

# RFID JOURNAL

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MARCH/APRIL 2015

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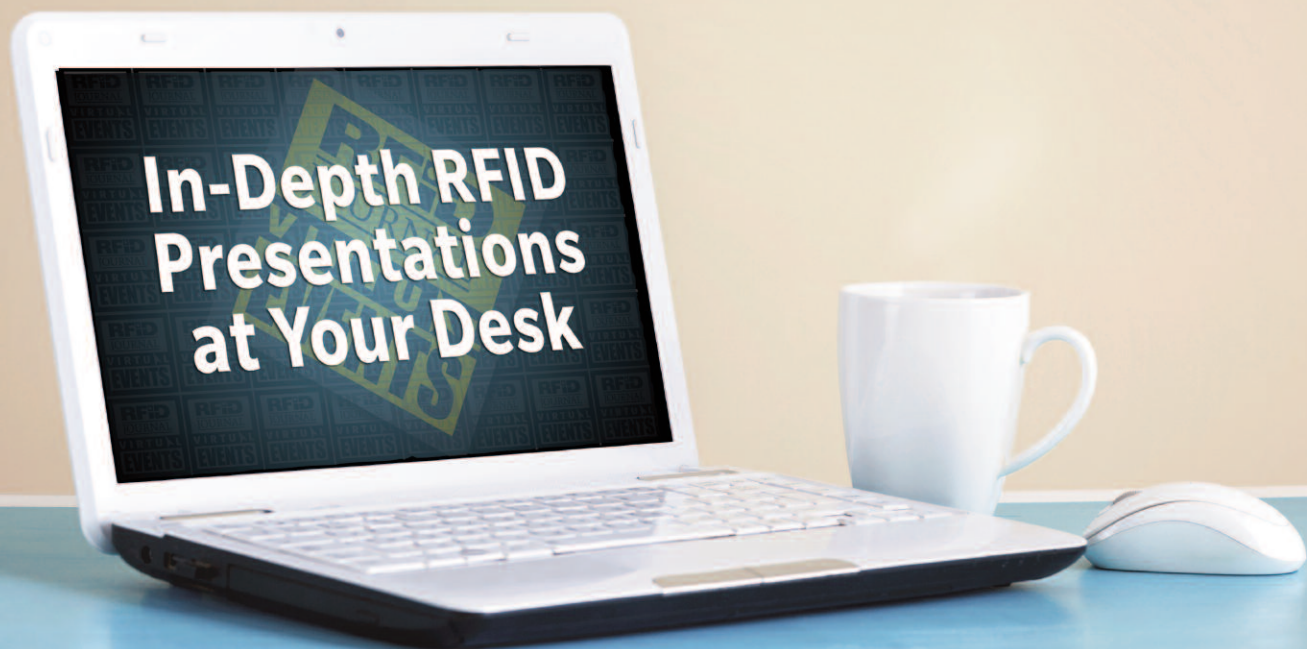
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# ADOPTION IS HEATING UP

(NO, REALLY)

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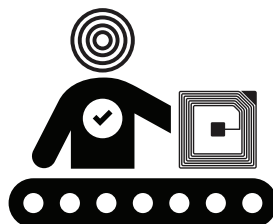
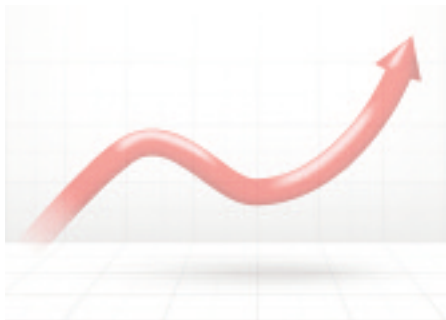
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## Find New Business Opportunities

RFID providers now have a source where they can find companies worldwide that are actively seeking to deploy the technology. [RFID Requests for Proposals](#) is updated regularly, with new RFPs from companies in diverse industries. Each RFP includes detailed information, contacts and submission deadlines.

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[RFID in Harsh Environments](#), May 20

[RFID for Asset Tracking in Asia](#), June 17

[RFID in Manufacturing](#), July 15

[RFID for Warehouse & Inventory Management](#), Sept. 23



Find products that can help you deploy RFID successfully, such as [TexTrace's Woven RFID Brand Label](#). The ultrahigh-frequency tag is designed for source tagging of apparel and other textile items. It is manufactured with custom branding

and looks and feels like a traditional clothing label.

## Most-Read Stories in March

- [What Are the Leading RFID Companies?](#)
- [Airbus Enters New Phase of RFID Usage, Digitalization](#)
- [ThinFilm Launches OpenSense Printed NFC Sensor Label for Bottles](#)
- [Chicago Hospital Deployment Delivers a Healthy ROI](#)
- [A Thousand Beacons Will Help SXSW Attendees Connect](#)

## Top 10 Search Terms On RFIDJournal.com

- 1 Supply chain
- 2 Conveyor
- 3 Library
- 4 Cost
- 5 RTLS
- 6 Security
- 7 Construction
- 8 Airbus
- 9 NFC
- 10 Disney



## The Inside Scoop

What are end users saying behind the scenes? Why should the RFID community be optimistic about the industry? Who's spreading misinformation? Get insight and perspective at the [RFID JOURNAL Blog](#).



## Ideas Exchange

RFID JOURNAL maintains an [Ask the Experts](#) forum, where you can submit questions about RFID technology and its applications. Your questions will be answered by RFID JOURNAL editors or outside experts. Recent questions include:

- What are the applications for RFID in health care?
- What do I need to know when deploying a retail RFID system?
- Can RFID track small components?
- Where can I find an active RFID solution for tracking children at game centers?
- Are there any recent significant developments in RFID technology?

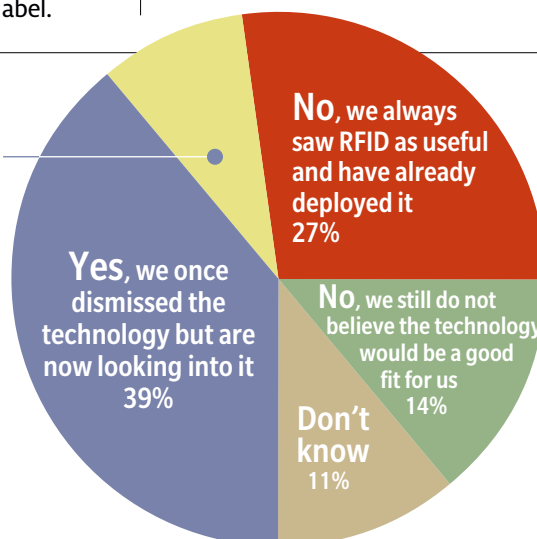
## POLL RESULTS



## Has your company's perception of RFID changed in recent years?

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Yes, we had considered deploying but have lately had second thoughts 9%



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# RFID Adoption Accelerates

THERE WAS A PERIOD in the mid-2000s when every year was declared “The Year of RFID.” It never happened. Mandates requiring suppliers to tag pallets and cases were met at only a minimal level. The suppliers that did tag shipments didn’t use the tags for any internal benefits—not even to confirm the accuracy of their ship-



ments. In many cases, they didn’t read the tags to confirm they worked and were properly encoded.

It’s hardly a surprise that RFID didn’t take off when few companies were benefiting from the technology. RFID began to gain some traction in 2008, but when the financial crisis hit in September of that year, many companies hunkered down and cut IT projects, RFID deployments among them.

Still, a funny thing happened. Even though RFID providers struggled during the downturn, they remained convinced that the technology would deliver huge benefits and would eventually take off. They continued to develop their products and work with a handful of end-user companies that believed RFID could solve some serious problems they were facing and was worth the effort and investment.

That stick-to-itiveness paid off. Today, there is a tag for almost every application and thing you want to track and manage. Passive ultra-high-frequency readers range from devices that can be installed in a ceiling to provide real-time location information on tagged items to devices so small they can be embedded in a key chain. And software has evolved to address specific

needs. These advances reduce risk for companies now seeking to adopt RFID. What’s more, companies that have been using RFID are developing smarter strategies for engaging supply-chain partners (see Perspective on page 10).

Costs have not yet come down dramatically, but the reduced risk and availability of mature technology solutions is helping to propel adoption. This will lead to more large-scale deployments, which will reduce the cost of hardware and software—and that, in turn, will encourage more companies to adopt.

As our cover story in this issue reveals, this is already beginning to happen (see page 14). Perceptions of RFID are changing, from overwhelmingly negative to largely positive. Retailers, health-care providers and manufacturers, in particular, are having success. The mainstream business press is now covering the technology more objectively, causing more companies to take notice. (Firms that aren’t deploying RFID are growing concerned about being at a competitive disadvantage.)

The liquor industry is an example of how mature technology is fostering adoption. The high value—and frequent counterfeiting—of wines and spirits has led some RFID providers to develop tags that work with the liquid and packaging of these items. As our Vertical Focus reveals, liquor manufacturers are beginning to embrace RFID as a way to authenticate their products, track their inventory and engage customers (see page 22).

RFID is not going to become ubiquitous over night. But adoption is accelerating, and it’s just a matter of time before it reaches the tipping point.

Mark Roberti, Founder and Editor

AGRICULTURE

# Big Data Gets Down and Dirty

New RF sensors could provide near-real-time data on the level of moisture and nutrients in farm soil.



c2sensor plans to change the form factor to make the sensors easier to put in the soil.

ROUGHLY 1.2 BILLION PEOPLE—approximately one-fifth of the world's population—live in areas where fresh water for drinking and irrigation is scarce. Optimizing water usage for farming can mitigate the problem, and radio frequency identification-based sensors just might help.

A company called c2sensor is commercializing sensor technology developed by researchers at North Dakota State University (NDSU). "My partner, Chad Ulven, was one of the researchers on the project," says c2sensor CEO Corey Kratcha. "They needed funding to continue development, so it made sense for us to license the technology and continue to work with the university to develop it."

The NDSU researchers conducted a field trial at the Soil Health and Agriculture Research Extension, in N.D., with RFID-enabled moisture sensors that are 2-centimeter squares. "Moisture content in irrigated soil is critical,"

Kratcha says. "Having data that allows farmers to optimize the amount of water they are using saves money and a valuable resource."

c2sensor plans to change the form factor to make the sensors easier to put in the soil. The idea is to make them three-dimensional, approximately the size and shape of an almond, so farmers can plant them like seeds. They would be made of materials that are harmless to the environment.

The company also wants to add to the device sensors that can detect nitrogen, potassium and phosphorous in the soil. Optimizing the amount of fertilizer would save farmers money and protect the environment, because there would be less runoff into streams and lakes.

