

RFID JOURNAL

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JULY/AUGUST 2014

- **PERSPECTIVE**
New Industry Standards: Another Step
Toward Mainstream Adoption PAGE 10
- **VERTICAL FOCUS: HORTICULTURE**
Tracking RTIs Delivers Benefits To Companies
And Customers PAGE 26
- **PRODUCT DEVELOPMENTS**
Hand-Hygiene Monitoring Solutions Reduce
Infection Rates And Related Costs PAGE 32

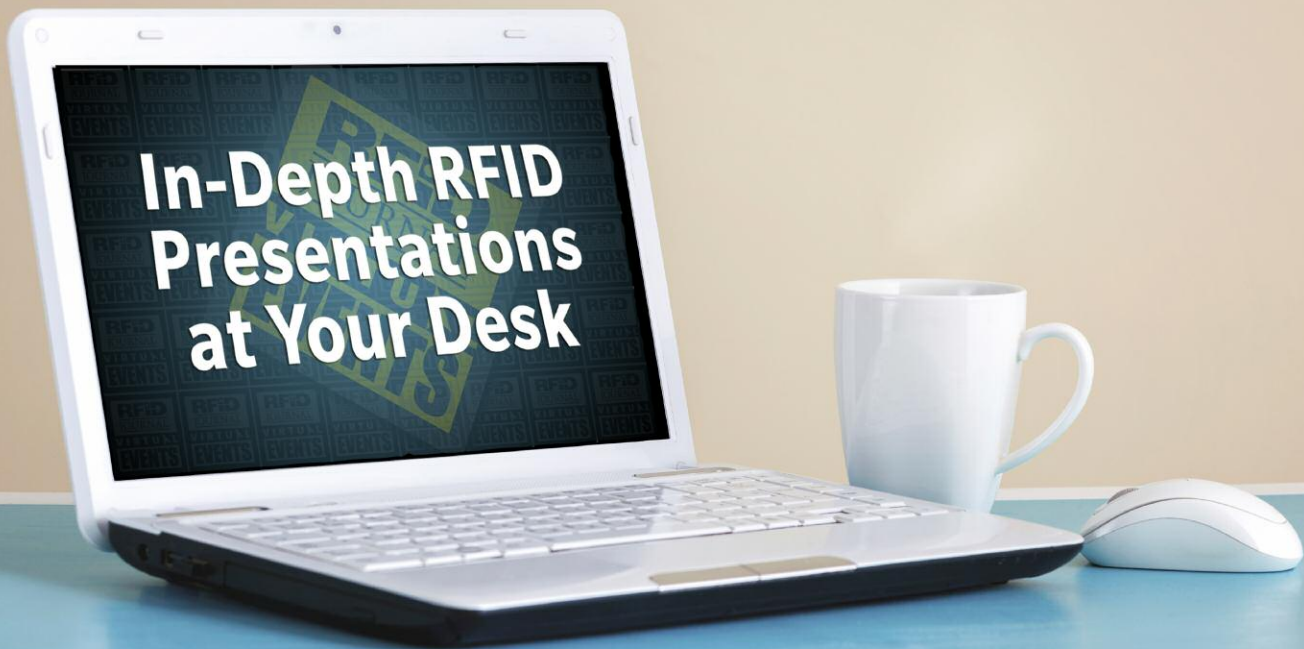
COMPLIANCE vs COOPERATION

A FRESH LOOK AT

SUPPLY-CHAIN

RELATIONSHIPS

PAGE 16



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features

COVER STORY

16 Reevaluating Supply-Chain Relationships

When customers help suppliers deploy RFID, everyone benefits.
By Samuel Greengard

VERTICAL FOCUS

26 Cultivating RFID

Horticultural firms achieve benefits from tracking returnable transport items, while nurseries, governments and researchers develop business cases for monitoring individual plants.
By Jennifer Zaino

PRODUCT DEVELOPMENTS

32 RFID Helps Hospitals Clean Up Their Act

Hand-hygiene monitoring solutions reduce infection rates and related costs.
By Amy Lipton

departments

5 Editor's Note
Moving beyond mandates.

6 Out in Front
Smart fabrics monitor patient health; RFID helps analyze hockey players' performance; sudden impact.

10 Perspective
Developing industry standards; retailers use RFID to woo shoppers; retailers already sold on RFID.

columns

41 Software Savvy
Tracking transformations.
By Ken Traub

42 Tuned In
Building on retail's RFID foundation.
By Bill Hardgrave

45 Supply Chain Links
A win-win for suppliers.
By Ian Robertson

tune in online

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.

Coming Soon to RFIDJournal.com



These live interactive programs offer a convenient way to learn why and how companies are employing RFID to improve the way they do business. Presenters will answer your individual questions.

[RFID in Retail](#), Sept. 11

[RFID in Harsh Environments](#), Oct. 8

[RFID in Manufacturing](#), Nov. 6

[Enabling the Internet of Things](#), Nov. 13



Find products that can help you deploy RFID successfully, such as

William Frick & Company's SmartMark series of durable tags designed for harsh environments. The company's [Solar Powered Active RFID Tag](#), for example, will never need a battery and has long-distance read capability.

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- [Inditex CEO Announces RFID Expansion Plans](#)
- [RFID Is the Cure for San Francisco Construction Project](#)
- [What Are the Leading RFID Companies?](#)
- [MagicBands Bring Convenience, New Services to Walt Disney World](#)
- [Companies Deliver New Apps for Bluetooth Beacons](#)

Top 10 Search Terms On RFIDJournal.com

- 1 NFC
- 2 EPC
- 3 RTLS
- 4 Internet of Things
- 5 Airbus
- 6 Construction
- 7 Library
- 8 Food
- 9 Security
- 10 Zara



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:

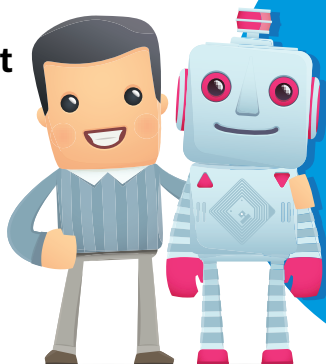
- Can RFID protect jewelry?
- Which RFID system is right for managing parking areas?
- Can an RFID tag be temporarily disabled?
- How do post offices employ RFID?
- What are Tiles?
- How can I track expensive guns?
- Are there any standards for asset tracking?

POLL RESULTS

Are you worried about RFID making workers obsolete?

Cast your vote.

Each week, RFID JOURNAL takes the pulse of the RFID community. See what other people are thinking—and make your opinion count.



No, technological improvement brings new types of jobs. 89%

Yes, increased automation often means fewer jobs. 8%

Don't know 3%

RFID End-User Case-Study DVDs

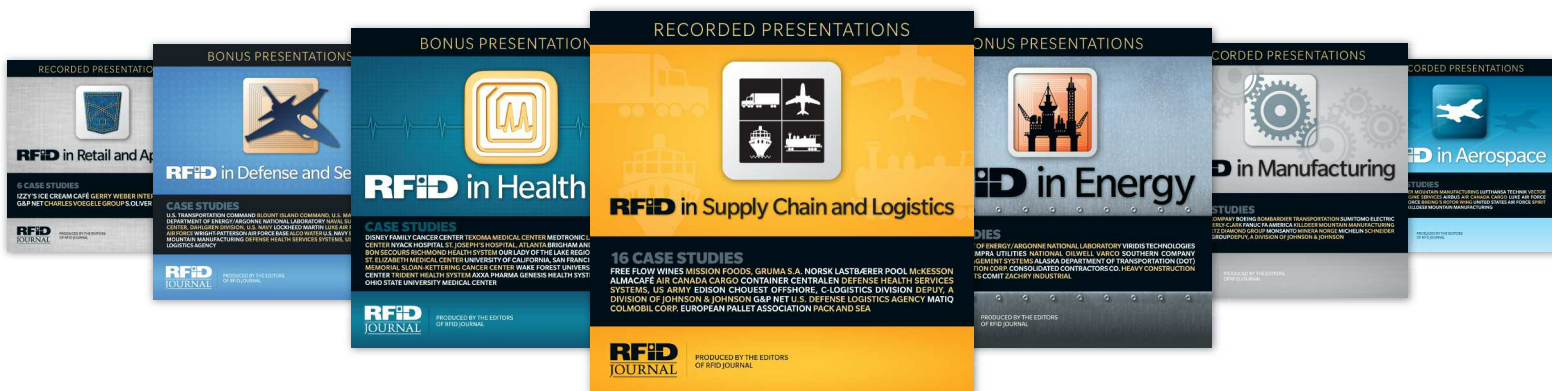
RFID Journal has created a series of DVDs containing presentations by end users, recorded at various live and online events.

Updated with new case studies from *RFID Journal LIVE! 2014*

RFID Journal holds several face-to-face conferences every year, as well as a number of online virtual events and webinars. These events feature end users speaking objectively about the business reasons that they deployed an RFID system, the technical hurdles they overcame in doing so and the benefits they now achieve as a result, as well as presentations by academics, vendors and other experts. Many of the sessions were recorded, and we have compiled these recordings into seven DVDs that are available for purchase for only \$99 or free with a one-year premium membership to *RFID Journal*.

Hear presentations from *RFID Journal* events, including:

- RFID in Health Care
- RFID in Energy
- RFID in Defense and Security
- RFID in Aerospace
- RFID in Manufacturing
- RFID in Retail and Apparel
- RFID in Supply Chain and Logistics



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RFID IN HEALTH CARE

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- › Reduce the incidence of objects being left behind
- › Enhance patient safety
- › Improve supply chain management
- › And much more

Exhibitors participating in the event will be displaying health-care solutions covering a range of RFID technologies, including:

- › Passive ultrahigh-frequency (UHF)
- › Passive high-frequency (HF)
- › Ultra-wideband (UWB)
- › 802.11x
- › Active UHF
- › ZigBee
- › Hybrid tags
- › And more



Case studies presented by health-care organizations already using RFID technologies will help attendees determine the best RFID technology for their needs, learn best practices from early adopters, find the right technology partners and move forward.

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Moving Beyond Mandates

A COUPLE OF YEARS AGO, I was at a function hosted by my wife's church. I was sitting next to a gentleman who asked me what I do for a living. I told him I run RFID JOURNAL. He knew about the technology and said: "We supply custom products for the U.S. Department of Defense, and we are required to put RFID tags on our shipments." I asked if they were using the technology within their operations. "No," he said. "We buy the tags and put them on the boxes. That's it."



