



BEA White Paper

# Radio Frequency Identification (RFID)

Why Reusable Asset Tracking is the Place to Start



# Copyright

Copyright © 2005 BEA Systems, Inc. All Rights Reserved.  
July, 2005

## Restricted Rights Legend

This document may not, in whole or in part, be photocopied, reproduced, translated, or reduced to any electronic medium or machine readable form without prior consent, in writing, from BEA Systems, Inc. Information in this document is subject to change without notice and does not represent a commitment on the part of BEA Systems, Inc.

## Trademarks

BEA, Built on BEA, Jolt, Joltbeans, Steelthread, Top End, Tuxedo, BEA WebLogic Server, BEA Liquid Data for WebLogic, and WebLogic are registered trademarks of BEA Systems, Inc. BEA AquaLogic, BEA AquaLogic Data Services Platform, BEA AquaLogic Enterprise Security, BEA AquaLogic Service Bus, BEA dev2dev Subscriptions, BEA eLink, BEA MessageQ, BEA WebLogic Communications Platform, BEA WebLogic Enterprise, BEA WebLogic Enterprise Platform, BEA WebLogic Enterprise Security, BEA WebLogic Express, BEA WebLogic Integration, BEA WebLogic Java Adapter for Mainframe, BEA WebLogic JDriver, BEA WebLogic Log Central, BEA WebLogic Network Gatekeeper, BEA WebLogic Platform, BEA WebLogic Portal, BEA JRockit, BEA WebLogic SIP Server, BEA WebLogic WorkGroup Edition, and BEA WebLogic Workshop are trademarks of BEA Systems, Inc. BEA Mission Critical Support is a service mark of BEA Systems, Inc. All other company and product names may be the subject of intellectual property rights reserved by third parties.

# Table of Contents

- Executive Summary .....5
- Introduction .....6
- So What is Supply Chain Management? .....7
- Getting to the Big Picture about RFID .....7
  - What is RFID? .....7
  - The Intelligent Physical Asset .....8
  - The Quasi-organization .....8
- The State of RFID Adoption .....10
  - RFID and the Hype Cycle .....10
  - Managing the Turbulence .....11
  - Current Opinion Regarding RFID .....12
  - Perceived Benefits from RFID .....13
- Why Reusable Asset Tracking is the Place to Start .....14
- Managing the Transition .....17
- Conclusions .....18
- About BEA .....19
- References .....20
- About the Authors .....21

## Executive Summary

1. Radio Frequency Identification (RFID) is a technology that is starting to have an impact on a wide variety of business processes across different types of organizations. Projections are that this will increase over the next few years as organizations move from RFID trials to implementation in everyday business activities.
2. One of the major applications for RFID is supply chain management. RFID can help organizations make the transition from a narrow focus on cost and functional excellence to a model in which they create value through collaboration with partners and synchronization of activities.
3. RFID creates intelligent physical assets, or an “Internet of things.” These assets know what they are, where they have been, what their status is, and where they are going. This enables organizations to take another step towards creating a real-time enterprise.
4. In order to capture the full benefits of RFID, organizations must collaborate across the supply chain, with retailers, distributors, and manufacturers. This will lead to the need for a “quasi-organization” that manages the collaboration.
5. As with many new technologies that promise to improve organizational performance, RFID is subject to the phenomenon Gartner labels the “hype cycle.” At the moment it is about to sink into the “trough of disillusionment.” But it is often during “trough” times that early adopters seize competitive advantage.
6. Industry opinion is generally positive about the benefits of RFID. A recent survey showed 24 percent of respondents to be positive, 39 percent cautiously optimistic and only 15 percent skeptical about generating an ROI in RFID.
7. Benefits from RFID come from improving customer service, increasing profitability, reducing costs and inventory, and speeding sales cycles.
8. Tracking reusable assets in a supply chain is a good first application of RFID, for several reasons. This is an area that currently underperforms, and that can greatly impact an organization’s financial performance. Also, the lower levels of management complexity involved in using RFID in this context makes it more likely that an organization will achieve a significant ROI.
9. Successfully adopting RFID will require organizations to consider the changes that the technology will bring to the ways in which managers and operators do their jobs.
10. Although relatively immature, RFID is a technology that can help organizations improve the management of their supply chains. By implementing reusable asset tracking applications, organizations can improve performance and gain expertise in using RFID to achieve and benefit from real-time responsiveness.

## Introduction

Radio Frequency Identification (RFID) is emerging as one of the information technologies that will have a major impact on the performance of organizations over the coming years. In Europe, retailers such as Metro, Tesco, Marks & Spencer, and Carrefour have announced initiatives that use the technology, and some have mandated that their suppliers tag reusable assets for the products that they supply.<sup>1</sup> In addition to retailers, companies such as Airbus have started to use RFID to track spare parts,<sup>2</sup> while BMW is tracking cars as they move through the production line.<sup>3</sup> The technology has also been the focus of attention by legislators, with the EU funding a number of research projects in this area<sup>4</sup> and currently working on nine regulatory initiatives.

---

*A survey by LogicaCMG (2004) showed that up to 50 percent of European companies either have started to use RFID or have plans to do so. Investment in RFID in Europe is predicted to reach \$1.1bn by 2007.*<sup>5,6</sup>

(Juniper Research, 2005)

---

While not without risk, RFID offers significant benefits. But first, organizations need to understand developments in supply chain management, and how RFID can support these. Organizations also need to know the current state of RFID, including how to differentiate reality from the hype, how European supply chain managers regard the technology, and what benefits they can expect from its adoption.