But for the sensors to be of use to farmers, the data collection must be easier than the current method of

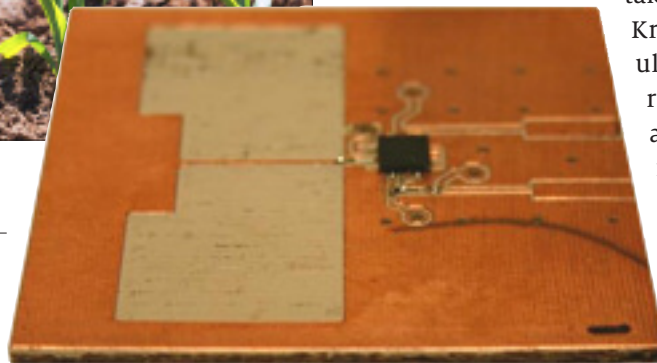
taking soil samples to a lab. Kratcha envisions passive ultrahigh-frequency RFID readers placed under all-terrain vehicles, so farmers can drive over particular areas and collect a wealth of data on soil conditions. Another option is to use unmanned aerial vehicles (drones) that

fly low over fields and collect the information.

This year, c2sensor will conduct field trials using the existing flat moisture sensors, and Kratcha envisions larger field trials involving hundreds of thousands of sensors when prototypes of the almond-shaped devices are available, which he expects to be in 2016.

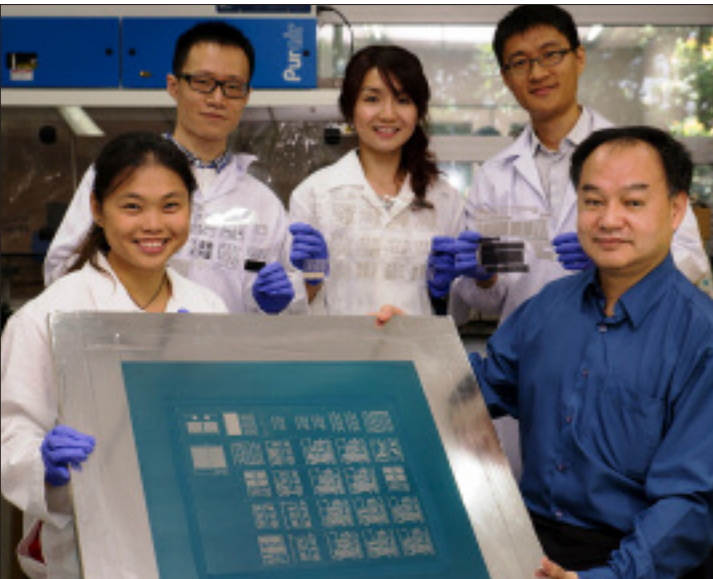
"We want to add more sensors, so we can get higher resolution of data," he says. "We want to look at different data points that we are able to collect and do a wide variety of queries to see what actionable information you can get."

The almond-shaped moisture sensors will likely be commercially available in 2017, and if the data they provide is as valuable as Kratcha anticipates, they could well take root in farms worldwide. —Mark Roberti



# All the RFID That's Fit to Print

THE ELECTRONICS INDUSTRY has envisioned printing complex circuits on ordinary materials since the late 1970s, when three University of Pennsylvania research scientists—Alan J. Heeger, Alan G. MacDiarmid and Hideki Shirakawa—developed the world's first conductive polymers (an achievement for which they were later awarded a Nobel Prize). But printing integrated circuits, including those for the chip used in radio frequency identification transponders, has turned out to be more challenging than many envisioned.



Professor Joseph Chang and the research team with printed chips.

A recent breakthrough by a research group at the Nanyang Technological University in Singapore could change that. One of the first applications of its technology could be the mass production of printed RFID tags, says Joseph Chang, an associate professor who's leading the research team.

Most ICs are made by a subtractive process—etching away materials then adding others to create circuits, Chang explains. The process is expensive, with silicon wafers undergoing many steps to produce chips, and the machines to execute these processes are very expensive

(new silicon foundries cost billions to build).

The researchers developed an additive process that uses the equipment and silk screens used to print multicolored T-shirts. “Our fully additive printing process is the only printing process that is able to print complete complex circuits and systems,” Chang says. “Also, our process features the highest speed. It is 3.5 times faster than other printed circuits and is comparable to significantly more costly subtractive processes.”

RFID chips are simpler than many other types of ICs, so they are an attractive first product for printed circuits. Chang's team has printed all the building blocks of an RFID tag. “All the blocks are fully functional,” he says. “We are now in the process of printing and testing a complete RFID tag.”

One downside of printing chips is the circuits are much larger than those etched in silicon (the RFID tag the team is working on is approximately 10 centimeters by 10 centimeters). But the goal is not to replace conventional microchips. “Instead,” he says, “printed electronics should be viewed as complementary to silicon and applied where its advantages, such as flexible substrate, large format, cheap and quick printing, and sensor technologies, can be exploited.”

There are many applications for which the size of an RFID tag doesn't matter, but the cost is crucial. If a low-cost tag could be printed inside a \$3 box of cereal, for example, that item could be tracked effectively with RFID, but a 10-cent conventional tag would likely be too expensive to make RFID-tracking feasible.

Now, the team is working on developing an industrial grade printing system so printed ICs can be mass-produced. Chang expects to begin commercializing the technology in a year or two. Perhaps one of the first applications will be printing tags right onto T-shirts. —M. R.

## When in Drought...

Hectares of worldwide rice lands expected to be impacted by water scarcity by 2025:  
**15 to 20 million**

Hectares of Chinese farmland impacted by water scarcity in 2011:  
**7 million**

Acres of California farmland left unplanted in 2014 due to water scarcity:  
**400,000**

Acres of Colombian farmland left unplanted in 2014 due to water scarcity:  
**50,000**

Annual precipitation decrease in Italy in recent years:  
**10 to 40 percent**

Annual precipitation decrease in Africa in recent years:  
**20 percent**

—Rich Handley

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## SUPPLY CHAIN

# Making RFID Work for All

Having learned from the experiences of early adopters, companies are engaging suppliers in more collaborative ways to encourage them to tag items or shipments.

At RFID Journal LIVE! 2015, Carlo Nizam, head of RFID and value chain visibility at Airbus, will talk about the jet plane maker's collaboration with parts suppliers, MRO (maintenance, repair and overhaul) service providers and customers. Airbus began using RFID internally to improve processes, then expanded the technology's applications to other compa-

nies within the larger Airbus group. Now, as Airbus seeks to track and manage all serialized parts with RFID, the company is actively engaging suppliers it will require to tag items. At the same time, it is working with MRO companies and airlines that can use the tags for their own benefit.

"It has always been an important part of our vision to take

an approach that creates value for the whole industry: our supply-chain partners, airline customers and service players,” Nizam tells RFID Journal. “The expansion to include permanent RFID on all traceable items will do just that and help enable value for everyone, both upstream and downstream.”

Nizam has been leading Airbus’ efforts to use RFID to improve operations for almost a decade, so he is well aware of some of the struggles early adopters had in getting suppliers on board. Most suppliers to the U.S. Department of Defense and Walmart simply put tags on cases and pallets to comply with requirements. They didn’t use the tags to their own advantage, and reports surfaced that they didn’t adhere to any quality-control standards. Faced with a backlash from consumer packaged goods companies that were not benefiting and had to manage separate tagged inventory for Walmart, the retailer dropped its tagging requirement.

Airbus is hoping to avoid these problems by providing flexibility and support to supply-chain partners. Suppliers can choose to use what is known as an RFID integrated nameplate (which contains an embedded RFID transponder) to replace a conventional non-RFID nameplate, or they can use separate RFID tags in addition to existing nameplates. Airbus is also beefing up the RFID expertise of its supply-chain engineering teams to help support supply-chain adoption. And the jet maker is openly sharing lessons learned from its RFID deployments, to help supply-chain partners take advantage of the technology’s capabilities.

It will take a time for Airbus’ suppliers to set up tagging operations and begin delivering tagged parts to an Airbus facility for installation on aircraft, so it will take a while for the new categories of tagged components to enter service for customer use. But airlines are already beginning to take advantage of tags attached to seats and life vests installed on Airbus planes. Some savvy carriers are realizing that RFID can be used


not only to track parts but also for physical logistics, tooling management, aircraft configuration and other processes. Airbus is providing both guidance and consulting services to help these companies develop a smart approach to using RFID.

“For us to succeed, our suppliers upstream need to succeed, and our customers downstream need to succeed,” Nizam says. “So we’ve been trying to help the industry move away from an analog- and paper-based supply chain to a more streamlined, automated and digitalized supply chain. RFID helps create that digital state of connectedness to our parts and processes that many are now calling the Internet of Things.”

Walmart changed its strategy and began working with clothing suppliers that understood the value in tagging items for the retailer—sales went up due to better on-shelf availability, which benefited both retailer and supplier. When Walmart began tracking its private-label jeans, sales rose significantly. The retailer shared that information with its jeans suppliers, which agreed to tag jeans voluntarily. Suppliers of men’s basics also got on board.

Macy’s is asking suppliers to tag items that are replenished regularly, but is not forcing compliance. Instead, it’s working with suppliers to help get them up to speed with RFID. Macy’s supported the Voluntary Interindustry Commerce Solutions Association (VICS) Item-Level RFID Initiative, which funded research by the RFID Research Center to identify use cases for suppliers. Only a small percentage of Macy’s suppliers have begun to use tags for internal benefits.

There will likely be some companies that push RFID on their supply-chain partners, and others that take a collaborative approach. Either way, it’s clear that companies have learned from early adopters that helping partners achieve benefits is good for business. —Mark Roberti



**When Walmart began tracking its private-label jeans, sales rose significantly. The retailer shared that information with its jeans suppliers, which agreed to tag jeans voluntarily.**

## ADOPTION

# Deploying RFID Is Less Risky

Mature hardware and software—and solutions tested by early adopters—mean less trial and error for companies adopting the technology today.



PASSIVE ULTRAHIGH-FREQUENCY radio frequency identification systems have been available for roughly a decade. Passive low-frequency and high-frequency and active RFID systems have been around longer than that. Each year, the various solutions become more robust, new products are developed, and technology standards make tags and readers more reliable. The increasing maturation of the technology means less risk for companies seeking to deploy RFID today.

Five or six years ago, a firm that wanted to track and manage, say, hoists on a construction site, sections of oil pipe or surgery scalpels had to work with an RFID company to develop tags specifically for its needs. It then had to test the tags and make refinements until it had a workable solution.

It was a time-consuming and expensive process, with no guaranteed outcome.

But that effort—across most industries, for many different types of assets—has led to an explosion in active and passive tags of various shapes and sizes. Some are designed for challenging operational settings and others incorporate sensors to monitor environmental conditions. Moreover, most have been tested in real-world deployments. And, as the tags are commercialized, costs have come down.

