

Looking Beyond the Technology on RFID Projects

*A White Paper
By Tom Singer, Principal
Tompkins Associates*

TOMPKINS
A S S O C I A T E S

Looking Beyond the Technology on RFID Projects

by Tom Singer, Principal
Tompkins Associates

Introduction

Operations has always been at the forefront of the push to adopt RFID in the supply chain. Since the first pilot programs, distributors and manufacturers have sought ways to improve operational efficiency through RFID. This goal has propelled major retailers and the Department of Defense (DoD) to issue RFID compliance mandates to their suppliers.

While other benefits such as increased visibility and enhanced product authentication play important roles in their strategic plans, these organizations also seek to reduce costs and increase the accuracy and velocity of their distribution operations through RFID. This desire to improve operations extends even to many suppliers who are being forced by mandates to embrace RFID. While suppliers might not believe that the technology is currently cost justifiable for their enterprises, most of these mandate-driven suppliers would agree that operations plays an important role in their implementation approach.

Operations may be a primary force behind the move to embrace RFID in the supply chain, but most RFID projects in this arena are likely technology-centric. Given the current state of the technology, this is understandable. While RFID has been around for decades, its use in supporting supply chain applications is relatively new. Compliance mandates have called for a new form of the technology—complete with new hardware and software requirements. This move towards a new format is driven by standardization, performance, and cost factors that are unique to the supply chain world. Consequently, the technology is still perceived as relatively immature by many supply chain professionals.

More Than Just a Technology Proposition

RFID supply chain implementations spend an inordinate amount of time dealing with the limitations of the technology. They must account for tag/product compatibility, background interference, tag placement, antenna orientation, extraneous reads, and a slew of other factors. Moreover, the hardware they utilize seems destined for early obsolescence. Functional support for RFID in their supply chain software packages is limited or non-existent, and their RFID applications must be repeatedly tuned to provide any degree

of acceptable performance. Therefore, in many respects, RFID projects are engineering exercises. They naturally tend to focus more on technology than business processes.

As an enterprise begins to dive into the mechanics of RFID, this technology-centric view is difficult to avoid, but treating RFID as basically a technology proposition has associated risks. It can lead to under performance, missed opportunities, cost overruns, limited growth potential and operational bottlenecks. It can also lead to the belief that any ROI is impossible to obtain within any reasonable timeframe. Furthermore, a technology-centric approach tends to make an organization view RFID as a tactical solution to meet mandates rather than a strategic tool to grow the enterprise.

Since most supply chain RFID projects are driven by compliance mandates, the concept of an elusive ROI is understandable. Most organizations faced with meeting a mandate undoubtedly view RFID as the cost of doing business with their prime customers. And the limitations and price points of the current generation RFID solutions reinforce this view. Achieving any sort of internal ROI for an RFID compliance implementation is definitely a significant challenge. For many suppliers, it might not be an obtainable goal. But this doesn't mean some organizations can't achieve a viable ROI from RFID today. The evolutionary pace of RFID in the supply chain is rapid. What is unobtainable today might be very practical in another year or two, and enterprises should account for this evolution in their strategic plans.

Always Lead With Operations

Whether compelled by a mandate or seeking to address a specific business problem, an enterprise should always lead with operations in any RFID supply chain project. Most RFID project teams would not admit putting operations in the back seat. However, the pull of the technical side is so strong that operational aspects can easily get submerged. This doesn't mean that technology can be pushed to the background. RFID is hardly a plug-and-play technology. Any implementation must account for the technical aspects of RFID from concept design through on-going support; however, any enterprise seeking to

implement RFID must make a conscious, continuous effort to keep operations at the forefront of its efforts.

No RFID implementation is exactly the same, either. Operational nuances and business requirements can make even simple "slap-and-ship" compliance installations vary significantly between companies. Yet, employing an operations-centric approach does have common characteristics that cut across industry type and size. These characteristics include having:

- A basic grasp of RFID's potential benefits and limitations within the DC.
- The right project team with the right operational commitment.
- An appreciation of RFID's potential beyond the DC.
- An innovative approach to flow and processes.
- Realistic expectations.
- A living business case.
- Handling exceptions.
- A long-term outlook.
- The vision to seek other opportunities.