A few months ago at a church fund-raiser, I once again sat at a table with this gentleman. He introduced me to the operations manager at his company and said: "We have a problem in our warehouse. We have \$3 million worth of inventory and cannot manage it. Do you think RFID can help?" I smiled.

The attitude among many suppliers required to RFID-tag shipments to the DoD, as well as to aerospace companies, retailers and other firms, has been: "Oh, no. Additional cost!" That attitude is slowly beginning to change—due, in part, to technology improvements and a better understanding of the benefits RFID can deliver.

But as our cover story in this issue reveals, many suppliers need help from their supply-chain partners to develop and fund RFID projects. Killdeer Mountain Manufacturing, a small, family-owned company in North Dakota that makes aerospace components, is a good example. It deployed an RFID work-in-process application to track orders for Boeing. The

system helped KMM improve its relationship with Boeing—and it helped the company reduce costs and streamline processes. The DoD funded the KMM project, and Boeing and several other partners helped develop the solution.

Companies are also beginning to recognize that, rather than mandating partners use RFID, it is more beneficial to collaborate on projects to achieve mutual benefits. Valtra, for example, wanted to ensure that its factory was always stocked to fulfill orders. The Finnish manufacturer of custom tractors worked with one of its suppliers, Metal Power, to deploy an RFID system that tracks parts from the supplier's facilities to Valtra's warehouse. The solution automates and streamlines parts replenishment and parts inventory management processes for Valtra, and also benefits Metal Power by providing visibility into inventory levels and parts consumption at the factory.

Horticulture companies are benefiting from using RFID to track and manage returnable transport items, but they are also developing business cases for their customers (see Vertical Focus). And companies in the aerospace, oil and gas, and retail apparel sectors are working to create a common way of using RFID to maximize the potential benefits of the technology for all supply-chain partners (see Perspective).

It's exciting to see collaboration among business partners taking root, and suppliers realizing RFID is not just an additional cost. I'll be visiting my church friend's warehouse soon, and I hope to hook him up with a systems integrator that can solve his inventory-management problems.

A handwritten signature in blue ink that reads "Mark Roberti".

Mark Roberti, Founder and Editor

HEALTH

Smart Fabrics Monitor Patient Health

Researchers at Drexel University are developing clothing with conductive fibers, which can detect medical conditions and transmit data via RFID.

WHEN A WOMAN IN LABOR arrives at a hospital, one of the first things caregivers do is hook her up to a tocodynamometer, a device that monitors the timing and severity of uterine contractions, by placing electrodes on her belly. But the electrodes and the wires connected to them can be annoying for a woman experiencing contractions.

A more comfortable monitoring device could be an RFID-enabled bellyband, which fits around a woman's mid-section. It has no electrodes or wires—just smart fabric.

The smart fabric was designed by an interdisciplinary team of researchers at Drexel University, including Kapil Dandekar, Adam Fontecchio and Timothy Kurzweg, electrical engineering professors in the College of Engineering; Genevieve Dion, a fashion design professor in the Antoinette Westphal College of Media Arts & Design and director of the Shima Seiki Haute Technology Laboratory; and Owen Montgomery, M.D., head of obstetrics and gynecology in the College of Medicine.

The team knit an RFID antenna with a combination of conductive and nonconductive threads and created a little pocket for a Murata MagicStrap ultrahigh-frequency chip. The chip has pads that inductively couple with the knit antenna, creating a working passive RFID transponder that can wirelessly transmit data to a reader.

One obvious arena for smart fabrics is health care, and several of the team members who've experienced childbirth in recent years recognized the potential benefit of using them to monitor contractions. The project is supported by the Drexel-Coulter Translational Research Program and a National Science Foundation grant.

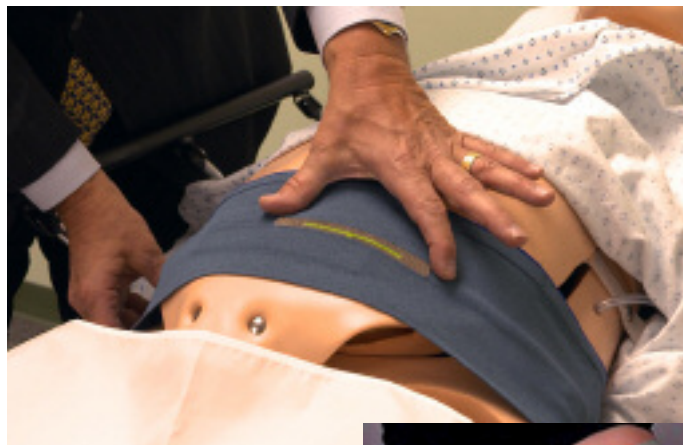
As a contraction occurs, the bellyband shrinks and expands. This changes the resonant frequency of the antenna and the level of inductive coupling between the passive RFID chip and the knit antenna, which affects the signal returned by the transponder to the RFID interrogator. The team is developing algorithms that use received signal strength indicator (RSSI), the strength of the signal the

reader antenna receives from the tag, to determine when contractions occur.

The researchers say that in lab tests on a mannequin designed for simulated childbirth, the RFID device appears to work as well as a tocodynamometer. "We are still testing, but the output of our bellyband appears to deliver a similar profile as the tocodynamometer," Fontecchio says. "And because we can know when the simulated contractions will occur, we can determine that the system is monitoring them accurately."

The researchers are looking for partners to commercial-

ize the bellyband. They believe it could be used at home for high-risk pregnancies. Data could be captured by RFID readers and transmitted to doctors, so they could monitor the patient remotely and respond to any early warning signs. "The same technology could perhaps be used on an infant as an early warning for sudden infant death syndrome," Dandekar says. "We are working on many other exciting biomedical smart textile applications." —Mark Roberti



The researchers tested the bellyband on a mannequin designed for simulated childbirth.





SPORTS

RFID Helps Analyze Hockey Players' Performance

IN EARLY AUGUST, when Finnish professional hockey teams faced off for the first preseason games, radio frequency identification was watching, silently tracking the players' ice time. And when next season begins, RFID could be tracking each player's physiology, to ensure anyone who might have gotten whiplash from a check or a concussion from a fall is treated immediately.

The RFID sports analytics system (which will be used in other sports besides hockey) is being developed through a partnership of Chicago-based Sports Technology Holdings (STH) and Kuru Digital Creations of Oulu, Finland. STH has been providing data and the software to analyze it to professional hockey teams in North America for several years. The firm collects a wealth of data about shots, checks, turnovers, odd-man rushes and more, input on touch screens by seven or eight off-ice officials during each game. Given the fast pace of ice hockey, getting all this information right is a challenge, so STH recently partnered with Kuru, which has been using RFID to collect one key stat: the amount of time each player is on the ice.

"With our system, coaches can get information in real time about each player's playing time, shift count and average shift length," says Markku Niemitalo, Kuru's managing director. "Of course, it's also possible to get the time they have been resting since last shift and other useful information that can

improve decision making during the game."

To collect information a passive ultrahigh-frequency RFID transponder is placed inside each player's kneepad. Readers are positioned near the team's bench and penalty box. The system, called KURU seQuence, automatically captures each player's ice time. The data is 100 percent accurate, compared with 85 percent to 95 percent accurate when collected manually, the partners say.

"Ice time is the most important stat, and teams want the data to be 100 percent accurate, so when we came across Kuru, it made sense to partner," says William Boll, a managing partner at STH.

The two companies have combined their solutions into a new product called Quantum Pro Hockey, which STH markets in North America and Kuru provides to pro teams in Europe and Russia. The companies are also working together on an active RFID transponder with an accelerometer that will measure the impact of a check, sudden changes in direction and other data that could be used to determine if a player has been injured.

The partners are negotiating with an RFID company to design and build the prototype. They plan to test it and make it available for pro sports teams to use in 2016. Several teams have already agreed to participate in the trials. Niemitalo and Boll are convinced RFID is a winner. —M.R.

SUDDEN IMPACT



Total sports-related concussions annually in the United States:

1.6 million to 3.8 million

Number of concussions experienced by National Hockey League players during an average season:

559

Concussion rate per 1,000 player hours for National Collegiate Athletic Association women's ice hockey:

2.72

Number of concussions reported in 2012 by the National Football League:

190

Concussion rate per 1,000 player hours for female middle-school soccer players:

1.2

Number of concussions experienced by U.S. high school athletes each year:

136,000 to 300,000

—Rich Handley



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ADOPTION

Developing Industry Standards

Companies in aerospace, oil and gas, and retail apparel are working to create a common way of using RFID to maximize the technology's potential benefits.

ILLUSTRATION: ISTOCKPHOTO

ONE SIGN that radio frequency identification is getting closer to mainstream adoption is the growing number of standards efforts under way globally. While RFID technology standards have existed for years, interoperability of tags alone doesn't foster adoption. It's essential to develop standardized ways to employ standards—what type of RFID will be used for specific applications, what data is written to the tag, where the tag will be placed and so on.

The first industry to come together to develop standards was the retail consumer packaged goods sector. Retailers and CPG companies agreed to use passive ultrahigh-frequency tags based on the Electronic Product Code standard, but they also wanted to create standards for sharing RFID data.

Walmart and Target got together with Procter & Gamble, Gillette, Kimberly-Clark and other companies to develop a set of XML tags, or qualifiers, that would be used to share data via GSI's Electronic Product Code Information Services (EPCIS). The idea was that qualifying data would be associated with RFID tag reads, and this data would be shared via the EPCIS standard. For example, one XML qualifier was for the business process being undertaken. So if an RFID tag was read when a retailer was receiving goods, that data would be shared via EPCIS with the supplier of the goods, as would the store's Global Location Number and other information.

The CPG industry abandoned RFID after the economic downturn in 2008, but other industries have launched standards efforts. GSI is currently working with apparel retailers and manufacturers to develop standards. Among the issues being discussed: what data to put on the tag, where to place the tags and how to manage data serialization.

The aerospace industry came together under the Air Transport Association to address the use of standards. ATA had already developed a comprehensive set of e-business standards called Spec 2000. It

was natural for companies interested in using RFID, including Airbus and Boeing, to work through the ATA to develop RFID standards. In 2009, ATA published an enhancement to Spec 2000 that includes data-capture devices such as RFID transponders (see [ATA Approves RFID Data Structures for Spec 2000](#)). Suppliers are now conforming to Spec 2000 standards as they tag parts, such as seats and life vests for Airbus.


