

# RFID JOURNAL

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JANUARY/FEBRUARY 2013

- **PERSPECTIVE**  
GS1 US Continues The Work Of VICS PAGE 8
- **VERTICAL FOCUS**  
Automakers Steer Toward RFID PAGE 24
- **PRODUCT DEVELOPMENTS**  
RFID File-Tracking Solutions PAGE 32
- **SOFTWARE SAVVY**  
Labeling Apparel Items PAGE 39



## HOW TO PICK THE RIGHT SYSTEMS INTEGRATOR

PAGE 14



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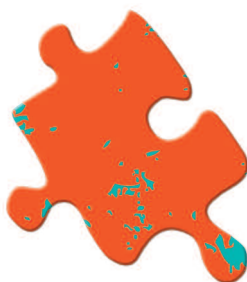
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## features

### COVER STORY

#### 14 The RFID Problem Solvers

Systems integrators help clients create the RFID solutions that will meet their business needs, while getting disparate components to function together seamlessly and cost-efficiently.

*By John Edwards*

### VERTICAL FOCUS

#### 24 Car Makers Steer Toward RFID

Manufacturing benefits drive adoption, and down the road, supply-chain standards could accelerate the ride.

*By Jennifer Zaino*

### PRODUCT DEVELOPMENTS

#### 32 RFID File-Tracking Solutions

Here's what you need to know to decide whether your business could benefit from managing files automatically—and in real time.

*By Minda Zetlin*

## departments

#### 5 Editor's Note

Choose your partners wisely.

#### 6 Out in Front

Kinect gives RFID another pair of eyes; helping seniors stay independent; growing older.

#### 8 Perspective

GS1 US continues the work of VICS; J.C. Penney pauses RFID efforts; easing the way for tagging items; why tags are not read in retail stores.

## columns

#### 37 Inside the Labs

Building a visibility platform.

*By Jin Mitsugi, Keita Miyazaki and Yuki Sato*

#### 39 Software Savvy

RFID-labeling apparel items.

*By Ken Traub*

#### 42 Tuned In

Move to OHIO. *By Bill Hardgrave*

#### 44 Radio Europe

Privacy and security standards.

*By Henri Barthel*

#### 47 Ashton's View

15 minutes of fame. *By Kevin Ashton*

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- **Using NFC to Enhance Products and Improve the Customer Experience:** Near-Field Communication technology enables mobile payments, interactive marketing, loyalty programs and other innovative applications.

April 9, 11 am to 1 pm EST



Find products that can help you deploy RFID successfully.

Here's an example:

**U Grok It** turns iOS and Android smartphones and devices into RFID readers, so you can track and manage tagged items anywhere. It's lightweight, plugs into a device's audio port and reads ultra-high-frequency Gen 2 RFID tags.



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- [VA Re-Awards \\$543 Million RTLS Contract to HP](#)
- [RFID Helps IKEA Furniture Maker Eliminate Shipping Errors](#)
- [J.C. Penney Defers Its RFID Dreams](#)
- [Predictions for RFID in 2013](#)
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## Top 10 Search Terms On RFIDJournal.com

- 1 NFC
- 2 Disney
- 3 RTLS
- 4 Walmart
- 5 Library
- 6 Macy's
- 7 Construction
- 8 Airbus
- 9 Mining
- 10 Food



## 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:

- Are active RFID-based real-time location systems being used in the mining industry?
- Can RFID be integrated with other technologies or computer programs?
- How can RFID be used in libraries?
- What is the jitter performance of pulse interval encoding (PIE)?

## Worldwide RFID Deployment Map



RFID JOURNAL's interactive map shows how widespread RFID adoption has become. The dots are color-coded according to industry, including aerospace, agriculture, apparel, defense, health care, logistics, manufacturing, pharmaceutical and retail. You can get more information about a particular deployment by clicking on one of the dots—a pop-up will appear.

To put your company's RFID deployment on the map, click [here](#) and fill out the form. It takes only a few minutes.

See the complete table of contents at  
[www.rfidjournal.com/howtochoose](http://www.rfidjournal.com/howtochoose)



# How to Choose the Right RFID Technology for Your Application

Choosing the proper radio frequency identification system for your application can be a daunting task. Now, for the first time, *RFID Journal* provides a guide to choosing the right system for your needs, and explains the pros and cons of different RFID solutions for different applications.

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# Choose Your Partners Wisely

ONE OF THE BIGGEST DECISIONS any company will make when deploying radio frequency identification technologies is choosing a systems integrator. The fact is, relatively few integrators—I'd estimate fewer than 200 worldwide—have deployed successful RFID systems. And even fewer have worked on large-scale projects. Yet, there are a lot of companies that claim to be RFID systems integrators.



End users frequently ask me to recommend a good integrator, which is why we decided to devote this issue's cover story to choosing the right partner (see "The RFID Problem Solvers" on page 14). By giving you practical advice about how to choose and work with a systems integrator, it's our hope that your RFID deployment will go smoothly and you'll have positive results.

I've heard many stories about end users' experiences with integrators. Watch out for an information technology or barcode systems integrator eager to get into RFID. These firms will tell you they know everything about RFID and have led successful projects. But in reality, some want to learn how to deploy the technology on your dime. Also be wary of the RFID integrator who knows only one type of technology and says it's the right choice for every application. Reputable integrators will refer you to another company if they don't offer the type of RFID system you need.

Some end users choose an integrator because it makes the lowest bid, or they coerce an integrator into working on a pilot for free with a promise that the integrator will get the job if the pilot works out. They wind up with a desperate company that has little knowledge of

how to deploy RFID successfully.

The best experiences occur when integrators become true partners. When you collaborate, an integrator can help you improve efficiencies and plan how to use RFID to solve future business problems.

It's also helpful to find a systems integrator with vertical industry expertise. Industries tend to have specific problems, and if an integrator has solved an issue for another company in your sector, that integrator understands some of the business issues driving your deployment. In the automotive industry, for example, car makers are deploying RFID to ensure the right parts are in the correct facilities when needed, automate many manufacturing operations and manage finished vehicles (see Vertical Focus on page 24).

For most deployments, integrators are needed to get hardware and software to work together efficiently. Now, some RFID providers are beginning to offer complete solutions—tags, readers, software, integration and training. That's the case with RFID file-tracking solutions, which reduce the cost and time businesses spend searching for misplaced files (see Product Developments on page 32).

Whatever your application, it's important to check out your RFID partners carefully. Make sure they are reputable, they have implemented RFID successfully and, most important, you feel comfortable working with them. There's nothing worse than having to change partners in the middle of the deployment dance.

Mark Roberti, Founder and Editor

RETAIL

# Kinect Gives RFID Another Pair of Eyes

Complementary technologies could boost confidence in RFID visibility solutions.



Researchers at the RFID Research Center demonstrate how an RFID reader (under the table) and a Kinect camera can track retail items. From left: Harry Scott (assistant), Senthilkumar CP (technical director) and Justin Patton (director).

INCREASINGLY, APPAREL RETAILERS are adopting radio frequency identification technology, which provides visibility into the location of movable assets, to monitor items moving from the back room to the sales floor and on store shelves. Studies show RFID improves inventory accuracy and is less labor-intensive than tracking items manually with bar codes. Yet, some retailers are reluctant to use RFID because it is automatic. They often ask, "If I read items on a shelf, how do I know I got everything?" With bar codes, retailers feel, "If I scan it, I see it."