A basic understanding of these characteristics will help an RFID project team place the proper emphasis on operations, which is necessary for a successful implementation.

Potential Benefits, Limitations within DC

Unless totally removed from the outside world, no supply chain professional has avoided the recent industry buzz surrounding RFID. Wal-Mart, the DoD, and other compliance-mandate issuers have made RFID a hot topic in the supply chain world. Through trade journals, vendor presentations, colleague opinions and other sources, we in the supply chain industry have been bombarded—both by RFID's potential supply chain benefits and current problems.

We have heard that it is supposed to reduce labor costs and increase accuracy, visibility and security. We have also heard about performance issues with tag reliability and readability in various distribution environments. Some sources have told us that RFID tag and infrastructure costs are declining, while others maintain that it is still too costly a proposition to generate real ROI for most operations.

It is sometimes difficult to judge this deluge of information within the context of our operations and experiences. If you are already utilizing a feature-rich supply chain system, it can be tricky to see how RFID is going to improve performance within the DC. What can RFID do to improve your operations that your cur-

rent bar code-based systems cannot? The most commonly cited differentiator is that RFID does not require a line-of-sight scan. This statement is both a little misleading and doesn't fully explain RFID's advantage over bar codes. Perhaps a better way of understanding RFID's potential is to consider how much more conducive it is to hands-free data acquisition and process automation than bar codes.

Hands-free Nature of RFID Yields Benefits

Most warehousing systems direct and track the movement of objects such as pallets, cases and items through a user-initiated bar code scan. While the amount of labor spent scanning any individual bar code might appear to be negligible, it quickly adds up as objects move from receiving to shipping. Furthermore, user-initiated bar code scanning is generally a disruptive process. It tends to slow down product movement within a DC. RFID offers the promises of capturing an object's identifier without slowing down its movement. These identifiers can be automatically captured as a pallet is moved through a receiving door portal, a picker places a case on a pallet, and a pallet is dropped off at a shrink-wrapper.

Bar code scanning can be automated in certain situations, such as transport and conveyor sortation. But even in these circumstances, a clear line of sight is required between the reader and the bar code. This requirement is usually met by manually orienting the carton on the conveyor or employing costly scanner arrays. RFID can overcome the limitations of bar code scanners in automated environments by capturing the identifier with a single reader and one or more inexpensive antennas.

RFID can offer other important benefits to a distribution operation. RFID tags can store more information than linear bar codes, making them very well suited for lot control and serialization tracking. Battery-assisted passive and active tags can collect product environmental data such as temperature. Active tags can even support real-time location systems that automatically track the movement of a forklift through a warehouse or a trailer through a yard. While other technologies, such as two-dimensional bar codes and contact memory, can meet some of these needs, it is the hands-free nature of RFID that makes it so appealing.

However, RFID is not a flawless performer in the warehouse. Most of us have heard about performance issues when tags are applied to product with high liquid or metal content. We may also be aware of interference issues with other RF devices and background electromagnetic noise typically found in a distribution

center (DC). The majority of RFID performance issues cited in trade journals center around Ultra High Frequency (UHF) passive tags that conform to EPCglobal standards. These standards were developed to meet specific cost and performance objectives. They provide the basis for tags that are relatively inexpensive, have reasonable read distance ranges, bear limited regulatory impact, and work well in a wide range of supply chain applications.

Cost vs. Effectiveness

Compromises had to be made to accommodate the somewhat conflicting goals of cost and widespread effectiveness. The result is a standard that might have performance issues in certain situations. While EPC-compliant tags do not require a clear line of sight between tag and reader antenna, their readability can be impacted by the orientation of the tag antenna to the reader antenna, as well as product and packaging characteristics. In other words, it can be difficult to get an acceptable read rate in some applications. Additional engineering and manual exception processing can overcome some of these challenges. But, as a trade-off, both of these approaches add cost to the final solution.

