busier libraries) encourage every customer to use self-check.

Defining key costs and benefits

Our investigations into RFID systems in existing NSW public libraries found limited quantification of installation costs and little quantification of benefits. It was evident that it was going to be difficult to establish a robust costs and benefits model that could be used for future purchases. The many combinations of library types and possible RFID solutions meant that calculating any ROI will depend on the design configuration chosen and that a cost and benefits model needed to be comprehensive enough to cover all possible solutions.

On the following pages we have detailed the breakdown of costs and benefits that we developed from the literature survey and interviews. These breakdowns are to be used in building the business case framework for RFID.

Cost Drivers

The level of RFID implementation at libraries varied from a basic standalone installation with a security gate, staff-check units and optional self-check units, to a full installation with RFID-enabled return chutes and automated sorting. Costs varied significantly between libraries for various reasons including library size and market factors.

The key costs types defined for circulation management systems in libraries are:

- Circulation and staff
- Security and inventory
- Processing of materials
- Equipment

System benefits

From our interviews the reasons for choosing the RFID route were mainly due to saved staff time through customer self-service and improved circulation efficiency although this wasn't quantified. Other benefits include improved ability to perform inventories and manage the collection. One library stated the opportunity to invest in updating systems during a library extension rather than reinstalling the outdated technology. The opportunity to showcase a new technology as an attraction to the library and to improve the overall customer experience was also cited as a benefit.

The key benefit types defined for circulation management systems in libraries are:

- Security
- Productivity
- Collection Management
- Customer Service
- Work Health and Safety

How libraries treat costs?

Implementation costs

For the libraries interviewed, costs of the initial implementation varied between \$150,000 and \$900,000. One of the libraries purchased the system through a five-year council-funded lease finance arrangement and the other libraries purchased directly with funds mainly from council and/or state government grants.

Conversion labour

Costs of conversion of the collection to RFID varied not only due to the size of the collection but also the source of labour.

One library had its collection tagged by the RFID vendor as part of the cost of implementation. The other libraries performed the tagging in-house using either existing staff, temporary staff, community volunteers, or some combination of the above. Of the two libraries that reported conversion labour costs, one was completed for \$85,000 using temporary staff, whereas the other was estimated at \$28,000 in-kind using existing staff.

Equipment and supplies

The costs of equipment and supplies varied considerably between libraries. Important factors affecting the cost included the choice of vendors and whether or not a scale of economy across a branch network could be negotiated with them.

Costs of ongoing purchase of equipment and supplies also depended on individual Library needs such as collection size and mix (books and AV materials).

While most libraries provided an approximate total figure for the costs, two of the libraries were able to provide an itemised breakdown as listed in Annex C. These are only to be used as indicative costs.

Installation and training

Installation costs are directly related to the amount of work required to accommodate the RFID system into the library.

On the software side, most of the libraries we interviewed were using an RFID system that plugs directly into the existing Library Management System. One of the libraries required a purpose-built intermediate system to interface between the RFID system and the LMS, although we were unable to determine how much this influenced the cost of the implementation.

On the hardware side, additional computing or network infrastructure may be required - for example if the LMS requires reliable network communications between the service point and a central server. None of the interviewed libraries reported a specific hardware cost.

Some of the libraries that we interviewed had made some building modifications to accommodate RFID equipment such as self-check stations or return slots; others had installed the system in a new purpose-designed building.

Of the two libraries that reported installation and training costs, one was \$20,000 and the other was \$5,950 (consisting of \$3,200 for building modification and \$2,750 for training and installation fees).

Additional staff costs

No libraries reported or estimated the cost of pre-implementation research (although every RFID implementation involves a significant effort in preparation and planning by senior library staff).

One library reported project management and evaluation costs of \$7,800 in-kind.

Maintenance costs are the most significant ongoing costs

Maintenance and ongoing costs

Maintenance costs are primarily related to maintenance of the equipment and ongoing tagging of new stock. Other indirect ongoing costs are related to non-benefits or detriments that may occur.

Equipment maintenance

Equipment maintenance costs include the cost of the service contract and any additional cost of repairs (around \$20,000 per annum). This can increase towards the end of the life of the contract and after the initial maintenance contract has finished. Typical maintenance contracts may be for five years, whereas the lifespan of the equipment is generally unknown but estimated at between seven and ten years. Some libraries are considering dropping items from the service contract where the cost of replacement is cheaper than maintenance of the item.

Indirect costs can be incurred while parts of the system are malfunctioning, for example through lost efficiency, and similarly if the rate of exceptions increases and more manual interventions are required.

The time taken to resolve issues depends on the library's access to technical support. This could include not only in-house expertise or vendor support but also nearby branches, collaborative partners or fellow members of a user group. On the spot diagnosis can sometimes save expensive outcalls or replacement, however distance can also be a factor: some libraries had experienced long waits for service calls or delivery of parts when the vendor was based overseas or in another city.

Ongoing tagging

If the ongoing tagging of new stock is performed in-house, the cost can be estimated in a similar manner to the retrospective tagging. Libraries have all found that the cost of RFID tags has decreased since the initial tagging (after The Hills Library's RFID implementation in 2003, tags cost over \$1.01 each; now they are between \$0.20 and \$0.35 each).

Most of the libraries have outsourced the tagging to the book vendor where the service is bundled with other processing tasks such as cataloging, binding/covering, labeling and barcoding. The libraries each may use several different vendors with the total processing fees between approximately \$5.00 and \$6.00 per item plus the cost of the RFID tags supplied by the library.

We were unable to determine the precise amount that the vendors charge for the tagging component of the service. One of the libraries demonstrated that an efficient tagging process can take less than 15 seconds to process an item that has already been barcoded and catalogued, and this could be used as a basis for estimating the labour cost and assessing the incremental value of outsourced tagging.

Risks

There were varied issues related to the operation of RFID. In the context of cost and benefits of operating these systems over a number of years. The key findings were:

- Security is not difficult to circumvent. DVDs and multimedia are a common target for theft; although most libraries indicated that security is not a great concern.
- Sort assist for item return, flags where the item goes but still needs physical handling.
- System data exchange response for some networks was not reliable so check-in/check-out lost efficiency (negating the potential efficiency benefits of reduced manual handling and simultaneous processing).
- WH&S was improved through a reduction in manual handling and, in some libraries, the use of smart bins which automatically adjust benches to the correct height. However, some of the workflows could be improved.

The main costs drivers for typical RFID installations

Category	Cost Driver
Circulation and staff	<ul style="list-style-type: none"> ○ Staff training requirements ○ Current staffing levels for circulation staff (base and peak, current and projected for 10 years or life of the equipment) ○ Average cost per hour of circulation staff incl. benefits (current and projected) ○ Annual circulation statistics (current and projected) - may see large jumps if moving into a new or larger facility ○ Number of opening hours per year (current and projected) ○ Current turnaround time from book return to placing on shelf ○ Cost of staff injuries (historical and projected) ○ Average length of line at circulation desk (base and peak)
Security/Inventory	<ul style="list-style-type: none"> ○ Amount of time spent looking for lost, misplaced or items on hold ○ Percentage and cost of items presumed stolen
Processing of materials	<ul style="list-style-type: none"> ○ Cost and amount of time needed to process a new item with current system ○ Estimated cost and amount of time to process a new item with RFID ○ Number of items added per year (current and projected) ○ Cost of supplies for new and replaced items (including AV materials) ○ Labour/staff cost involved in routine tagging, processing, checking services, inventory and health and safety
Equipment	<ul style="list-style-type: none"> ○ Current cost of maintenance on electromagnetic or other circulation/security equipment ○ Reliability and effectiveness of current equipment (down time, service calls, distance to vendor etc) ○ Installation of equipment such as self-check out units, self return stations and tag programmers ○ Supplies such as RFID tags and RFID tags for AV cases. ○ Obsolescence and whole of life cycle costs