For organizations that decide to pursue the benefits of RFID, the most straightforward application at this stage in the evolution of RFID is reusable asset tracking. This can deliver a rapid and easily measured ROI while also providing organizations valuable experience in addressing and overcoming the challenges of adopting RFID.

## So What is Supply Chain Management?

Supply chain management has evolved over the last decade in response to a growing awareness that improvements in performance do not come solely from internal operations. Widely adopted cross-organizational supply chain management practices now include outsourcing of manufacturing and logistics operations, global sourcing, just-in-time supply, and the strategic positioning of inventory. There are two major drivers of this change. First, organizations are shifting their focus from excellence in functional activities and internal business process management to recognition that competitive success requires collaboration and synchronization of activities across the supply chain. And secondly, a narrow focus on cost is expanding to include supply chain performance and value creation.

---

*Building a strong supply chain is essential for business success. But when it comes to improving their supply chains, few companies take the right approach. Many businesses work to make their chains faster or more cost-effective, assuming that those steps are the keys to competitive advantage. To the contrary: Supply chains that focus on speed and costs tend to deteriorate over time. Only companies that build supply chains that are agile, adaptable, and aligned get ahead of their rivals.*<sup>7</sup>

Lee (2004) Harvard Business Review

---

Examples of organizations that model this evolution are Toyota and Dell. Toyota has eliminated unnecessary or wasteful process steps, aligned components of each activity into a continuous flow, and used cross-functional teams to remove non-value adding activities or “waste” from its internal operations and across its supply chain<sup>8</sup>. Dell has embraced supplier organizations in a high-performance supply chain<sup>8</sup> that enables it to take custom orders for computers and build and deliver them within days.

## Getting to the Big Picture about RFID

---

*“Auto-ID systems create new efficiencies, transform supply chains, improve planning and labor productivity, and reduce shrinkage, thus benefiting consumers, manufacturers, retailers and wholesalers.”<sup>9</sup>*

Ginsburg et al. (2004) Executive Outlook

---

### What is RFID?

Technically, RFID is tags and readers: electronic tags that contain memory and an antenna, and readers that can read the data stored on the tag. Each product takes on a unique electronic identity when a tag is attached that stores an Electronic Product Code (EPC), a unique product identifier based on standards developed by the EPCglobal Network.<sup>10</sup> A can of baked beans could have a tag on it that contains information as basic as who manufactured it and its own unique number, or as complex as what locations it has passed through in the supply chain and how it was disposed of. Tags can also track containers of multiple products, such as cartons or pallets, so organizations can track these assets as they move through a supply chain to minimize the number of containers lost.

Applications for RFID are many and varied. To take just a few examples, pharmaceutical companies including Abbot Laboratories, Pfizer, Proctor & Gamble, and Johnson & Johnson have all started to tag drug containers in an attempt to reduce counterfeiting. Motorcycle company Viper is tracking high-value parts such as engines as they move through the manufacturing process. The Vatican is using RFID to improve the management of over 1.6m of the world's oldest books and manuscripts. Tagging of patients in hospitals, children in schools, and luggage in airports all demonstrate the breadth of applications for this technology. The primary focus of this paper, however, is on its application to various stages in the supply chain.

The visibility of tagged products and other assets as they move through the chain depends on the RFID readers being integrated into existing operational systems such as enterprise resource planning, supply chain management, and customer relationship management systems. For example, if a pallet of stock were shipped to the wrong location, alerts could be sent to a transport management system to initiate re-routing of the pallet. Without RFID, some organizations would not have the capability either to see where the pallet had been shipped, or to respond to this error in real time. This could have a negative impact on customer service performance indicators such as on-time and in-full delivery and on-shelf availability—a major determinant of retailers' profits.

## The Intelligent Physical Asset

---

*“Creating a way for companies to use sensors to identify goods anywhere in the world is a very big deal. It's going to revolutionize the way we track goods from manufacturing to the consumer and even through recycling. We are, in effect, creating an Internet of things.”<sup>11</sup>*

Ashton (2003) Auto-ID Center

---

The first major impact of RFID is the bringing together of the flow of products and information through the supply chain. Traditionally, information about product location has moved between organizations by paper, EDI, or through the Internet. The products, meanwhile, move physically, often separate from the information about them, which creates the potential for the two to be inconsistent. For example, a driver obtains a signed delivery note when delivering a pallet to a distribution center, but then goes on to make other deliveries and delays entering data from the note into an information system until that evening. In the interim, the information system does not have the accurate pallet location. This can have a major impact on performance targets for customer service and inventory levels as staff struggle to compensate for the lack of real-time visibility and ability to manage supply chain events.

With RFID, though, physical and information flows converge to create intelligent physical assets, which constitute discrete information systems within the larger organizational information environment. No longer are assets “dumb,” unable to understand what they are and where they are, and without the ability to communicate this information to a third party. Instead, when assets pass into a retail store or distribution center they can identify themselves to the readers located at the loading bays, alerting the systems with which these readers are integrated.