Furthermore, there are some performance issues that just can't be solved given the current state of the technology. Even Wal-Mart does not expect to be able to read all case tags on a nested pallet that passes through a receiving-door RFID reader portal. The retailer just wants to be able to capture the master pallet tag. The technology will improve over time. But this doesn't mean that the physical laws governing radio frequency transmission will be abrogated. Solution providers will just become more adept in providing work-arounds.

Despite its hands-free nature, RFID is not immune from the human factor. Performance and reliability can also depend on people applying the right tag to the correct case and never bypassing shipping dock reader portals. No technology that involves human interaction can guarantee 100 percent performance. Sound processes must still fill the gap between reality and reliability.

Right Team, Right Commitment

Most supply chain systems projects employ cross-functional teams with representatives from each area touched by the prospective changes. The operations staff members are generally assigned appropriate roles in any project that impacts their areas. It should be no different for an RFID project that impacts the DC. Undoubtedly, most RFID project teams probably

feel they have the proper representation from operations, but representation does not necessarily equate to participation.

There is a tendency for non-technical staff to back away from application projects they deem high-tech or "bleeding-edge." It is very easy to cede the decision-making process to the technicians on these types of projects. It is also very easy for operations to view RFID as a "bleeding-edge" proposition. Like it or not, operations must be a full partner in the RFID decision-making process since they are probably going to end up owning the final solution in the warehouse.

This doesn't mean that operations personnel must become RFID subject matter experts, but operations must make sure that their interests are properly represented on any RFID project that impacts the DC. Leadership needs to assign the right people with a sufficient time commitment to be active team members. Furthermore, the team members must take the time to learn enough about the technology so they are able to make informed decisions. Operations must also integrate RFID into present business process and material flow. It might take modifications to both of these to take advantage of the technology. Trying to integrate RFID into existing flows would be equivalent to automating a bad process.

RFID's Potential Beyond the DC

While DC improvements play an important part in their plans, Wal-Mart and other compliance-mandate issuers are looking to achieve substantial benefits from RFID outside the warehouse. They seek major gains in their stores. Inventory, timeliness and accuracy at the store level have always been a challenge for retailers. Most store systems do not have the ability to track product movement from the back dock to the front register on a near real-time basis.

Furthermore, store receiving and physical inventory are time-consuming activities. RFID promises to help automate these functions, as well as provide more timely information on what is happening in the store. This will not only save labor, but it can also help reduce stock-outs. While Wal-Mart is unwilling to pay its suppliers to tag cases and pallets, it is promoting the more timely exchange of store inventory movement as a key benefit to suppliers. This casts RFID into the role of a collaborative replenishment enabler.

RFID offers many other benefits in the supply chain that go well beyond the warehouse and store operations. Since it is well suited to serial number and lot tracking, RFID can help make warranty tracking, product recalls and returns processing more efficient. In theory, hands-free data acquisition should provide a

more detailed history of product movement throughout the supply chain. RFID can bolster the ability of all links in the supply chain to authenticate product and expedite issues. While these benefits might not necessarily impact DC operations, they greatly enhance RFID's overall value proposition. Even small "slap-and-ship" implementations should try to keep the big picture in mind.

Innovative Approach to Flow, Processes

The problem with current RFID compliance initiatives is that they tend to cast RFID in a role similar to bar codes. Suppliers are directed to encode unique identifiers on case and pallet tags so the mandate-issuer can help automate their receiving and product tracking processes. But, many distributors are doing basically the same thing today with bar codes and Advance Shipping Notices (ASN). They are already meeting other retail mandates by applying UCC-128-compliant shipping labels to their outbound cases and pallets.