The main benefits delivered by typical RFID installations

Category	Benefit	Outcome
Security	○ Identification of missing items	○ Less staff time spent searching if better idea of items missing or stolen
	○ Theft prevention and deterrent	<ul style="list-style-type: none"> ○ System can identify stolen item; fewer bag searches ○ Acts as an additional deterrent if no previous security system, but can still be circumvented ○ Ability to combine security features of different systems for identification and detection
Productivity	○ Staff service and productivity increase	<ul style="list-style-type: none"> ○ Faster handling of items ○ Customer self service - self check and self return ○ Automation for sorting prior to shelf placement ○ Efficiency through streamlined circulation desk processes
	○ System service reliability cost reduction	<ul style="list-style-type: none"> ○ Improved item recognition reliability ○ Improved reliability and reduced maintenance costs of system equipment ○ Vendor support and compatibility across network systems, improved economy of scale
Collection Management	○ Inventory management productivity increase	<ul style="list-style-type: none"> ○ Portable scanners can more easily and quickly scan large collections ○ Inventory checks can be done as part of the tagging process ○ Automated sorting at the return point may reduce time to reach shelf

	<ul style="list-style-type: none"> ○ Reduced time locating of missing items 	<ul style="list-style-type: none"> ○ Scanners can detect items without visible or physical contact ○ More regular inventory checks ensure collections are more thoroughly compiled
Customer Service	<ul style="list-style-type: none"> ○ Privacy issues limited 	<ul style="list-style-type: none"> ○ Self-check allows customers to borrow in privacy ○ Privacy violation through malicious scanning risk low ○ Fewer false alarms and bag searches
	<ul style="list-style-type: none"> ○ Interaction time with customers increased 	<ul style="list-style-type: none"> ○ Circulation staff can assist in other areas such as queries or community programs ○ Staff can scan items without breaking eye contact
	<ul style="list-style-type: none"> ○ Customer use satisfaction improvements 	<ul style="list-style-type: none"> ○ Self check option gives customers another option if they are in a hurry ○ Self return enables return via collection bins, sometimes outside business hours ○ Staff able to spend more time engaging in other library services such as community programs
WH&S	<ul style="list-style-type: none"> ○ Reduced repetitive strain injuries 	<ul style="list-style-type: none"> ○ Reduced risk of injury through less repetitive movements, so long as work station is correct design
	<ul style="list-style-type: none"> ○ Low electromagnetic radiation 	<ul style="list-style-type: none"> ○ Electromagnetic energies are lower than for mobile phones
	<ul style="list-style-type: none"> ○ Staff satisfaction and morale improved 	<ul style="list-style-type: none"> ○ Staff can spend more time doing a more fulfilling range of duties

4

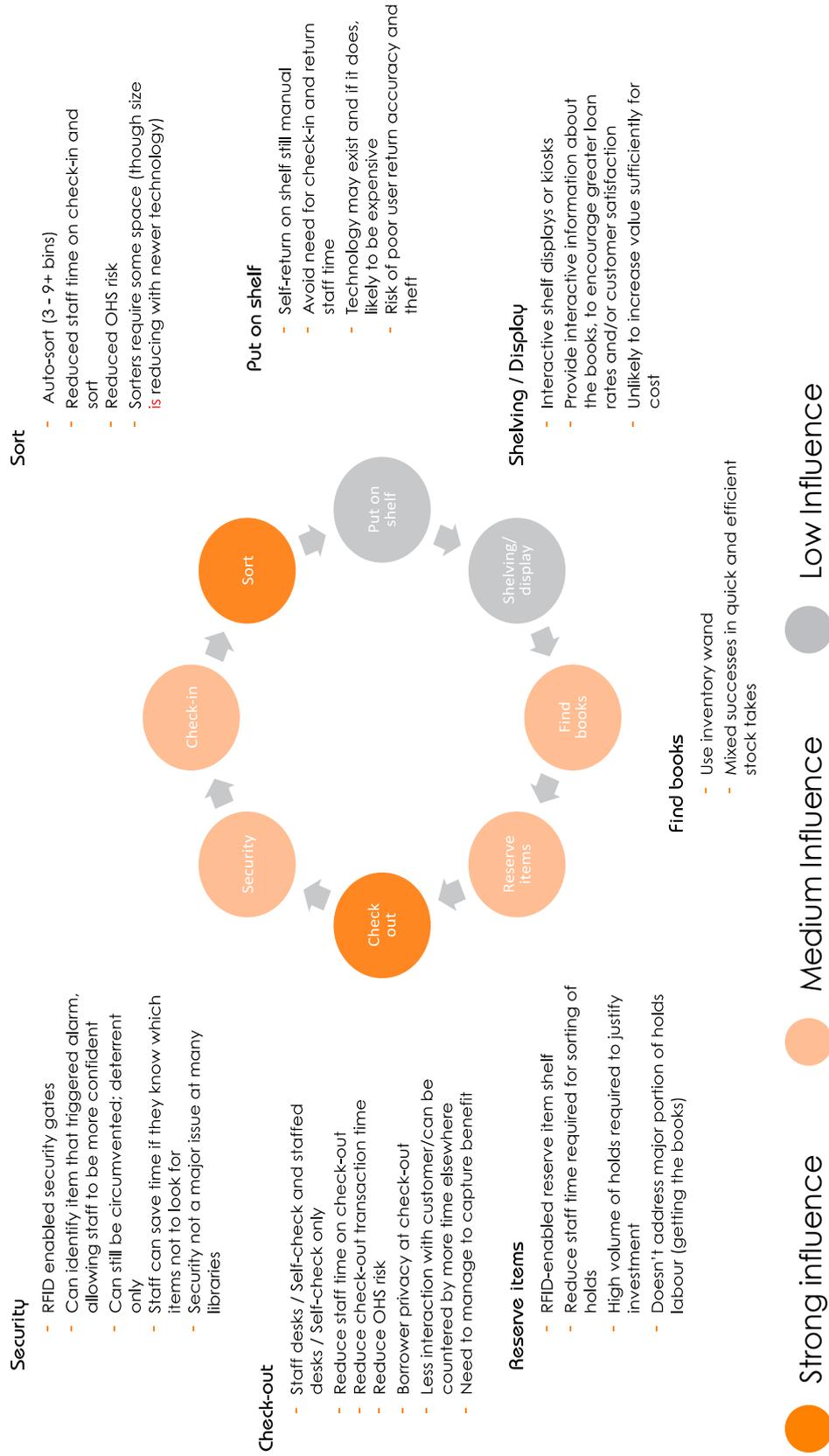
Circulation management assessments for RFID

To aid future business cases we assessed the circulation management of library items.

We found that the typical costs and benefits of RFID systems for public libraries were associated with the various stages in the circulation life-cycle of a loaned item. We determined that the most significant influence of RFID on costs and benefits were in the Check-out and Sort stages. Secondary to these, RFID impacts on the Reserve Items, Security and Check-in stages.