## The Quasi-organization

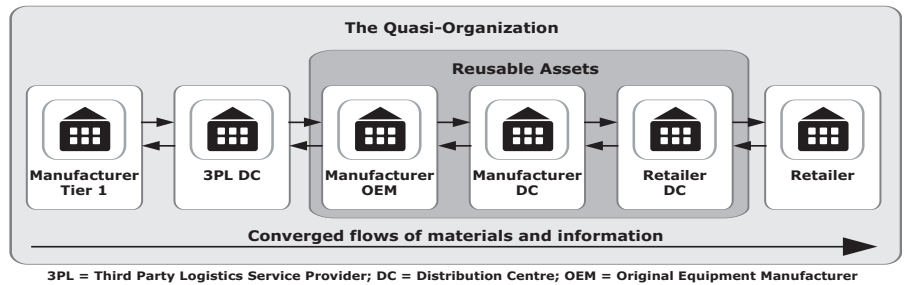
The second major impact of RFID has implications for the whole supply chain. As material and information flows converge across the supply chain, a quasi-organization could emerge that subsumes multiple organizations into one entity (see Figure 1). An organization then gains its competitive advantage not just as a standalone entity, but as part of its multi-organizational supply chains. RFID exploitation can hone competitive advantage while encouraging a collaborative approach to working with customers and suppliers.

For item-level tagging, this quasi-organization might manage processes that are partly operated by a retailer, partly by suppliers (at two levels in this illustration), and partly by a third party logistics service provider (3PL). For example, a computer disk drive might be tagged by a tier-one manufacturer and then tracked through a 3PL and into an OEM. The OEM could assemble it into a personal computer and ship it via a retailer's distribution center to the retailer. If a problem then occurs with the disk drive, either at the retailer or once it has been sold to a customer, it could be resolved much more quickly if information stored on the tag is used in the process for returns or for end-of-life disposal.

This requires a holistic and comprehensive view of the whole life of the disk drive, so a quasi-organization might be required to organize the processes that manage this activity. The lead role in this quasi-organization might be filled by powerful organizations such as Wal-Mart or the large pharmaceuticals companies; 3PLs or 4PLs (who manage multiple 3PLs); or electronic supply chain management hubs, such as E2Open in the electronics sector or SupplyOn in the automotive sector. Different types of quasi-organizations will probably be present in different industries, and sometimes in competing supply chains within the same industry.

Figure 1

The convergence of material and information flows and the emergence of quasi-organizations.



In contrast with item-level tagging, tagging of transportation assets such as pallets and cartons is more likely to span just two organizations: the manufacturer (including its distribution center) and the retailer. This quasi-organization is less complex because it involves fewer organizations, has less data, and needs fewer touch-points at which RFID readers interrogate the product. One example of this simpler type of tagging is reusable asset tracking. Retailers often request that products are delivered in totes, re-useable assets that operate within a closed-loop supply chain. Suppliers and retailers often suffer under-performance when these go missing, get lost or stolen, or are not visible in supply chains. RFID could solve many of these problems, but would require a quasi-organization to manage the relevant processes. As in the example for item-level tagging, one of several different types of organizations could take the lead in this activity.

---

*“We are now entering an era of supply chain competition. The fundamental difference from the previous model of competition is that an organization can no longer act as an isolated and independent entity in competition with other similar stand-alone organizations.”<sup>12</sup>*

Christopher (1998)

---

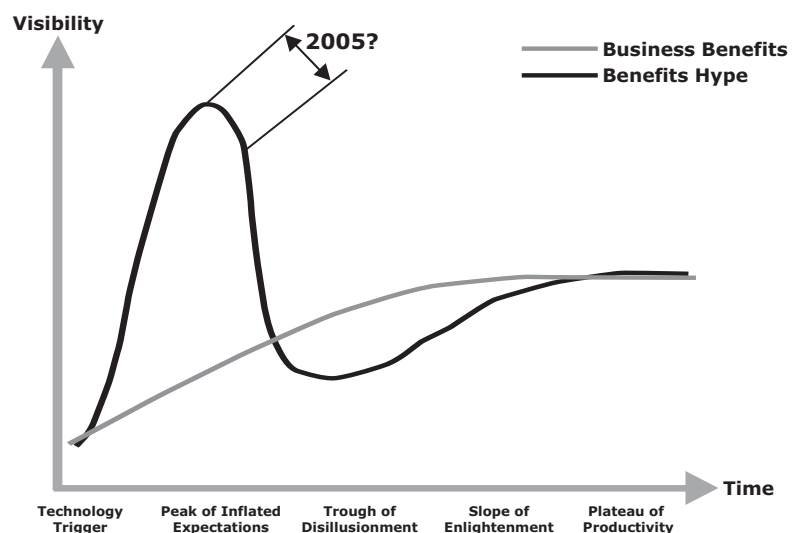
## The State of RFID Adoption

RFID has proven that it can create intelligent physical assets, whether products or transportation containers, and deliver significant benefits within the supply chain. It has also shown that organizations in the supply chain need to collaborate in order to achieve these benefits. But the technology is still relatively new, and organizations considering RFID need to sift information from different sources to distinguish between hype and reality.

### RFID and the Hype Cycle

IT analysts Gartner have famously observed that new technologies showing a high level of promise tend to go through a process they describe as a “hype cycle” (see Figure 2).

Figure 2  
The “Hype Cycle” for RFID Technology.



This cycle starts when a *technology trigger* occurs: an insight into the potential of a new technology stimulates investment in the development and marketing activities of potential vendors. As this insight grows it evolves into hype, and, over time, this becomes a *peak of inflated expectation*. When the technology fails to deliver the promised benefits in a short period of time, often due to its immaturity and the complexities associated with implementation, organizations enter the *trough of disillusionment*. But then pioneering adopters start to realize and communicate the benefits of the technology, climbing a *slope of enlightenment*. Finally they reach the *plateau of productivity* and succeed in embedding the technology within their organizational practices.