Many end users are surprised to learn that there is a tag for almost any product or application. Last year at RFID Journal LIVE!, for example, Richard Parker, a senior plasma receiving supervisor at Grifols, a global developer of life-saving protein therapies, visited several exhibitors and told them what he was trying to do. “There were a few ‘wow’ moments,” he says, explaining they understood exactly what he was looking for and could provide a solution.

Miguel Torrejon, cell leader at GE Power & Water, who also attended LIVE! 2014, had a similar experience: “The number of suppliers and vendors that are out there for this technology—I wasn’t expecting that many.”

Among the new tags that will be on display at this year’s RFID Journal LIVE! are passive tags that monitor voltage, strain and moisture. They could be embedded in buildings and other environments on a large scale, because they are inexpensive and have no batteries to change.

Readers have also been developed for many applications. There used to be three kinds of passive UHF readers, for example: portal readers, handheld readers and readers designed for mounting on forklifts and carts. Now, there are readers that can be mounted overhead, carried on a key

chain, plugged into a smartphone, or embedded in a smart cabinet or household appliance.

Software solutions have evolved as well. There are, for instance, specific applications for tracking drill pipe in the oil industry, clothing and jewelry in stores, and work-in-process at manufacturing plants. This means the software does not need customization to the extent that generic software does, so it reduces the cost and risk of new deployments.

In many cases, RFID providers work with early adopters to develop the tags, readers and software. Together, they address real-world issues and resolve problems, to ensure the technology works as intended and meets the needs of end users. That means there is less risk for fast followers.

Marks & Spencer, for example, paved the way for retailers to tag and track a wide range of merchandise, including items containing metal or liquids. The retailer worked closely with Avery Dennison Retail Branding and Information Solutions to design EPC Gen 2 RFID tags in various sizes and shapes. The tags also had to meet the aesthetic requirements of cosmetics and other manufacturers. All told, the partners developed 10 tag formats covering all the items the retailer sells.

M&S tested the tags at a mock store within the company's headquarters. Once the team had ensured consistent, accurate tag reads on the various materials, the retailer began testing the tags at operational stores. Only when it was fully satisfied that it could achieve reliable tag reads did it make the decision to roll out the technology for all nonfood items chainwide.

Richard Jenkins, head of RFID strategic development at M&S, is a speaker at this year's RFID Journal LIVE! conference. Jenkins plans to share the trial-and-error M&S went through, so attendees can benefit from the knowledge as they go forward with their deployments. "Talking about the things we got right and maybe haven't got right," he says, "should build the confidence in others to take that leap."

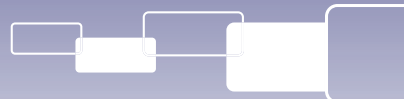
Mature technology alone does not mean every RFID project is guaranteed to succeed. Every end user must do its due diligence on hardware and software providers, plan its deployment carefully and manage it well. But the fact that so much has been learned and baked into new products during the past decade will make the chances of success far greater than they were just a few years ago. —M.R.

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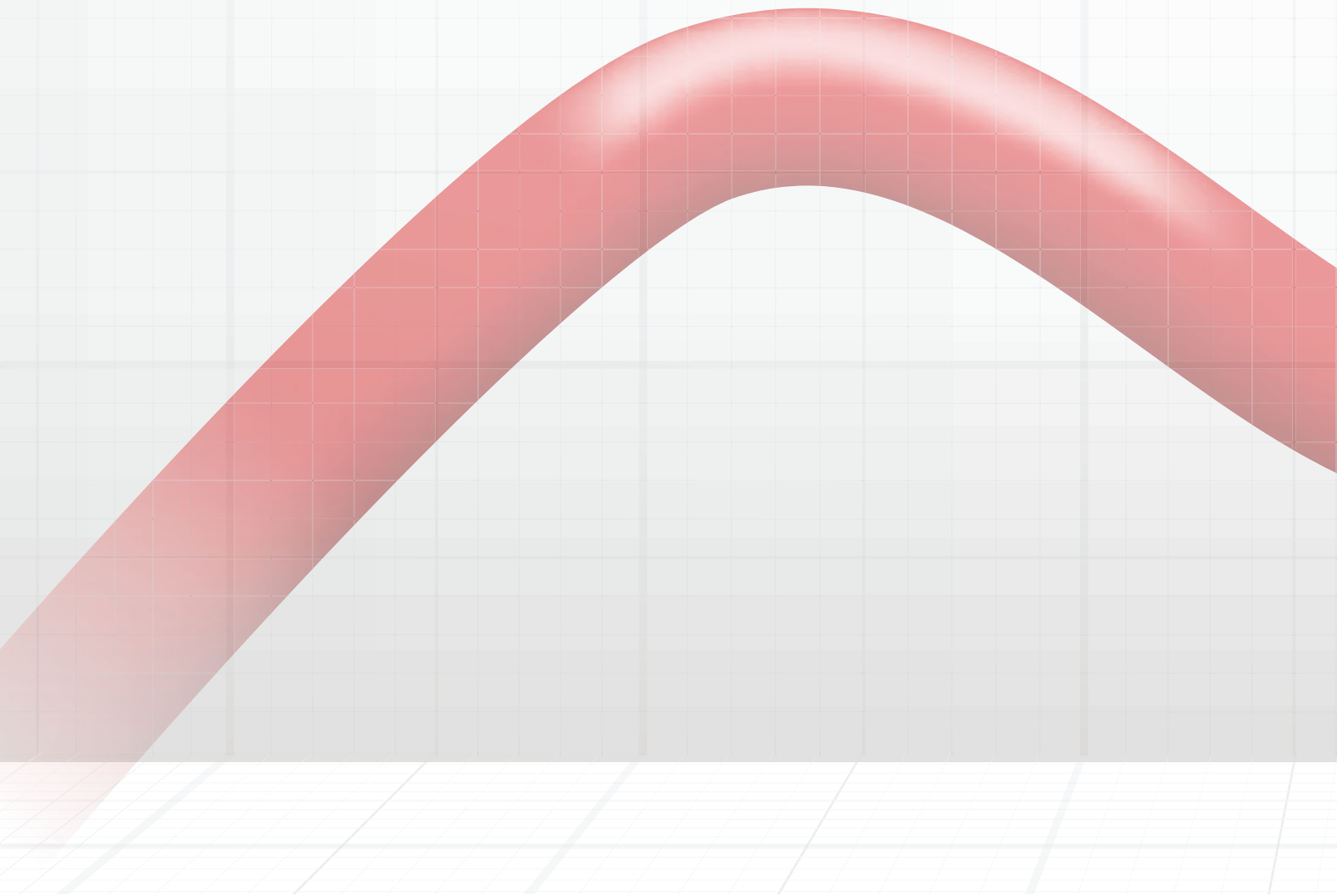


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# RFID Adoption Heats Up

By Samuel Greengard



# Companies in many industries now understand what radio frequency identification is—and how and where it delivers benefits—and they want to reap the rewards.

*It gives our company a competitive advantage. It enables us to track and manage high-value assets or inventory or work-in-process or vehicles or livestock or perishables in transit... It allows us to safeguard hospital employees and patients or assisted-living residents or miners... It boosts productivity and efficiencies. It improves customer service and engenders loyalty. It saves money and delivers a significant return on investment.*

"It" is radio frequency identification, and after numerous fits and starts, the technology is now on a steady path to adoption. The predictions of naysayers and skeptics who questioned RFID's value have been drowned out by published reports from companies across a wide swath of industries that extol the technology's benefits. In addition, news continues to leak out about companies that have deployed RFID but prefer to stay mum on the subject, precisely because they believe it offers a competitive advantage.

Today, most businesses know what RFID is and what it does. They likely are aware of companies in their industry that are using RFID and what benefits those companies have achieved. This is especially the case in the apparel retail sector, as well as health care and manufacturing. But increasingly companies in other industries—from agriculture to waste management—have proven there's a business case for adopting RFID. "There is a growing awareness and understanding about the benefits of RFID," says Michael Liard, an independent analyst and consultant for the RFID industry. "We've seen an uptick in deployments across manufacturing,

health care, transportation and logistics, and other fields."

Some may say: "We've heard these predictions about RFID before." It's true many thought RFID would take off when Walmart, the U.S. Department of Defense and others required suppliers to tag shipments. But that didn't happen. Before the Great Recession, the industry seemed poised once again to take off. Then, the economic downturn caused many companies to rein in spending on IT projects, including RFID pilots and deployments. In some cases, the threat of lawsuits from so-called patent trolls also led to implementation postponements.

But during that time, the RFID industry continued to improve the technology and develop standards, to make it more reliable, robust and easy to deploy. At the same time, when reducing payrolls and eliminating discretionary spending wasn't enough to weather the recession, some companies turned to RFID and found new efficiencies and cost savings, earning profits even in a sluggish economy.

To achieve benefits from RFID, organizations must still develop a clear deployment strategy—from defining the business case and forming a crossfunctional team to developing training programs and addressing change management (see [Best RFID Deployment Practices](#)). "There are a lot of moving parts and a lot of potential use cases," Liard says. "It's important to focus on how and where RFID makes sense and provides the biggest returns."

## RFID Can Solve a Problem

One of the key factors in the adoption of a new technology is that it can solve a problem no other technology can solve, according to Geoffrey Moore, author of *Crossing the Chasm* and *Inside the Tornado*, two best-selling books that explain how new technologies become mainstream. Companies understand that RFID solves real-world business problems, Liard says.

This is clearly the case with apparel retailers, a sector industry analysts believe will likely be the first to reach the tipping point in RFID adoption, perhaps as early as 2016. “Apparel retailers used to think they didn’t have an inventory problem, until studies conducted at the RFID Research Center showed that RFID could improve inventory accuracy from an industry average of 60 percent or less to more than 95 percent,” says Bill Hardgrave, dean of Auburn University’s Harbert College of Business and founder of the RFID Research Center.



**“We’re seeing traction in several verticals, such as waste management, health care, automation industry, commercial laundry and even ‘proof-of-presence’ use cases.”**

—RICHARD AUFREITER, HID GLOBAL

“By 2014, it was hard to find a retailer not aware of RFID and its ability to improve inventory accuracy cost-effectively.”

Still, while Kohl’s, Inditex and other major retailers announced RFID deployments in 2014, many companies continued to sit on the sidelines—“that is, until a new problem created a sense of urgency,” Hardgrave says. “Retailers now want to get up to speed quickly to achieve the real-time inventory accuracy they need to deliver an omnichannel shopping experience to customers.”