Recently, five big energy companies—BP, Petrobras, Shell, Total and Woodside—formed the Global RFID Committee for Oil & Gas to begin developing standards for the industry. The five have agreed on issues to be addressed, and held their first standards meeting in Perth, Australia, on Aug. 14, as part of the RFID in Energy, Mining and Construction event hosted by RFID JOURNAL. The group explored the common use cases for RFID in the energy sector and the types of RFID that might be used in each application. It also looked at some of the complexities in energy that other sectors don't share, such as operations in harsh environments and the need for intrinsically safe equipment. The group plans to hold regular teleconferences and face-to-face meetings to formulate a set of standards for using RFID across the industry.

There is a nascent movement within the health-care sector to develop standards. One challenge is the array of technologies being used for asset tracking. Some hospitals are using Wi-Fi-based RFID tags. Others are using ZigBee, proprietary active technology or ultrasound systems, which means a tagged asset that travels from one hospital to another with a transferring patient usually cannot be identified at the receiving hospital.

Technology standards are critical to fostering adoption, but industry standards are needed to make RFID interoperable among supply-chain partners and other companies that collaborate. It's a positive sign that major industries are beginning to realize this and take action. —Mark Roberti



Five big energy companies formed the Global RFID Committee for Oil & Gas to begin developing standards for the industry.





RETAIL

Retailers Use RFID to Woo Shoppers

It's not easy to engage customers, in stores or online, but a number of innovative applications may do the trick.

ABOUT FOUR YEARS AGO, retailers began switching their focus from using radio frequency identification to track pallets and cases in their supply chains to monitoring unique items in stores. This shift was driven, in part, by studies conducted by the RFID Research Center at the University of Arkansas that showed using passive ultrahigh-frequency RFID systems to take inventory of apparel in stores could increase inventory accuracy from roughly 65 percent to more than 95 percent.

Subsequent trials found that improved in-store inventory accuracy often led to an increase in sales.

During the past few years, Bloomingdale's, Macy's, Lord & Taylor, Saks and other U.S. retailers announced they were using RFID in stores. This year, the pace of retailers worldwide adopting RFID technology to manage inventory has picked up (see *Retailers Already Sold on RFID* on page 14).

Now, some retailers are deploying innovative RFID solu-

ILLUSTRATION: ISTOCKPHOTO

tions to capture customers' attention and make a sale. Here's a look at some of the new applications being rolled out by retailers.

Alex and Ani, a U.S. jewelry and apparel retailer, deployed Bluetooth Low Energy (BLE) beacons at all 40 of its branded stores in an effort to engage customers by sending data directly to their mobile phones while they shop. The beacons, which are essentially active RFID transponders, were supplied by in-store mobile marketing company Swirl Networks. If a shopper has a Swirl In-Store Explorer application running on his or her handset, that individual can receive product information on the phone, based on the in-store location of that beacon (and, thus, that customer). The retailer is also able to collect information regarding customer interest and traffic. Timberland

and Kenneth Cole also have adopted the solution (see [Alex and Ani Rolls Out Swirl's Bluetooth Beacons at 40 Stores](#)).

Several retailers are planning to deploy a similar system developed by U.K.-based startup Iconeme, which uses BLE technology to enable store mannequins to transmit data to customers. The VMBeacon solution consists of a beaconing device installed inside a mannequin that transmits a signal to the Bluetooth reader built into a consumer's phone. In that way, individuals who pass in front of mannequins, either in a store or at a store window, can receive information about the garments that mannequin is wearing, including sizes, colors, prices and online buying options, as well as coupons (see [Iconeme Launches Bluetooth Beacon Solution for Mannequins](#)).



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Retailers Already Sold on RFID

The following companies are among those that announced this year they are using RFID in their operations.

Belt Liquors

The U.S. liquor retailer installed an RFID system that has eliminated the problem of tracking cases of product in its warehouse, which is adjacent to the store. Thanks to the solution, which the beverage company installed itself, managers now know what product is in the warehouse, and can conduct quick inventory checks at any given time to determine if that has changed (see [Colorado Liquor Retailer Gets Quick Payback From Low-Cost RFID Solution](#)).

Coccinelle

The Dutch retailer of children's clothing is employing RFID to improve inventory accuracy at its distribution center and stores, to ensure goods ordered online are, in fact, available, enabling the retailer to avoid having to cancel those transactions. Since the system was deployed, online sales cancellations have dropped by 60 percent (see [Coccinelle Finds RFID Virtually Eliminates Out-of-Stocks for Store and Online Sales](#)).

Intersport Jan Bols

The athletic equipment and clothing store in Hoogeveen, the Netherlands, has boosted sales and decreased inventory-monitoring costs thanks to an RFID solution that tracks approximately

10,000 items storewide, from back room to point of sale. Intersport International, based in Switzerland, is now deploying the technology at 10 additional Intersport locations throughout the Netherlands (see [Intersport Expects RFID to Boost Its Sales, Decrease Its Costs](#)).

ISA Boutique

This China retailer installed an RFID system to track fine jewelry. In addition to reducing out-of-stocks, the solution monitors when a piece of jewelry is removed from a cabinet and returned—and how often, providing analytics regarding how well customers like each item. The retailer is now planning to install the technology at another store (see [ISA Boutique Tracks Inventory, Shopper Behavior via RFID](#)).

Kohl's

The U.S. department store installed an RFID solution to track garments in select categories at its stores and distribution centers. Now, a large number of strategic apparel items, including footwear, denim and men's basics (such as underwear and T-shirts) are being tagged at various points along the supply chain, and then counted during regular inventory cycle counts via handheld readers (see [Kohl's Rolls Out RFID for Select Product Categories at Its Stores](#)).

Made.com

The designer-brand online furniture retailer is providing customers at its London showroom with tablets they can use to read NFC tags to learn about each product, while giving the retailer access to data about shopper behavior and preferences (see [Online Furniture Retailer Adds RFID to Its Brick-and-Mortar Showroom](#)).

Tara-Espen Dronsett, Follestad and Høyer

These three stores are among more than 40 fashion boutiques and small retailers throughout Norway that have begun using an RFID solution to reduce the amount of manual labor previously required to conduct inventory counts and ensure that goods are available when customers want them (see [Small Stores in Norway See Payback From RFID](#)).

Zara

The Spanish clothing retailer is using RFID in all its distribution centers and at more than 700 stores in 22 countries. Parent company Inditex revealed it expects to have the technology installed at nearly 2,000 Zara locations by 2016, with plans for a gradual rollout across the rest of its chains worldwide (see [Inditex CEO Announces RFID Expansion Plans](#)).

Tarrytown Pharmacy, in Austin, Texas, deployed a series of hybrid beacons—combining BLE and Near-Field Communication technologies—to enable customers to access coupons and promotional information regarding products via a simple tap of their mobile phones. The solution, provided by startup Shelfbucks, consists of the beacons and a Shelfbucks application that consumers download to display product and promotional information. If, for example, a customer taps a Shelfbucks beacon located in the store's cold and flu products section, he or she can receive information about facial tissues currently on sale (see [Shelfbucks' Bluetooth-NFC Beacons Bring Discounts to Tarrytown Pharmacy's Shoppers](#)).

Swiss online fashion company Heidi.com opened a brick-and-mortar store in Neuchâtel, Switzerland, where customers can purchase in-store merchandise and other products from the retailer's website. To make this possible, the retailer is issuing NFC loyalty cards to customers and has installed NFC readers in two large digital touch-screen kiosks known as "totems," which display a changing lineup of products. If a shopper sees something she wants, she can select the product and check its availability. If it is located in the store, she is directed to its location. If not, she can request that it be shipped to her home or delivered to the store for future pickup. In either case, she will receive a text message or e-mail containing a link to Heidi.com, where she can complete the transaction by approving a credit-card payment (see [Heidi.com's New Store Uses NFC RFID to Enable Omni-Channel Shopping](#)).

Social-Media Shopping

A few years ago, there was a lot of buzz about applications that allowed a consumer to take a picture of herself in an outfit and e-mail the photo to friends or family members to get their input. Store fixtures incorporating


the technology never caught on, but Ritani, a Seattle, Wash.-based jewelry company, has a new take on social-media shopping. The company recently launched a multistore pilot of an RFID solution that enables retailers selling Ritani jewelry to automatically display information about merchandise customers ask to see—and allow those shoppers to share the items' images and descriptions with friends prior to or after making a purchase. Store management can collect data regarding sales-floor behavior, including items viewed, percentage purchased and employees' sales rates (see [Ritani Creates RFID Solution to Engage Shoppers, Increase Sales](#)).

Enhancing Products


Designers that sell their own products online are using RFID to add pizzazz to individual items. Aki Choklat, a designer of shoes and accessories, for example, is selling a lady's handbag that links a digital record about each unique handbag with the physical product, via an NFC tag positioned under the label and an application the buyer uses to access the data. In addition, a smartphone application developed for Aki Choklat allows the bag owner to create a travel diary (see [Aki Choklat Brings Authentication and Personalization to Luxury Bags](#)).

Four Levent, a Swedish men's clothing startup, has begun marketing what it calls wearable technology, consisting of a shirt with an NFC tag embedded in each cuff. The tags are intended to transmit data—such as information about the shirt, or the wearer's contact information, company URL or full business card—to an NFC-enabled mobile phone (see [Swedish Men's Shirts Provide Off-the-Cuff Info](#)).

It isn't clear yet which, if any, of these applications will catch on with consumers and become widely adopted by retailers. But it is clear that RFID is becoming a permanent store fixture. —M.R.



Store management can collect data regarding sales-floor behavior, including items viewed, percentage purchased and employees' sales rates.





RE-EVALUATING

SUPPLY-CHAIN

RELATIONSHIPS

When customers help suppliers deploy RFID, everyone benefits.

BY SAMUEL GREENGARD

The word “mandate” looms large in the hearts and minds of many manufacturing, defense and apparel retail suppliers that have been asked to RFID-tag pallets, cases or items for their customers. Whether it’s called a mandate or a request, most suppliers view RFID-tagging shipments as a cost of doing business. Consequently, they opt for the easiest and least expensive slap-and-ship approach.