This phenomenon was most evident during the period of the dot-com boom and subsequent bust. Many investors and organizations lost all or part of the value of their investments in Internet-based technologies. But just a few years later, Christmas 2004 saw e-commerce sales reach \$8.8bn in the US,<sup>13</sup> a 24 percent increase from the previous year, and in Europe, Forrester Research reported online sales increasing by 44 percent to €13bn.<sup>14</sup>

In the world of e-business many organizations such as IBM, Johnson & Johnson,<sup>15</sup> and Cisco<sup>16</sup> are reaching new levels of supply chain performance through e-business technologies. If these organizations had waited for others to prove the benefits of new technologies, they would have lost the opportunity to gain competitive advantage through early adoption. So, while the actual business benefits of a new technology are less than the hype, they are greater than they appear from the perspective of the trough of disillusionment. An Accenture report demonstrated this in a report on e-commerce in Europe, published in 2001.<sup>17</sup>

This analysis of hype cycles begs the question: where is RFID today? Industry consensus suggests it's close to the peak of inflated expectations and poised to descend into the trough of disillusionment during 2005 while analysts and adoptors adjust their expectations and await results.

## Managing the Turbulence

In order to navigate this turbulence successfully, and to ensure expectations and implementation are not affected by hype, organizations need to set realistic expectations for operators, managers, and senior executives. They also need to select vendors for resilience: many start-ups came and went during the dot-com boom. Ideally vendors should have a strong track record in delivering IT-based business improvement initiatives, and should understand how to integrate RFID technologies into existing IT architectures, business processes, and organizational activities.

The most fundamental success factor, though, is to have a well researched and carefully considered RFID strategy. This should spell out the case for ROI while specifying the who, what, when, where, how, and why of this technology. Given that RFID is still in its infancy, organizations should adopt a probe-and-learn strategy, taking small experimental steps and learning from them, rather than undertaking a “big-bang” deployment. This cautious approach also allows for incorporation of new features as the technology continues to evolve. Capturing the benefits that will come from the convergence of the flows of information and materials will be a marathon—not a sprint.

Despite the dangers of the hype associated with new technologies, the greater danger is the risk of not adopting and conceding the competitive advantage to others. While many organizations faced challenges in adopting IT-based supply chain solutions, those solutions have more than repaid the resources and time invested in them, delivering unique business capabilities that strongly differentiate and enrich those early adopter organizations.<sup>18</sup>

## Current Opinion Regarding RFID

A 2004 survey conducted by RFID manufacturer Intermec of 616 supply chain managers across Europe<sup>19</sup> found a range of attitudes from enthusiasm to skepticism about the potential of RFID to deliver a return on investment, as shown in Figure 3.

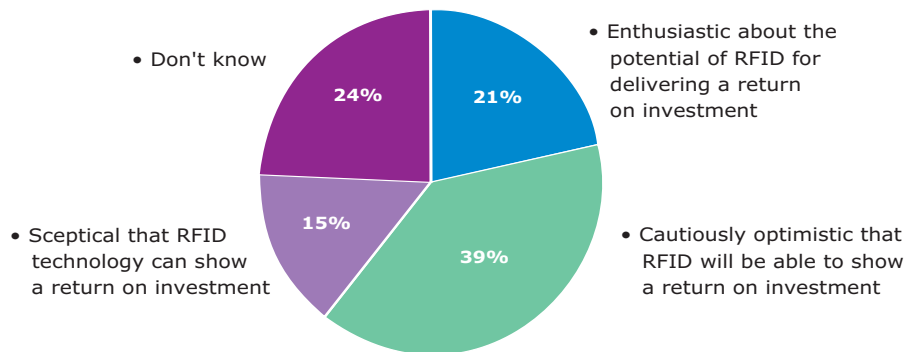
The “enthusiasts” focused on three benefit areas: the potential to increase efficiency of operations, control over warehouses, inventory, and stock operations, and traceability, visibility, and security of stock. Because each of these areas directly affects costs or revenues, organizations were confident of generating a return on investment from the technology.

“Cautious optimists” perceived shortcomings in current RFID technology, and many felt the need for further knowledge about its various applications. They cited a lack of a proof of concept with regard to their specific circumstances, and uncertainty about whether the benefits would cover the costs. In particular, they needed more information on the reliability of the technology and the appropriateness of RFID for their applications.

The cost of the technology was the most common reason “skeptics” gave for taking the position they did. Further examination of the results showed that many of the respondents who mentioned this were referring to item-level tagging. Indeed, in some high-volume, low-value sectors, item-level tagging is costly—at mid-2004 prices of approximately 20-40 cents per tag. This price is, however, down from 50-60 cents in 1993, and is projected to fall another 25 percent by 2012, according to Forrester.<sup>20</sup> The range of applications for which RFID is financially viable increases as the price falls, and reusable asset tracking, which uses fewer tags than item-level tagging, is already affordable for most organizations.

Figure 3

Expected return on investment from RFID technologies.



## Perceived Benefits from RFID

The same Intermec survey of European supply chain managers showed a wide array of benefits being attributed to RFID technology. The benefits the respondents hoped to gain are presented as Figure 4.

The most widely cited of these is improvement in customer service. On-time and in-full delivery of products are key metrics by which suppliers and logistics service providers are judged. The reusable assets that move products between these types of organizations and their customers are crucial to high levels of performance. Tracking these assets to ensure they are in the right place at the right time helps improve customer service and asset visibility. This also helps improve the sales cycle, as operators will know the location of assets in real time and can leverage that information to respond more quickly to customer demand.