Companies in other industries also understand that RFID can solve a business problem, says Richard Aufreiter, director of product management identification technologies at HID Global. As a result, he says, “We’re seeing traction in several verticals, such as waste management, health care, automation indus-

try, commercial laundry and even ‘proof-of-presence’ use cases, as in home health-care visit verification or digital marketing.”

For Sanford Health, a nonprofit health-care system operator with locations in 126 communities throughout nine Midwestern U.S. states, lower cost and more comprehensive but streamlined solutions served as the trigger for implementing RFID. In 2014, the health-care provider opened a new “patient-centric” clinic in Moorhead, Minn., that uses an RFID real-time location system (RTLS) to eliminate wait times for examining rooms and to monitor equipment and supplies. Sanford Health is now rolling out the RTLS solutions at two other medical centers.

“In looking at market segments in our patient population, it became evident that efficiency, accuracy and time surrounding a clinic visit are all important aspects to consider when looking at improving satisfaction and quality,” says Jeff Hoss, VP of Sanford Clinic Fargo, which includes the Moorhead site. “Our decision to invest in this technology is based on current applications in asset tracking and a futurist vision of perfecting our patient experience.”

American Woodmark, a Winchester, Va.-based manufacturer of custom kitchen cabinets, deployed RFID across its enterprise to improve inventory accuracy, which is essential to meet its production schedules. In addition to RFID-enabling its plants and warehouses, American Woodmark worked with two domestic and two international suppliers to get them to tag components before shipping. “RFID is now engrained in our manufacturing processes,” says Harry Arose, senior project manager at American Woodmark. “Our people think and talk RFID.”

### **RFID Gets Easier and Less Risky**

RFID is far from plug-and-play, but lessons learned from early adopters, hardware and software product developments, and technology standards have coalesced, so it’s become

less risky for organizations to adopt the technology, and they can move forward with RFID projects faster and more efficiently. “We now have standards-based technology across the board—for low-frequency, high-frequency, active and passive systems,” Hardgrave says. “Costs have dropped dramatically and the ROI equation for various applications has been enhanced significantly.”

When a CIO reviews a list of potential IT projects, he or she considers cost/benefit and risks, says Scot Stelter, senior VP of RFID and Internet of Things at ChainLink Research. “In the past, risks such as intellectual property exposure, unclear return on investment and deployment uncertainty often moved RFID projects below the cut line on the priority list,” he says. “The risk issues are behind us. RFID is now on a level playing field with other technologies a CIO could spend money on.”

In addition, Stelter says, RFID is becoming easier to deploy because companies are taking advantage of developments such as cloud computing. “Cloud-based software solutions offer more flexibility and lower IT costs,” he says. “Typically, RFID software platforms have to be customized to integrate with legacy systems, which can be expensive and time-consuming. Cloud-based systems simplify and accelerate this process. Pay-as-you-go software services also reduce upfront costs, making RFID more accessible to projects with limited budgets.”

The RFID industry and customers also understand the capabilities of RFID and the maturity of related solutions better now, HID Global’s Aufreiter says. “The technology is much less ‘mysterious’ and ‘threatening’ than it may have been a few years back,” he says. “What may have once been too ‘cutting edge’ is now mainstream.

“Often potential customers come to a show booth knowing what the technology can and can’t do, and how it may apply to their specific application,” Aufreiter says. “They ask whether we have or can make a tag for their needs. This was not the case a few years back. It’s espe-

cially true for RFID shows, not so much in vertical shows.

“Nevertheless,” Aufreiter says, “almost every RFID project presents unique challenges in terms of environment, IT and process integration at the customer’s site. This requires trusted advisors from the RFID industry as well as properly planned pilots from the customer’s side. RFID is rarely an out-of-the-box solution. But RFID providers and systems integrators are quite experienced, and can help customers reduce pilot and evaluation times.”

Still, companies often have to work with

**“The risk issues are behind us. RFID is now on a level playing field with other technologies a CIO could spend money on.”**

—SCOT STELTER, CHAINLINK RESEARCH

several RFID providers to cobble together a system. They may buy readers from one vendor, tags from another and software from yet another. Then, they have to hire a systems integrator to put it all together. One of the goals of the RAIN Alliance, formed in 2014 to promote passive ultrahigh-frequency RFID, is to encourage its members—hardware and software vendors and systems integrators—to work together to offer complete solutions, says Steve Halliday, the organization’s president.

Whether it’s a retail, health-care or manufacturing deployment, following best practices gleaned from early adopters can speed deployments. Detailed project planning and store-specific hardware/software configurations packed in a “golden release” enabled Kohl’s to deploy RFID across its stores in roughly three years, while competitors are taking as long as six years, says Su Doyle, head of RFID industry programs at OATSystems, a division of Check-



point Systems, which provided the hardware, software and integration. Methodical planning, she says, eliminates problems and surprises.

What's more, Doyle adds, "The more involved a retailer's store operations and training staff are at the ground level, the more successful the project, since the participants have a vested interest in the outcome." Some retailers are using flagship stores as RFID training facilities, Doyle says. They appoint "ambassadors in each store who are willing to teach best practices for tagging, managing

Once all the technical issues were addressed, Sanford Health began educating staff, doing demonstrations and discussing how the RTLS application would work in practice, Hoss says. "The use of this technology without thorough explanation can leave gaps in understanding," he explains. "We spent quite a bit of time talking about our intended use, which was to help simplify work. We reframed concerns about tracking employees and focused on tracking events in workflow and how we could intervene earlier to eliminate variation."

In early 2013, Deere-Hitachi Construction Machinery Corp., a joint venture between John Deere and Hitachi, began considering RFID to track the assembly of construction machinery at its Kenersville, N.C., facility. By year-end, the company had deployed an RTLS that identifies when each excavator passes through a specific zone on its way to the next assembly station. The solution improves visibility into the firm's work-in-process.

A number of factors were critical to the speed and success of the project, says Dennis Kubica, CEO of

Kubica Corp., the Novi, Mich.-based engineering firm that provided systems integration services. "With an RFID solution, there are typically many players involved—from our client's enterprise teams to subcontractors," he says. "Each entity has its own needs and interests. Quickly bringing to the collaboration table those needs and interests gets the team working together to solve problems."

Team members on the Deere-Hitachi project, Kubica says, formed a strong, trusting partnership. They mapped existing business processes and workflows, and then matched the business process change with the right technology. They also assessed vendors and worked with companies that offered scalable base technology that would allow the company to add RFID applications and expand the scope of existing solutions in the future. In order to build a robust RFID platform, he says, compa-

**"The use of this technology without thorough explanation can leave gaps in understanding. We spent quite a bit of time talking about our intended use."**

—JEFF HOSS, SANFORD CLINIC FARGO

inventory, expediting orders and fulfilling orders," she says. "They move them from store to store. The approach tends to advance the technology faster and more effectively than if a vendor handles the task."

Mapping out processes and steps is critical to speed and success, says Hoss at Sanford Health. Roughly 18 months prior to implementing RFID, the firm began identifying scenarios and issues that typically arise when moving patients from one station to another. "We used pencil and paper to identify ideal pathways with little obstruction when patient navigation was reviewed," he says. "We spent time understanding what milestones in a patient visit are most important to the staff so they could better prepare and predict workflow. Once we completed the task on paper, we applied technology to help us monitor and adhere to our new process flows."



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nies must “understand the business need and apply the right technology for the solution.”

### RFID Delivers Multiple Benefits

RFID is heating up not only among new adopters. Companies that have deployed the technology successfully are now looking for ways to gain additional benefits and expand their use of the technology. This may mean extending it within an organization or into the supply chain. Airbus is doing both.

In 2007, the jet airplane maker announced a three-phase plan to use RFID to gain visibility

the technology’s benefits by using it internally. In 2011, Smartrac, a Netherlands-based RFID hardware provider, partnered with Vilant, an RFID solutions provider based in Finland, to develop a system to automate shipping processes at Smartrac manufacturing facilities. The EPC Gen 2-compliant system, which was piloted at a plant in Fletcher, N.C., verifies shipments, improves handling and processing, reduces error rates and lowers overall costs, says Andreas Petrongari, Smartrac’s SVP Corporate IT.

Since then, Vilant has rolled out the solution at Smartrac facilities in Finland and Malaysia. “It’s a turnkey solution,” Petrongari says. “It took us just one week to implement the solution in Malaysia.” Smartrac plans to introduce the technology to facilities in Ayutthaya, Thailand, and Dresden, Germany, soon.

Retailers are also expanding and entering new phases of their deployments, many to support omnichannel initiatives. Marks & Spencer, for example, has moved beyond tagging apparel items at all its stores. The British retailer is now using RFID to track and

manage all general merchandise.

Macy’s and Bloomingdale’s have been RFID-tagging replenishable apparel and footwear items at 850 stores, to ensure they are on store shelves when shoppers want to buy them. Now, Macy’s is beginning to tag nonreplenishable fashion items, to make sure the merchandise is on the sales floor, which could reduce the need for markdowns.

Retailers that have been using RFID to improve inventory accuracy now want to build on that foundation to achieve other benefits, Hardgrave says. They are interested in what the RFID Research Lab calls second-order (SO) use cases, such as enhancing the customer experience and loss prevention. Another SO use case is distributed order management, which addresses whether to source goods directly from the supplier, the back room of a store or a distribution center. As retailers develop an omnichannel strategy, Hardgrave says, the



“For us to succeed, our suppliers upstream need to succeed, and our customers downstream need to succeed.”

—CARLO NIZAM, AIRBUS

into operations companywide—from its global supply chain to manufacturing and in-service support processes. Since then, Carlo Nizam, head of RFID and value chain visibility at Airbus, has shared the company’s big-picture approach to deploying the technology, and reported on various initiatives and deployments.

In February, Airbus announced it was entering a new phase: It has asked suppliers to tag all traceable items with passive RFID transponders. Understanding the challenges many of these businesses face, Airbus is offering a high level of flexibility along with consulting and technical support. A key to expanding an initiative and making it work—particularly across a supply chain—is to introduce value for everyone, Nizam says: “For us to succeed, our suppliers upstream need to succeed, and our customers downstream need to succeed.”

RFID providers, such as Hanmi IT and Zebra Technologies, are creating greater confidence in

source decision must be optimized and made in real time.

Royal Caribbean has been steadily adding RFID applications since it first deployed the technology in 2009 on its Oasis of the Seas cruise ship, to enable families and tour groups to track their members. The following year, Royal Caribbean introduced RFID-enabled self-service soft drink machines on the Majesty of the Seas, which eliminated long waits at the bar and boosted sales for the company. It was such a hit that the company decided to roll out the drink dispensers to its entire fleet. And since 2014, passengers on its newest cruise ship, Quantum of the Seas, receive RFID wristbands, which they can use to pay for food, drinks and services, and to unlock their stateroom doors. In addition, the company introduced an RFID solution that lets passengers keep track of their luggage. "Guest convenience is number one," says Royal Caribbean CIO Bill Martin.