The University of Arkansas' RFID Research Center may have the solution: combining RFID with vision technology. In a demonstration set up in the center's lab, researchers used Kinect—the Webcam-like device that allows players to interact with Xbox 360 games—to capture images of items, while reading tags with an ultrahigh-frequency reader under the table. The system could enable retailers to see if items are actually where RFID says they are. Having two sources of data-capture information will give retailers and other end

users confidence that RFID systems are accurate, says Justin Patton, the center's director.

"Harry Scott, a student working in the lab, saw us identifying items with RFID and said he could do that with a Kinect device," Patton says. To demonstrate how it would work, Scott put a soda can and several other items on a table. The Kinect camera scanned the items and matched their characteristics to those of items stored in a database, to determine what the items were (currently, it works with roughly 10 items).

"The demo allows the user to define an area of interest, and then identify items in it by analyzing their size, shape and color," Patton says. The researchers plan to add optical character recognition for

even greater accuracy. "You can now get a camera that can deliver pretty high-quality video and infrared range and create a point cloud of a 3-D environment for \$100 or so," Scott adds.

The 3-D video system can't determine exactly how many jeans are in a stack on a shelf, but it could be set up to learn that, say, six pairs of a certain type take up a specific amount of volumetric space. If the RFID system reads six tags and the camera records a corresponding volume, the retailer could be sure that six pairs of jeans are on the shelf.

3-D video cameras also could be used to tell retailers whether a shoplifter has removed an item and left its RFID tag on the shelf. To demo this, researchers placed three tagged items and two unattached tags on a table. An RFID reader identified all five tags, but the Kinect camera saw only three items. Software could alert retail staff when such a discrepancy is detected.

The RFID Research Center team plans to mount a Kinect camera or similar device on an RFID handheld to see if it can



capture visual images and RFID data while taking inventory of a store.

"With vision technologies alone, I could tell there are items on the shelf and where they are, but I can't see the items behind those

in the front row," Patton says. "With RFID, I can read tags on the items behind those in the front, most of the time, but I'm not sure where they are. So these are very complementary technologies." —*Mark Roberti*

## HEALTH

# Helping Seniors Stay Independent



Researchers at the University of Adelaide are developing a solution to automatically monitor human activity in real time using RFID and sensors.



Michael Sheng

AUSTRALIA, LIKE MANY industrial countries, has an aging population. To help older people live independently and safely in their own homes, researchers at the University of Adelaide recently launched an ambitious project

using RFID and sensor technologies. The goal: To automatically identify and monitor human activity to determine if an individual's normal routine is being maintained and provide timely assistance if needed.

"Our work will be among the first few projects in the world conducting large-scale common-sense reasoning in automatic human-activity recognition," says Michael Sheng, an associate professor in the School of Computer Science who is leading the project.

The plan is to create a computing platform linked to RFID and sensors on which applications can be built. One application will monitor and interpret daily activities of elderly people. The aim is to prevent falls and other problems, and to alert the proper authorities if an incident does occur.

"Our goal is that people do not have to wear any devices, so we will deploy sensors within the environment," Sheng says. "We'll collect

sensor readings, and then software will interpret these in real time."

Sensors could monitor motion, force and other environmental factors. Some might work with conventional RFID, in which a tag communicates with a reader. Others will be on wireless mesh network nodes, which pass environmental information from one sensor to another until it reaches a base station that communicates it to the back-end software application.

The system will be able to check whether an elderly person living at home is performing daily routines. Any interruption to those routines might indicate a problem. The software will exploit common-sense knowledge when interpreting data. If, for example, an individual is walking around at 2 p.m., that will not raise any concerns. But if the same person is walking around at 2 a.m., that might indicate a problem.

Sheng has received support from the United States and the United Kingdom. "Taking care of the elderly is becoming a significant problem for most developed countries, where the proportion of older people is rapidly increasing and the labor market is tightening," he says. "There are more elderly people to be looked after, but fewer people to do it."

Sheng hopes the project will bear fruit within three years, and products to support the elderly can be ready to market two or three years after that. —*M.R.*



## Growing Older

Number of people in **China** age 65 or older:

**123 million**

Number of people in **India** age 65 or older:

**62 million**

Number of people in the **United States** age 65 or older:

**40.3 million**

Number of people in **Japan** age 65 or older:

**30.7 million**

Number of people in the **United Kingdom** age 65 or older:

**10 million**

Number of people in **Australia** age 65 or older:


**3 million**

—*Rich Handley*

## ADOPTION

# GS1 US Continues the Work of VICS

The Item Level RFID Initiative takes steps to advance adoption by retailers and supply-chain partners.



THE VOLUNTARY INTERINDUSTRY Commerce Solutions (VICS) Association was founded in 1986 to improve supply-chain efficiencies among trading partners by creating standardized business practices. In 1995, it established a program called Collaborative Planning, Forecasting and Replenishment (CPFR), to promote best practices for shared visibility and improved replenishment.

In 2010, VICS established the VICS Item Level RFID Initiative (VILRI), which brought together retailers, their suppliers and RFID solution providers to foster a common means for using radio frequency identification based on GS1's Electronic Product Code standard throughout the global supply chain. The group's goals were to promote the business benefits retailers and suppliers would gain from using EPC RFID technology and resolve technical issues, such as tag placement and performance.

Last year, the close working relationship between VICS and GS1 became even closer as the two organizations merged. All workgroup activity and industry support that had taken place under VICS, including VILRI, have been integrated into the GS1 US Apparel and General Merchandise Initiative, and VICS member-

ships have been transferred to GS1 US. VILRI has been renamed the GS1 Item Level RFID Initiative (ILRI). "The merger combines the best of both organizations for the betterment of the supply chain and the apparel and general merchandise sector specifically," says Gena Morgan, GS1 US program director.

For 2013, the GS1 Item Level RFID Initiative plans to focus its efforts in three critical areas:

**Adoption:** An outreach effort aimed at developing a peer-to-peer strategy to assist the increasing number of retailers and suppliers that plan to deploy EPC RFID technology is under way. GS1 US will bring together key executives to share lessons learned and industry to-dos.

**Implementation:** The ILRI Implementation and Getting Started subgroup will identify and solve common deployment challenges. These issues often require industry collaboration to resolve. The subgroup has already developed guidelines for supply-chain partners regarding tag placement and management of serialized product numbers.

Currently, the subgroup is focused on defining "tag performance" and developing criteria for measuring tag performance on items, so suppliers can be assured the tags

they buy will work on their products in the supply chain and in retail stores.

**Education and training:** GS1 US has developed the Item-Level Readiness Program to provide support for the apparel industry. The program includes:

- Web- and teleconference-based education sessions with topics ranging from understanding the value of EPC RFID to meeting the requirements of trading partners;
- an interactive Web-based adoption road map, a cost calculator, an implementation timeline and other tools;
- community forums to share best implementation practices and identify industry business needs and challenges;
- guidance on the use of the EPC symbol to ensure consumer privacy.