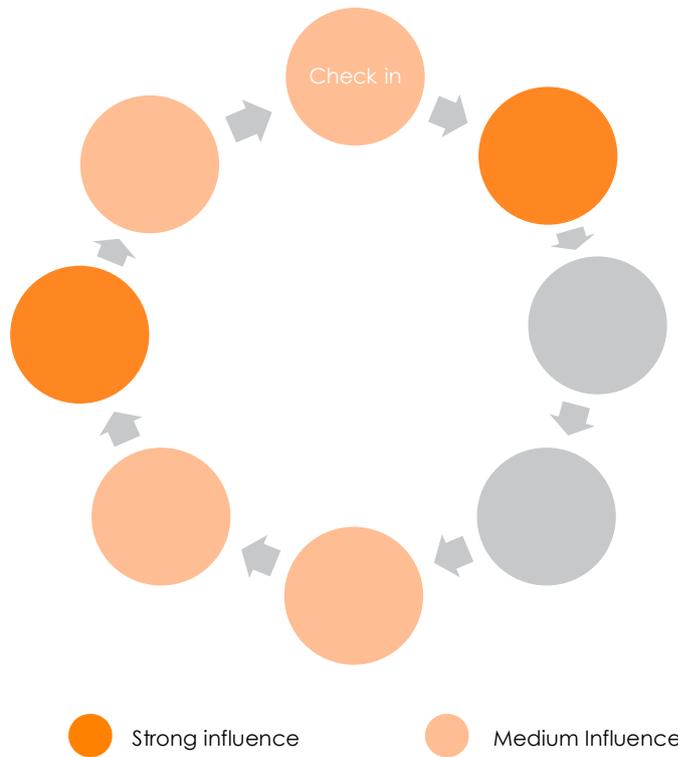
The influence of RFID on circulation management will aid the design and configuration of future options. Our assessment by library size for a generic library is also included in this section.

How RFID applies to circulation management



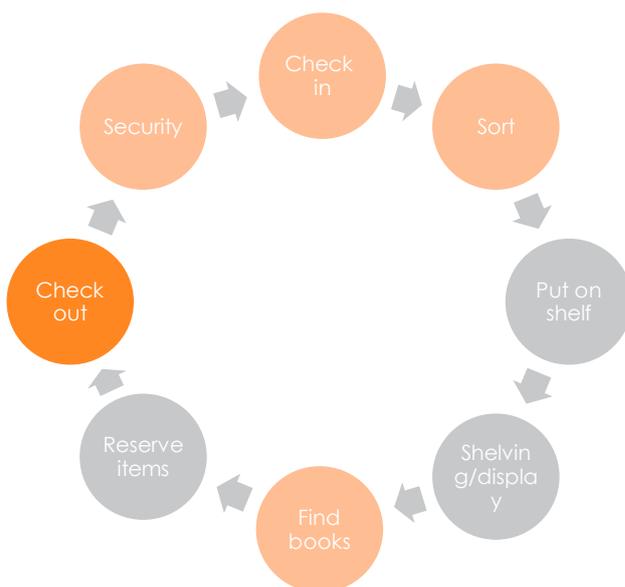
How RFID applies to circulation management by library size

Large Libraries



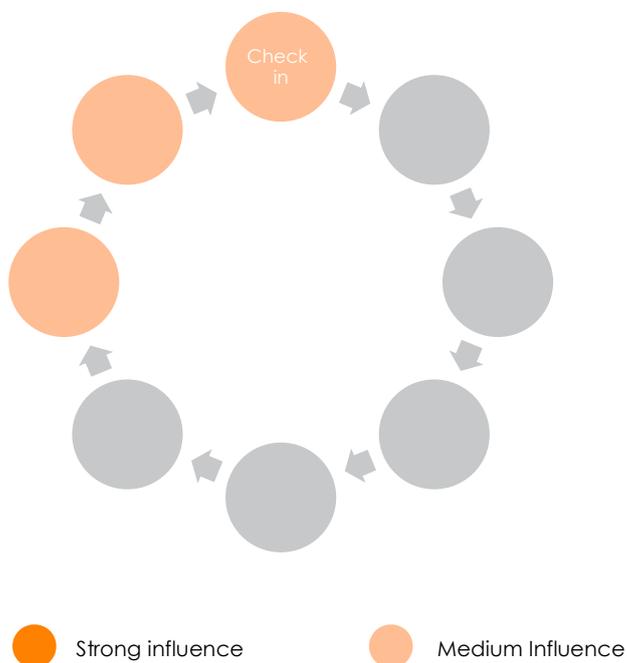
- Saved staff time through self check-out
- Self check-in with RFID-enabled returns chute or smart bins
- Large enough to benefit from auto-sorting - number of bins that can be used effectively depends on individual library circumstances
- Portable scanners can speed up inventory process (though at reduced accuracy)

Medium Libraries



- Saved staff time through self check-out
- May benefit from a small sorting machine - if space permits and if staff time saved can be allocated to something else or to enable growth
- An RFID-enabled returns chute or smart bin can check items off a customer's card immediately, but still requires additional handling by staff

Small libraries



- Self check-out and staff-enabled RFID check in stations - but only if staff time saved can be allocated to something else or to enable growth
- Self check becomes the additional staff member, without salary
- If no existing security, provides another level of deterrent
- If internal technical expertise is limited, having a strong external support network is crucial to realising the full benefits

5

Business case framework for RFID in the context of public libraries

This section provides the justification for building prudent and efficient business cases for libraries that are considering installing RFID systems and are seeking public body funding. The framework outlined is based on Huegin's knowledge of building business cases in a number of sectors.

A business case for RFID is demonstrated in this section. We have used information and data gathered during the interviews to demonstrate the process.

Why should you use a business case?

Defining a business case framework helps make the decision to invest

For this cost and benefit analysis of RFID enabled libraries, Huegin found that they followed the NSW local government procurement process. Whilst this provides a good framework for assessing tenders, we recommend that further assessment should be done around the areas of fit with objectives, consideration of the “do nothing option” and risks and a costs and benefits analysis of some different design options. We propose a business case framework that we believe would provide a sound basis for making prudent and efficient decisions about the investment of public funds in library infrastructure projects. To demonstrate the framework we have used the information gathered from the interviews of a number of NSW libraries which already have had experience with installing and operating RFID systems over a number of years.

The business case process is shown below.

A business case framework serves five purposes:

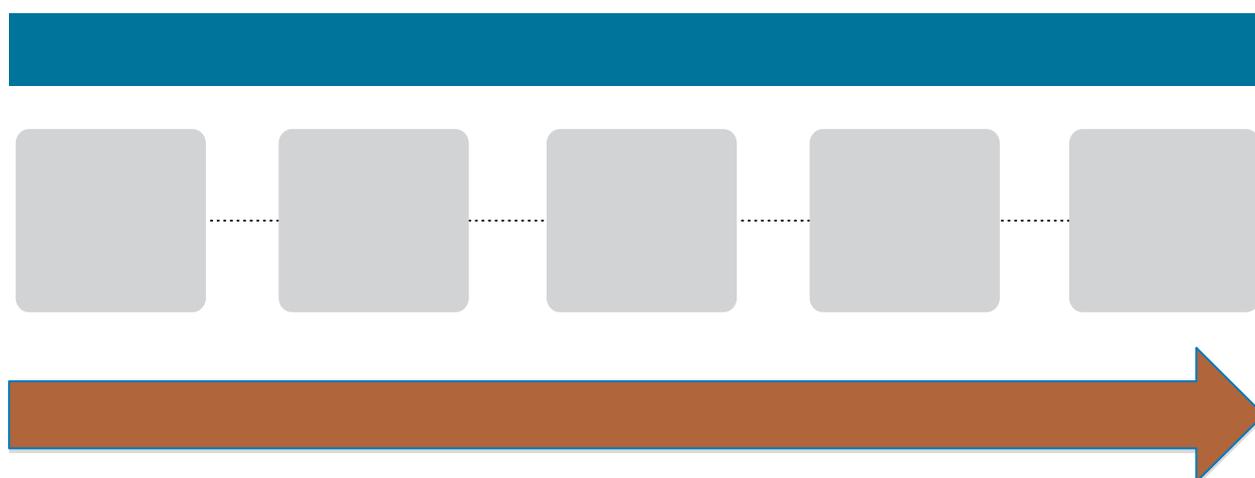
It explains to program administrators, funding bodies and other stakeholders **why** the project represents a prudent decision to invest.

It helps the applicant think through the project in a systematic, step-by-step manner and describes **how** the preferred option is necessary.