---

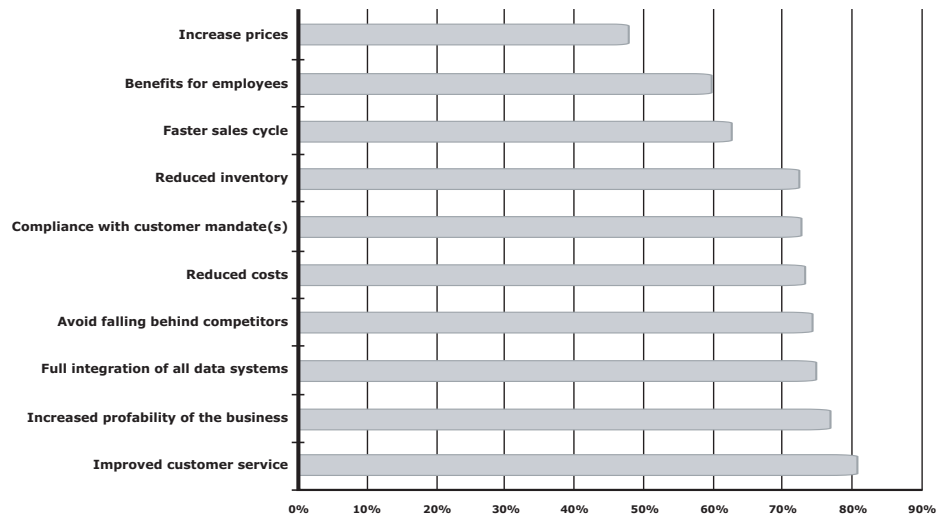
*“All retail businesses suffer from only being able to deduce what stock is in a store. They make that deduction by knowing what was sent to a store and what has been sold, but errors occur. RFID enables us to know exactly what is in the store.”<sup>21</sup>*

James Stafford—Technical Executive—Marks & Spencer (2005)

---

Another major benefit of adopting RFID, cited by 74 percent of all respondents, was avoiding falling behind competitors. With major European retailers like Metro and Tesco starting to mandate tagging of reusable assets received from suppliers, suppliers will increasingly need to offer customers a reusable asset tracking service in order to win or even keep business. This makes *complying with customer mandates* a major reason for adoption.

Figure 4  
Benefits of RFID technology in the supply chain.



Eliminating manual processes such as barcode scanning and recording deliveries will contribute towards reducing the cost of operating processes that manage reusable assets. German retailer Metro demonstrated how the automation of a hanging-garment sorter can route 4,000 to 8,000 garments every hour when they are RFID tagged, versus only 150 pieces via manual sorting processes.<sup>22</sup> Moreover, the automation of data collection will improve its accuracy and lead to the possibility of reduced inventories as less buffer stock will be required to cope with inventory inaccuracies and fluctuations in demand. These benefits are all ways in which RFID contributes towards businesses' *increasing profitability and avoiding falling behind competitors*.

## Why Reusable Asset Tracking is the Place to Start

For many organizations hesitating between the potential benefits and challenges of RFID implementation, reusable asset tracking is the logical application to start with. Reusable assets—pallets, shipping containers, totes, and refillable liquid containers such as beer kegs—are the means by which products are consolidated and transported through supply chains. They often form what is called a closed-loop supply chain. For example, 20 car parts might be placed in a tote and shipped to a manufacturer's distribution center. Once the parts have been removed, the tote is returned to the supplier for reuse. As shown in Figure 5, multiple reusable asset supply chains can exist across a supply chain.

Improving the performance of the supply chain for reusable assets is important because they consume a significant proportion of corporate revenues. Research indicates that for many organizations, reusable asset operations consume 5 percent of annual revenues, and 35 percent of those surveyed said they lost or had to replace 10 percent of their assets annually. Moreover, investment in reusable assets can amount to several million dollars when, for example, new part bins are procured for a new automotive manufacturing facility.<sup>23</sup>

---

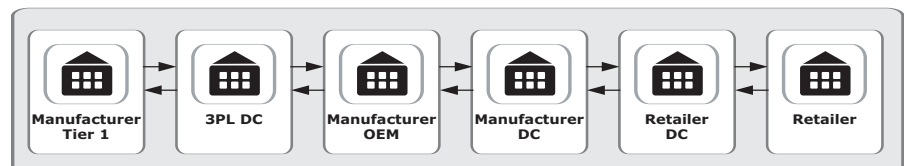
*Applications identified for a sensible employment of RFID are especially Reusable Transport Items (Assets) and logistics in general. Here RFID can efficiently fulfil long-life identification, Tracking and Tracing, stock management and more flexible service. RFID offers new possibilities and opportunities for the management of Reusable Transport Items.*<sup>24</sup>

ECR Europe (2003)

---

Figure 5

Closed-loop supply chains for reusable assets.