Mass adoption of RFID for tracking goods through the supply chain requires much more than just technical stan-

dards for tags, readers and software. It requires industry agreement on a wide variety of new issues. For instance, if one retailer requires a jeans supplier to put the RFID tag in an existing label and another requires the tag to be in a new label, the supplier is saddled with added cost and operational complexity. If one retailer says a tag must be readable from a distance of 10 feet and another from 20 feet, the supplier may have to purchase two different types of tags, which also adds cost and complexity. The work of the ILRI is critical to facilitating mass adoption of RFID for tracking items from the point of manufacture to the point of sale.

“Our goal is to help companies smooth out the speed bumps that exist with any new technology, so they can benefit from using EPC RFID,” Morgan says. “A lot of progress has been made, and we think there will be a lot more progress in 2013.” —Mark Roberti

## RETAIL

# J.C. Penney Pauses RFID Efforts

A troubling decline in sales has had an impact on the retailer's RFID rollout.

A COUPLE OF YEARS AGO, J.C. Penney began one of the largest rollouts of radio frequency identification technology in retail. Penney announced that it would RFID-tag all jeans, bras and shoes at its 1,100 stores. Then, in June 2012, at the Fortune Brainstorm Tech conference in Aspen, Colo., Penney CEO Ron Johnson announced that the retailer planned to begin placing RFID tags on 100 percent of its merchandise.

Johnson disclosed that the company expected to employ the technology to help it transform the way shoppers purchase goods at all its stores. During an interview at the conference conducted by Jennifer Reingold, senior editor at *Fortune* magazine, Johnson said Penney planned to accomplish something no other retailer has ever “done completely” before: “We are going 100 percent RFID with ticketing this fall. So February 1st next year, the entire Penney's platform will be on RFID tickets.”

However, in a letter to suppliers dated Jan. 21, 2013, J.C. Penney said it “is modifying the rollout schedule of RFID tagging for merchandise categories. Until further notice, only the below merchandise sub divisions will need item level RFID tagging/labeling.” The letter lists 41 separate product areas, but they all fall under the three categories Penney was already RFID-tracking: jeans, bras and shoes.



J.C. Penney CEO Ron Johnson

News that Penney is backing off its plans to greatly accelerate its use of RFID inevitably will be spun as another example that RFID didn't deliver on its promise. But that, in fact, is not the real story.

The letter does not state a reason for “modifying the rollout schedule,” and the retailer declined to speak to RFID JOURNAL. But sources say the change had nothing to do with the benefits RFID was delivering. Penney was seeing



improved inventory accuracy and better store execution through its use of RFID.

Johnson, who led Apple's successful entry into retail, has been trying to remake J.C. Penney since he took over as CEO in November 2011. As part of the makeover, he introduced concepts designed to make shopping in a store more engaging and efficient. He had hoped that RFID-tagging all items would allow the retailer to eliminate fixed points of sale and let people check out on the store floor (as they do in Apple stores). Store layouts are also changing. Some merchandise is being eliminated, and new items are being introduced.

He also announced plans, in February 2012, to cut prices

and eliminate sales events. That had a drastic—and negative—impact on revenue. Total sales dropped by 23.1 percent to \$9.1 billion during the first nine months of the retailer's current fiscal year, and Penney lost \$433 million.

On Jan. 29, 2013, Penny announced plans to reinstate sales to lure back shoppers, Johnson told The Associated Press. The retailer also said it plans to add signage showing comparison prices from competitors.

"Deploying an RFID system with all this change going on proved to be too much," says one person involved with the RFID project. "They need to complete these changes before expanding their use of RFID. It makes a lot of sense." —M.R.

## RETAIL

# Easing the Way for Tagging Items

The University of Arkansas' RFID Research Center's compliance program aims to ensure that RFID transponders will work in retail stores.



The RFID Research Center's anechoic chamber for testing RFID tags.

BACK IN 2003, when Walmart first asked its top suppliers to tag pallets and cases, consumer packaged goods companies had a lot of questions. What tags do we use? Where do we place them? How do we know the tags will be read in a Walmart facility? This gave rise to a considerable amount of testing in labs worldwide. The tests typically involved putting tags on cases of tomato soup, and reading the tags as they traveled along a conveyor.

The quality of passive ultrahigh-frequency tags and read-

ers based on GS1's Electronic Product Code standard have improved a great deal—and so have testing procedures. Now, as more retailers are moving RFID-tagging of apparel and other items to the point of manufacture, suppliers are once again asking these questions. And the University of Arkansas' RFID Research Center is prepared to answer them. But instead of testing tags for each supplier, the center has created the Arkansas Radio Compliance (ARC) program, which aims to qualify tags that will work in a specific retailer's environment.

RFID JOURNAL recently visited the center's new 20,000-square-foot lab in Fayetteville, Ark., to view the testing being conducted for the ARC program. The program was launched in January 2011, at the request of retailers that wanted suppliers to be able to choose tags from a variety of approved vendors. The program qualifies tags that can be used by suppliers of a particular product category, so every supplier doesn't have to recreate each retail partner's store environment and test the tags.

The RFID Research Center set up a three-step process to qualify tags. First, the center's researchers visit one or more of a retail chain's stores to observe the environment in which the tags will be read. They tag a variety of products within a category the retailer wants to track with RFID, and they read those tags to understand the variables that affect RFID performance in that environment.

"The retailer has usually chosen its technology partners



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and has a clear idea of what they want to track,” says Justin Patton, director of the RFID Research Center. “We use the RFID readers they are planning to use—say, handhelds from a specific vendor—and we read the tags to understand how tags generally perform in that environment. Then we create a specification for the store use case. We can compare that spec to tags we tested back at the lab.” The specification might include the required sensitivity of the tags, the angles at which they’re positioned or the materials on which they’re placed. The center also provides this spec to tag vendors and suppliers.

Researchers then test the tags in the lab’s 12-foot by 12-foot anechoic chamber, which has steel walls and is lined

with foam spikes that reduce radio wave reflections. The chamber is designed to filter out any potential interference and provide a controlled test environment.

The tags are tested on standard materials based on the category—denim for jeans, plastic for apparel that comes in polybags, and corrugate for flat-panel televisions and other large items packed in boxes, for instance. Tags are read from a variety of angles, based on how they will be read in a store. Testing a single tag can take several days.

The third step in the process is to take the tags that are likely to meet a retailer’s performance criteria back to the store, to verify that they will work the way the lab tests indicate they will work.

“A lot of people ask us how we can be sure the tags will work in a store when we are testing them in the anechoic chamber,” says David Cromhout, the center’s research director. “The answer is, we take a few types of control tags to the store and test them. Based on which of those passed and failed, we find the performance cutoffs. We know the chamber performance of those inlays, so we can make a spec, and quickly compare it against all of the others.”

The lab has tested 136 inlays from 18 manufacturers and collected 160,000 data points on each inlay (an inlay is an RFID transponder that has not been converted into a label or embedded in a hangtag). So far, 51 of the inlays submitted have been fully enrolled in the program.

Four retailers are involved with the ARC program today, and more than 75 retail suppliers rely on the program for tagging information. If a retailer adds a new product category—say, car batteries or smartphones—the center will create a specification and test tags from participating inlay manufacturers. In some cases, existing tags will work fine on new products. In other cases, tag makers will need to develop new designs in order to sell a tag that will meet a retailer’s needs.

“Since we share the specification with the participating tag manufacturers, they can easily create prototype tags, test them and confirm they will meet the retailer’s requirements before they mass-produce them,” Patton says.