### RFID—It's All About Value

The perception that RFID adoption has been growing in fits and starts is due mainly to all the attention paid to retail, where progress has been dominated by just a few players like Walmart, ChainLink's Stelter says. "The reality is that RFID has been seeing steady growth as companies in multiple verticals move from awareness of the technology to consideration, evaluation, negotiation and deployment," he says. "We're not only seeing this progression in large industries, such as manufacturing and health care, but in smaller sectors, such as law firms and libraries."

Now that the retail industry is embracing RFID, it's driving awareness in nonretail sectors, Stelter says. "When Macy's announces the benefits it is achieving from RFID," he says, "all retailers—as well as firms in other industries—pay attention."

While retailers may be garnering the headlines, companies in other industries have been exploring, piloting and deploying RFID for years, says Robert Zielinski, director of com-

mercial marketing at systems integrator CDO Technologies. "Today, more organizations are looking at more applications to drive value," he says. "RFID is coming out of stovepipe mode, in which companies deployed an application to track work-in-process or inventory, and entering blanket mode, in which RFID provides visibility across the enterprise. Now they have an intelligent organization."

One CDO client, a global manufacturer of consumer packaged goods, deployed an RFID system to reduce waste and got what Zielinski calls "a surprise byproduct." The system "elim-

**"RFID is coming out of stovepipe mode... and entering blanket mode, in which it provides visibility across the enterprise."**

—ROBERT ZIELINSKI, CDO TECHNOLOGIES



inated quality incidences—the company went from about a dozen quality issues a year to zero," he says. "So while they are very excited about the improved efficiencies on the manufacturing floor, they have a new reason to look at RFID and are now implementing it at other facilities."

And it's not just large manufacturers that are exploring RFID, Zielinski adds. "We recently worked with a small repair shop for retailers with 53 employees," he says. "They're using RFID to provide visibility into workflow, automate batch processes and automate finish-goods shipping."

CDO is seeing an "explosion" in RFID adoption, Zielinski notes. "In the first two months of 2015, CDO's RFID contracts are up 409 percent from the same period last year," he says. "And last year was more than double the year before. The customer is out looking for information about RFID." ■

VERTICAL FOCUS: WINES AND SPIRITS

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# *A Toast To* **RFID**

*The wine and spirits  
industry is tagging bottles  
to authenticate products, connect  
with customers and improve  
supply-chain efficiencies.*

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BY JENNIFER ZAINO



**CHINA HAS REPORTEDLY BECOME** the second largest consumer of expensive wine in the world. But many Chinese wine connoisseurs aren't buying what they think they are, because counterfeiters apply fake—sometimes photocopied—labels to bottles of cheap wine or replace the vintage wine in real bottles with a different product. At least half the Château Lafite Rothschild-labeled wines sold in China do not come from France's Bordeaux region, according to Chinese officials, but are made on boats moored in international waters. "There seems to be a new swell of counterfeit wines and spirits in emerging markets like China for very expensive wines," says Eric Przyswa, director at risko5, which conducts technology-oriented analysis of counterfeit issues related to supply-chain and consumer consumption, among other areas.

To help combat fraud, anticounterfeiting identification technology company Selinko is developing an e-commerce website for Chinese consumers. The site will sell wines that use

**Antonio Sorgato  
Godeau, Bodegas  
Toro Albalá winery**

PHOTO: BODEGAS TORO ALBALÁ



**Selinko's new CapSeal anti-refill solution employs an NFC tag positioned under the wine bottle's capsule. Consumers can use an NFC phone to confirm the bottle has not been opened.**



Selinko's Near-Field Communication solution, which leverages an Inside Secure NFC chip combined with a Selinko platform and patent-pending processes to ensure authenticity. "When you go online to order a product, you will have access [through a secure pop-up] to the digital certificate attached to the product," says Gwennaëlle Festraets, VP of marketing and communications at Selinko. "When the bottle is delivered at home, you can scan its NFC tag [with an NFC-enabled mobile phone] to make sure they match. If confirmed, only at that time will the payment be released."

Bodegas Toro Albalá, a luxury vintage and dessert winemaker in Spain's Córdoba countryside, and a major U.K. wine and spirits distributor (as yet unnamed) are the first to have signed up to sell through the platform. "The object is to give the Chinese market a wide range of luxury wine and spirits brands where they can be sure the product is genuine," Festraets says, adding that product authenticity is the first concern of Chinese online shoppers.

Bodegas Toro Albalá is also using Selinko's LabelSeal solution, to ensure authenticity of its bottles sold to real-world consumers and to provide a means to interact with consumers. "I do believe that in the future, wineries will choose the NFC system as it is a product guarantee for the consumer and also for the ease of information that can be offered," says Antonio Sorgato Godeau, the firm's export manager.

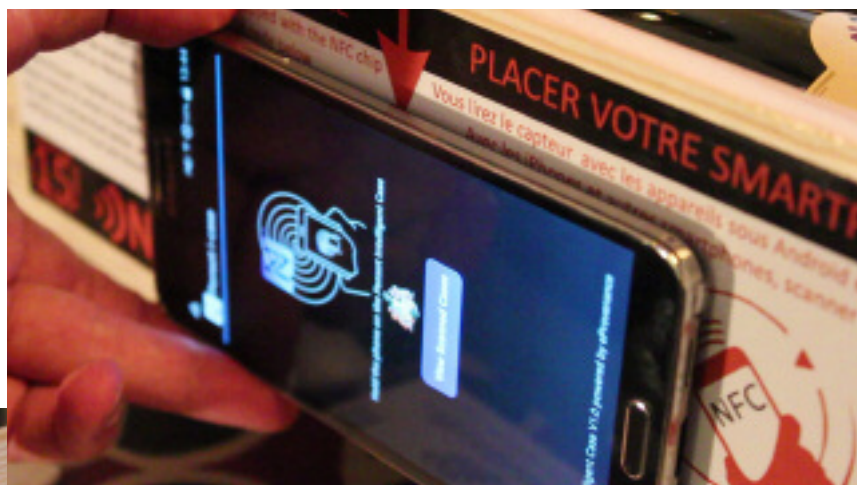
Other RFID providers are developing solutions to improve supply-chain efficiencies and inventory management. Like vintage wines and aged spirits, it may take a little time for wine and spirits makers to determine which applications deliver the best business value. Meanwhile, an RFID asset-tracking solution could take hold in the brewery industry (see "A Complete Solution for Tracking Beer Kegs" on page 30).

## AUTHENTICITY AND COMMUNICATION

Bodegas Toro Albalá's main facilities, one in Aguilar de la Frontera and another in Montilla-Moriles, "decided to apply the Selinko system

in the high range of our wines to ensure authenticity to the buyer of these exclusive wines,” Godeau says. The company is launching the solution in April, tagging its exclusive 1929, 1955 and 1965 vintages. While the cost to add the NFC chip is high, he says, “the profit margin allows modifications in this type of product, like other luxury goods.”

The LabelSeal consists of a high-frequency 13.56 MHz NFC-compliant tag embedded into



**eProvenance's Fine Wine Cold Chain solution features RFID-enabled sensors embedded in wooden wine cases to monitor temperatures during transport and storage.**

a wine bottle's label, an application for NFC-enabled phones to capture the label's ID number, and a server to manage the collected data. A mobile application lets customers with NFC phones read the tag embedded in the wine-maker's label; if the bottle is authentic, its certificate of authenticity and unique serial number will be displayed. The NFC chip features asymmetric encryption technology for a tamperproof digital certificate that is impossible to be copied and placed on another tag, even by Selinko, Festraets says.

Selinko's mobile app also allows consumers to register, so they can learn more about the wine and enjoy various brand services. A My Wine Registry feature lets users create personal notes about a particular wine and link those comments directly to their social-media networks. “Everything moves by the social

network,” Godeau says, “and so does the consumer.” Given the proliferation of smartphones, he adds, putting an NFC tag on its bottles provides a great way for Bodegas Toro Albalá to communicate information faster.

Château Le Pin, a French Bordeaux wine-maker, adopted the Selinko LabelSeal solution a couple of years ago to authenticate its vintage 2010 bottles. It's now NFC-tagging its 2011 and 2012 vintages, Festraets says. While it's an expensive investment, the winemaker sees the value, she says. “They are very convinced by the fact that they reduced a lot of the issues they had with counterfeiting,” she explains, adding that such issues can jeopardize a wine's status, which damages the company's image and revenue.

To address the issue of replacing real wine with fake wine in real bottles, Selinko and



**Diageo Technology Ventures is using Thinfilm's Connected Smart Bottle to deliver marketing content to consumers.**

Inside Secure are launching the CapSeal anti-refill solution, which also can be used for authentication of purchase at retail stores or online. It uses the same NFC chip offered in the behind-the-label option, but the tag is positioned under the bottle capsule (the metal or foil protecting the cork) and connected to an antenna inserted just above the cork. The tag is mechanically deactivated if someone tampers with the capsule and/or cork.

A consumer or supply-chain partner can use an NFC smartphone to read the tag and then check Selinko's mobile app to confirm the bottle has not been opened. One of the top five international spirit brands plans to use CapSeal in its Cognac line, beginning with products destined for sale in China in 2016, Festraets says, noting that she isn't yet at liberty to disclose the brand.

Another company, Thinfilm, recently introduced the Connected Smart Bottle, which uses printed sensor tags with Thinfilm's OpenSense technology, to dynamically detect, with the tap of an NFC smartphone, whether a bottle is sealed or has been opened. To ensure authenticity, the company says the tags are permanently encoded at the point of manufacture and cannot be copied or electrically modified. "OpenSense provides two states of NFC interface," says Jennifer Ernst, Thinfilm's chief strategy officer. "When the tag is sealed and product is sealed in factory condition, you get one identifier, and if the factory seal has been broken, you get a different identifier."

The Connected Smart Bottle can also be used to deliver marketing content to consumers. Those reading the tag at a retail store before purchase, for instance, may get a promotional offer, while those reading it after purchase may get a cocktail recipe or other exclusive content. "They can get tasting notes, for example, or once they've opened a bottle, a brand could set and send a time to say how long it should be open and breathing," Ernst says. "There's an interactive experience for the consumer on brand value."

In fact, Thinfilm worked with Diageo Technology Ventures to use the technology to serve

personalized communications to its brand-alcohol consumers, unveiling a prototype Johnnie Walker Blue Label Smart Bottle at Mobile World Congress in March. “Diageo focuses on the consumer experience and campaigns around the use of NFC in marketing,” Ernst says, noting an NFC indicator on the bottle will alert consumers to the tag’s presence. “It’s part of engaging consumers in the experience.”