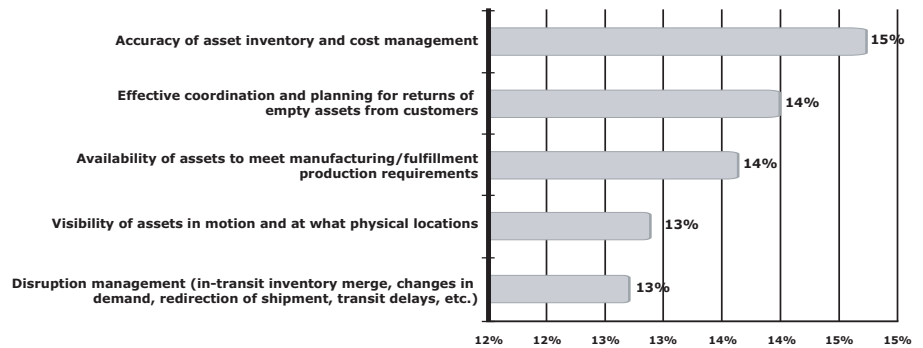
Existing technologies fall short in managing the logistics of returnable assets. In a recent survey only 14 percent of respondents thought current systems supported effective coordination and planning for returns of empty assets from customers, and 15 percent said that they adequately supported their need to comply with customer mandates for processes such as the shipment of goods.

Adopting RFID in a closed-loop reusable asset supply chain is inherently less complex than item-level tracking, as fewer organizations “touch” the product. Moreover, as the assets are not “consumed,” the cost associated with procuring and fitting tags to products is amortized over long periods of time, because the tags don’t have to be removed and refitted and don’t leave the supply chain.

Finally, as these assets never enter the possession of the end consumer, adopting RFID for this reusable asset tracking doesn’t raise concerns about privacy. The confidentiality of personal information has proved to be of considerable concern to some activists in the US,<sup>25</sup> and in Europe protests have been seen outside Metro’s “Store of the Future” in Germany.<sup>26</sup>

Figure 6

Underperformance of current technology in addressing logistics asset management challenges.  
Source: Aberdeen (2004)

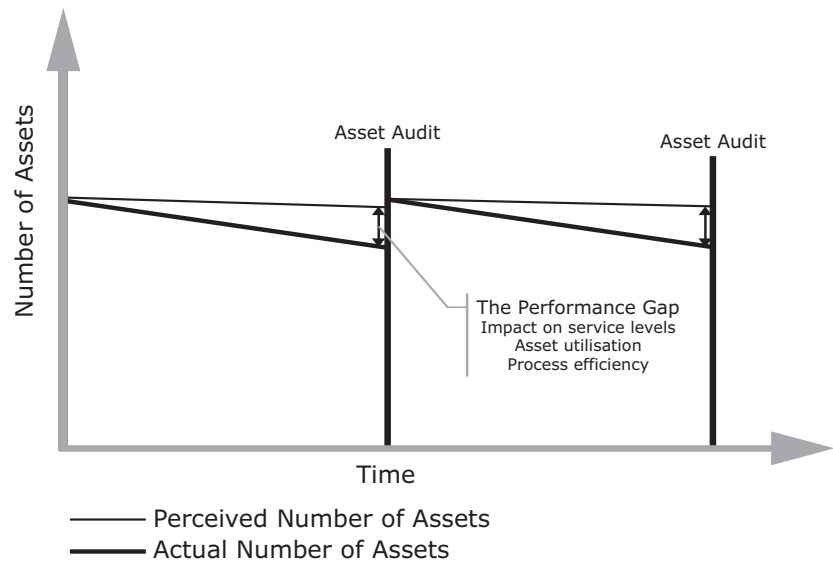


Without this ability to track reusable assets, they are frequently lost, stolen, or mislaid. Figure 7 illustrates the performance gap, in which the actual number of assets (the thin line) decreases at a faster rate than the perceived number of assets (the thicker line). The gap between these two values negatively impacts:

1. Service levels, because assets are not available for shipping products to customers
2. Asset utilization rates, because more assets are required than necessary
3. Process efficiency, because of time spent trying to locate assets.

Figure 7

The "performance gap" in reusable asset management.



## Managing the Transition

For many, then, reusable supply chain assets will form RFID's quick win. Whatever the first serious applications, though, successful implementation of this as of any other new technology is a risky endeavour. Research by the Standish Group.<sup>27</sup>

Fortunately, the early experience of RFID is much better than that of IT projects generally: a recent survey into the adoption of RFID found that 91 percent of organizations that had conducted a trial deemed it to be successful, and 82 percent had already gone on to implement RFID as part of their everyday operations. Nevertheless, organizations undertaking such a potentially far-reaching innovation should manage the risks proactively.

The starting point for any technology adoption is to select the business processes that will be impacted. In the case of RFID, organizations must begin by identifying the process that is most likely to improve with RFID.<sup>28</sup> Reusable asset tracking is one of the most promising places to start an RFID implementation. Organizations that choose such an application must consider all the processes associated with managing, tracking, and reporting of the movements of assets. If the assets are used to manage the flow of products between two organizations, such as totes that carry product from a supplier's distribution center to a retailer's one, then the process should be analyzed from the perspective of both organizations.

Next, organizations should establish improvement goals for the process. For reusable asset management, these could be improving customer service by adding "track and trace" functionality, removing manual processes such as barcode scanning, reducing asset loss and theft, and increasing the accuracy of invoicing for products delivered. Organizations should spell out the attributes of the ideal process, including the dates by which these will be achieved and the means by which constraints will be overcome.

Organizations considering a new technology often think of it purely in terms of its constituent technological parts. However, technology only describes half the picture. Changing the way an organization does business requires the participation of users, managers and executives of the organization. To implement RFID in the supply chain, organizations need to change their perspective, supply chain practices, and operational behavior.

- *Changes in perspective* require organizations to think about the entire supply chain, not just the part of the chain that is internal to the organization. An organization's philosophy needs to change to embrace collaboration with its customers and suppliers.