The ARC program is beneficial to retailers, suppliers and tag manufacturers. A retailer can expand tagging to a new product category and have confidence that suppliers will be able to purchase tags from one or more tag manufacturers that can be read in its store environment. Suppliers can buy tags without having to do a lot of their own testing. And tag vendors can understand the requirements in a standard language and create tags they are sure will work for specific applications. —M.R.

## Why Tags Are Not Read in Retail Stores



SEVERAL RETAILERS HAVE asked the RFID Research Center to conduct audits in stores, to determine whether their RFID systems were working properly. They wanted to know, for instance, whether they read 100 percent of the tags when they did cycle counts.

The center sent a team to the stores to do manual counts and cycle counts with an RFID reader. They rarely found 100 percent of the

tags were read. Below are the key reasons they found that tags were not read. The first two reasons relate to problems with the tag; the others are process issues that can be resolved with training.

- The tag was damaged and could not be read.
- The tag didn’t function due to a broken antenna or another issue.
- The manufacturer or supplier didn’t put a tag on the item.
- Two tags were placed on the same item.
- The tag was not encoded with an EPC.
- The tag was encoded but the EPC didn’t match the UPC.
- The tag was functioning but was not read during a cycle count.
- The tag fell off or was torn off by a customer.
- The tag was read but was not attached to an item.
- The tag was removed by a customer after purchase, and then the item was returned.

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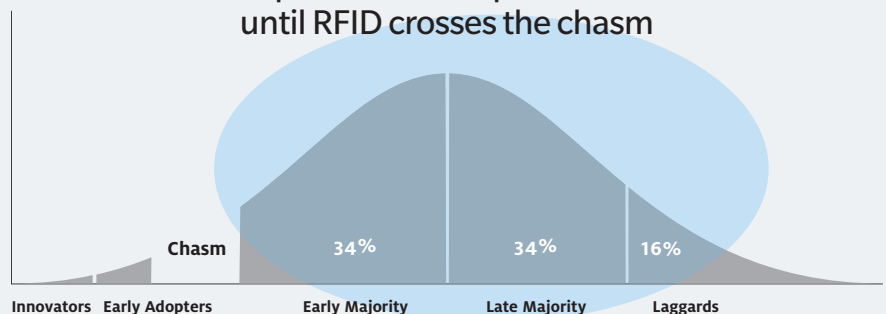


Based on a new survey of RFID end users, this guide reveals:

- › The state of adoption by industry and region
- › Who the RFID buyer is
- › How companies make RFID investment decisions
- › The applications end users are pursuing

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# The RFID Problem Solvers



Systems integrators help clients create the RFID solutions that will meet their business needs, while getting disparate components to function together seamlessly and cost-efficiently. **BY JOHN EDWARDS**

FEW BUSINESSES POSSESS the in-house knowledge and skill necessary to develop and install their RFID solutions without outside assistance. Systems integrators help the vast majority of RFID adopters, offering design, testing, installation, training and other essential services.

"Companies need a systems integrator," says John Devlin, practice director of security and ID at ABI Research, a technology market research firm in Oyster Bay, N.Y. "I don't think the market has evolved yet to a stage where it's anywhere near plug and play. Systems integrators have quite a lot of knowledge of the market, in terms of being able to implement RFID for customers and to tailor the solution for them."

Put simply, systems integrators are the experts that blend RFID hardware and software elements into a coordinated,

functional solution that can solve a company's business problems. But finding a qualified systems integrator can, at times, be almost as challenging as building an RFID system from scratch. You want an integrator that has experience working in your industry and is not experimenting on your time—one that understands your business issues and can recommend ways to improve operational efficiencies. The integrator should have experience with both passive and active RFID systems, so it can recommend the technology that is best for your company, and not just the system with which it is most familiar. And you want an integrator that will become part of your internal RFID team and be invested in your company's goals.

Here, then, are best practices for choosing and working



with a systems integrator that will help ensure the success of your RFID deployment.

#### DEVELOP AN RFP

Once you've formed an RFID team composed of people from different departments within your company and have identified the problems you need to tackle first, you're ready to hire a systems integrator. You'll need to draw up a detailed Request for Proposal (RFP), an essential tool for obtaining formal project bids, and determine which integrators to invite into the bidding process.

**"If the systems integrator provides an immediate quote, chances are they do not understand the problem."**

STEVE HALLIDAY, HIGH TECH AID

#### WHY WE CHOSE OUR SYSTEMS INTEGRATOR



### Had Experience With Similar Deployments

At the request of a key customer, logistics services provider Port Logistics needed to install an RFID inventory-tracking system at one of its Los Angeles-area warehouses. With the company's reputation at stake, Port Logistics managers needed a systems integrator that could assure maximum accuracy, performance and reliability. "We run 24x7 operations, so we looked for providers with a stable, scalable hardware solution that had demonstrated the ability to work in high-volume shipping environments," says Greg Morello, Port Logistics' chief marketing officer. The company ultimately decided to use technology and integration services from RFID infrastructure manufacturer Tagsys. "Our evaluation criteria focused on reliability and interoperability," Morello says. "Our customers have very high requirements regarding system uptime and the ability to communicate across multiple platforms." —J.E.

You could use the systems integration services offered by a technology provider that specializes in your industry or an independent firm that can mix and match technologies from different hardware and software vendors. To identify potential candidates, read RFID news stories and case studies to see which integrators have experience working in your industry and region, as well as integrating RFID with back-end systems similar to those your company uses. The "Why We Chose Our Systems Integrator" profiles in these pages provide real-world insight into the selection process.

When requesting bids, it makes no sense to hand out RFPs to integrators that are substantially larger than your own business. "There's no point in a one- or two-site company with just a local interest using a multinational IT consultancy as their systems integrator," Devlin says. "In that case, you just want to call a local specialist, an integrator that will be able to dedicate time to assist you on your system."

A carefully thought-out, well-crafted RFP will include the project's goals, general and specific requirements, desirable features, performance expectations, timeline estimation and pricing requirements. Unless all these details are included in the document, there's a strong likelihood the systems integrator will respond by asking for more information. Most bid documents provide too few details, says Steve Halliday, president of High Tech Aid, an RFID advisory firm in Gibsonia, Pa. A subpar RFP keeps integrators from developing a complete response.

If an integrator requests more specifics, don't be discouraged, says Halliday, who also is a founding partner of RFIDTraxx, an RFID systems integrator in Westlake, Ohio, noting that a rapid-fire response may, in fact, signal trouble. "If the systems integrator provides an immediate quote, chances are they do not understand the problem," he says. "A good independent systems integrator will ask a lot of questions before proposing a system."

While RFID project leaders should try to pack as much detailed information as possible into an RFP, it's OK to leave things open-ended when you don't understand how certain RFID

functions or processes will work or how the new deployment can be designed to mesh with existing business processes and systems. “The enterprise does not need to be fully informed before looking for the systems integrator,” Halliday says. “In fact, we have seen situations where the customer listed desires—in the way of particular hardware or a particular way to solve the problem—and the decisions severely limited the solutions in a way that a nonoptimal solution was the only choice [available to the integrator].”

Ray Cavanagh, VP of New Orleans-based security systems integrator Crescent Guardian, agrees that it’s usually beneficial to give an integrator at least some leeway in system design and component selection. “While it’s always a good thing to have knowledgeable customers, I think it can be a bad thing if their opinions are so strong that they’re not open to other suggestions,” he says. “Part of what integrators are being tasked with is finding not only the best solution in the market, but the best solution for the customer on the market.”