In this regard, little has changed since 2003, when Walmart first asked its suppliers to RFID-tag cases and pallets. The retailer’s request (Walmart didn’t use the term “mandate”) led to the notion that the technology was largely a tool that would benefit the customer. That notion was reinforced in 2004, when the U.S. Department of Defense announced its RFID-tagging initiative. Stories surfaced of firms placing tags on pallets and cases without adhering to any quality-control standards. Whether the tags worked correctly was secondary to meeting Walmart’s or the DoD’s mandate.

Slap and ship remains the order of the day for far too many contractors, says Don Ertel, senior VP of operations at CDO Technologies, a systems-integration firm that manages major RFID initiatives for government and industry, including the

DoD. “Executives at suppliers continue to think in limited terms, because they’ve grown accustomed to a sale as a simple and straightforward transaction rather than something that’s part of a larger business ecosystem.”

Apparel retailers are now experiencing similar reactions from their suppliers. Most retailers have been RFID-tagging apparel items from different manufacturers, either at their distribution centers or when the goods arrive at the stores. But the process is inefficient, and they would like to see their suppliers do the tagging. The suppliers see RFID as an additional cost and believe all the benefits go to the retailer.

“There’s been a perception that the reason to use RFID is because a big gorilla customer has demanded it,” says Ian Robertson, CEO of Supply Chain RFID Consulting. “Unfortunately, this thinking diverts attention away from the opportunities and possibilities that RFID provides.” In fact, Robertson, who introduced the term “slap and ship,” bristles at the mention of the concept, which he says has been misconstrued. “I always thought suppliers should do *more* than slap and ship,” he says. “The goal should be to use RFID to drive internal gains as well as better performance across a supply chain.”

To that end, a lot has changed since Walmart first asked suppliers to use RFID. Many legitimate supplier complaints—tag costs are too high, read rates are too low, there’s no business case—have been addressed. The price of tags, readers and middleware has fallen, and the technology is more reliable and easier to deploy. In addition, early adopters and industry groups have developed solid business cases for suppliers.

Yet, while there’s a growing acknowledgment that RFID fuels gains, there’s a general lack of understanding about how to use it in a more dynamic way, Ertel says. “We see a lot of niche and specialty uses, but not many organizations

he says. “A lot of opportunities are flying below the radar because both suppliers and upstream supply-chain partners are busy with so many initiatives, and they haven’t examined or reexamined RFID over the last few years.”

INTERNAL BENEFITS

Suppliers that ask, “What’s in it for me?” should consider that they have many of the same problems as their customers. They, too, could benefit from using RFID to track and manage inventory, tools, work-in-process and finished goods in their factories and warehouses, as well as to authenticate their products.

Killdeer Mountain Manufacturing, for example, a small family-owned company in North Dakota that makes aerospace components, deployed an RFID work-in-process application to track orders for Boeing. Killdeer improved customer relations and transformed its own operations, shaving costs and streamlining processes. Warmkraft, a Mississippi company that applies finishes to military uniforms, has reduced its manual shipping labor costs and lowered its shipping-error rate by RFID-tagging its products at the item level after those goods are treated, and by then reading the tags prior to shipment.

In the retail arena, a report from the University of Arkansas’ Information Technology Research Institute has identified 60 unique business cases for apparel suppliers. They fall into three categories: quality management, inventory management, and inbound and outbound. The applications revolve mainly around receiving accuracy, pick and pack accuracy, shipping accuracy and electronic proof of delivery (EPOD), says Bill Hardgrave, dean of Auburn University’s Harbert College of Business and



“Too many suppliers are attempting to respond to retailers requesting them to tag rather than looking at the underlying business case for RFID.”

—BILL HARDGRAVE, AUBURN UNIVERSITY

and supply chains taking a more comprehensive view of how to move from incremental gains to more substantial benefits.”

Many suppliers have settled into a business-as-usual approach, Robertson says, but they can benefit immensely by taking another look at the business case for RFID. “Advances in the technology have opened the door to possibilities that didn’t exist only a few years ago,”

founder of the RFID Research Center.

“Too many suppliers are attempting to respond to retailers requesting them to tag rather than looking at the underlying business case for RFID,” Hardgrave says. “The thinking needs to shift from viewing RFID as a necessary cost of business to recognizing it as a genuine opportunity to drive business gains. There are enormous possibilities for suppliers that understand the business case for using the technology within their own facilities, including tagging items as close to the point of manufacture as possible.”

Suppliers that adopt RFID to improve processes and workflows in a way that isn't possible with older and less automated systems are also likely to achieve other gains, says Diana Hage, CEO of consulting and integration firm RFID Global Solutions. “It's not just about having information to drive better decision-making among managers and executives,” she says. “There are CAPEX [capital expenditure] spending reductions.”

SUPPLY-CHAIN BENEFITS

Today's business relationships and supply chains are deeply interwoven. Suppliers need to source and acquire raw materials and components from different companies that become part of the product that's shipped off to a customer.

Suppliers that can track materials and goods from *their* suppliers can develop a real-time inventory model. This makes it possible to trim costs and inefficiencies related to carrying too much or too little inventory. It also means not having to stop production lines because of a shortage of raw materials, as well as being able to fulfill customer orders on time.

Then, instead of just slapping and shipping goods to customers, suppliers could use the

RFID tags to ensure orders are filled correctly, and automate the process of reconciling what was received against what was shipped with EPOD. Often, suppliers are fined because customers claim their orders were not delivered correctly, Robertson says, even though studies show most errors occur on the receiving dock (see [An Impartial Observer](#)). In addition, once goods are tagged, they can be used to support auto-replenishment (see “A Win-Win for Suppliers” on page 45).

CDO Technologies' Ertel says organizations must understand where a value proposition lies. Tagging specific ingredients, materials and components at the item level, for example,



“It's not just about having information to drive better decision-making among managers and executives. There are CAPEX spending reductions.”

—DIANA HAGE, RFID GLOBAL SOLUTIONS

can benefit all stakeholders—retailers, manufacturers and suppliers—by establishing traceability back to the point of origin. This makes it possible to trace and track food items, cosmetics, automotive and aerospace components and scores of other items. “If a recall takes place,” he says, “it makes it a lot easier to locate the product, pull it from shelves and recover it in a timely manner.”



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TACKLING CHALLENGES

Suppliers, like other adopters of RFID technology, will have to identify the business problems they want to solve, and then bone up on RFID to learn which system is best for their needs. Establishing a crossfunctional team is vital to identifying opportunities and interconnecting processes and systems for maximum performance and return on investment, Hage says. “It’s all about figuring out how to best leverage the wealth of information in ways that make a business operate better and delight customers,” she says.

Fortunately, there’s a lot of information



“**T**hey take on projects that fail and it gives RFID a bad name. It reinforces the notion that it’s nothing more than a slap-and-ship tool...”

—DON ERTEL, CDO TECHNOLOGIES

available to help suppliers deploy a system successfully and manage the inevitable change to employees’ jobs and workflows (see [How to Choose the Right RFID System: A Step-by-Step Guide](#) and [Best RFID Deployment Practices](#)). GS1 US offers the [EPC Item-Level Readiness Program](#), which provides education, training, tools and community support to help apparel suppliers implement Electronic Product Code item-level tagging for day-to-day operations.

It’s important for suppliers to take advantage of the knowledge acquired by early adopters before unleashing a project on the company. In some cases, IT departments lack knowledge and experience with RFID but perceive that switching on a system is a fairly straightforward proposition, Ertel notes. Consequently, he says, “They take on projects that fail and it gives RFID a bad name. It reinforces the notion that it’s nothing more than a slap-and-ship tool—and that RFID is nothing more than a way to meet the letter of the law rather than a business opportunity.”

One of the biggest challenges for some suppliers considering RFID for supply-chain management is that they lack a unique identity for products they produce, Robertson says. Assigning a unique serial number to each item they want to track—a process called serialization—requires a well-thought-out plan. But here, too, there are guidelines and best practices (see [Identifying Items](#) and [Serialization Road Map](#)).

In addition, suppliers, including those in industries that have already serialized items, must collaborate with supply-chain partners to design a system that works across multiple companies and environments. The discussion should focus on how to take a distributed approach from manufacture to point of consumption, Robertson says. “Start with your supplier to see if you can agree on which goods should be tagged and how the collective costs are borne on a fair and equitable basis,” he advises. “If you can solve the problem with your

supplier, it’s a lot easier to then work with the next player in the chain—your customer.”

SUPPLIERS NEED HELP

Many suppliers—particularly smaller firms—do not possess the expertise, resources or

budget to identify RFID opportunities and put them into play. Moreover, these businesses regularly face challenges in designing and building systems compatible with multiple upstream partners. In addition, trust issues sometimes arise, particularly when proprietary data is shared across organizations.

A significant problem, Hardgrave says, is that many of today's RFID initiatives are not scalable. A particular company embarks on a project to address a specific need, but the system doesn't necessarily mesh with other systems and firms. At the outset, he says, there's a need to build in governance, standards and policies—but expand the planning beyond the IT departments, which often have a limited scope.

The upshot? “Larger firms must educate suppliers about the benefits of RFID and also consider paying for projects or at least incentivizing them,” says Richard Aufreiter, director of product management for identification technologies at HID Global.

To work with suppliers effectively, it's important to identify the key business and technology decision makers and enlighten them about the benefits and ROI associated with RFID, Aufreiter says. Past success stories or case studies and cost-benefit models that demonstrate the financial gains are particularly effective. It may also be necessary to walk business leaders through a nontechnical presentation about what an initiative has to offer and what benefits will accrue. “There remains a huge gap between the RFID technology industry and the non-RFID world,” he says.

Often, getting a project off the ground requires the provision of funding for outside consultants and integrators to ensure that systems and data connect across organizational boundaries as well as different IT environments, Aufreiter says. It may mean developing middleware and coding new application programming interfaces (APIs). There's almost

certainly a need to examine workflows and reengineer processes with the right external touch points. In some cases, different manufacturers or distributors may want to focus on different problems or opportunities, he adds.

It's also important to provide training and development sessions that focus on how to use an RFID system successfully on a day-to-day basis—as well as how to harness it within a broader strategic framework. The initial project may serve as a starting point for the supplier to launch additional projects that produce bigger gains. The end goal, CDO Technologies' Ertel says, is to establish a technology platform that supports communi-



“Larger firms must educate suppliers about the benefits of RFID and also consider paying for projects or at least incentivizing them.”