Laxcen, a Hong Kong tag and label manufacturer, developed a passive EPC Gen 2 UHF RFID label that can be used to authenticate wine bottles. Each tag’s ID number is linked to data regarding the wine, including when and where it was bottled. Retailers can use a handheld reader to verify that a bottle is genuine; counterfeit bottles will have no label or a broken label, indicating the bottle was opened. A prominent Chinese wine company is using the solution for its most costly premium brand, says Lawrence Lin, Laxcen VP of sales and marketing. “The counterfeit issue is severe in China, especially for those expensive wines,” he says.

Laxcen is working on a “better tamperproof tag, hybrid [NFC-UHF] tag as well as an encrypted IC for next-generation tags,” Lin says. “One of the advantages of adding the NFC option is that it can work with a mobile phone instead of a specific reader. Half of China’s mobile phones now come with the NFC feature.”

## SUPPLY-CHAIN EFFICIENCIES

Some authentication solutions can also be used to improve supply-chain efficiencies. “A few premium wine companies are adopting EPC tags primarily for inventory management [both out of the factory and at the distribution center],” Lin says.

Thinfilm’s technology can also be used to track a bottle’s movements across the supply chain, Ernst says. “At each read, you can pick up the date and the time scanned, the GPS coordinates and unique ID associated with that particular model, as well as the state of the sensor device on the tag,” she says. Customers can know when products reached their destination, she says, and it could help spot

any diversion along the way.

For research company Epix, the business case for RFID in the wine and spirits industry revolves around tracking and validating the number of bottles being received in bulk as crates come through the dock door and make their way along conveyor belts, and in counting bottles put on shelves without requiring a close read, according to Brian Weeks, managing director at Epix and at Interactive Product Solutions, which holds the worldwide marketing rights to the technology. Epix recently began working with manufacturer r-pac International to produce CapTag, a near-field passive UHF tag that attaches beneath a wine bottle’s capsule.

“Retailers want the ability to count the stock on their shelves, and they may have 10 bottles deep on some shelves,” Weeks says. CapTag, which has a 36-foot read range when a bottle is standing upright, can handle that with a handheld UHF reader even with metal shelving, he says. The technology also can be used with EPC Gen 2 UHF readers to receive bottles at the back of the store in bulk, he says, “to make sure each case has the true number of bottles to update inventory in real time.”

Weeks thinks the solution also could be used by wine-making countries, such as Bulgaria, Italy, Portugal and Spain, that must apply a tax strip over the top of each bottle, to prove taxes were paid on that bottle. “We can include an RFID inlay into that tax stamp so you can remotely read inside sealed cartons and cases,” he says. “It’s useful in terms of receiving single cases to validate that you have the correct number of bottles with a tax stamp on each bottle. It can be an all-purpose tag for inventory control, authentication and bona fide tax stamp in one go.”

Selinko is considering adding temperature tracking to its NFC anticounterfeit technology, so producers and customers could check that products stayed within an appropriate temper-

“Retailers want the ability to count the stock on their shelves, and they may have 10 bottles deep on some shelves.”

BRIAN WEEKS, EPIX

High temperatures can be a problem with sweet and high-density wines. “The wine expands and pushes the cork.”

ANTONIO SORGATO GODEAU,  
BODEGAS TORO ALBALÁ

ature range on their journey from manufacturer to customer. Many customers have asked about the option to have “on one chip with one technology the ability to make sure a product is genuine and also that temperature is respected, especially for wine and spirits,” Festraets says. That has appeal to Bodegas Toro Albalá’s Godeau, who says too-high temperatures can be a problem with sweet and high-density wines: “The wine expands and pushes the cork.”

Cain Vineyard & Winery, in Calif., and Domaine Ponsot, in France, have begun using eProvenance’s Fine Wine Cold Chain solution to monitor select shipments. RFID-enabled sensors embedded in wooden wine cases monitor temperature during transport and storage from the producer through to the final consumer. The second-generation sensor technology is compatible with the NFC protocol, so customers can use NFC smartphones to access eProvenance’s database of temperature and humidity history for a case of wine. The sensors have a 15-year battery life for long-term temperature monitoring of fine wines,

which move through distribution and may then be cellared for a long time, says Louise Domenitz, the firm’s marketing director. Customers want them for scenarios such as auction shipments, she says, “so the wine’s story stays with the case as it moves through the auction to a consumer or to a seller who can resell it with its long-term story of provenance.”

The value, Domenitz says, comes from using eProvenance’s monitoring service to analyze the temperature and humidity data to determine whether a wine’s quality has been damaged. But, she adds, it also can be used proactively, in combination with eProvenance’s Global Tracker technology, to monitor temperature en route in real time. As long as the sensor is in communication with a cell tower, a wine producer or distributor can be alerted to a problem, and in turn reroute a truck to the

nearest warehouse, where the issue can be resolved and the shipment saved.

eProvenance recently introduced The Bottle Tag, a self-adhering RFID tag designed to identify individual bottles of wine that are associated with a case once they are separated from the case. It can be useful, Domenitz says, if a retail or restaurant customer wants validation that the wine shipped under excellent conditions. A store associate or sommelier could use an NFC phone to communicate with the tag to get the bottle’s provenance. “Our primary focus is not on anticounterfeit,” she says, “but certainly this could provide some anticounterfeit assurance, to authenticate that this bottle came from this case that came from this winery.”

## IDENTIFYING THE BUSINESS CASE

As RFID providers develop applications to target specific issues, it’s up to wine and spirits makers—and their supply-chain partners—to determine which business cases deliver the strongest return on investment.

Leveraging technologies such as NFC for authenticating very high-cost wines or spirits is a way for luxury producers “to show to the consumer that they are at the avant-garde of protection and security,” risko5’s Przyśwa says. “They’re not just protecting wine but also giving a good image of the company.” But, he adds, high-quality, high-priced wine can have a very long life, and established wineries, particularly in France, wonder whether RFID and NFC technology will last as long.

“We think we are delivering business value [with the CapTag], which is counting thousands of bottles in a matter of minutes in a retail store environment, and giving an accurate count of every bottle in there,” says Weeks at Epix. “That’s worth a lot to retailers.”

With solutions such as ThinFilm’s Connected Smart Bottle, a manufacturer can track shipments through the supply chain. “If there is diversionary activity,” Ernst says, “that means the money is in other parties’ pockets rather than the brand’s.” ■

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# A COMPLETE SOLUTION FOR Tracking Beer Kegs

HEINEKEN AND THREE OF THE TOP five global keg manufacturers are among the companies taking advantage of an RFID asset-tracking solution developed for the brewery industry by HID Global and Visibility Asset Management Solutions. It includes HID Global's ultra-high-frequency tags, and Visibility's fixed and handheld readers and cloud-based software platform.

Companies can use the solution to keep track of what kegs are onsite, which have been filled and shipped, and the contents of individual kegs. The solution also tracks each keg's journey through the supply chain, so companies know how long kegs remain at a bar or restaurant, and when they are ready for pickup. In addition, it can be used to manage a keg's lifecycle, including maintenance schedules. This knowledge helps companies accurately forecast asset availability and can potentially reduce capital investment in new kegs during peak periods, says Jon Quinn, Visibility's managing director.

Fixed RFID readers can consistently read 100 percent of kegs on pallets as they are transported in bulk on forklifts to warehouse dispatch areas, as they are loaded onto vehicles, and as they enter or leave central warehouse or depot locations, says Marie-Françoise Glotz-Bartley, VP of sales at HID Global. "UHF gives the best read distance," she says. "When there are 50 kegs on a truck, you can't afford to miss one as the driver is going out, because the keg is generally more expensive than its contents." Handheld readers are used to identify individual kegs at a bar or restaurant to confirm proof of delivery and return to a collection depot.

Franke Beverage Systems, a leading provider of stainless steel beverage containers to brewers and third-party companies that rent the kegs to brewers, offers to equip the kegs with HID Global UHF tags. Nearly a decade ago, Franke began offering its customers the option of using low-frequency tags to track their kegs. The company still

offers that option, because LF tags are cheaper, but it advocates UHF for its support of bulk reads that enhance logistics operations beyond simply reading one keg at a time on a conveyor line, says Alexander Brand, Franke's president and CEO.

That said, Franke doesn't expect to move all its customers to UHF en masse. Roughly 85 percent of its U.K. customers, for example, use keg-mounted RFID tags, and only about 10 percent are leveraging UHF technology, Brand says. But most customers just getting started with RFID tend to choose the UHF option, he says, because they understand the payback of the associated infrastructure and information-gathering software: "If you really know where you send the kegs and the state they are in, it makes a difference."

Visibility worked with Franke to develop a software module for Global Network Keg Services, which Franke introduced to support maintenance activities for kegs that have a 30-year warranty. "It gives GNKS repair partners a reliable system that identifies kegs as being, for example, 7 years old and requiring a change of a rubber part in the fitting, as it's most likely wearing out by that time so the risk of leakage increases," Brand says.

Brand estimates that 90 percent of brewers worldwide don't know which keg went to which customer and when it returned to its own fleet. "There is massive potential in the market to just achieve the basics," he says. Beyond that, Brand envisions a day when the RFID keg connection will extend through to bars and restaurants that can tune into temperature and other data supplied by a neutral party, such as Visibility. End users could know at the tapping point whether the right CO<sub>2</sub> pressure has been applied for the particular brand of beer coming from the keg, and how many liters are left so they could get a jump on changing the keg. —J.Z.