It provides a framework for **where** the initiation, deployment and completion of the project will occur and for the operation of the system throughout its lifecycle.

It helps potential funding bodies to understand the economic value of the project in the context of competing priorities. **When** will the majority of the investment activity take place?

It describes **who** the key stakeholders are.



Setting out the case for a business case framework

Need to consider strategic alignment

A business case framework determines the strategic case for the RFID system purchase. By establishing the investment rationale for RFID in the context of the overall organisation's strategy then it should also provide a clear criteria for screening out options that may not deliver any value or ROI.

Need to consider whole of life costs and benefits

Our observation of participating libraries indicated that costs were not comprehensively considered across the whole lifecycle of the RFID system. We recommends that any RFID system option should be costed using an aggregation of one-time installation costs and also ongoing costs over the lifecycle of the RFID systems which could be up to ten years. Recognising that the RFID systems have a lifecycle means that costs will accrue:

- from installation;
- following the installation for system maintenance, consumables, upgrades; and
- ultimately disposal of an obsolete system.

Similarly, the benefits model should consider the one-off and ongoing benefits gained through implementing the system within a library or library network. Of the benefits that are intangible, and not measurable by a dollar value, these should be rated at least qualitatively. The qualitative scores can then be weighted and combined to give an overall benefit score. Benefits that are tangible shall be quantified by a dollar value.

Risks occur from both project and business perspectives

Whilst the literature review outlined the typical costs and benefits of installed RFID systems, it also considered the risks involved in installing RFID. Huegin recommend that the risks should be considered both from a business perspective and from an installation project management perspective.

Such risks could be that maintenance costs rise significantly or that lack of functionality becomes a burden for the staff operating the system. Perhaps customer satisfaction levels could also drop. By understanding the shortcomings of the existing system the library is best placed to define the requirements of a replacement system to mitigate the risks. Such requirements could cover cost targets, benefits targets, system lifetime, risk reduction and RFID system performance.

Optionality is an important part of the tender process

When a library seeks an upgrade to its existing circulation management system, it should consider an array of potential options. To ensure that any investment made by public bodies is considered to be prudent and efficient, the library should also consider the option of continuing with the existing system. We call this the "do nothing option" and it is used to benchmark possible design solutions for a RFID system. For some cases the continuation of this option can pose a significant risk to the organisation as ongoing maintenance costs rise. The do nothing option considers the risk of not investing.

The business case framework

Why is the problem to be solved?

Defining the investment need

The investment logic is presented as a summary of why a problem or need is driving the request for funding. The justification for the need for the investment should be defined by the business case author. It sets the scene for why the organisation or body should invest public funds in the solution.

Defining the strategy and objectives

The investment need should align with the strategic objectives of any contributing funding body and the need for the investment should generate the objectives that the eventual solution should meet.

Assess the 'do nothing' option

A key component of the optionality of the business case is the so called do nothing option. This case represents the option to the organisation of deciding not to invest in a new solution. It will be used to assess the effectiveness of the actual solution chosen; it is the baseline option. It defines the risk to the organisation if it continued with the current operation.

Determine best possible solution through optionality

An assessment can be made for each option to determine how they contribute to the investment objectives. For each option, the risks should have been mitigated in some way against the do nothing risks. The cost and benefits of each option should be considered over the solution's system lifecycle.

Justify the reason for choosing

Options analysis assists the decision maker in understanding the Author's consideration of the most efficient and effective means of executing the investment.

What is the problem to be solved?

Defining the investment need

The investment logic provides the context for the funding proposal. Here the investment logic is presented as a summary of the problem or the need that is driving the request for funding. Importantly, this business case does not discuss any solutions but rather defines the problem that needs solving along with the objectives for the funding and the risk to the organisation should the funding request be turned down.

The justification for the need for the investment should be defined by the business case author. It sets the scene for why the organisation or body should invest public funds in a new RFID system for a library. It may be the case that the library simply needs to replace an ageing circulation and security system and that RFID is one of a number of possible solutions to the problem.

This stage of the business case requires the author to determine the level of confidence of the need for the funding. The following assessments can be used:

1. **Certain** - Indicates that the problem exists currently.
2. **Highly Likely** - Indicates that there is a need existing or the need arising in the future.
3. **Likely** - Indicates there is a common belief that the need exists or will exist in the future.
4. **Possible** - Indicates there is a reason to believe the need will exist in the future.

Investment Objectives

The need for the investment should generate the objectives that the eventual solution should meet. That is, the design of the RFID system should meet the specific objectives of the library organisation. By defining these objectives the solution can be assessed both from the point of view of the solution versus the do nothing option and against the other design options of the RFID installations. Setting of the investment objectives at the start of the business case process will ensure that the design of the solution can be monitored throughout the RFID lifecycle. The roll-out project can monitor the completion of key milestones and the library management team can continue to monitor the RFID system's key performance indicators.

Huegin propose one primary and three secondary investment objectives for any library RFID system business case. The business case author will select these from the list on the following page.

Strategic Alignment

The RFID investment should be aligned with the strategic objectives of the local council body and/or the State Library of NSW should investment funding be sought from the latter. Typically, the investment need should align with the strategic objectives of any contributing funding body.

Huegin propose one primary and three secondary strategic objectives for a library RFID system. The business case author will select these from the list on the following page also.

What are the investment objectives and strategic fit?

Defining the strategy and objectives

The RFID investment objectives are likely to cover a number of higher level objectives similar to the current circulation management systems in place across all libraries. Normally in a business case framework the individual project will have a primary and three secondary investment objectives. This higher level assessment will provide each library with the initial decision to invest, or not invest. The list below provides four categories of objectives. The aim is for the business case author to make a selection from a predefined list to ensure that the logic does not stray too far from what the overall organisation requires.

(Some objectives have been highlighted to identify priority and secondary P1, S1, S2 and S3 to be used in our example on p 51)

Compliance

- Improvement to Staff WH&S conditions through reduction in repetitive strain injuries.

Business Performance

- **High circulation efficiency through patron self check and return- S3**
- High inventory management efficiency through management of multi-media materials
- Increase security effectiveness through reduction in theft
- Increase security effectiveness through reduction in false alarms
- **Efficient inventory management through quicker inventory control- S2**
- Efficient and precise inventory management through precise item tracking
- Cost reduction and operational productivity improvement through reduction in circulation desk staff costs
- Cost reduction and operational productivity improvement through reduction in inventory management costs
- Efficient materials processing for new items through faster processing times.
- **Efficient materials processing for new items through reduced processing costs-P1**

Customer & Stakeholder Expectations

- Improved satisfaction of customers through loans circulation queue shortening at peak times
- High circulation efficiency through return of items to shelf more quickly
- Improved satisfaction of customers through loans circulation service quality
- Improvement of staff morale through improved loans circulation service quality

Asset Performance

- Cost reduction and improvement through reduction in space used for circulation functions
- Efficient and effective asset management of system equipment through increased reliability
- Efficient and effective asset management of system equipment through reduced impact of obsolescence
- **Efficient and effective asset management of system equipment through reduced maintenance support costs-S1**
- Library network growth improvement through expansion of circulation system.

What is the potential risk and impact of not investing?

Assess the do nothing option

The key component of the optionality of the business case is the so called **do nothing option**. This case represents the option to the organisation of deciding not to invest in an RFID system. It will be used to assess the effectiveness of the actual solution chosen; it is the baseline option. The do nothing option defines the risk to the organisation if it continued with the current circulation management system such as barcoding. The option is considered in two ways:

1. Inherent risks of not investing in new technology
2. Potential financial impact of not investing in new technology

Inherent risk of not investing

For the do nothing case, the business or organisation should consider the risks of continuing with the existing circulation system. The risk assessment can follow ISO 31000:2009 (Risk management - Principles and guidelines) and should consider the following risk categories used to assess the uncertainty in outcomes such as *Policy and legal compliance, Safety (employee and public), Circulation system performance and capacity, Environment, Customer reputation and public image*.