This focus on applying RFID smart labels to support what is, essentially, ASN receiving at a retailer's DCs and stores obscures the true potential of RFID in the warehouse. It paints a picture of RFID usage in the DC where each existing bar code scan is replaced by a tag read. But, RFID promises to be a less process-intrusive technology than bar codes. This should allow for more tracking points through a facility without disrupting product flow. It also changes the interaction dynamics between a warehouse associate and the warehouse management system. Putting RFID in the DC can require some innovative process redesign in order to obtain its full potential.

Many operations could be years away from incorporating RFID into their internal warehouse processes and systems, but even an organization that is only embracing RFID to meet a customer's mandate should consider product flow alternatives in their efforts. Applying an RFID tag to outbound cases and pallets on the shipping dock might be a valid approach when shipping a handful of products to a couple of DCs and stores, but is it a reasonable method when volumes and destination points start to grow dramatically?

Maintain Realistic Expectations

If EPC-compliant RFID tags cost about a penny each, could offer near-100 percent reliability for most supply chain applications and were supported seamlessly by the vast majority of supply chain execution system packages, then they would be as commonplace as bar codes in the DC. However, the technology and marketplace are not there yet and might never

meet these targets. Actually, many industry analysts have cited five cents as the cost-per-tag threshold to common acceptance of RFID in the supply chain. But, even at this price, would RFID make sense for every operation?

Bar code scanning through wireless terminals is general practice in the distribution world, but there are many operations that still paper-pick orders because they cannot justify the technology. There is no reason to think that RFID will be any different even as cost, performance and integration factors continue to become more favorable to end-users. Despite its many potential benefits, RFID might not be the right solution for a given distribution operation.

Whether compelled by a customer mandate or intrigued by its many benefits, no distribution operation should approach an RFID project without some degree of skepticism about the applicability and benefits of the technology within their facility. This doesn't mean that negativity should reign, however. RFID project teams need to embrace the possibilities offered by the technology, but they also need to temper this enthusiasm with a dose of realism.

Any supplier facing an RFID mandate naturally seeks to gain internal benefits from implementing the technology for its customer. Some operations can meet this goal, while others might not. For the latter, RFID might just be a cost of doing business with certain customers. The real question for these organizations is not how to obtain internal gain but how to support tagging requirements in the most efficient manner.

Develop Living Business Cases

Few supply chain systems projects are launched without some sort of documented justification or business case. However, many organizations treat business cases as a static proposition. They are unwilling to revisit and revise the case to match any change in the scope or direction of a project. Few projects wind up at the endpoint initially envisioned. Given the technology's current state in the supply chain world, this is especially true for RFID projects.

There is a tendency to shortcut business case development and on-going maintenance for application projects that appear to be on the cutting edge of technology. People naturally shy away from going on the record when the knowledge they are using to make decisions is sketchy or incomplete. But since they are going to have to live with the results, operations must actively push for a living business case for any RFID project within the DC. This is just as true for

a slap-and-ship compliance project as it is for an internal improvement initiative.

Handling Exceptions

Warehousing is about exceptions. From the receiving dock to the sealing of outbound trailers, every DC deals with numerous exceptions to its normal operational flow. Many exception processes revolve around manual intervention and decision-making. For example, an operation might employ a special procedure to deal with PO overages on an inbound shipment. The exact steps involved in dealing with this situation might depend on the vendor, the SKU, and outstanding customer orders. The decision-making process could entail a combination of firm rules and local discretion.

Since a key benefit of RFID is process automation, special thought should be given to exception processing. Significant gains might be obtained by automatically receiving inbound freight as a trailer's contents are moved through a dock door, but how will this functionality handle the numerous exceptions inherent in a receiving process? Exception processing must also account for manual errors and systematic failures. A compliance application might do a downstream read verification of RFID case tags, but is there any check that the cases are getting on the correct pallets?

Any system can be designed to handle exceptions, but no technology can assure 100 percent reliability in real-world applications. Once again, sound processes must fill the gap between what technology can deliver and what business requires. As the technology becomes more robust, you can expect the exception processing to decrease. In any event, it is crucial to understand that you will not get 100 percent accuracy from the technology at the beginning but can achieve close to it in the future.