—RICHARD AUFREITER, HID GLOBAL

cation, collaboration and data exchange. “While many suppliers benefit from these systems, they either can't see or can't establish the business case on their own,” he says. “Some suppliers can't afford to pay for consultants, integrators and others.”

Suppliers that want to push forward with an initiative should “focus on finding an anchor partner or tenant that adds value and expand from there,” Hage says. “Define the goals, iden-

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tify the systems, understand the interchange of data and delineate the reporting structure.” She also believes it’s critical to establish a Single Source of Truth (SSoT) database for asset records.

MUTUAL BENEFITS

Achieving RFID’s full potential means large organizations and their supply-chain partners must approach the technology with the idea of building systems that benefit everyone involved. Jet maker Airbus, for example, developed a three-phase program to improve business processes and provide real-time automated visibility across its entire value chain of operations, from suppliers to customers, says Carlo Nizam, head of value chain visibility and auto ID. “We want to encourage all the players to join in the party,” Nizam says. “It is in everyone’s interests to reduce costs.”

When Valtra, a Finnish manufacturer of custom tractors, wanted to ensure its factory was always stocked to fulfill orders, it worked with one of its suppliers, Metal Power, to deploy an RFID system that tracks parts from the suppliers’ facilities to Valtra’s warehouse. The solution automates and streamlines parts replenishment and parts inventory management processes for Valtra, and also benefits Metal Power by providing visibility into inventory levels and parts consumption at the factory.

The work-in-process solution that Killdeer Mountain Manufacturing deployed was funded by the U.S. Air Force and developed by KMM, Boeing, the Air Force Manufacturing Technology Division and several RFID solution providers. Providing up-to-the-minute information regarding the status of its products helps Boeing, one of KMM’s main customers,

better plan its production schedules.

RFID adoption will steadily grow as suppliers recognize what RFID has to offer and how the technology can improve both internal processes and supply chains, says John Devlin, practice director at ABI Research. For now, Devlin suggests larger supply-chain partners aid in identifying benefits—particularly in the asset-management space—and build on slow but steady advances. “RFID will ultimately be widely used because it adds intelligence to systems,” he says.

Supplier adoption will result more from the “pull” of large firms rather than a push by suppliers, Hardgrave says. “The hope is that once suppliers begin tagging products they



“**W**e want to encourage all the players to join in the party. It is in everyone’s interests to reduce costs.”

—CARLO NIZAM, AIRBUS

will see the benefits beyond what they now receive by operating under the mandate of a retailer or manufacturer.” At that point, he says, adoption will likely take off and far more substantial gains will result.

“Businesses that deploy RFID more comprehensively gain a more strategic view of assets, products and the supply chain,” Hage says. “Suppliers are only beginning to wake up to this fact.” ■



PHOTO: COOPERATIVE VEILING HOLA MBRA

CULTIVATING



BY JENNIFER ZAINO

Horticultural firms achieve benefits from tracking returnable transport items, while nurseries, governments and researchers develop business cases for monitoring individual plants.

HOLAMBRA, A MUNICIPALITY in São Paulo, Brazil, is known as the City of Flowers. In 1989, the Cooperative Veiling Holambra (CVH) was established to market flowers and plants from roughly 400 farmers to domestic and international distributors and wholesalers. CVH rents more than one million returnable transport items (RTIs)—including metal trolleys, plastic buckets and trays—to producers and clients, to move flowers between different areas of its 80,000-square-meter (262-square-foot) warehouse and auction facility in Santo Antonio de Posse, a city roughly 250 kilometers (155 miles) from São Paulo.

Until recently, CVH tracked and managed the RTIs manually, a process that was labor-intensive and error-prone. This spring, following a 12-month project to design, test and implement an RFID system, CVH began tracking RTIs automatically. The company installed 25 fixed portals equipped with Impinj readers at dock doors and other strategic locations throughout the facility, so any RTI, empty or full, must pass through a portal as it is moved from one location to another. Plastic RTIs are identified with Confidex Pro ultrahigh-frequency EPC Gen 2 tags; metal RTIs are tracked with Smartrac Dogbone tags. Coss Consulting, a Brazilian RFID service provider, developed custom software for the system.

“By automating the RTI material counting with RFID in all areas and processes and tracking their life cycle,” the flower co-op reports, “CVH is now able to count RTIs faster, with better accuracy in their operation, and produce key information

on the fly for its business managers, saving a huge amount of labor time.” Each tag is encoded with a GS1 Serialized Global Return Asset Identifier (SGRAI) number, which can be used to manage regular maintenance and repair records.

Next up, CVH intends to orchestrate a flower supply chain to further improve logistics. The co-op plans to install the RFID asset-tracking solution at its flower producers’ and clients’ facilities.

CVH is not the first horticultural company to adopt RFID for managing RTI assets. Container Centralen, a Dutch horticulture logistics supplier, has been employing the technology in its European and U.S. operations for a few years. Now, the industry is developing the business case for using RFID-tagged RTIs to improve supply-chain and business processes. In addition, there’s growing interest in tracking individual plants to boost inventory accuracy, regulate a budding legalized marijuana industry and manage water conservation (see “RFID in the Nursery” on page 30).

PLANTING THE SEEDS

In 2007, Container Centralen (CC) began piloting passive ultrahigh-frequency RFID technology to manage its assets. Two years later, the company’s U.S. division began identifying its RTIs with active RFID tags, and in 2011, the firm fitted all the RTIs used in its European operations with EPC Gen 2 RFID tags.

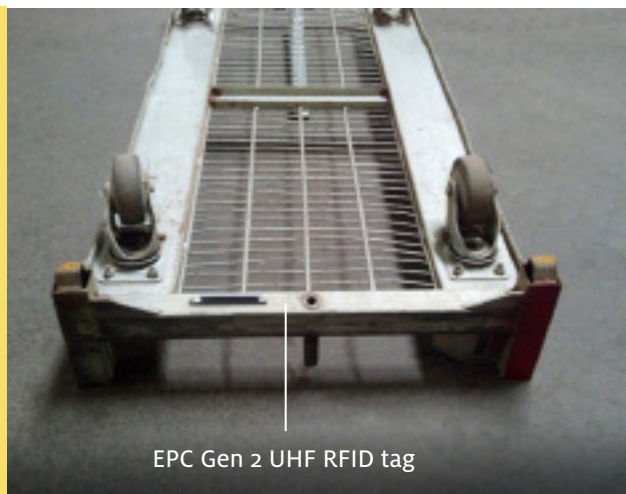
CC's European clients—small and large growers, wholesalers, transport companies and retailers—generally subscribe to long-term trolley hire contracts. Some 22,000 customers use the trolleys on their own premises, and typically exchange those filled with flowers or plants for empty ones, or vice versa. CC RFID-tagged its 3.84 million trolleys to combat the use of counterfeit containers and theft. RFID readers were installed at 60 CC depots and four repair shops. Customers use handheld readers to authenticate a tagged

in 100, 200 and 300 containers, respectively," Spaeth says. "We make sure everything comes back from Metro, and we tell the supplier where to pick up the [replacement] carts that are available for them. So we know what the items are—what was delivered—and we organize quantities on return flow so the supplier can go to just one location to pick up what is available for them instead of five."

In the United States, RFID replaced a barcode "honor" system that didn't automatically track assets. "There was always the suspicion

"There is a very clear indication that before the introduction of RFID, there was an inflow of copies of our trolleys, and we can see, when we run the same analysis now, that this negative trend was broken."

—FLORA SPAETH, CONTAINER CENTRALEN



EPC Gen 2 UHF RFID tag

trolley before making a swap.

"There is a very clear indication that before the introduction of RFID, there was an inflow of copies of our trolleys, and we can see, when we run the same analysis now, that this negative trend was broken," says Flora Spaeth, the firm's European sales manager. That's good for Container Centralen and good for its customers, she says, since rising repair costs for counterfeit items would impact the fees for use of the company's trolley pools.

Shortly after CC completed its European tagging deployment, the firm began helping some retailers manage their container operations. CC is working with German retailer Metro, for example, to confirm the authenticity and number of delivered containers, to better handle disputes regarding counts.

"At Metro, we do collection services, meaning we control that Supplier A, B and C handed

from the customer that the next guy was not scanning, and was free-riding," says Sonny Costin, CC's president. With RFID technology in place, he adds, "We now have a very sophisticated asset-tracking system."

The business model in the United States required CC to adopt active RFID technology to track approximately 450,000 racks that are transported across multiple facilities, Costin says. In addition, customers generally move assets around very large open shipping docks. "Our readers see within a range of 200 to 300 feet, and that covers the whole dock," he says.

Roughly 200 customer locations are equipped with RFID readers, as well as 50 CC depots where unused racks are stored. A farmer, for example, could rent racks to deliver flowers to a retail site. At the store, the farmer could pick up empty racks left by another CC customer, or CC could take the empty racks.

“We are trying to get assets away from retail stores as quickly as possible,” Costin says, because when they are not moving, they are not being used efficiently. The RFID system automates the process of identifying who is using the equipment and transferring it from one customer account to another at a low cost, efficiently, he says.

This season, CC began opening up the tracking system so customers can track their own racks. “We are the biggest single pool rack provider, but collectively U.S. growers own a

ging trolley shelves so its customers could link product, sales and order data for the items on each shelf with information about the trolley’s physical location. The application is being considered, especially given a new European Union directive that will require companies to be able to trace edible plants within a couple of hours in the case of recalls, says Léonard Smits, CC’s RFID implementation officer.

“The role of RFID will grow in that respect,” Smits says. While a single tag on a trolley can trace these plants if all the items are going to



The FloraHolland cooperative flower auction in The Netherlands, which tracks the Container Centralen tagged trolleys that enter its premises to verify authenticity, is also RFID-tagging some 300,000 of its own flower trolleys.

couple of million of their own racks,” Costin says. “We are providing a consolidated tracking system that allows seamless tracking and reporting for all the assets they use for deliveries to retail stores.

“Having great data about where your assets are is super important,” he adds. “You can see the net balance of your assets, and that can guide you on how to best set up trucks to pick them up so you can minimize the cost of recovering those assets.”

TAKING ROOT

Container Centralen’s European customers are beginning to understand they can leverage the tagged trolleys to increase supply-chain visibility and, for example, identify the status of their orders. At the RFID Journal LIVE! Europe 2011 event, CC executives discussed RFID-tag-

ging the same retailer, the situation is trickier if a trolley’s contents are distributed to more than one market, he explains.