#### EVALUATE THE BIDS

In an effort to secure your business, some systems integrators may submit a bid that lowballs anticipated cost, time or performance expectations. “You want to be wary of anything that’s too good to be true,” Devlin says. “Integrators that promise the earth, that say you can simply plug and play an RFID solution—they are the ones you want to watch out for.” An unbelievably low bid may be a sign that the integrator is trying to get the prospective client to deploy a generic, one-size-fits-all solution, he says. Such

#### WHY WE CHOSE OUR SYSTEMS INTEGRATOR



### Understood the Business Process

When Cisco Systems decided to use RFID to manage fixed assets within 70 U.S. data centers and research and development labs, a 15-member evaluation committee reviewed requests for information, as well as proposals, oral presentations and solution demonstrations, from roughly a dozen RFID providers. The team selected RFID Global Solution as its systems integrator. “The choice of our RFID partner was really based on the fact that they had a good understanding of the business process behind the technology,” says Maryanne Flynn, Cisco’s director of operations, who co-managed the initiative. “It wasn’t just about getting good read rates.” —J.E.

systems rarely meet a business’ RFID vision. “In every kind of case and implementation, every adopter has slightly different requirements, different expectations,” he notes.

Developing an RFID system is kind of like shopping for a new car, Cavanagh says. “You can make an argument that a Lexis, Acura, Mercedes or BMW are all similar in terms of being the best car,” he says. “But some have front-wheel drive, some don’t; some ride stiff, some ride soft.” The real question, he says, is: “What’s the best car for me?”

“While it’s always a good thing to have knowledgeable customers, I think it can be a bad thing if their opinions are so strong that they’re not open to other suggestions.”

RAY CAVANAGH, CRESCENT GUARDIAN





Just as a car shopper visits several dealers to find the one offering a suitable vehicle on the most beneficial terms, the business looking for a knowledgeable and reliable systems integrator must examine all the bids received, select the most promising providers, and then schedule presentations and discussions. Think of these sessions as “test drives.”

Yet, finding an integrator that meets a project’s basic performance, cost and time mandates is only half the battle. The provider also should have experience developing the type of system the RFP describes, as well as a strong

commitment to quality and an ability to work closely and creatively with clients.

“Having a systems integrator with a track record in the client’s market definitely pays dividends,” Devlin says. “Ideally, you want a company with a proven track record, knowledge of hardware performance, read range, interference and the different environmental conditions that may have to be encountered.”

#### **COLLABORATE WITH YOUR SYSTEMS INTEGRATOR**

Businesses that turn to an integrator to create or revamp an RFID system need to feel comfortable in their partnership. To develop an RFID system that works reliably and efficiently while providing tangible benefits, both parties must agree on basic approaches and goals. A good integrator, particularly one that specializes in deployments tailored to businesses operating in a specific industry, provides insights into technologies and processes that surpass the client’s original expectations, says Chris Castaldi, business development manager for W&H Systems, a Carlstadt, N.J., systems integrator that specializes in retail deployments.

Understanding key processes, as well as RFID’s role within those activities, is perhaps the most important ability an integrator brings to a project, Castaldi says. “We always look at an RFID implementation as a process-improvement project,” he says. “In deciding whether to utilize the technology, it is vital to analyze the current or upcoming business practices carefully and determine which aspects can be improved by implementing an RFID-based solution.” Analysis and planning, he says, require an integrator to collect information from project stakeholders in key business areas, including management, IT, production and logistics.

Integrators also help clients make sense out of a technology that seems at times almost overripe with possibilities. Tags alone present an array of bewildering options. “RFID tags come in hundreds of different configurations,” Castaldi says. “W&H determines which vendors’ products to use based on the client’s specific needs.”

Beyond choosing tags, systems integration

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“We always look at an RFID implementation as a process-improvement project.”

**CHRIS CASTALDI, W&H SYSTEMS**

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#### **WHY WE CHOSE OUR SYSTEMS INTEGRATOR**



### **Offered Hardware Flexibility**

As Texas Health Harris Methodist Hospital Alliance began searching for assistance in designing and deploying a real-time location system (RTLS) patient-monitoring environment, it needed a partner that had a ready-made rules engine capable of supporting virtually any brand of RTLS hardware. After considering its options, Texas Health managers selected Intelligent InSites as its systems integrator. “Not only did they not care what hardware we were going to use, but we could use multiple types of technologies to feed into their rules engine,” says Kathi Cox, a Texas Health project consultant. Cox believes it’s important to use a systems integrator that allows maximum design and configuration flexibility. “You need to look for a partner who has an open architecture or you could end up with hardware in your facility and no company to manage it.” —J.E.



involves more work than many businesses realize, Devlin says. “The tags may be fairly simple in terms of setup and usage, but then you have to think about how, where and when things are going to be read,” he says. “Also, in terms of integration—be it IT infrastructure or other systems—there can be quite a bit of customization required.”

Systems integrators also help clients solve challenges that often seem overwhelming. Castaldi recalls working with a Walmart supplier that wanted to make the retailer’s Direct Store Distribution Center supplier list, an initiative that requires individual pallets to be created for each store the supplier serves. To meet Walmart’s requirements, the supplier needed to improve its turnaround time and accuracy performance, as well as double its distribution center capacity.

W&H proposed, and eventually provided, a “pick-to-light” solution that directs order fulfillment via light indicator modules mounted onto shelving, pallets, conveyors, racks and other storage fixtures and assets. “Whenever product is needed from a particular location, the right indicator light turns on, drawing attention to where action is required,” Castaldi says. The operator picks the product quantity displayed and then confirms the pick by pressing the lit module button. “Using RFID and real-time feedback audit stations, orders are confirmed when picked correctly,” he says. “The company is now able to process orders quickly, cost-effectively and accurately, processing greater than 90,000 units per day, up from 50,000, at an accuracy rate of approximately 99.75 percent.”

#### PLAN FOR THE LONG-TERM

While many businesses planning an RFID system focus primarily on their short-term needs, it’s also important to consider how adaptable today’s deployment will be to future demands. Designing a system that’s extensible—capable of growing in size and scope as well as adjusting to new technologies and processes—can help a business keep pace with changing needs without having to deploy a new RFID system from scratch every few years.

## WHY WE CHOSE OUR SYSTEMS INTEGRATOR



### Listened and Learned

Orthopedics implants distributor Zimmer Ohio needed a systems integrator that could commit to learning and understanding a complex and demanding medical technology products distribution system. “We were looking for [a bidder] that was willing to listen to us, learn what our business was about and learn our business processes,” says John Reese, Zimmer’s warehouse and IT Manager. “I was not really happy with the [companies] who came in and told us, ‘Well, this is how it’s done in other places, so this is how we’ll do it for you.’” After meeting with several candidates, Zimmer settled on RFID Enabled Solutions. Reese was most impressed by the company’s commitment to developing extremely reliable systems, an essential attribute when tracking medical device shipments. “We’re sending sometimes hundreds of implants and surgical instruments into a single surgery,” Reese says. “It’s absolutely critical that we’re 100 percent accurate.” —J.E.

