

WHITEPAPER

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Barcoding, Incorporated

How to Implement a Successful RFID Project

Barcoding, Inc.
www.barcoding.com

Ultra-high frequency (UHF) Gen 2 radio frequency identification (RFID) solutions, which operate at 915 MHz, are used by a variety of industries including retail, military, and supply chain management. Often lost in the hype and technical appeal of RFID is an explanation of why the technology is an ideal solution for many warehouse and distribution management issues.

Barcoding Inc. recommends selecting RFID as a solution only when its capabilities provide *an immediate or projected future benefit to a process that makes it more effective than choosing another technology.*

1 MANAGE EXPECTATIONS

The first step to take during an RFID project is to evaluate your company's expectations against what a new RFID system can actually provide. Be critical of media and internet articles about RFID because these may be inaccurate or misleading. Understand your company's perceptions of the technology's capabilities and temper those expectations with ideas and plans grounded solidly in reality.

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2 PROCESS EVALUATIONS

Understanding key processes and RFID's place within that equation is the most important aspect of a successful implementation. Always look at an RFID implementation as a **process improvement project**. In deciding whether to utilize RFID, it is vital to analyze the current or upcoming business practices carefully and determine which aspects will improve by implementing an RFID-based solution. This entails gathering information from multiple stakeholders, usually business management, IT, maintenance personnel, and end users.

3 REQUIREMENTS DOCUMENT

Even when implementing a small-scale project, it is critical to create a requirements document. This document should describe the company's preferred process flow and the specific requirements necessary to implement that process. Significant considerations include software, hardware, RFID tags, environmental factors, regulatory concerns, reliability, security issues, network, throughput, maintenance, and others. Additionally, functional responsibilities must be delineated and "signed off" on in this document.

Other key benefits to a requirements document include preventing future issues and serving as the basis for system acceptance at the completion of the project. Although requirements may change or grow throughout the project, this document will be a tool for managing "requirement CREEP" AND "OUT OF SCOPE" TASKS.

4 PERFORMING A SITE SURVEY

It is important to perform an RFID survey of a planned installation location. This survey should include both an RF Spectrum Analysis to search for any interfering or competing signals in the area, as well as a physical survey to help plan the location and installation of any readers and antennas.

The RF spectrum analysis is not only necessary to make sure any existing systems do not affect the readers, but also to determine if any other devices, such as 900Mhz wireless headsets or radios in the area, are adversely affected by the RFID reader transmissions.

Some preliminary tag testing should also take place during this survey. An assortment of tags should be brought along and tested using a handheld RFID reader to get an indication of how well the tags can be read when attached to the items.

The physical layout of the area or facility should be documented and annotated in a report to show the locations where read points will be implemented. All stakeholders for planning and implementing the project will use this report.

5 THINK HYBRID

When it comes to RFID technology, "hybrid" often involves utilizing a mix of technologies to create your solution.

Utilize print tags with barcodes and human readable data whenever possible. Not only can the barcode, or the human-readable code on your RFID tag, be a backup in case the reader or RFID chip fails, but it can also be utilized in parts of the process where an RFID reader does not make sense. This might be a part of the process in which some form of human interaction will still be used, or when you may need to locate and identify a single item among many.

In these situations, it may be difficult for an RFID reader to distinguish between the item you really want and the one right next to it. If you are going to use a handheld RFID reader to read a tag just like you would a barcode, then a barcode is the better solution.

6 TAGS

Because RFID tags come in hundreds of different configurations, selecting the proper tag for the application is crucial. There are simple labels that can be printed, tags embedded in plastic credit card formats, various hard mount tags, and even tie wrap style tags. Some can be mounted on metal and perform best that way, while others will effectively be made useless if mounted on metal. Tags are available for various harsh environments, including both high temperatures and even cryogenic sub zero ranges.

Barcoding Inc. suggests selecting several tags based on specifications for a project and then running comparison tests before deciding on a specific one for your application. The other aspect of tag selection often overlooked is quality and repeatability. Although the quality and consistency of tags has improved a hundred fold over just a few years ago, choose a tag converter that you trust and that comes highly recommended. If you don't, one roll of tags may not perform as well as the next.

Consider using both barcodes and RFID tags in your system.