The FloraHolland cooperative flower auction in The Netherlands, which tracks the CC tagged trolleys that enter its premises to verify authenticity, is also RFID-tagging some 300,000 of its own flower trolleys, with an eye toward improved logistics business processes, says Sander Merckx, a partner at systems integrator Mieloo & Alexander, which works with FloraHolland and other horticultural concerns on RFID efforts. Mieloo & Alexander created the Morph Stick—a Nordic ID Morphic hand terminal mounted on a stick reader—so tags at the bottom of carts can be read without the user having to bend down; the device also avoids crossreads from adjacent carts.

The RFID initiative was set in motion as part of a refurbishment when FloraHolland Naald-

RFID in the Nursery

CAN GROWERS GAIN VISIBILITY into the location of plants as they are moved from field to storage, or between sites or within a greenhouse? Is there a more efficient way to manage irrigation and fertilization schedules? These are just two of the questions Tom Fernandez, a professor in the department of horticulture at Michigan State University, aims to answer as he studies RFID-tracking individual plants to improve nursery operations and the environment.

Under Fernandez's direction, Michigan State is working with J. Frank Schmidt and Son, a large U.S. tree and shrub nursery, on a three-part project designed to determine whether passive ultrahigh-frequency RFID technology can be used to boost inventory accuracy. The team has completed the first component, which involved tagging bundles of 10 shrubs or trees when they were harvested, and then loaded onto tagged pallets to be moved to storage. The bundles were associated with the pallet in the nursery's database, so the trees could be tracked by reading the pallet tag as it moved through RFID portals. That addressed the concern about trying to read individual bundles when they are densely loaded on a pallet, each holding water that could attenuate the RFID signal. The effort had "really good success," Fernandez says.

The second part involved tracking "starter" plants as they pass through RFID portals before being loaded on trucks for shipment to nursery customers. The team plans to integrate the tag reads with the nursery's inventory system. "It is such an intense time during harvest—such a short window to do things—so you can lose track easily of where items are in storage and would benefit from more up-to-date inventory for better sales," Fernandez says.

The third part, now under way, involves tracking potted plants stored on beds roughly 160 feet wide and hundreds of feet long. "We have tagged the trees and are seeing how far into that width we can penetrate [using RFID readers mounted on hand trucks]," Fernandez says. Reading through tree canopies that hold lots of water is a consideration, he says, but reading through the width of the beds is the real challenge.

The team expects the project will show that for a relatively small investment in RFID technology, significant savings can be realized. As in other industries, automating processes should reduce human error in counting and database entries, as well as labor. Greenhouses and nurseries could also save the cost of waterproof paper and other expensive materials needed to manually track inventory in dirty, moist and humid conditions.

On another front, Michigan State is working on a joint water and



Bundles of harvested trees are RFID-tagged and then loaded onto tagged pallets.

nutrient conservation project with seven other universities and sensing technology company Decagon Devices. The team has applied for a grant from the U.S. Department of Agriculture to conduct the project with four nurseries. The idea is to use sensors to determine soil moisture and nutrient content, and schedule irrigation and fertilization based on that information.

The team plans to install the sensors on potted plants in a concentrated area, where they can be easily maintained. All the potted plants in the nursery will be RFID-tagged for identification and location purposes, and plants with similar moisture and nutrient requirements will be linked together in a database. "So we'll monitor one group with the sensors, and then use RFID to apply that information to irrigate and fertilize the rest of the similar plants," Fernandez says.

Nurseries could use RFID to make sure potted plants, which tend to be moved around a lot, stay grouped with other plants that have similar water and nutrient requirements, Fernandez says. This would help eliminate overwatering and other problems that can occur when plants with different requirements are mixed. It would also help nurseries conserve water and nutrients, he says, and grow plants faster, with fewer problems from pests, diseases and weeds.

In addition, the RFID solution should result in less runoff water from nurseries and greenhouses, Fernandez says. The nutrients in runoff stimulate plant growth in lakes and streams, which cuts off oxygen to fish and other organisms. —J.Z.

wijk merged with the flower auction in Bloemenveiling Aalsmeer and several other smaller auctions and wanted to standardize on a single trolley design. The trolleys are used for transport around the site—including “an auction hall premises larger than Monaco,” Merkx says. Flower buyers’ items travel from the auction floor to their own shipping areas. In addition to tracking the trolleys, RFID could speed up the distribution process. That, in turn, could facilitate shipping, which could help ensure flowers are still fresh when they get to retailers.

RFID is also used to manage the rented trolleys some buyers take off-site to their own facilities. Each trolley is equipped with a lock plate that has an RFID tag. When the trolleys are returned, FloraHolland employees remove the lock plates, and the renters return them at the service desk to get back their deposits and have rental fees deducted from their balances. “RFID helps with this,” Merkx says, “for process efficiency. It’s all about volume.... The lock plates can be pushed in stacks of 10 over a reader and the return process is faster.”

FloraHolland is now considering using RFID to automate the manual processes used to count all its trolleys, a task it undertakes six times a year, involving roughly 100 people working overnight, Merkx says. “We have tested an electric pulley equipped with RFID scanners to see if we could use that to do counting automatically and are contemplating its use.”

Merkx is also fielding questions from some FloraHolland buyers that want to know how they could benefit from RFID. An export company, for example, is interested in using the RFID tags on the trolleys and lock plates to get better process control between its box at the auction and its own logistics operations. “They have two outside facilities where they do sorting, produce bouquets and create customer shipments, and between those facilities they lose a lot of visibility,” he says. “They want more visibility, and they want to use RFID tags for that. I think this is only a matter of time, and it is a good thing that the two main trolley RTIs being used in the sector are equipped with RFID tags.”

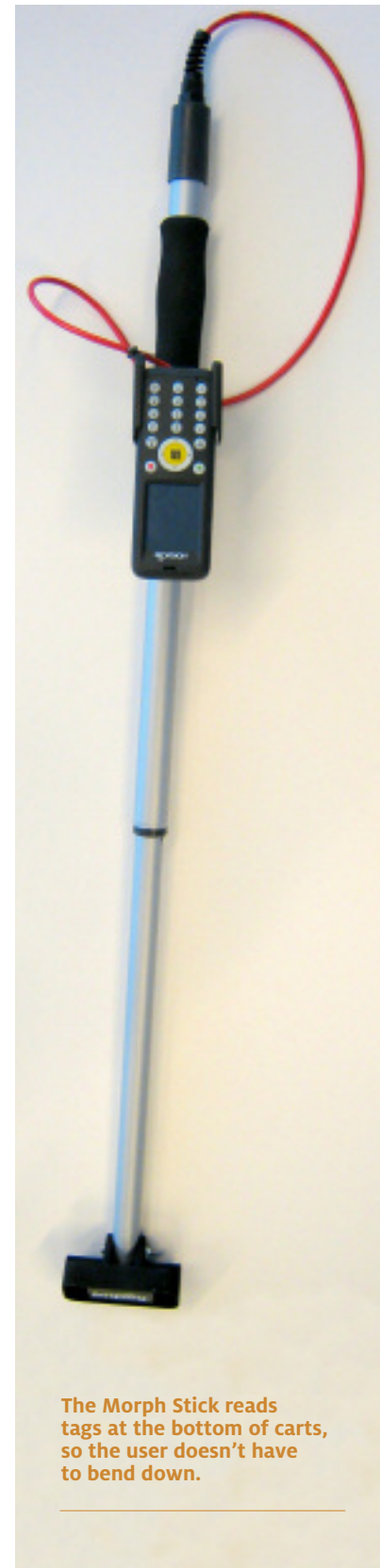
GROWING APPLICATIONS

The horticulture sector is made up of a lot of small companies, Merkx explains. Even large growers and buyers are more like mom-and-pop shops compared with suppliers and distributors that populate sectors such as the auto industry. “They don’t have a lot of innovation budget or technology managers to embrace the concept, and then the budget to trial and test it,” he says.

Still, some of these shops are beginning to adopt RFID to manage trolley asset-tracking and supply-chain logistics. Take, for example, Color Point, a Kentucky greenhouse operator that supplies plants to Lowe’s, Walmart and other retailers using its own mobile carts, which double as display units at the retail sites. Color Point deployed a passive RFID system for order management and inventory tracking that includes RFID portals, labels, handheld and fixed readers, and asset-tracking software. With RFID tags attached to each end of the cart, the company now has the ability to read them as they ship out to each retail customer, match their serial numbers to orders for accurate load numbers and destinations, improve visibility into returned assets and invoice customers for carts that don’t make it back.

In Europe, there’s interest in tracking individual potted plants in the nursery to manage their growing process. But the next RFID application to take hold in the horticulture sector could be monitoring flower buckets, which are a standardized item in Europe.

There’s also an RFID application that most industry experts didn’t foresee. As U.S. states and other countries begin to legalize the sale of marijuana, RFID is being adopted to help regulate the market. Colorado requires growers, processors and retailers of medical or recreational marijuana to use EPC Gen 2 passive RFID tags to authenticate each plant or product. Growers need to tag each plant so it can be tracked from the greenhouse in which it is grown to the store where the drug is sold. Uruguay is also implementing an RFID solution to monitor the legal marijuana industry in that country. ■

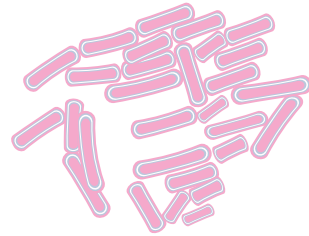


The Morph Stick reads tags at the bottom of carts, so the user doesn't have to bend down.

RFID Helps Hospitals Clean Up Their Act

BY AMY LIPTON





Hand-hygiene monitoring solutions reduce infection rates and related costs.



FOR MORE THAN A DECADE, the World Health Organization, the Centers for Disease Control and Prevention and other agencies have promoted awareness of the critical role hand hygiene plays in preventing the spread of bacteria that cause health-care-associated infections (HAIs) in hundreds of thousands of hospital patients annually. For 2014, as part of its annual “Save Lives: Clean Your Hands” campaign, WHO is emphasizing the intensifying threat of multidrug-resistant organisms, such as *E. coli*, pneumonia and sepsis, as well as the relationship between hand sanitation and the transmission of these germs.

Yet while most hospitals are likely aware of that relationship, they still struggle to enforce hand-hygiene compliance. Medical

In addition to reducing health-care-associated infections, RFID hand-hygiene solutions can deliver a return on investment.