For the case of RFID, the following risks have been identified from our survey of libraries:

Risk 1 - Poor performance of current identification tagging (e.g. Barcodes)

Risk 2 - Reduction in processing costs for existing tagging systems may not be realised as the supporting systems become obsolete. Obsolescence may occur earlier than expected.

Risk 3 - Existing security system allows easy circumvention and theft of items resulting in increased new item purchases.

Risk 4 - Cost reduction and operational productivity improvement not able to be realised through increased circulation desk staff costs; especially as library patronage increases over time.

Risk 5 - Increase of maintenance costs through reducing reliability of existing systems. Maintenance costs may be greater for more remote libraries.

The risks can be assessed by estimating the consequence and likelihood of each risk defined. Both consequence (impact) and likelihood can be scored on a scale of 1-5, 1 being low impact and 5 being extreme impact. For the purpose of this demonstration we have assumed the consequence and likelihood of these no investing risks as follows, resulting in one medium, three high and one extreme risks:

	Risk analysis			
	Impact	Likelihood	Risk	Reason
Risk 1	3	3	High	Significant staff costs
Risk 2	4	2	High	Significant replacement costs mid-life
Risk 3	2	3	Medium	Generally low cost impact
Risk 4	5	4	Extreme	Library patronage level high burden
Risk 5	3	3	High	Geographic spread significant overhead

The assessment shown is for demonstration purposes.

Potential financial risk of not investing

The potential financial risk of not investing is considered as the “business as usual” costs for operating a current circulation and security system. The costs should be established on the same basis as the subsequent options analysis. We have established the following categories suitable to assess library circulation systems (see table at right):

- Circulation and staff costs
- Security and inventory management costs
- Processing of materials costs. e.g. tagging new books
- Equipment, maintenance and replacement costs

When determining the financial risk to the organisation of not investing, the business risks that may impact the implementation and operation of the existing system should be considered over the same period of time that the subsequent options assessment is done. Huegin recommends that this should be a period of up to ten years.

The financial risk should be expressed in the same dollar values as the subsequent options assessment. In this demonstration no business as usual costs will be identified and we have made the assumption that staffing levels will not change once a RFID system is put in place. Hence comparison of the business as usual costs and the options assessment will not include any underlying staff costs.

It is recommended that staff costs should be calculated in future assessments to be able to truly represent any efficiency improvement that a new circulation system may bring.

Cost Driver type	Cost driver assessment
<i>Circulation and staff</i>	<ul style="list-style-type: none"> ○ Staff training requirements ○ Current staffing levels for circulation staff (base and peak, current and projected for 10 years or life of the equipment) ○ Annual circulation statistics (current and projected) - may see large jumps if moving into a new or larger facility ○ Current turnaround time from book return to placing on shelf ○ Cost of staff injuries (historical and projected)
<i>Security and inventory</i>	<ul style="list-style-type: none"> ○ Amount of time spent looking for lost, misplaced or items on hold ○ Percentage and cost of items presumed stolen
<i>Processing of materials</i>	<ul style="list-style-type: none"> ○ Cost and amount of time needed to process a new item with current system ○ Number of items added per year (current and projected) ○ Supplies for new and replaced items ○ Labour/staff cost involved in routine tagging, processing, checking services and inventory management
<i>Equipment</i>	<ul style="list-style-type: none"> ○ Current cost of maintenance on EM or other circulation/security equipment ○ Reliability and effectiveness of current equipment (down time, service calls etc) ○ Installation of equipment such as self-checkout units, self return stations and tag programmers ○ Supplies ○ Obsolescence and whole of life cycle costs

Assess the solution design options available

Determine best possible solution through optionality

The next stage of the business case considers the possible RFID design options. Typically, up to three possible options for solving the investment rationale should be analysed: first address the investment objectives and the do nothing risks. Following this, a detailed costs and benefits analysis should be carried out.

During the interviews we observed that most libraries only had detailed cost information for the first installation of the RFID system, based on the tender responses of the successful vendors. Secondary to this, some libraries monitored ongoing maintenance costs through fixed cost maintenance contracts with vendors and the costs of tagging purchased items. Beyond this, little information was available to determine activity based costs of staff directly interacting with the RFID systems.

To demonstrate the business case framework we consider three options for a theoretical library requiring a replacement of an existing barcode system with a new RFID system.

The configurations of the three options considered are detailed in the table below:

Option	A	B	C
<i>Installation</i>	Full	Partial	Partial
<i>Self Check</i>	Y	Y	Y
<i>Auto-sorter bins</i>	N	N	N
<i>Inventory wands</i>	Y	Y	N
<i>Branch system deployment</i>	Y	Y	N
<i>Maintenance contract</i>	Y	Y	N
<i>Tagging</i>	Outsourced	Internal	Internal
<i>Defer project</i>	0	0	2 years

Assess option contribution to objectives

An assessment can be made for each option to determine how they contribute to the investment objectives. Each of the primary and secondary objectives defined earlier can be ranked on a scale of *no contribution* to *high contribution*. The chosen objectives (see page 44-45) were:

P - Efficient and effective asset management of system equipment through reduced maintenance support costs.

S1 - High circulation efficiency through patron self check and return.

S2 - Efficient inventory management through quicker inventory control

S3 -Efficient materials processing for new items through reduced processing costs.

Design option contribution to investment objectives

	Contribution to objectives		
Option A	P		
	S1	S2	S2
Option B	P		
	S1	S2	S2
Option C	P		
	S1	S2	S2

Objectives P - Primary, S1 - Secondary 1, S2 - Secondary 2, S3 - Secondary 3

Contribution  High  Moderate  Low  None

Assess option residual risk exposure

Each design option should in some way mitigate the risks identified previously and move the severity to a lower level so each option can be compared in terms of the benefit to business risk.

For each of the three options, the risks should have been mitigated against the do nothing risks. The table below shows an example of how each option changes the residual risk profile.

In this case, Option C provides a greater risk for maintenance as the option chooses not to include a maintenance contract. Option A may provide the best mitigation of risks.

Design option residual risk exposure

	Residual Risk Exposure Count			
	Low	Med.	High	Extre.
Do Nothing (Baseline)	0	1	3	1
Option A	3	1	1	0
Option B	2	2	1	0
Option C	3	1	0	1

The assessments shown are for demonstration purposes

The cashflow of the options should be considered over the system lifecycle

The cost to the library network of installing and operating RFID should be calculated for each option. The costs can be broken down by the cost drivers identified earlier (Section 3) but should also include a cashflow over time. For this analysis we recommend that a ten year life span be considered for RFID. Typical RFID systems have about a seven year life span, so ten years considers the option to maintain an obsolete system until a new system can be tendered, sourced and installed.

During the survey we found that few libraries had comprehensive cost data for both installing and operating an RFID system. Most costs data were derived from the original tender documentation. Noting that costs may vary significantly between libraries due to the size and complexity of the installation, we demonstrate the business case framework based on the costs provided by one of the medium-to-large libraries.