---

*"If we were to go back in time 100 years and ask a farmer what he'd like if he could have anything, he'd probably tell us he wanted a horse that was twice as strong and ate half as many oats. He would not tell us he wanted a tractor. Technology changes things so fast that many people aren't sure what the best solutions to their problems might be."*<sup>29</sup>

Philip J. Quigley, former CEO of Pacific Telesis

---

- *Changes in practices* are required to manage processes that span multiple organizations, rather than processes that start in one organization and end at handover to the next. A unified process could be a sales process for one organization and an order fulfilment process for another organization. Practices must change to address the integration of marketing and supply chain activities.

- *Changes in operational behavior* are essential for an organization to benefit from a near real-time environment. An organization only gains competitive advantage from having inventory data available in real time when it can put this data to use immediately. For example, operators in a warehouse environment will have to learn to respond appropriately to the alerts generated by their RFID technologies and systems.

The people who will need to change their operational behaviors, practices, and perspectives are likely to be operators within warehouses, drivers of vehicles, and managers of logistics, finance, and commercial units. People in these roles will be affected across the supply chain, within customer, supplier, and third-party logistics organizations. Each of these people needs to understand the implications of RFID both for the organization and for their own role. The organization is most likely to succeed in its RFID initiative if individuals become advocates for the new processes.

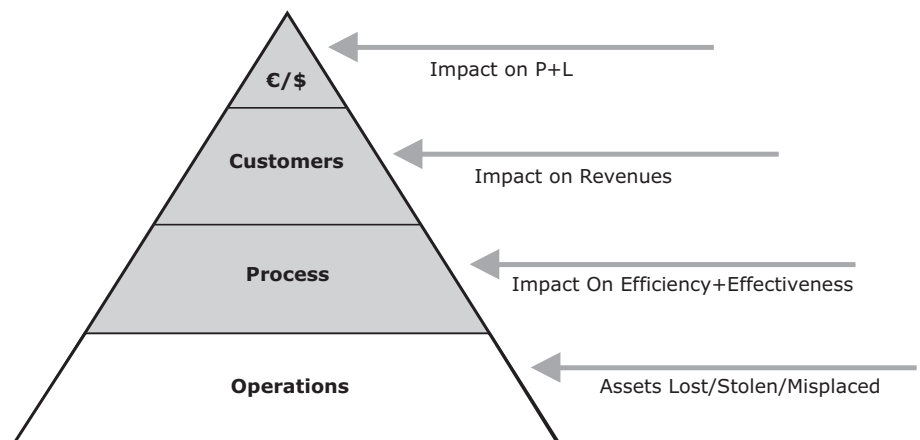
## Conclusions

Developments in RFID are expanding the scope of supply chain management from internal functional excellence to collaboration with other members of the supply chain, and then to synchronization of activities across the whole supply chain. This expanded scope helps organizations move beyond minimizing costs to increasing value. It also blurs the lines between organizations: As RFID enables a convergence of physical and information flows, it creates the need for quasi-organizations, made up of multiple organizations working together, to manage these flows.

RFID is still evolving, and organizations need to understand the benefits it can offer them and their supply chains. Benefits are there: more than 50 percent of European supply chain managers are either optimistic or cautiously optimistic that RFID will deliver a return on investment. This same group also reported that RFID has already delivered improved customer service, increased profitability, greater compliance with customer mandates, and faster sales cycles.

Figure 8

The escalating impact of underperformance of reusable asset management on profit and loss.



The most promising application for RFID technology at this stage is reusable asset tracking. Its closed-loop supply chain avoids any privacy issues and reduces the cost of using RFID because fewer tags are needed. More importantly, this is an area that has traditionally performed poorly, costing organizations money.

Successfully implementing RFID in a closed-loop, reusable asset supply chain requires organizations to define the breadth, improvement goals, and attributes of the processes involved. They'll also need to consider both the technological and human aspects of deployment, ranging from tags and readers to staff training and support. Organizations need to ensure staff are committed to the implementation by communicating clearly potential benefits or disadvantages and anticipating any resistance.

Reusable asset tracking is a good place to start because it's easy to explain to people within the organization how it can benefit the company's performance. Assets being lost or stolen impact the efficiency and effectiveness of key processes, which in turn impacts revenues and hence corporate performance. In a short period of time, RFID can transform this cycle of loss and help an organization gain productivity—proving its value and winning the support of people within the organization. Once that support has been established, then an organization can build on that foundation of confidence and good will to undertake more complex and potentially more challenging RFID applications.

## About BEA

BEA Systems, Inc. (Nasdaq: BEAS) is a world leader in enterprise infrastructure software, providing standards-based platforms to free the flow of information, services, and business processes. BEA product lines—WebLogic®, Tuxedo®, and the new AquaLogic™ family of Service Infrastructure products—help customers reduce IT complexity and successfully deploy Service-Oriented Architectures to improve business agility and efficiency. Headquartered in Silicon Valley, BEA is a billion-dollar company with 15,000 customers worldwide served by 76 offices in 36 countries. More information at [bea.com](http://bea.com).