Long-Term RFID Outlook

Given the various compliance mandates, industry initiatives and trade journal scrutiny, it is easy to view RFID's role in the supply chain world in revolutionary terms. The adoption of RFID is really an evolutionary process, so the technology will continue to improve. Standards will continue to evolve based on real-world experiences and technological advances. Solution providers will meet these changes with new generations of products.

No one can say for certain what the technology will look like five or ten years from now. We can only speculate about cost, performance and functionality. Other factors might have a significant impact on

RFID's role in the supply chain. Despite this uncertainty, it is a relatively safe bet that the technology will get better and comparatively cheaper. This doesn't mean that all the limitations confronting RFID adopters will vanish, but it is foolish to judge RFID's potential solely in terms of where the technology is today.

Distribution operations need to account for these changes and improvements in the technology just as they factor other potential business changes into their strategic and tactical plans. Perhaps, certain benefits are unobtainable today for some operations given current costs and performance issues. Yet this can change in a relatively short time. Operations should not give up on RFID's potential if it cannot make full use of the technology today, rather, it should keep its planning process attuned to developments and advances in the technology.

Vision to Seek Other Opportunities

Most of the focus on RFID in the supply chain centers on tagging cases and pallets to support process automation and inventory visibility. This is not surprising given the current thrust of the various compliance mandates. However, RFID can play other roles within the distribution facility. Some pharmaceutical companies have already discovered that complying with Wal-Mart's item-level tagging requirements for Class II drugs provides them with the ability to improve internal lot control processing.

Potential DC uses for RFID are not restricted to EPC-compliant UHF passive tags. Active tag technology can be employed by real-time locator systems to track trailer movements in the yard or moveable assets on the warehouse floor. High-frequency (HF) tags might provide a good alternative to bar codes for tote and reusable container tracking. Environmental conditions can be monitored using semi-passive and active tag technology.

Operations needs to keep an open mind about RFID's potential in the DC. Its efforts to understand the implications of the technology should not be restricted to current compliance mandates. There will likely be other areas where RFID can provide real benefits. By seeking other opportunities, operations will also place itself in a better position to profit from current compliance initiatives.

No RFID project starts out intending to fail or under-achieve. Undoubtedly, every project team believes that it is charting a course in the best interest of its organization, but treating the application of RFID technology in the DC as primarily a technological exercise is a recipe for under-achievement or outright

failure. RFID utilization in the DC is inevitably intertwined with the operational flow of the facility. No project team can succeed in putting RFID in the DC without addressing the technological side of an implementation. To be truly successful, operations must remain a key aspect of every phase of the project.

Selecting Suitable Partners

Leading with operations is not only a function of internal resources and focus. It also depends on the partners an organization selects to help implement RFID within their distribution facilities. The RFID marketplace is crowded with vendors, integrators and consultants. Most are technically qualified, but how many have the operational credentials that will help ensure success?

To ensure that you lead with operations, seek out a total supply chain solutions provider that has helped clients across all industries achieve measurable results. Putting RFID in the DC is much more than a technological exercise—it is an operational proposition that can significantly impact a DC's bottom line.

It is also critical that you utilize a reliable RFID product and packaging testing service. Whether you are trying to meet an RFID compliance mandate or seeking to gain internal improvements, be sure to lead with operations.

About Tompkins Associates

Tompkins Associates is the leading operations-focused consulting and integration firm, specializing in end-to-end supply chain solutions. Customers look to Tompkins' expertise to develop and implement strategies for intelligent solutions in distribution center design, warehouse strategic planning, distribution network configuration, transportation system planning, system integration and implementation, logistics and manufacturing outsourcing, benchmarking and best practices, and supply chain optimization. As consultants and integrators for more than 30 years, Tompkins offers a proven track record and deep industry expertise for solutions that reduce costs and improve overall supply chain performance. The company is headquartered in Raleigh, NC. For more information, visit www.tompkinsinc.com.