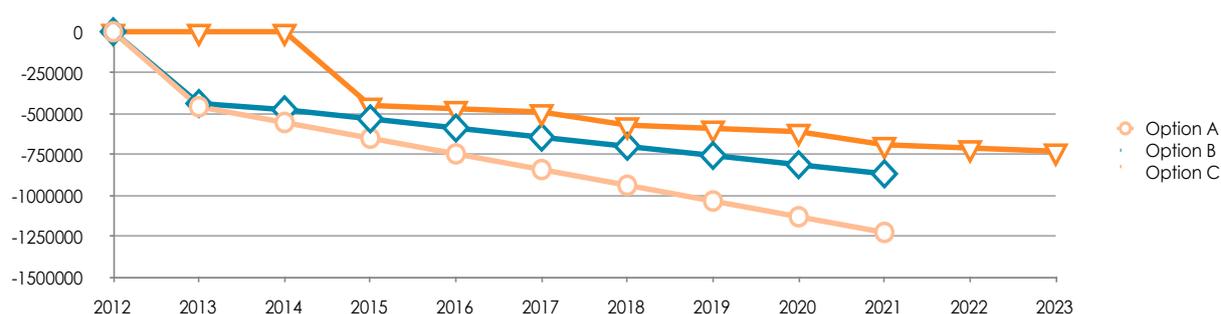
We have assumed that staff costs are the same for the design options and the incumbent circulation management system (eg barcode) - the do nothing option. Our options analysis excludes inkind costs for the initial installation and ongoing support.

This is a reasonable assumption given that there have been no significant staff level changes in the libraries we interviewed following RFID installation so the cost position is neutral.

Where additional staff were hired for the installation these are included as separate costs. These should also be included in any future business cases for proper comparison of the options.

The ten year cashflow for each option is presented in the figure below. The costliest option is Option A considered in isolation of risks and benefits. Option C demonstrates the special case where the option is to defer the purchase by two years. In this case the purchase price in the first year has been inflation adjusted.

All other costs are assumed to be in present dollar value; the assessment shown is for demonstration purposes.



What are the benefits delivered by each design option?

Benefit category

Of the previously identified benefits of a circulation management system (Section 3) we have categorised them into five types including security, productivity, collection management, customer service and work health and safety.

Benefit Category
Security
Productivity
Collection Management
Customer Service
Work Health and Safety (WHS)

Benefits can be broken down by types for assessment

The benefits ultimately need to be quantifiable to enable a comparison of benefits during the options assessment. The benefits can be further categorised in 3 ways:

1. *Direct revenue increase or cost saving* - the benefit has a direct cost saving through either a reduction in staff interaction time or reduced material costs.
2. *Indirect potential benefit* - where RFID makes staff available to perform other duties there is an indirect benefit to another part of the organisation. However, it is only a potential benefit if the assigned time is used effectively.
3. *Qualitative benefit* - the benefit is intangible and includes such things as customer and employee satisfaction.

For the libraries interviewed, few had any program in place to directly measure direct staff cost savings as a result of the benefits the RFID technology. None had any program in place to measure indirect potential benefits. Therefore we have developed a scorecard that considers all benefits of any RFID system to be non-financial. That is, no dollar value can be attributed to the benefit.

A scorecard to assess benefits

To gain the most from the business case methodology Huegin have produced a specific scorecard that enables each option to be quantitatively assessed in the absence of direct cost and revenue data. Each benefit is allocated a score and a weight. The product of each benefit is added to give an overall benefit score per options. The allocation of a score will depend on the benefit type.

The type of benefit is indicated on the scorecard and Huegin have provided weightings based on our interviews with RFID libraries. State Library of NSW has the option to modify the weightings based on a more subjective understanding of the benefits.

The following scorecard uses dummy scores to demonstrate the method.

Benefits scorecard to assess benefits of RFID design options

Category	Benefit	Type	Scorecard	Score (a)*	Weight (b)	Weighted Score (a x b)
Security	Identification of missing items	Indirect	1. (low) <5% impact on staff redeployment 5. (modest) 11-15% impact on staff redeployment 9. (breakthrough) > 25% impact on staff redeployment	5	1	5
	Theft prevention and deterrent	Qualitative	1. Little change 5. Modest change 9. High degree of theft change	5	1	5
Productivity	Staff service and productivity increase	Direct	1. <\$20,000 pa saving 5. \$20,000 - \$100,000 pa saving 9. >\$100,000 pa saving	1	1.5	1.5
	System service reliability cost reduction	Direct	1. <\$20,000 pa saving 5. \$20,000 - \$100,000 pa saving 9. >\$100,000 pa saving	1	1.5	1.5
Collection Management	Inventory management productivity increase	Indirect	1. (low) <5% impact on staff redeployment 5. (modest) 11-15% impact on staff redeployment 9. (breakthrough) > 25% impact on staff redeployment	5	1.5	7.5
	Reduced time locating of missing items	Indirect	1. (low) <5% impact on staff redeployment 5. (modest) 11-15% impact on staff redeployment 9. (breakthrough) > 25% impact on staff redeployment	5	1	5
Customers Service	Privacy issues limited	Qualitative	1. Little change 5. Modest change 9. High degree of privacy change	1	1	1
	Interaction time with customers increased	Indirect	1. (low) <5% impact on staff redeployment 5. (modest) 11-15% impact on staff redeployment 9. (breakthrough) > 25% impact on staff redeployment	5	1	5
	Customer use satisfaction improvements	Qualitative	1. Little change 5. Modest change 9. High degree of service model change	5	1	5
WH&S	Reduced repetitive strain injuries	Direct	1. <\$20,000 pa saving 5. \$20,000 - \$100,000 pa saving 9. >\$100,000 pa saving	1	1	1
	Low electromagnetic radiation	Indirect	1. (high) Significant risk to health 5. (modest) moderate risk to health 9. (low) >low risk to health	9	0.5	4.5
	Staff satisfaction and morale improved	Qualitative	1. Little change 5. Modest change 9. High degree of service model change	5	1	5
Total Score						48*

* the assessment shown is for demonstration purposes

Choose the preferred option

Justify the reason for choosing

Options analysis assists the decision maker in understanding the Author's consideration of the most efficient and effective means of executing the investment. The selection of the preferred option has been informed by the ability to mitigate the do nothing risk, the contribution to the investment objectives and the net present value (NPV). The summary of that analysis is provided below.

The options comparison summary table should be a good visual aid to the selection of the preferred option. At this stage of the business case framework the visualisation can help with distinguishing the important artefacts that each option contributes to.

The assessment shown is for demonstration purposes.

	Residual Risk Exposure Count				Cost (\$)	Benefits Score	Contribution to objectives			Direct NPV (\$)	
	0	2	3	0							
Do Nothing (Baseline)	0	2	3	0							
	Low	Med.	High	Extreme							
Option A	3	1	1	0	1.227m	48	P	S1	S2	S2	\$\$
	Low	Med.	High	Extreme							
Option B	2	2	1	0	0.868m	65	P	S1	S2	S2	\$\$
	Low	Med.	High	Extreme							
Option C	3	1	0	1	0.731m	52	P	S1	S2	S2	\$\$
	Low	Med.	High	Extreme							

Objectives P - Primary, S1 - Secondary 1, S2 - Secondary 2, S3 - Secondary 3

Contribution  High  Moderate  Low  None

Preferred option recommendation

The author of the business case should make a recommendation of their preferred option to the investment stakeholders. This should include a justification as to why the selected option is to be implemented over and above the do nothing options as well as the other designed options. If the option is to be deferred then the reason why should also be stated.

Scope of deliverables

The scope and deliverables of the preferred option are to be defined in the business case to indicate to the investment stakeholders that sufficient planning and detailing has gone into the preferred option. As this option is most likely to be deployed using project management methodology then this part of the business case should outline the following:

- **Project scope**

This should include a detailed description of the extent of the equipment to be installed and the associated tenderer. The way the installation shall proceed may be included.

- **Project schedule and milestones**

This should include the key milestones for the project. The schedule may include typical design, build and deploy phases.

- **Project dependencies**

These can be the key to whether or not a project may proceed or in fact why a preferred option may be selected within the business case. In some case the project dependencies may include new library facilities being built and that an RFID installation may not be able to proceed until certain building works are complete.

- **Funding details**

The preferred option shall include details of the sources of the funding for the project. The funding sources may be separated out depending on local accounting requirements.