An extensible system may also be able to support a business in solving existing issues unrelated to the main project, reducing or eliminating the need to create separate systems for individual processes. These are matters that should be discussed with the systems integrator at the start of the partnership and periodically thereafter.

An integrator’s responsibilities don’t end on the day the system is successfully activated. Aftercare is also essential. Long-term support arrangements should be specified and solidified at the project’s outset. Support costs, as well as the length of time the integrator will stand behind its work without demanding additional payment, must be specified at the start.

Halliday offers a final word of advice to companies planning a new RFID system. “Look around,” he says. “Make sure you approach some of the smaller systems integrators as well as the big ones.” Don’t assume that the big companies have the best solutions. “Ask colleagues in your industry who have planned similar systems and learn from their experiences.” ■

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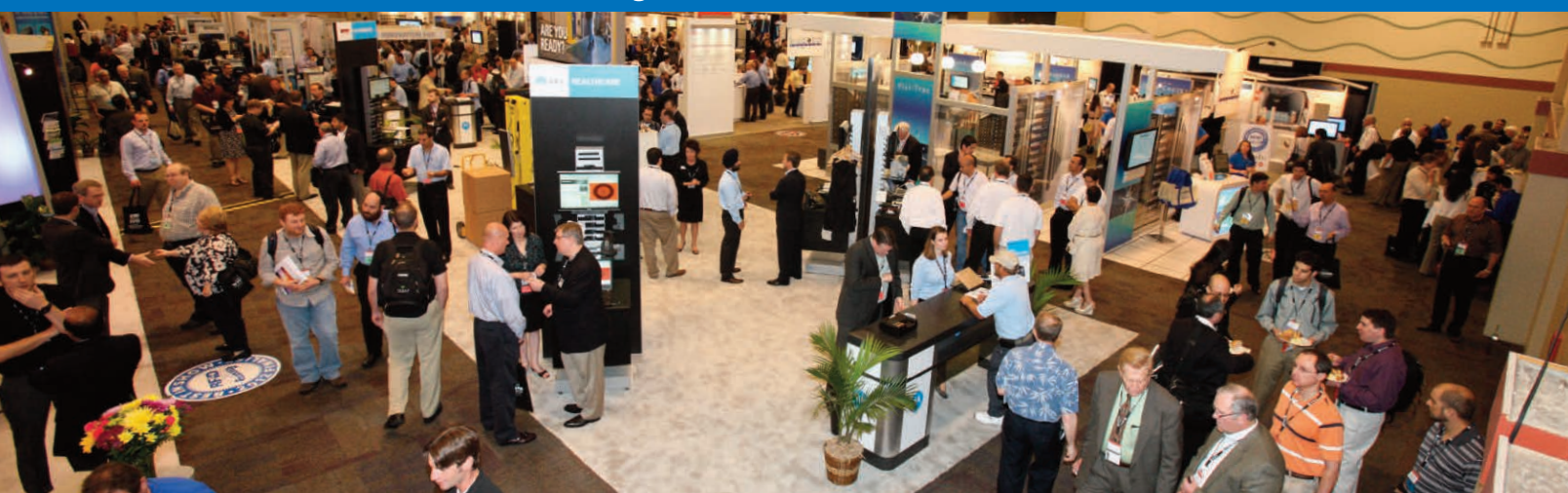
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# Car Makers Steer Toward RFID

Manufacturing benefits drive adoption, and down the road, supply-chain standards could accelerate the ride.

*By Jennifer Zaino*

AUTO-INDUSTRY PLAYERS often quip that returnable containers are never lost, just misplaced. But while said in jest, it reveals a hidden truth—actually, a costly problem. Containers can cost thousands of dollars, and studies estimate that the automotive industry spends millions of dollars annually replacing returnable transport items (RTIs), including racks, totes and pallets. In addition, lost or misplaced RTIs carrying

PHOTO: ISTOCKPHOTO

essential parts and assemblies can lead to production delays.

To improve RTI tracking, the international Joint Automotive Industry Forum (JAIF)—composed of the United States' Automotive Industry Action Group (AIAG), Europe's Odette International, the Japan Automotive Manufacturers Association (JAMA) and Japan Auto Parts Industry Association (JAPIA)—set out to drive standards into the industry's supply chain. Closed-loop supply chains exist in the auto market, but many supply chains are open, says Michael Liard, VP of AutoID at VDC Research.

"Manufacturers are sourcing materials and goods from various supply-chain partners, and in an open-loop supply chain, standards are critical," he says.

In 2011, JAIF published global guidelines for RTI management. They recommend identifying RTIs with EPC Gen 2 ultrahigh-frequency passive RFID tags. They also

include rules for storing data on RFID tags so information can be read by barcode and RFID readers, fed in a common format into diverse back-office systems and shared among parties worldwide.

"You have some expensive containers, boxes and pallets designed to protect parts in transit, and they need to go back to the supplier after the parts are delivered to the customer," says John Canvin, managing director of Odette International. Tags encoded according to the guideline specifications put everyone in the chain—from the subsuppliers of a supplier to the carmakers themselves, wherever they are in the world—on the same page. "It's almost the analogy of the mobile cell-phone market," he says. "There are different makes and service providers in different


countries, but they can all speak to each other because of a common format for data exchange and protocols."

Last year, JAIF published the Global Radio Frequency Identification Item Level Standard, which describes best practices, processes and methods for item identification, verification, traceability, product characteristics and Vehicle Identification Number (VIN) throughout the global automotive supply chain. The goal was to make it possible, at the most fundamental level, for companies to exchange information about part numbers, serial numbers and sources for individual items with the utmost facility.

The Item Level Standard specifies the use of passive or battery-assisted passive RFID tags and the ISO/IEC 18000-63 air-interface protocol. It enables data interchangeability between 2-D optical symbols and RFID systems by prescribing the use of ANSI MH10-based Data Identifiers and ISO or EPC/GS1 standards-based Data Syntax, so there's minimum impact on IT infrastructures. The use of these standards also is core to achieving data interoperability among companies' diverse systems, which may use traditional alpha or alphanumeric data identifiers.

"Anytime you have to change software, from an IT standpoint, it's no longer a minor issue," says Larry Graham, document editor for the Item Level Standard and principal at consulting firm LG AutoID, and formerly global manager of manufacturing, AIDC and wireless technologies at General Motors. "If we make the data consistent—and the key focus here is on the data—we don't care about what the media is that carries it. We've solved things from the data standpoint."

Now that standards are in place to facilitate the tracking of RTIs and parts in the global supply chain, the question remains: Will automakers take advantage of them? Meanwhile, RFID continues to make headway in manufacturing operations, and in after-market applications (see "The Connected Service Vehicle" on opposite page and "Audi Connects With Consumers" on page 29).



Tags encoded  
according to the  
guideline specifications  
put everyone in the  
chain—wherever they  
are in the world—on  
the same page.



## Agility and Visibility

Automotive manufacturing involves many complicated operations—from ensuring the right parts are at the correct facilities when needed (the standards discussed above should help with this issue) to managing finished vehicles. Car makers first face “a big logistical dance” finding the trailers that have the raw materials they need for production from among the many vehicles making deliveries to their yard, says Adrian Jennings, VP of location technology at Ubisense, an ultra-wideband RFID real-time location system

(RTLS) provider. “For many automotive customers, when a trailer comes into the logistics yard, they put our tag on it so they can find it five hours later using our visibility software.”