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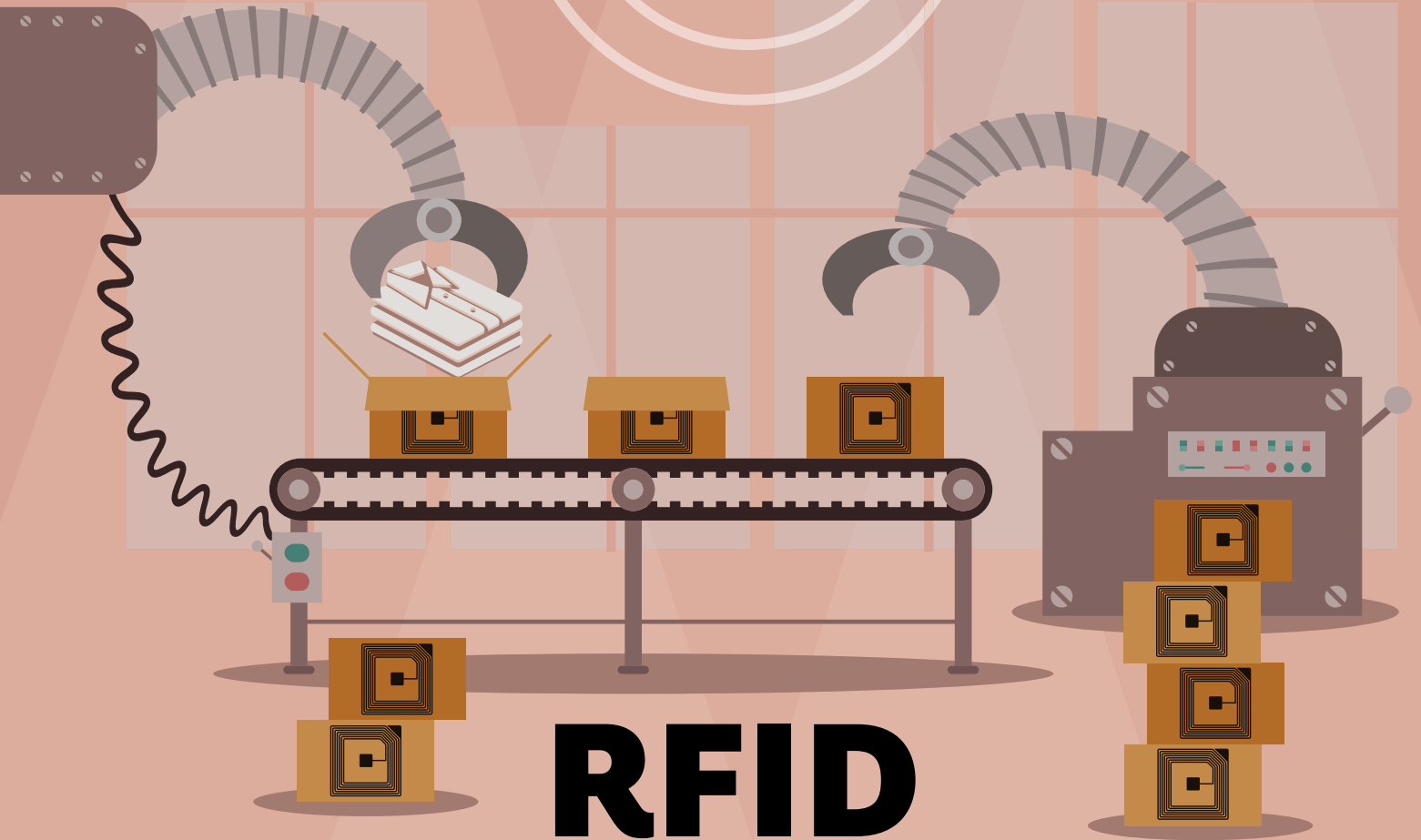
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# RFID Warehouse- Management Systems

FOR APPAREL RETAILERS

# It's time to automate your warehouses and distribution centers. Here's why—and how to do it.

**BY BOB VIOLINO**

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Most apparel retailers that are using RFID to improve inventory management have been tagging items in their stores. As they tag more items—and more apparel retailers adopt RFID—the industry is moving toward tagging at the source of manufacture. It's more efficient, because manufacturers are already attaching price tags and/or care tags and labels to items. To facilitate source tagging, GSI US's Item Level RFID workgroup has developed guidelines

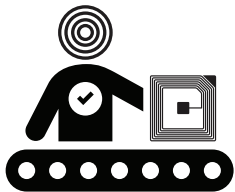
(see [GSI Expects Tagged-Item Performance Protocol Guideline to Boost RFID Adoption](#)).

Of course, in between the manufacturing facilities and stores are warehouses and distribution centers. This means retailers have a great opportunity to get complete visibility into their supply chains—by RFID-enabling their warehouses and DCs. RFID warehouse-management systems (WMS) developed for apparel retailers can verify shipments received from the manufacturer and those shipped to stores. They can also improve efficiencies in put-away and picking. This would help retailers ensure they have specific goods on store shelves when customers want to buy that merchandise.

A more efficient warehouse or DC would also enable companies to implement omnichannel retailing—the ability to shop anytime, anywhere, in a store, on a mobile device, on a home computer or by phone. Many stores promoted omnichannel shopping for the 2014 holiday season, but they were unable to deliver on their promise because they didn't know where specific merchandise was or how much inventory they had.

“Holiday 2014 was a test of retailers' omnichannel competence, and many shoppers were disappointed,” says Su Doyle, head of RFID industry programs at OATSystems, a division Checkpoint Systems. “Stores threw extra labor, inventory and expedited shipping into the mix, since they didn't

An RFID tunnel reader can be used to encode a large number of RFID tags as items pass through it.



Fashion retailer Inditex developed a WMS to RFID-tag garments in boxes, hanging items and pallets at its distribution centers, at a speed that's in line with the company's logistics needs.

Su Doyle, OATSystems



have time to change inefficient processes.

"Stores are literally the 'last mile' of the supply chain," Doyle adds, "and many store back rooms are full of unopened boxes, incorrect shipments and duplicate inventory that takes too long to process and reconcile. A disorganized back room results in higher working capital, lower shelf availability and inefficient omnichannel fulfillment."

It's clear omnichannel shopping is a high priority for retailers. A study released in February 2015 by the National Retail Federation, the world's largest retail trade association, and Forrester Research found that omnichannel initiatives are the second highest business priorities for retail IT executives, following data security. Of the 84 retail IT leaders surveyed, 76 percent said integrating selling channels—e-commerce, mobile, social, catalog and stores—is a business priority for 2015, up from 61 percent in 2014.

Source tagging by manufacturers is not yet happening on a broad scale, says Sue Flake, director of RFID business development at Zebra Technologies, but industry analysts predict wide-scale adoption over the next three to five years. Meanwhile, there are several good rea-

sons for apparel retailers to RFID-enable their warehouses and distribution centers now—it would allow them to track items that are being tagged at the source; tag items at the DCs to improve inventory visibility and shipping accuracy to stores; and prepare for the time when source tagging becomes common practice.

Fashion retailer Inditex, for example, worked with Checkpoint to develop a WMS to RFID-tag garments in boxes, hanging items and pallets at its distribution centers, at a speed that's in line with the company's logistics needs, Doyle says. The system enables Inditex to automate the sending of garments from the DCs to stores—more than 700 of its Zara stores in 22 countries, as of September 2014—avoiding any possible packing mistakes in quantity, model, size or color, she says.

#### DEPLOYING A WMS

Some RFID providers, such as OATSystems, offer a complete solution, including hardware, software and integration services. Zebra Technologies provides the hardware for a WMS and works with partners that provide the WMS software. "Customers typically have a preference for WMS software," says Mark Wheeler,

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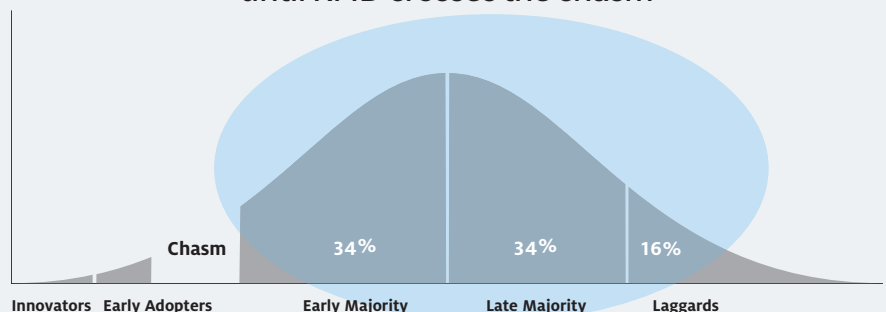


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director of supply-chain solutions at Zebra. “We work with the software provider to ensure that our hardware functions appropriately with the software.”

Either Zebra’s technical staff or a third-party integrator handles the implementation onsite. “Companies implementing a WMS for the first time or going through a major upgrade will often prefer to have the WMS supplier provide the hardware and be responsible for the integration, due to the perceived risk of a WMS go-live,” Wheeler says. “If the warehouse in question is complex and includes a lot of material-handling equipment, a third-party integrator may take on this broader role, including the mobility infrastructure. For subsequent support and upgrades, customers

are often more likely to turn to a partner they work with on a broad spectrum of mobility projects for support.”

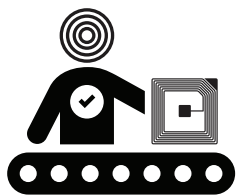
RFID warehouse-management solutions are not plug-and-play, because sites vary and retailers have different operations at their facilities. Customization is needed with any WMS deployment.

“We have a saying in retail IT that there’s no such thing as ‘off the rack’ or ‘one size fits all,’” Doyle says. “Every retailer has different systems, processes and business models. But there are many common threads, which is why we use configurable scenarios for shipping, receiving, order pick and pack, etc. Then it’s just a matter of mapping the scenario to the retailer’s process and data

## Some Leading Providers of RFID Warehouse-Management Solutions for Apparel Retailers

COMPANY	RFID HARDWARE	SOFTWARE	SERVICES
<b>OATSystems/Checkpoint</b> www.oatsystems.com	Fixed readers, tunnels and tables; tags and labels; works with partners to provide handheld readers	OAT Foundation Suite Auto-ID software platform; integrates with enterprise applications	Consulting, systems integration, deployment and technical support
<b>SATO Global Solutions</b> www.satosolutions.com	Fixed and handheld readers	Label &Track; integrates with enterprise applications	Consulting, project management, systems integration and technical support
<b>Tagsys RFID</b> www.tagsysrfid-fits.com	Hangtags and tunnel readers; works with partners to provide fixed and handheld readers	e-Connectware platform; integrates with enterprise applications	Configuration, integration, implementation and technical support
<b>Zebra Technologies</b> www.zebra.com	Fixed readers and antennas; handheld readers	Partners with firms that provide WMS software, including HighJump Software, JDA and Manhattan Associates	Systems integration

A WMS includes a tagging station with an RFID printer-encoder, for items that aren't tagged at the source.



For items that are RFID-tagged at the source of manufacture, an RFID portal on the receiving conveyor is used to receive at the item level.

**MARK WHEELER,**  
**ZEBRA TECHNOLOGIES**



fields in their system of record.”

This approach, Doyle adds, enables a retailer to deploy faster and at less risk, but get a solution that is tailored to its individual needs. “Time is of the essence at most retailers,” she says, “and they need to deploy quickly to avoid disruption, and have the system in place before the peak selling season begins.”

To that end, it's important to choose an RFID provider that has experience deploying warehouse-management systems for apparel retailers. Ask the vendor to provide customer references from the retail industry. It's also important to discuss change management. Be sure the provider has a plan to help employees understand and use the new system.

How does an RFID-based WMS improve receiving, put-away, picking, shipping and inventory management? It's a combination of RFID hardware and software working together.