Location of the tag on the tracked item is vital. Whether it is a vial of vaccine or a shipping container on a dock, the orientation and position of the tag must be carefully picked and set up to be consistently read by the reader.

Also, consider the placement of the tag in relation to how that item is used. If you are tagging assets or equipment, make sure that the position does not interfere with normal operations or create a dangerous situation.

7 ONBOARD DATA OR NOT?

Initially, one of the key advantages touted about RFID was the ability to store various data in the tag itself, making it available wherever that tag was. In reality, 90% or more of the applications using UHF Gen 2 tags will not require this feature. Why? Because storing additional data within a tag creates many troublesome issues; not the least of which is devising a reasonable security scheme to prevent unauthorized access to that data.

Most applications will simply use the RFID tag as a unique “license plate” that can be referenced to a database. Since most system users will have access to a network, that database can be easily accessed to either identify or update information about the tagged items.

This method provides a virtually unlimited number of data fields for information that can be stored and accessed about that tag, restricted only by your database’s limitations. Limiting access to your database through normal network security features means that as long as your database is secure, someone unauthorized who reads an RFID tag is left only with a random, 96-bit number instead of any useful information.

8 CABLES

Cabling is an important part of any RFID installation and can affect performance, ease of installation, and access for maintenance.

Cabling for an RFID project is an area often overlooked until the actual installation. An RFID system may use a combination of Ethernet data cables, power cables, and coaxial cables for connecting a fixed reader to its companion antennas.

At UHF frequencies, RF losses can affect performance even when using high quality, low loss cables. Note that each connection point generates losses and cable lengths over 20ft can significantly reduce signal levels. The shorter the RF cable length, the better.

Barcoding Inc. suggests running comparison tests on several tags before deciding on the specific one for your application.

Install Ethernet and power runs near the reader mount point and test them prior to installing a system. Take care to secure all cabling neatly and securely to prevent damage and safety issues.

9 SYSTEM TESTING

An RFID system is not complete until 1) it has been integrated and tested with any software applications it is expected to operate with and 2) it has been operated by its users.

Include ample time to test and troubleshoot the system before going live. Involve all of the stakeholders, and, most important, the everyday users of the system. When testing, use real world scenarios whenever possible to verify that the system requirements have been met.

10 THE BOTTOM LINE...

A successful RFID project requires the following:

- 1 Setting reasonable expectations.
- 2 Understanding and designing a system to implement your company's desired process.
- 3 Defining and agreeing upon the system requirements.
- 4 Collecting and analyzing the necessary site data.
- 5 Integrating various technologies smoothly.
- 6 Selecting the proper tags.
- 7 Understanding the data needs of the system.
- 8 Properly installing equipment and setup.
- 9 Planning adequate time for testing and changes.
- 10 Documenting the lessons learned from each new RFID project.

Following the steps above will help make your RFID integration project flow smoother and will provide a baseline of knowledge for each new project.

RFID technology can provide you with increased efficiency, security, and visibility into your business processes and make you more profitable—but only when implemented smartly.

Barcoding, Incorporated

Barcoding, Inc. is a national systems integrator, specializing in the development, deployment, and management of supply chain and mobility systems based on automated identification and data capture (AIDC) technology. More than 2,500 organizations depend on Barcoding, Inc. as their trusted advisor for barcoding, radio frequency identification (RFID), and wireless applications automating operations in: field service, food and beverage, healthcare, manufacturing and distribution, retail, transportation and logistics, and wholesale inventory. For more information, visit www.barcoding.com

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- **Slap and Ship RFID Kits:** include everything you need to meet Wal-Mart, DoD, and other compliance tagging requirements with no additional software or equipment to buy.
- **RFID Evaluation Kits:** provide a low-risk, easy-to-use way to find out if RFID is right for your organization. The kits include readers, software, and a variety of tags you can use to sample applications.
- **RFID Active Shelf System™:** quickly create location monitoring or check-in check-out applications for tools, supplies, materials, medications, or other products and assets.
- **RFID Readers**
- **RFID Printer/Encoders**
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Contact Information



Barcoding, Inc.
Corporate Headquarters
2220 Boston St.
Baltimore, MD 21231



888.860.7226



info@barcoding.com
www.barcoding.com