Then there’s the complexity at every step along the mile-or-so-long assembly line that leads to the finished product. That assembly line has become more complicated as manufacturers consolidate operations so more models can be built on the same line. To further complicate operations, manufacturing runs are smaller, and there’s a trend toward mass customization, so manufacturing lines have to be reconfigured regularly to deal with

# The Connected Service Vehicle

IN 2008, FORD MOTOR CO. partnered with RFID firm ThingMagic (now a division of Trimble) and toolmaker DeWalt to develop Tool Link, an RFID asset-tracking application. The solution, which was offered as a feature on some pickup trucks and vans, was designed to help contractors make sure they had all the tools they needed before leaving for a job site, and they had everything back on board when they were finished.

Ford is no longer offering the RFID application, which ran on an in-dash computer and featured a built-in RFID reader to identify the tagged tools. The broader system of which it was a part was pulled when Ford ran into production issues around elements unrelated to the RFID component, says Bernd Schoner, VP of business development at ThingMagic.

But the concept was sound, so ThingMagic is updating the application. While data capture (reading tagged assets) still resides on the vehicle, data management is moving from the vehicle to the cloud. This way, the data is available for use by a variety of applications and can be accessed by vehicle operators as well as managers who need to monitor assets.

Telcom companies, for example, have thousands of service vehicles, and each must have onboard the tools needed to fix whatever problems the tech encounters. “They are very well organized around what that inventory should be, but not good at making sure it’s actually there,” Schoner says. “RFID is a great tool to essentially monitor the inventory on a utility vehicle and make sure the tech actually has everything he needs when he goes out.”

The Connected Service Vehicle, developed by the ng Connect



Program, was demonstrated in January at the 2013 CES show in Las Vegas. Founded by Alcatel-Lucent, ng Connect is composed of more than 190 members, including network and consumer electronics companies, and application and content providers. The Connected Service Vehicle showcases cloud-based services that deliver office productivity to vehicle-based workers. As part of the concept vehicle, the ThingMagic Mercury6 RFID reader will be used to support work-order-based inventory-management and tool-tracking applications. Uploading asset information from the vehicle to a central data aggregation layer for anywhere, anytime consumption, Schoner says, “is the future.” —J.Z.

variations, such as hard or soft tops or optional third-row seating.

At BMW, no two adjacent vehicles coming down the line are the same, because buyers can order any combinations of styles and options they like for their vehicles, Jennings says. There's a lot of switching up for operators to account for, and a lot of mistakes waiting to be made, he adds.

To facilitate custom assembly, in 2009, Ubisense provided an RTLS solution at the automaker's Regensburg, Germany, plant.

Vehicles and tools are identified with Ubisense RFID tags, and software dictates which tools are used where and how for different cars. This helps BMW avoid problems such as applying the wrong tool-tightening settings to particular models, Jennings says. "We physically prevent the tool from being used with the wrong setting, because we know exactly where it is and what it's working on," he says. Based on the project's success, BMW deployed the solution at its other plants, recently completing the global rollout at its Spartanburg, S.C., facility. (For more details about the RTLS solution, see [BMW Finds the Right Tool](#).)

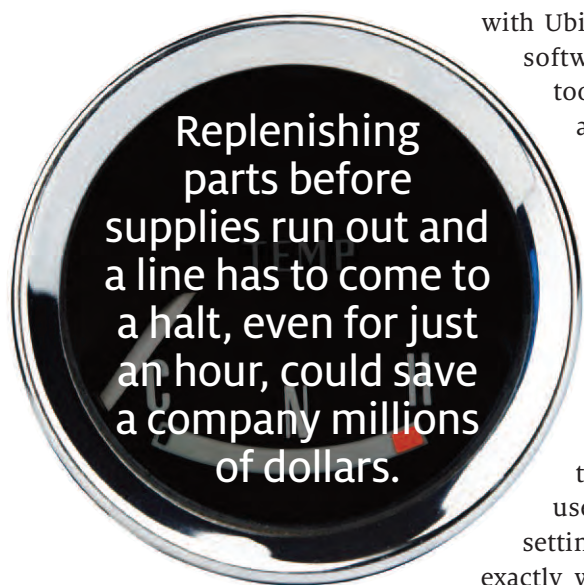
RFID enables agile manufacturing, says Mark Gallant, VP of industrial marketing at AeroScout. The company, recently acquired by Stanley Black & Decker, offers Wi-Fi-based RFID RTLS solutions for managing mobile assets, to help with tasks such as parts replenishment and vehicle inventory. Many large global auto manufacturers have adopted its solution, Gallant says, because they had already expanded their standard Wi-Fi networks beyond the corporate offices to their plants, a trend AeroScout says it sees gaining

momentum. With a Wi-Fi infrastructure already in place, deployment can be quicker and less expensive, and return on investment can be realized faster.

AeroScout battery-powered tags are most frequently attached to work cells, the points on assembly lines where car doors and other parts are added, says Bret Small, VP of technical services. When an operator at a work cell runs low on inventory, a push of a button activates a message that's sent from the tag along standard wireless access points on the Wi-Fi network. This kicks off a replenishment process in which the tag's unique ID is associated in a car maker's enterprise resource planning and warehouse systems with the required parts, and then a delivery cart takes the parts to the appropriate spot on the line. Replenishing parts before supplies run out and a line has to come to a halt, even for just an hour, could save a company millions of dollars.

Manufacturers of commercial vehicles and heavy equipment, such as tractors and seed planters, build bigger items typically in smaller volumes. They also manufacture their products in work cells or departments, rather than on a continuous assembly line. So instead of attaching tags to work cells, it's more efficient to monitor the physical work-in-process, Small says. That makes it easier to locate each unit and gain actionable business intelligence. "There is a way to see, for example, that a particular planter spent three hours in that cell, when the average time is 2 hours and 20 minutes," he says. "So it can raise an alert automatically through the system that something is happening—maybe a shortage of parts that's slowed things down. You can manage by exception automatically."

RFID-enabled agility extends to the end of the car-manufacturing process. AeroScout's RTLS technology, affixed to finished vehicles, can deliver the precise location of the 12 cars out of the thousands in storage on a manufacturer's lot that are scheduled to be shipped to a particular dealer, Gallant says. Workers locate vehicles using a computer or handheld





device that lets them view a vehicle's location on a map, eliminating long searches and increasing productivity.

Volkswagen Slovakia is using Identec Solutions' active RFID RTLS at its Bratislava facility to track each vehicle as it enters and exits servicing stations during testing and finishing processes. It helps staff members find vehicles quickly, improve planning and prevent bottlenecks (see [Volkswagen Slovakia Gains Efficiency in Its Finishing Process](#) for more details.) Based on the benefits, the auto manufacturer expects this spring to have "a much deeper penetration of the system and a

way bigger experience with it," says Bernward Wenninger, the company's IT and process manager.

In addition to improving efficiencies, using RFID to manage post-assembly finishing processes can save auto manufacturers money. "The time between a vehicle leaving the end of the inspection process and shipping is cash tied up in inventory," says Ubisense's Jennings. "That's working capital locked up in a vehicle awaiting some kind of repair or rework." An RTLS solution can turn information gleaned from tracking cars into actionable business intelligence that can

## Audi Connects With Consumers

AUDI HAS TURNED to RFID to build cars more efficiently (see [Audi Uses Semi-Passive Tags to Make TTs](#)). Now, Audi of America believes the technology will help its dealerships build better relationships with their customers. Ten of its dealerships piloted the RFID MyDealerLot (MDL) solution in 2012, and other locations are due to join the project this year.