6

Benefits tracking and key performance indicators

To ensure that the end benefits are delivered through the RFID system, Huegin recommend two means of tracking desired outcomes. The first is monitoring the long term generation of quantitative benefits by tracking planned benefits versus actual benefits achieved. The second is using KPIs to enable control of performance through effective feedback.

RFID benefits and performance during and after installation

Monitoring performance of installed systems

The benefits identified in the design stage are ultimately delivered to the library organisation once the RFID system is installed and made operational. These same benefits will have been quantified during the business case process so should have been clearly defined. To ensure that the actual benefits are delivered through the RFID system, Huegin recommend two means of tracking desired outcomes. The first is monitoring the long term generation of quantitative benefits by tracking planned benefits versus actual benefits achieved. The second is using KPIs to enable control of system performance through effective feedback.

Benefits tracking

Direct and indirect benefits generated during the options analysis can be quantified in dollar terms (or value) and given a delivery date (or schedule). Upon sign-off of the business case, the investment stakeholders should hold the initial project team and operating organisation to account for the delivery of these benefits. The benefits may be realised some time after completion of the project and often the benefits delivery will be the responsibility of the organisation, not the project team.

Huegin recommend that these benefits should become part of the ongoing business plans for the library. In a similar way to how a project is managed, the value of the benefit can be tracked over time (planned versus actual) and can be assessed to whether or not it is on schedule for delivery or has been achieved. Management intervention can be applied to correct the performance of the system if it is predicted that any benefit is not on track.

Over time, the tracking of actual versus planned returned benefits can be used to define a performance benchmark of the RFID systems in the NSW network.

The scorecard defined earlier in the business case is transformed to track benefits realisation. See the following example template. The assessment shown is for demonstration purposes only.

RFID benefit	Planned benefit (Refer to business case scorecard)	Schedule (days late from planned)	Actual achieved benefit (% planned)
Identification of missing items	5. (modest) 11-15% impact on staff redeployment to other value adding activities, eg. programming	0	X%
Staff service and productivity increase	1. \$20,000 pa saving per FTE	120	X%
System service reliability cost reduction	1. \$20,000 pa saving per FTE	20	X%
Inventory management productivity increase	5. (modest) 11-15% impact on staff redeployment to other value adding activities, eg. programming	120	X%
Reduced time locating of missing items	5. (modest) 11-15% impact on staff redeployment to other value adding activities, eg. programming	0	X%
Interaction time with customers increased	5. (modest) 11-15% impact on staff redeployment to other value adding activities, eg. programming	25	X%
Reduced repetitive strain injuries	1. \$20,000 pa saving per FTE	0	X%
Low electromagnetic radiation	9. Low risk to health	40	X%

Act
 Monitor
 On track

Monitoring RFID key performance indicators

Key performance indicators (KPIs)

Broadly, there are two ways in which KPIs can enable communication and decision making; they can be informative or they can be investigative. Informative KPIs simply provide insight into the status of the element on which they are reporting; for instance time and cost performance on a project. Investigative KPIs allow managers to look at the drivers and causes of performance at a deeper level.

Once the decision has been made to install an RFID system in a library then a suite of KPIs can be developed to monitor the performance of the system and to provide the ability for managers to investigate root causes. Typical KPIs that could be used include item circulation efficiency, inventory management duration, staff operational productivity and efficiency, asset management costs of system equipment and health and safety events. These are inherent in the objectives, risks, costs and benefits identified during the business case.

The outcome of the business case provides a range of KPIs to be tracked by the managing library. The approach taken to developing the proposed new suite of KPIs for any RFID installation was to provide a suite that answered three key questions:

Objectives alignment: how well does the system continue to meet the investment objectives?

Cost performance: how well is the system meeting cost targets?

Benefits delivery: how well is the system delivering qualitative benefits?

KPIs can be presented at a periodicity suitable to the managing library to ensure that decision makers have access to a consistent and appropriate measurement. Huegin recommend the example template to right; the assessment shown is for demonstration purposes.

KPI		
Efficient materials processing for new items through reduced processing costs at service desk	Monitor	
Efficient and effective asset management of system equipment through targeted maintenance support costs. +/-5% contract variation.	On track	
Efficient inventory management through quicker inventory control. Annual inventory stocktake 2 days p/a.	On track	
High circulation efficiency through patron self check and return. 10% improvement year-on-year.	Act	
Circulation and staff cost targets being met	Act	
Security performance targets being met. Low rate of false alarms.	On track	
Processing of materials costs within <10% contract estimates.	On track	
Equipment costs as per tender in +/-5% contract variation.	Monitor	
Theft prevention and deterrent modest change. Less than X%.	Monitor	
Privacy issues limited or unaffected. No adverse feedback.	On track	
Customer use satisfaction showing modest improvements through more diverse delivery of services. eg programming, digitisation of local history, developing online services.	On track	
Staff satisfaction and morale showing modest improved through improved feedback of quality of customer service.	Monitor	

■ Act
 ■ Monitor
 ■ On track

7

Future applications of RFID in libraries

We briefly looked at RFID applications in two other industries for comparisons on system operating speed and finding missing items. Ultimately the decision to invest in RFID will be dependent on the individual library building a relevant and current business case that demonstrates that the decision is prudent and efficient.

Future applications of RFID in libraries

Desirable future applications

We asked some of the librarians what kind of RFID-based technologies (existing or future) would be “nice to have” for their library.

- Book vending machines to allow 24/7 access to popular books and multimedia (e.g. the mk LibDispenser®).
- Smart shelves for reserve items, or to assist with stocktake, locating items and tracking misplaced items (e.g. the Starhome SmartShelf System).
- An “app” to use RFID-enabled smartphones as self-check stations or to deliver “enhanced” content such as reviews, “find like me” etc.
- Readers' advisory kiosks to “find me more books like this one” while accepting returns.
- Gates that check items in/out as you walk through.

Smart phone applications

Smart phone applications appear to have the most potential as a means of directly connecting the library customer with the loan item. These enable the customer to use their own phone to link with the library catalogue system, recommended programs and received directed marketing which targets advertised programs based on their borrowing habits. The latter is similar to the method used by supermarket loyalty card schemes whereby the supermarket analyses the customer's buying habits and customises advertising for that particular target.

The most promising use of smart phones to date appears to be the emerging technology of near-field-communications (NFC). This technology can use radio waves to interact directly with an RFID tag enabling the customer to find out more about a book they see or find an item they require. Finding a book may also need interaction with an in-library navigation (GPS, wifi) as the NFC has limited range. NFC is already being used as “contactless” payment systems for credit cards and transport smart tickets. The next step in the development of this technology is to allow users' smartphones to be the substitute NFC device (e.g. Google Wallet).

In such a rapidly changing field we do not wish to second guess what the emerging coupling of RFID and smart phone technology use in libraries would look like. We do believe such a coupling is likely, given the ever increasing momentum of smart phone use in all aspects of people's lives.

RFID applications in other industries also suggest some future avenues for development of RFID technology.

Learnings from the retail industry

One of the unresolved questions in library inventory management is how to efficiently detect missing or malfunctioning tags without testing each item individually. Portable scanners and checkout units only read working tags, and even if a tag is working it might not be detected if it is aligned with nearby tags in a particular way. Looking to the retail industry, some self-checkout units, such as those often seen in supermarkets, use scales to detect when an item has been placed in the bagging area without being scanned. Libraries could employ similar systems to verify items at checkout or to perform accurate inventories in a more efficient way.

Learnings from the agricultural industry

The agricultural industry has been successfully using RFID technology for many years before RFID was introduced into libraries. Livestock can wear RFID transponders as ear tags which typically operate at a low frequency and are passive (i.e. no battery) in order that they continue to operate for the lifespan of the animal.