## References

- 1 <http://www.informationweek.com/story/showArticle.jhtml?articleID=57703000>
- 2 <http://whitepapers.zdnet.co.uk/0,39025945,60114761p-39000822q,00.htm>
- 3 <http://www.rfidjournal.com/article/articleview/667/1/1/>
- 4 [http://www.cordis.lu/ist/directorate\\_d/ebusiness/workshop.htm](http://www.cordis.lu/ist/directorate_d/ebusiness/workshop.htm)
- 5 <http://www.juniperresearch.com>
- 6 <http://www.tmcnet.com/usubmit/2004/Apr/1031650.htm>
- 7 Lee, H. (2004) The Triple A-Supply Chain. *Harvard Business Review*. Vol. 82, No. 10. pp. 102.
- 8 Womack, J.P. and Jones, D. (1994). From Lean Production to the Lean Enterprise. *Harvard Business Review*. March-April, pp. 93-103
- 9 Ginsburg, L., Schmidt, P., Tobolski, J. and Brooks, J. (2004). Auto-ID across the Supply Chain, *Executive Outlook*, Vol. 4, No. 3, pp. 20-37.
- 10 See <http://www.epcglobalinc.org/> for more details.
- 11 <http://magazine.digitalidworld.com/Nov03/Page66.pdf>
- 12 Christopher, M. (1998). *Logistics and Supply Chain Management*, Financial Times: London.
- 13 <http://networks.silicon.com/webwatch/0,39024667,39126795,00.htm>
- 14 <http://www.accountancyage.com/news/it/1159487>
- 15 Authors' own research
- 16 Mukund, A. and Subhadra, K. (2002) Cisco Systems: The Supply Chain Story. European Case Clearing House, [www.ecch.cranfield.ac.uk](http://www.ecch.cranfield.ac.uk)
- 17 The Unexpected eEurope: The Surprising Success of European eCommerce, Accenture. [www.accenture.com/eeurope2001](http://www.accenture.com/eeurope2001)
- 18 <http://www.business-intelligence.co.uk/PDFdownloads/esupply/Cisco.pdf>
- 19 The sample of supply chain managers was drawn from the UK (303), Germany (64), France (60), Sweden (60), Spain (69) and Italy (60). Four broad sectors were included: manufacturers of consumer goods including food and drink; manufacturers in other sectors; transport, distribution and logistics; and retailing.
- 20 Homs, C. (2004). "Exposing the Myth of the 5 cent tag." [www.forrester.com](http://www.forrester.com).
- 21 <http://www.rfidjournal.com/article/articleview/1412/1/1/>
- 22 <http://www.informationweek.com/story/showArticle.jhtml?articleID=57703000>
- 23 RFID-Enabled Logistics Asset Management Benchmark Report (2004). Aberdeen Group, [www.aberdeen.com](http://www.aberdeen.com)
- 24 Reusable Transport Items (RTI) – Organisational Recommendations [www.ECRnet.org](http://www.ECRnet.org)
- 25 See <http://www.nocards.org/> for more information about this.
- 26 See <http://www.spychips.com/metro/protest.html> for more details
- 27 <http://www.standishgroup.com/>
- 28 Benjamin, R.I. and E. Levinson (1993). A Framework for Managing IT-Enabled Change. *Sloan Management Review*, Summer, 23-33.
- 29 [http://www.shsu.edu/~mgt\\_ves/mgt561/](http://www.shsu.edu/~mgt_ves/mgt561/)

## About the Authors

### Dr. Andrew White, Research Fellow, Cranfield School of Management

Andrew White's research interests are in the impact of information technology on business-to-business relationships, and the management of innovation. He recently completed a major two-year study that examined the evolution of electronic marketplaces. He is currently working on a number of research projects that examine the role of information systems in creating an agile supply chain. This includes technologies and services such as electronic marketplaces/hubs, Web services, RFID, and business process management tools. He is also conducting research into the management of innovation, particularly at the level of inter-organizational relationships and networks. Andrew spent four years at the University of Warwick's Manufacturing Group researching disruptive technologies. He currently works with several companies in applying this research, which has resulted in the development of several innovative products. He was awarded his engineering doctorate from Warwick in "Creating the Conditions for Innovation" in the summer of 2002.

### Dr. Hugh Wilson, Senior Research Fellow, Cranfield School of Management

Hugh Wilson is Director of the Centre for Multi-Channel Marketing at Cranfield School of Management, and an influential author, speaker, and consultant in marketing and IT. Hugh is listed in the Chartered Institute of Marketing's global "Guru Gallery" of "the 50 leading marketing thinkers alive today," ([www.shapetheagenda.com](http://www.shapetheagenda.com)) and was recently honored by the DTI by being placed on the "Internet Decade" list of the hundred individuals who have had most influence on the development of e-commerce. Hugh has a mathematics degree from Oxford University, a postgraduate computer science degree from Cambridge University, and a prize-winning PhD in marketing planning from Cranfield. He has extensive industrial experience, including thirteen years in the IT industry working for IBM, Logica, and others. He now spends much of his time working with companies including IBM, Lloyds TSB, General Motors, and Centrica on marketing planning, e-commerce, CRM, and multi-channel marketing, as well as teaching on these topics in Cranfield. His books include the best-selling "e-Marketing" (1999) and "The New Marketing" (with Malcolm McDonald, 2002), and he writes regularly for academic and practitioner journals.

### Mr. Peter Cook, Sector Director, BEA Systems, Inc.

Peter Cook is BEA's director for the retail, travel, transport, and logistics sector in the UK. Peter is responsible for developing this sector, delivering software solutions that enable organizations to bridge the gap between business needs and IT capability. In addition to his five years at BEA, previously as alliances director, Peter has worked in the IT industry since 1988 in various sales and management roles. His experience includes work in the distribution business and as major accounts director for Informix Software.



BEA Systems, Inc.  
2315 North First Street  
San Jose, CA 95131  
+1.800.817.4232  
+1.408.570.8000  
bea.com

CWP0964E0705-1A