### **HARDWARE**

The basic hardware components of an RFID-based WMS include fixed readers at receiving and shipping dock doors, to verify shipments coming in from suppliers and going out to

retail stores. Handheld readers are used to locate items for an order on a pick list. In lower-volume scenarios, they are also used to scan items for inbound receiving.

“High-volume operations often have conveyors at the receiving dock ready to take product from the inbound trailers directly into the distribution center for cross-docking or put-away,” Wheeler says. For items that are RFID-tagged at the source of manufacture, an RFID portal on the receiving conveyor is used to receive at the item level, he explains.

Another component is a tagging station with an RFID printer-encoder, for items that aren't tagged at the source. An RFID tunnel reader can be used to encode a large number of RFID tags as items pass through it.

Checkpoint recently introduced a “smart table” that can be used to verify whether an apparel supplier has shipped the correct items. The RFID hardware and software are integrated into the table and linked to a retailer's enterprise software. As an employee runs tagged items over the table's surface, inventory data is updated and items ordered but not received are flagged. This enables staff members to receive items without

PHOTO: ZEBRA TECHNOLOGIES

having to read tags with a handheld reader.

“Handhelds have their role, but for high-volume scenarios it is much faster to read something on a table or in a tunnel or portal,” Doyle says. “When handhelds are used, speed and training must be considered.”

## SOFTWARE

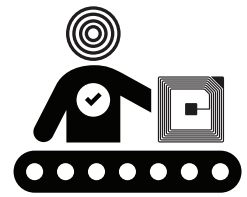
WMS software automates receiving and shipping information, eliminating errors from manual, paper-based processes and reducing labor costs. The software can verify that a shipment has been received and all the items have been put into inventory. It can also verify the items in an outgoing shipment, as well as the shipment date and time. “Basically, it is inventory management at the start of the supply chain, before delivery even gets to the stores,” Doyle says, “so that stores start with accurate inventory as opposed to sorting it out there.”

In addition, WMS software can be integrated with enterprise resource planning software and

other back-end business applications, such as accounting, customer relationship management and sales force visibility. Retailers can view the information on a variety of dashboards. HighJump Software offers cloud computing, which the company says can help small and midsize retailers with limited resources implement a WMS.

In the near future, WMS vendors expect to see rising demand for their systems as more apparel retailers adopt RFID and more companies move to deliver omnichannel retailing. “We have seen a renewed interest in RFID-enabled [distribution center] operations in the aftermath of holiday 2014,” Doyle says.

Looking ahead, once RFID reaches the tipping point in apparel retail, the technology will be adopted by other retailers, including sporting goods and home improvement. And that means those retailers will benefit from RFID-enabling their warehouse and distribution centers as well. ■



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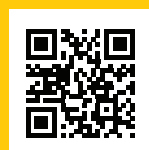


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# Get Hip to BOPIS

Retailers must adopt an omnichannel mentality and put processes in place to support it.

By Bill Hardgrave



I'M A SCIENTIST, so I like to experiment. To see how "buy online pickup in store" (BOPIS) works—or doesn't work—I went to several retailers' websites and chose products I know they carry in local stores.

When the sites told me the stores didn't have the items in stock, I went to the stores to see for myself. Most often, the items were on the store shelves. If you're curious about this phenomenon, try the experiment where you live. I bet you'll find the results replicated.

Why would a retailer show you a product is unavailable for pickup when it is actually in the store? There are a couple of reasons, and they represent an old-school mentality and way of conducting business.

One reason I often hear is: "We want to make sure we have the product available for our in-store customers to buy." Sorry retailers, but in this age of omnichannel shopping, it's not smart to separate customers into channels, such as online customers and in-store customers. If your aim is to sell a product, why give preference to a potential in-store customer over an actual omnichannel customer?

A second, usually unspoken reason is: Retailers don't have much confidence in their inventory accuracy. To compensate, they build in a buffer when showing inventory counts. A retailer, for example, might have a business rule that says: "If inventory at the store shows fewer than three items in stock, show it as out of stock online."

One retailer recently told me it uses a buffer of *nine* items. I have to admit I was astounded. But like most retailers, this company doesn't want to get it wrong by sending an online customer to a store to pick up an

item that's unavailable. That scenario would embarrass the retailer, and it's quite possible the unhappy customer would never patronize the company again, either online or in-store. The retailer would rather tell you the product is out of stock and disappoint you in this one sale than upset you by sending you to the store erroneously.

For BOPIS to work, retailers must adopt RFID, which provides high inventory accuracy and the ability—and confidence—to provide a



rewarding omnichannel experience for customers. And so I ask retailers: Do you want to tell your customers you are out of stock when you have three or more items—or do you want to make a sale and drive additional traffic to the store (where almost 40 percent of BOPIS customers will make an unplanned purchase)? The answer seems clear. ■

*Bill Hardgrave is the dean of Auburn University's Harbert College of Business and the founder of the RFID Research Center. He will address other RFID adoption and business case issues in this column. Send your questions to [hardgrave@auburn.edu](mailto:hardgrave@auburn.edu). Follow him on twitter at @bhardgrave.*

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# To RTLS or Not to RTLS

The question of whether to deploy a real-time location solution doesn't have to be so weighty.

By Harold Boeck and Ygal Bendavid



You're a hospital manager and a request has landed on your desk from the intensive-care unit to increase operational efficiencies of mobile assets and ensure better compliance with regulatory requirements. You're aware that other hospitals are using RFID-based real-time location systems (RTLS) to track and manage high-value assets, and you've read numerous articles about the benefits they've achieved, including minimizing rental expenses and reducing the amount of time personnel spend searching for equipment.

But you're also aware of the challenges involved in having to decide among the many technology and application platforms on the market. Should you choose an active, passive ultrahigh-frequency or proprietary RFID system? Is it smart to leverage the hospital's Wi-Fi network? What about ultrawide-band, ultrasound or hybrid solutions? While each has its distinct advantages and limitations, these competing technologies seem to offer similar benefits, as do the various software platforms that collect and manage the data.

You want to make a wise decision, but you're already overloaded with other projects that seem simpler and less risky. Moreover, with this project you may get bogged down in endless comparative analyses, which will delay implementation.

We meet many hospital managers who face

this deploy-or-not-to-deploy question, and we always advise them to overcome their fears and jump into an RTLS project. Here's why.

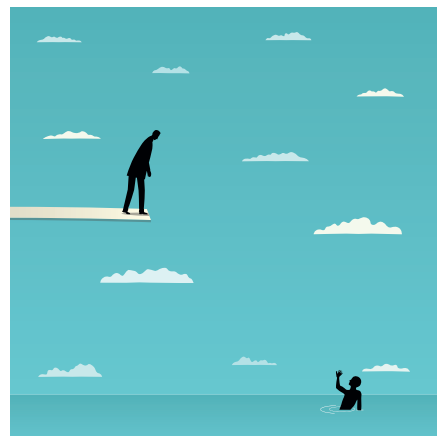
Unlike the retail industry, which has chosen UHF EPC RFID for tracking items, the health-care industry is not going to settle on one standard any time soon. Choosing the right system was complex in 2010. It still is today and probably will be in five years. If you take a wait-and-see attitude, you will delay cost savings and other benefits you could be achieving now.

Another argument for moving forward resides in the fact that RTLS technologies are reliable and have been adapted to meet hospital requirements. RFID providers that work in the health-care sector have well-documented case studies and experience deploying their solutions in hospitals, including integrating RFID data into hospital information systems.

For those who point to the prohibitive cost of adopting an RTLS, we suggest conducting a return-on-investment analysis. Hospital managers will need to look at initial investment and total cost of ownership. We believe they'll find it's more expensive not to implement an RTLS.

Yes, choosing an RTLS is complex, but an RTLS enables real-time hospital decision-making and operational business intelligence that will lead to cost savings as well as an increase in operational efficiencies and improved patient care—and that's true for whichever technology solution you choose. ■

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# Pretesting Software Speeds Deployments

Before you go live with an RFID system, make sure your field and enterprise software are working the way they should.

By Ken Traub



YOU'VE DEVELOPED a business case for using RFID to improve operations. You've chosen tags to track your assets, and fixed and handheld readers to capture the data. Now, while you're procuring the hardware,

your IT department can develop the software components—and fully test them, before the readers are installed.

There are two software components: field software—middleware that captures data from RFID readers and outputs cleansed data—and enterprise software, which receives and integrates the cleansed data. If you design the interfaces up front and employ test harnesses, the two components can be tested at the same time.

First, design the data that flows between the field software and the enterprise software in each use case. This includes the cleansed RFID data to be used by your business applications. (To design this data, you can use the Electronic Product Code Information Services standard or a similar data model; see [How to Deploy EPCIS](#).) It may also include queries the field software makes for enterprise data, such as shipping manifests or product masters.

Next, mock up the data for each use case. The mock data takes the place of the information you'd get from a live field system. Now, one IT team can use the mock data to develop any enterprise software that might be needed for new business processes, and to test how new and existing enterprise software receives and integrates RFID data.

Meanwhile, another IT team can develop and test the field software. For this, you will need an RFID reader simulator—software that

mimics the behavior of an actual RFID reader. (Most middleware vendors provide reader simulation software.) A simulator lets you create virtual tags on a computer screen, which the simulator reads. With each tag read, the simulator sends data to your middleware using exactly the same protocol as a real reader.

Most reader simulators let you simulate missed reads and stray tags, and some let you record a complex sequence of tag reads and then play it back as you test and revise the software. You can use the simulator to explore many different real-world scenarios and confirm that the field-software outputs match the data for each use case you've mocked up. There are also simulators for handheld readers, and they include a simulation of the device's keyboard and screen.

The final step is to bring the field software and the enterprise software together to test the complete data flow, using the reader simulator in place of actual readers. Now, you're ready to go live with actual tags and readers, with the confidence that your software is up to the job. ■

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# APPAREL RETAIL ROI CALCULATOR

ESTIMATE WHAT RFID CAN DO FOR YOUR BOTTOM LINE

Learn how to assess your potential return on investment (ROI) from employing RFID to track apparel, footwear and accessories in stores. This interactive spreadsheet comes with supporting notes that explain the assumptions in the calculator.

## THE CALCULATOR ENABLES RETAIL FIRMS TO:

- › Enter their average number of units on the sales floor and in the back room, as well as their average unit cost, inventory turns and retail margins
- › Enter the number of hours that staff members spend receiving goods, conducting cycle counts and replenishing product inventory
- › Estimate the reduction in labor costs

## THE CALCULATOR ALSO:

- › Allows a user to estimate the potential increase in sales
- › Enables companies to estimate hardware, software and integration costs, based on their store layout and operations
- › Provides a sample case for a fictional company

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