One of the librarians has first-hand experience working with RFID on a sheep farm, where the time taken for stocktake was reduced from several days using barcodes down to a few hours with RFID. The librarian had found that the library RFID system could be very slow to respond at times, and that the presence of metal restricted the use of inventory scanners and security gates. On the other hand, the RFID livestock readers were able to monitor livestock in real-time as they were running through metal gates and sort them with a push in the appropriate direction from a pneumatic device.

Whilst feedback from libraries indicated that they were generally happy with the technology, they did point to some failings in performance. The main area where RFID performance was less than satisfactory was the ability to perform rapid inventory checks. Perhaps library RFID systems can achieve a similar level of performance to retail and agriculture in the future.

In summary

There are many possible ways that libraries could yet harness the potential of RFID systems for circulation management. Whilst RFID does have advantages over other systems, it is important that each library, intending to replace their incumbent system, assess all the options and determine whether or not similar benefits can be achieved through use of other technologies. The business case framework encourages the consideration of options (optionality).

For example, security, self-check and auto-sorting can all be performed with existing barcode and tattle-tape systems but with varying degrees of performance in comparison to RFID. The whole of life costs involved will be different for each type, but it will be up to the individual library to justify this investment against the eventual benefits that will be delivered.

Early uptake of rapidly-evolving technology also introduces the risk of obsolescence or interoperability issues. On the other hand, with RFID technologies opening up new ways to manage their inventories, libraries need to carefully assess whether the potential benefits, such as versatility, outweigh the costs of implementation. The business case framework provides a means to justify this investment in light of not only the costs and benefits, but also the risks and contributions to the stakeholders objectives.

Huegin recommend that the business case framework presented here will provide a sound basis for making prudent and efficient decisions about the investment of public funds in library infrastructure projects such as RFID. Whilst providing a business case framework gives libraries a method to carry out a prudent and efficient investment, it will be up to the individual library making the business case to gather the information and data to ensure that their justification is up-to-date, relevant and has the means to follow through to deliver the desired benefits.

Annex A

Requirements traceability matrix

Requirements traceability matrix

	Identify the costs and benefits of implementing and using RFID in a public library context	Sections 2 and 3	Literature survey and interview with libraries identified the key items
	Identify the return on investment in a public library context over the life of RFID	Section 5	Actual ROI was not determined. A business case framework has been proposed
	Identify and analyse the costs and benefits for small, medium and large library services	Sections 4 and 5	Costs and benefits were identified. Analysis is contained in business case framework
	Identify and analyse the costs and benefits of implementing and using RFID for NSW libraries at local, regional and collaborative environments	Sections 2 and 3	Costs and benefits were identified. Analysis is contained in business case framework
	Identify the library context (including demographics, collection size, service model, resourcing model, collection management model) in which the optimum benefits of RFID are achieved	Section 5	Optimum benefits were not determined from data collected. Business case framework provides ability to perform options analysis
	Identify the costs and benefits of RFID in terms of Work Health and Safety	Sections 3 and 5	WHS was identified as a key cost and benefit
	Consider issues relating to RFID such as collection security, privacy issues, impact on library staff, productivity and service provision, use with non book material and any other issues relating to the implementation of RFID	Sections 2, 3 and 5	These issues have been identified as key benefits and costs to be assessed by the business case
	Identify key performance indicators for measuring the successful use of RFID	Section 6	Frameworks and templates are proposed
	Identify variables which may influence the outcomes of implementing and using RFID, eg. partial/complete implementation, use of self check technology , returns sorting technology, funding sources	Section 5	Key costs and benefits which impact on the decision to upgrade a circulation management system are identified
	Explore future applications of RFID in public libraries	Section 7	

Annex B

Interview agenda and particulars

Sample meeting agenda for library interviews

Why we'd like to meet	We would like to understand your experiences with RFID and use these to guide our overall approach to developing the SLNSW RFID business case.	
What we'd like to get out of the meeting	<ol style="list-style-type: none"> 1. A preliminary description of the context, options, benefits and costs of your RFID implementation. 2. Sufficient descriptive detail to produce an illustrative case study, to be shared with other NSW libraries. 3. An understanding of the further data or resources available for us to follow up with in more depth, if required. 	
Who will be there	<p>Library: Library Manager (please feel free to invite any further participants if appropriate).</p> <p>Huegin: Ben Petschel, Nick Dillenbeck</p>	
What we'd like to discuss	<ol style="list-style-type: none"> 1. Quick context on Huegin's project: background, aims, scope, required output 2. Broadly understand how your library operates (things like: who your patrons are, how you service them, the types and volumes of services provided and activities performed, what your major revenues and costs are, etc.) 3. Discuss the options you considered - and finally took - regarding RFID 4. Understand how this changed how your library operates 5. Discuss the costs, benefits and drawbacks of the implementation 	<p>~ 5 min</p> <p>~ 20 min</p> <p>~ 25 min</p> <p>~ 20 min</p> <p>~ 50 min</p>
Is any preparation required?	Please advise us if there are any further people you think we should meet with so that we can arrange to meet them while we are on site. Any background documents you can share prior to the meeting would also be greatly appreciated.	

Interviews summary

Interview location	Local government classification	Date held	Attendees	Notes
Ryde	Urban Metro	12 Nov 2012	Jill Webb	Large metro library with central library in a new building.
Sutherland	Urban Metro	15 Nov 2012	Lyn Barakat	Very large metro library with approximately 2 million items in circulation per year and eight branches.
The Hills	Urban Fringe	16 Nov 2012	Brenda Barrett	Early uptake (first in Australia) with autosort capabilities and one of the highest circulation per staff member.
Leeton	Rural Agricultural	21 Nov 2012	Lyn Middleton	Early uptake (first west of the Blue Mountains) and the smallest NSW public library to have implemented RFID.
Riverina	Mixed (Urban/Rural)	21-22 Nov 2012	Robert Knight Brian Plummer Helen Graetz Ros Floyd (Temora) Rob Chapman (Mobile) Linda Dyer (Junee)	Large regional implementation spanning 200,000 sq. km and nine local councils; includes 12 branches and a mobile library.
Great Lakes	Urban Regional Town/City	26 Nov 2012	Chris Jones	Collaborative implementation with Greater Taree across 5 service points.
Greater Taree	Urban Regional Town/City	27 Nov 2012	Margie Wallis	Collaborative implementation with Great Lakes across 5 service points.

Annex C

Example costs

Example of supply and equipment costs

Note that the figures are as at September 2008 - current costs may vary considerably.

For example, some libraries indicated that the price of RFID tags is currently well below \$0.35 per tag and "can be close to \$0.20 depending how hard you negotiate."

The table does not list prices for an RFID-enabled secure returns chute or an automated sorter (these were typically installed after the initial implementation), although another library reported that in 2007, in response to an Expression of Interest, "the pricing for a 5 bin automated sorter from each of three respondents ranged as follows: \$47,600, \$113,216 and \$590,000."

Category	Item	Cost per unit (Library A)	Cost per unit (Library B)
Supplies	Standard RFID tags	\$0.45	\$0.41
	RFID tags with barcode	\$0.59	
	Lockable multimedia box (1-2 discs)	\$1.10	
	Lockable multimedia box (3-6 discs)	\$2.20	
Equipment	RFID read/write pad (plugs into an existing library terminal)	\$1,100	\$1,700
	Mobile conversion unit (leased during conversion of the collection)	\$2,200/month	
	Automatic multimedia unlocker	\$3,300	\$2,600
	Double column security gates (single aisle)	\$8,800	
	Portable scanner		\$9,500
	Triple column security gates (two aisle)		\$10,500
	Self loan station	\$11,000	\$12,000
	Automatic returns bin		\$19,500
<i>Typical costs for supplies and hardware for two libraries as at September 2008 (Source: Library Development Grants 2008/09)</i>			

STATE LIBRARY OF NSW
Macquarie Street
Sydney NSW 2000 Australia

www.sl.nsw.gov.au