Proventix Systems' nGage solution uses active RFID technology.

facilities typically have hand-sanitation stations outside and/or within patients' rooms, but doctors, nurses, technicians and others either fail to use them when entering and leaving a patient's room, or do not do a thorough job of washing their hands. Some hospitals assign staff members to unobtrusively monitor and manually record health-care workers' hand-hygiene behavior, but the results tend to be unreliable and any improvements short-lived.

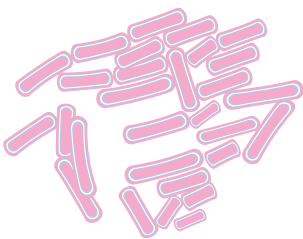
More reliable and effective are radio frequency identification solutions that automatically monitor health-care workers' hand-hygiene behavior and use the collected data to pinpoint problem areas or individuals, to help the hospital effect change. Alabama's Princeton Baptist Medical Center, for example, deployed Proventix's nGage hand-washing compliance system in February 2010. The system enables users to view messages or news items on screens mounted above each soap or alcohol dispenser. During a 44-month follow-up study, the hospital reported a 217 percent improvement in hand-hygiene compliance

and a 20 percent reduction in HAIs, resulting in a reduced length of stay of nearly 1,200 days and a cost savings of more than \$1.5 million.

Similarly, this year, England's New Cross Hospital introduced a hand-hygiene solution from CenTrak that enables personnel to view their compliance rates at any time, via touch-screens installed throughout its premises. As a result, the hospital reports, compliance rates have increased.

In addition to reducing HAIs, RFID hand-hygiene solutions can deliver a return on investment. U.S. hospitals, for example, typically receive little or no reimbursement from the Centers for Medicare & Medicaid Services (CMS) or private insurance providers for patient care attributed to such infections.

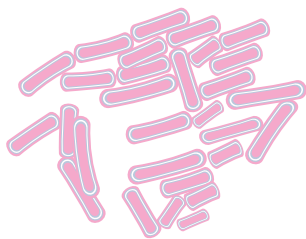
"If you're a hospital administrator or infection preventionist at a 150-room hospital with 10,000 admissions a year, with a typical HAI rate of 5 percent, that's 500 HAIs annually at an additional cost of care per patient of \$20,000, or \$10 million annually," says Harvey Nix, Proventix's CEO. "So there's an opportunity to recover a big number with a hand-hygiene



Some Leading Providers of RFID Hand-Hygiene Solutions

Company	Product	Hardware	Software
Airista www.airista.com	Hand Hygiene Compliance Monitoring Solution	Wi-Fi-based RFID badges; detection units for room-level monitoring; works with any soap or sanitizer dispenser	Healthcare Visibility Suite Software Console
CenTrak www.centrak.com	Hand Hygiene Compliance	Hybrid infrared and active RFID staff badges; IR receivers; works with any soap or sanitizer dispenser	Hill-Rom and TeleTraking Software
Elpas (Tyco Security Products) www.elpas.com	Elpas Hand Hygiene (offered outside North America)	Elpas active RFID badges and readers; Elpas low-frequency beacons and infrared receivers	Eiris Tracking and Management Software
Gojo Industries www.gojo.com	Gojo SmartLink	Wi-Fi-based RFID badges from AeroScout or Ekahau; integrates with Gojo's SmartLink dispensers	Gojo SmartLink
Proventix Systems www.proventix.com	nGage	Active RFID tags and readers; works with any soap dispenser or sanitizer	nGage for reporting; nQuire for custom analytics
Stanley Healthcare www.stanleyhealthcare.com	Hand Hygiene Monitoring Solution	Wi-Fi-based RFID badges; ultrasound exciters for room-level monitoring; integrates with Ecolab and Gojo hand-hygiene dispensers	Stanley Healthcare MobileView
Versus www.versustech.com	SafeHaven	Hybrid infrared and active RFID badges; RFID readers and IR receivers; integrates with Georgia-Pacific soap/sanitizer dispensers	Versus Advantages Hand Hygiene Safety

An RFID hand-hygiene solution can be a standalone system, deployed one unit at a time, or part of a real-time location system that can be used to track assets and monitor patients.



CenTrak uses infrared and active RFID technologies.

solution alone, and a bigger opportunity to recover outcomes for the patient. There's a direct savings to the organization in terms of both clinical improvements and financial benefits."

Yet, it's estimated that RFID hand-hygiene monitoring is in use at only 1 percent to 5 percent of hospitals worldwide. While acute-care hospitals are the primary target of most RFID-based hand-hygiene vendors, they say other markets—including community health centers, senior-living facilities, physician offices, schools and food services—stand to benefit from the technology, and have begun to express interest.

The hand-hygiene compliance market "is still in its infancy," but growing competition is driving "faster and better product development," says Brett McGreaham, hand-hygiene product manager at Versus Technology, whose solution is now in use at six U.S. hospitals. "Many companies are trying to provide a solution since there is a very evident need for actionable data surrounding best hand-hygiene practices."

That means hospitals have a choice when it comes to tackling the problem. In general, a hand-hygiene solution monitors whether a health-care worker wearing an RFID-enabled ID badge stops at a sanitization station—and, if so, for how long. An RFID reader transmits data about each hand-washing event—the dispenser location, the length of action, the type

of sanitizer and so forth—to a hand-hygiene software application that ties into a hospital's broader infrastructure of servers and databases. Each event is associated with a particular unit, floor or individual, so administrators and hospital personnel can view compliance reports and dashboards, and then follow up with training as necessary.

But RFID hand-hygiene solution providers employ different technologies to achieve these goals. The best approach for your hospital depends on the technology already in place at the facility, as well as your organization's budget and long-term plans. Here are some issues to consider. See the table on page 35 for some leading hand-hygiene solution providers.

STANDALONE VS. RTLS

An RFID hand-hygiene solution can be a standalone system or part of a real-time location system (RTLS) that can be used to track assets and monitor patients. It can be deployed throughout a hospital or one unit at a time.

Pennsylvania's Robert Packer Hospital, for example, deployed Proventix's nGage solution within its 5 Main Oncology Unit, where patients are especially vulnerable to infection. The system, which uses active RFID technology and proprietary software, is brand-neutral, so the size and style of the existing dispensers and sanitizers were not a factor (see [Hospital Deploys RFID to Boost Hand-Washing Compliance](#)).

New Cross Hospital, on the other hand, first deployed an RTLS solution from CenTrak to track assets and monitor the locations of patients and workers to improve services. A year later, the facility added the hand-hygiene application. The CenTrak solution uses the hybrid combination of infrared (IR) and RFID technologies to pinpoint the location of a tag or badge specific to a particular room—or, in some cases, to a given patient bed (see [New Cross Hospital Boosts Handy Hygiene, Efficiency via RTLS](#)).

Stanley Healthcare, whose parent company, Stanley Black & Decker, purchased Wi-Fi RTLS vendor AeroScout in 2012, now offers an RFID-

based hand-hygiene application. “We have north of 1,000 customers doing RTLS, mostly for environmental monitoring, asset management, nurse call or patient flow,” says Joel Cook, Stanley Healthcare’s solutions director. “Many of them have been coming to us saying, ‘We have an issue with hand hygiene... We’re getting pressure from the regulatory agencies...’ That’s what usually gets the conversation started.” The solution allows hospitals to compile data and produce reports for regulatory bodies and internal auditors, Cook notes.

If an existing customer wants to add hand-hygiene monitoring, Cook says, “We upgrade or replace the existing dispensers on the walls and add Wi-Fi tags to [employees’ ID] badges if they’re not already there. Then we install our MobileView hand-hygiene module so it automatically detects each dispenser, and configure the Tableau business intelligence software and dashboard.” A recent pilot deployment carried out on a 30-room cardiac unit with 50 employees took approximately three days, including software installation and configuration, as well as dispenser upgrades and additions. The upgraded dispensers trigger the Wi-Fi tags to transmit only when a dispense event occurs, providing the location, the time, and the name and role of the person who triggered it.

Versus, which partners with cleanser vendor Georgia Pacific, says its hand-hygiene solution does not burden a hospital’s existing Wi-Fi system. This setup is designed to eliminate interference, McGreaham says, “especially with electronic medical records now competing for Wi-Fi space.”

Costs range widely due to scalability, McGreaham notes. “If you install an entire network from scratch, it’s going to cost more than if you just add one application,” he says, explaining that Versus’ RTLS can be used for multiple applications, such as asset management, environmental monitoring, nurse call and patient flow. “There are all sorts of variables,” he states. “It depends on the size of the hospital, the unit and so on. We usually work with the infection preventionist or someone



Stanley Healthcare’s solution is Wi-Fi based.


else tied to the clinical realm to help make those decisions.”

MISSED OPPORTUNITIES


Increasingly, hand-hygiene solutions are incorporating workflow data to better understand employees’ behavior. The longer a caregiver remains in a room, for example, the more likely he or she has touched a patient, performed a procedure or come in contact with a potentially contaminated surface that would require hand washing to ensure patient safety. Without direct video surveillance, it is difficult or impossible to know if such an event has taken place, so vendors use time in the room as a proxy for this parameter.

“The technology has advanced to the point where compliance can be monitored at the room level,” Versus’s McGreaham states. “Traditionally, the data has been aggregated, using small, less granular sample sizes. Now, it can identify individuals, rather than units or floors, giving leaders an even clearer understanding of how to increase participation and improve overall quality of care.”

Proventix’s Nix agrees that you have to understand workflow to change behavior. “One of the biggest challenges we’ve overcome is the ability to monitor several hundred people working on the same floor at the same time,” he says. “This involves trying to understand variability of health-care worker movement,



The longer a caregiver remains in a room, the more likely he or she has touched a patient, performed a procedure or come in contact with a potentially contaminated surface that would require hand washing.





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and to understand workflow by specialty, and for that you need software and analytics and QA [quality assurance] tools. Workflow is the key to hand-hygiene monitoring and intervention activities.” Once you get that, he says, “then you can change behaviors and improve outcomes.”

Stanley Healthcare’s Cook also says hand-hygiene compliance must be “time-correlated,” usually based on discussions with infection preventionists. “By correlating entry and exit from patient rooms and time between hand-hygiene events, we have the granularity that allows us to evaluate interactions between clinical staff and patients, and determine how long it took for a nurse to arrive in the room when the patient pushed the call button. We can also track housekeepers’ hand hygiene. This all goes directly to compliance, as well as to other safety and legal issues, including patient and family experience and perception.”

In addition to monitoring workflow, Cook says, Stanley Healthcare’s solution can be programmed to differentiate between the use of soap and alcohol-based sanitizers. This supports facilities’ efforts to contain the spread of an outbreak of certain types of infections, such as methicillin-resistant staphylococcus aureus (MRSA). “Washing with soap takes longer,” he adds, “but soap must be used in certain environments or with certain infections.” If a hospital could pinpoint which workers cleansed with gel instead of soap following exposure to a patient who is then diagnosed with a particularly virulent infection, it could contact those employees to test and treat them, and limit their contact with other patients and staffers.

Most vendors say health-care workers require little training to begin using their hand-hygiene solutions, though they work closely with infection preventionists and others to develop the most effective benchmarks and compliance-education processes for particular units or individuals. Vendors also cite the need for positive feedback and encouragement for staff members struggling to comply with hand-hygiene regulations. “You want to reward the rock stars,” Proventix’s Nix says,



Gojo Industries partners with AeroScout or Ekahau.

“but you don’t want to demoralize the whole group” if a particular person on a unit is underperforming.

The bottom line, Nix adds, is that hand-hygiene compliance “is not about the counting—it’s about the intervention. Hospital leaders can use hand-hygiene compliance data to target opportunities, influence caregiver behavior and improve patient care.

“HAIs affect the weakest and most vulnerable members of our communities,” Cook says. “Whether you have an ill child or an aging parent, whether you’re the patient yourself or you’re going to visit someone who’s sick, this situation affects everybody at some point. Some companies come at it from a pure hand-hygiene standpoint, but at the end of the day, we’re all in it to improve health care.” ■

Most vendors say health-care workers require little training to begin using their hand-hygiene solutions.

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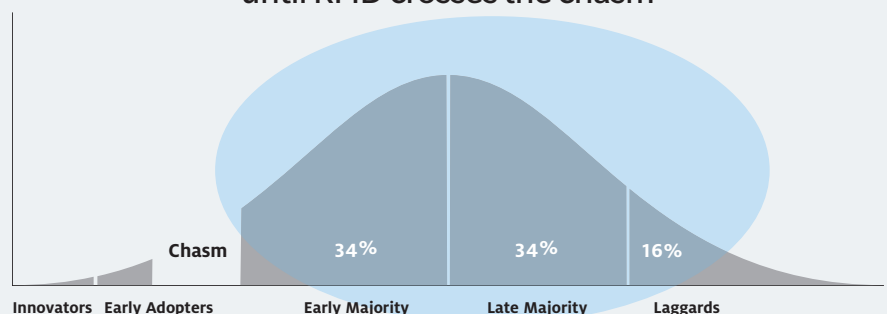


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Tracking Transformations

EPCIS 1.1 connects the life cycle of a finished product to its raw materials.

By Ken Traub



THE ELECTRONIC PRODUCT Code Information Services (EPCIS) standard is designed to give companies visibility into the whereabouts of an RFID-tagged object in the supply chain. A finished product, for example, can be tracked from manufacture to point of sale. Each time the tagged product is read—during packing, shipping, receiving, stocking and other business steps—it generates an EPCIS event, creating a complete electronic record of its life cycle.

But what happens when you also want to track the raw materials used in that finished product? Each tagged part has a unique identifier, and the finished product has a different identifier. To enable companies to connect the history of raw materials to the history of finished products, a new type of EPCIS event that can track relationships has been needed.

EPCIS 1.1, ratified by GS1 in June, provides this. The new version of the standard includes a data structure called a “transformation event”—it captures the relationship between a list of input objects (each carrying a unique identifier) consumed in a process and a list of produced output objects.

A cattle supply chain in Sweden is using this new capability in a food traceability application. At the farm, each animal has an RFID tag with a unique identifier. At the slaughterhouse, the animal’s ID is attached to its carcass. Then, at the cutting plant, where many carcasses may be ground and combined to form a variety of hamburger and other products, an EPCIS transformation event links all the animal IDs to the Serialized Global Trade Item Numbers (SGTINs) assigned to each package of finished product.

It is now possible for retailers to trace the finished products all the way back to the farms where the animals were raised. EPCIS events captured at the farm, slaughterhouse and cutting plant provide a historical record of the animals’ daily feedings, which animals were combined at the plant, on what days they were processed and so on. Based on this data, retailers, for example, could assure consumers that their beef is organic. The application also improves product recall management. All meat items in a contaminated batch of hamburger could be quickly traced back to specific farms, then the relevant information could be forwarded to stores, where only the packages that contain contaminated meat would have to be pulled from shelves.

The EPCIS 1.1 transformation event feature will prove useful in many other industries as well. Chemical and pharmaceutical manufacturers, for example, will be able to use it to track raw materials to finished products to comply with government safety mandates. Similarly, automotive and electronics manufacturers can use the feature to assure end users that their products contain no counterfeit parts. ■

Ken Traub is the founder of Ken Traub Consulting, a Mass.-based firm providing services to companies that rely on advanced software technology to run their businesses. Send your software questions to swsavvy@kentraub.com.



Building on Retail's RFID Foundation

Companies that have deployed RFID to improve inventory accuracy can now use the technology to gain a competitive advantage.

By Bill Hardgrave



IN 2007, the RFID Research Center identified and began promoting what we call the four foundational use cases for RFID in retail: inventory accuracy, out-of-stocks, product location and loss detection. All retailers face these issues, and RFID addresses each of the issues head-on. By 2009, inventory accuracy, which affects the other foundational use cases, had become the silver bullet for RFID adoption. That's why, in my first column for *RFID Journal* magazine, in 2012, I wrote that any retailer not actively considering tagging and tracking items to improve inventory accuracy had better "get in the game" (see [Tracking Your Competitors](#)).

Today, it is hard to find a retailer that is not aware of RFID's ability to improve inventory accuracy, which, in turn, leads to better replenishment practices, significantly reducing out-of-stocks. With RFID, we know where things are in the store and, if deployed properly, the technology can serve as a loss-detection device.

Recently, I've had conversations with several retailers that have deployed RFID. None of them asked whether RFID could deliver on the promise of inventory accuracy. They already knew the answer to that question. Instead, they all wanted to know what other benefits they could achieve, now that they're tracking items in their stores. I told them the RFID Lab has identified a number of ways they could build on the foundational uses cases. We call these applications second-order (SO) use cases.

Let's put these SO use cases in perspective. I have suggested for several years that the foundational use cases are not strategic, because they will not provide a sustainable

competitive advantage. High inventory accuracy may provide an edge in the near term, but every retailer can—and eventually will—deploy a basic RFID system and conquer the foundational use cases.

The SO use cases, on the other hand, will allow forward-thinking retailers to use the foundational RFID data to do things never before deemed possible. These retailers will develop proprietary solutions that cannot be easily duplicated by others, and the market share they'll capture by using these innovative solutions likely will be sustainable.

Take, for example, distributed order management (DOM), 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, the from-where-to-source decision must be optimized and made in real time. This decision requires high inventory accuracy and knowledge of where the product is located. Solutions developed for DOM will be complex, retailer-specific and based on RFID data. The first retailers to solve this issue will be able to provide an unparalleled experience for their customers.

In my next column, we'll explore more SO use cases for retailers. ■

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. Follow him on twitter at @bhardgrave.



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A Win-Win for Suppliers

RFID-enabled VMI improves customer service while reducing costs and errors.

By Ian Robertson



VENDOR-MANAGED inventory (VMI) is a common business practice between suppliers and their customers. The inventory supplier (the vendor) is responsible for keeping inventory of specific products at an agreed-upon location and within established minimum and maximum levels. Vendors often retain ownership of the inventory until it is “consumed” by the customer.

Since this is a valued customer service, it’s essential for the vendor to maintain the set inventory levels, which requires timely visibility into what products are consumed and replenished. In practice, vendor representatives usually visit the site regularly to check inventory levels, or the supplier relies on customer consumption reports. The first method is costly and hard to time. The second is not always reliable.

RFID can automate the overall process—providing suppliers with near-real-time visibility while reducing costs and errors. Suppliers and customers that adopt RFID for electronic proof of delivery, which I discussed in my last column ([An Impartial Observer](#)), can build on that deployment to enable auto-replenishment. Suppliers would already be tagging goods so customers can track them automatically on the receiving dock.

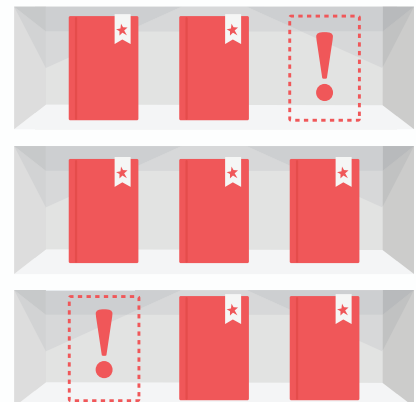
Some companies store goods in a shared inventory area. But VMI requires a separate area with a fixed RFID reader. When goods are moved from the receiving dock, RFID confirms they are in the VMI inventory location. When product is moved out of the VMI location, RFID confirms exactly when the customer has consumed it and it is no longer managed by the vendor.

Supply-chain partners can use the Electronic Product Code Information Services (EPCIS) standards to share information securely. That way, the vendor can use the VMI data to trigger replenishment if the inventory level falls below minimum. The vendor would also know when to invoice the customer for what it just bought. In addition, there would be traceability in the event of a recall. EPCIS messages are generally sent and received in XML format using Web services, so little software development is usually required. Some enterprise resource planning software has this capability built in.

Suppliers could authorize their customers to use RFID handheld readers to facilitate picking of VMI, which would benefit both supply-chain partners. The customer would know it picked the correct items. Products with some form of expiry, such as coated heart stents, could be identified automatically when picked, and an alarm could be triggered if they should no longer be used. Picking could even be directed so the item with the shortest remaining period of use is picked first, minimizing inventory write-offs.

RFID-based auto-replenishment will not completely eliminate the need for suppliers to conduct periodic physical inventory checks. But it does create a valuable link between the vendor and the inventory it owns at the customer site. ■

Ian Robertson is CEO and president of Supply Chain RFID Consulting, a Texas-based firm providing services to companies that want to understand how to use and implement RFID internally and with partners. Send your supply-chain questions to ian.robertson@s-c-r-c.com.



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