MDL enables Audi dealerships to provide more personalized service when customers arrive for auto maintenance or repairs. To identify customers and their vehicles, a passive RFID tag is placed on the back of a car's rearview mirror, and RFID readers are installed at key points around a facility. Service staff can greet guests by name, and the solution checks them in automatically. Customers' cars also can be tracked anywhere on the property, even through a car wash, so service advisors can keep guests informed of their cars' status.

"For Audi customers, in particular, time is the most important commodity," says Audi of America service operations analyst Dan Rider. "The more efficiently customers can get in and out of their dealer, and the more personal the experience, the better. RFID technology enables this to be executed seamlessly."

But Audi is betting that in addition to improving customer relations, MDL will help boost sales. When a customer drives onto the service lot, the person who sold that individual the car also is notified, so he or she can greet the guest and reinforce the relationship. That's helpful when it comes time for the customer to buy a new car and sell the old one as part of the process, says MDL founder and CEO George Cresto. "They do business with you today, you know the history of their vehicle, and you can get them out of their



existing vehicle and into a new one," he says. "That is the name of the game in the auto industry—keeping a customer for life."

That's exactly what's happening at a Coral Springs Audi dealership that has deployed MDL. "By simply keeping the relationship alive and greeting the customer," Rider says, they've sold some people new cars when they come in for service. It's little wonder he believes RFID technology will become "one of the core fundamental pieces of our service process. We are continuously striving to be at the cutting edge of technology, both in vehicles and in our dealership experience." —J.Z.

address problem issues. "If you halve the time vehicles spend in rework," he says, "you release 50 percent of the capital tied up there."

## Moving Forward

The three-year RFID-based Automotive Network (RAN) project, which ended in December, was designed to test the use of RFID in seven production and logistics processes in Germany's auto industry, including sharing supply-chain information using data repositories based on the Electronic Product Code Information Services (EPCIS) standard.

Roughly 20 auto manufacturers, suppliers, logistics firms, research institutes, and IT and software companies, including BMW, Daimler and Opel, participated in the RAN project (see [Germany's RFID-based Automotive Network Gets Rolling](#)).

The group, which plans to continue its efforts in 2013, according to Oliver Czech, manager of Daimler's RFID-based processes, said it met one of its main goals: developing methods, approaches and standards for tagging containers and products with RFID, to enable the real-time exchange of information among supply-chain partners (see [RFID-based Automotive Network Project Achieves Its Goals](#)).

Some of the participating automakers have announced plans to continue using—and, in some cases, expanding—RFID applications within their own facilities. Now that the auto industry is recovering from the 2008 economic crisis, car makers are beginning to invest in closed-loop applications. U.S. car makers are investigating RFID technology, but they are keeping their pilots close to the vest. When it comes to open-loop applications that

involve supply-chain partners, "I would say the uptake is slow, but nevertheless it is growing," Odette International's Canvin says.

As part of the RAN project, Daimler successfully exchanged information with partners regarding the locations of tagged metal carriers for motors being transported between two countries, and the car maker plans to continue testing the RFID-based tracking system. Robert Bosch GmbH, which manufactures automotive components, participated in a pilot involving the exchange of RTIs with one of its parts suppliers and automaker Opel. It is moving some applications into production and continuing to test others. It is also working to launch replenishment processes with RTI suppliers.

The efforts of JAIF and RAN are on a course to intersect: JAIF intends to set up an Automotive Business Vocabulary that extends the existing EPCIS Core Business Vocabulary, and RAN plans to work with the German Association of the Automotive Industry (VDA) on RFID standardization. Since VDA is a member of Odette, and Odette is part of JAIF, "we have a direct interest in establishing the best solution for all parties," Canvin says, noting the current VDA, Odette and JAIF standards for RFID are all aligned around ISO.

While GS1 has done a lot of useful work with EPCIS, their processes are focused on the production and distribution of general consumer goods, including food, Canvin says, and don't reflect the specific requirements of the automotive industry. "Together, we want to define the events useful for our industry and 'translate' them into the EPCIS language," he says.

Ultimately, education is key to getting all auto-industry players to embrace supply-chain applications. Projects like RAN that demonstrate RFID's benefits in the open automotive supply chain are critical.

"The JAIF RFID team did a lot of proactive work in engaging ISO to craft the global automotive Returnable Transport Items standard and the Item Level standard," LG AutoID's Graham says. "The harder work is ahead to drive implementation." ■





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## Here's what you need to know to decide whether your business could benefit from managing files automatically—and in real time.

AN ESTIMATED ONE OUT OF EVERY 20 paper documents is lost in the workplace, according to research firm IDC, and office workers lose hundreds of hours each year searching for documents that have been misplaced. RFID solutions to address these problems were first introduced in 2000 by 3M, followed by similar offerings from FileTrail and other providers. These solutions let companies and organizations automatically monitor file rooms and the movement of files within offices, so they can determine who checked out a file and when, as well as the file's current location. The government agencies, law-enforcement departments, law offices, research libraries and universities that have adopted RFID file-tracking solutions report significant time-savings and reduced costs associated with searching for misplaced files.

Yet, in spite of technology advances that make RFID file-tracking solutions more effective, easier to deploy and less costly, adoption is stagnating. 3M no longer accepts new file-tracking business, though it continues to support its current customers. "We're always evaluating different markets and businesses to make sure we can focus on the best opportunities," says Skip Driessen, 3M's global business manager. "We didn't see it as a market that fits our future plans." Instead, the company is focusing on its RFID solutions for libraries.

The problem is one of marketing, not value, says Michael Liard, VP of the AutoID practice at VDC Research. "I don't know if it's an issue of getting the message across," he says. "Is it a lack of understanding of the technology or the cost savings? If you get it all down on paper, it just makes sense."

In fact, there's never been a better time to consider an RFID file-tracking deployment, Liard says. "When RFID for file tracking was first introduced, there were no standards and price points were fairly high for passive smart labels," he says. What's more, existing technology could only read tags from roughly three feet away. Now, industry standards have evolved, and passive ultrahigh-frequency Gen 2 RFID tags are the norm. The cost of passive UHF tags has come down, and read ranges have increased.

Another stumbling block—aesthetics—is no longer an issue, Liard adds. "A lot of the readers for passive UHF tags have an industrial look and feel," he explains. A law practice trying to project elegance, or a doctor's office seeking a homey feel, might well have hesitated to put these devices in public areas. With longer read ranges, RFID antennas can be installed below flooring, above ceiling tiles and under desks, says Darrell Mervau, CEO of FileTrail.

RFID fixed readers such as the DeskMate, used in Engineered Data Products' ATM Software Solutions products, are small and sleek enough to fit into any office design, says Jeff Gibson, the firm's product manager. The DeskMate measures 5.5 by 4 by 1.3 inches.

Longer read distances also reduce or remove still another common barrier to RFID adoption: the need for office personnel to change the way they do their jobs. People using the files don't have to change their behavior at all, Mervau says. They merely pick up the files and transport them around as they normally would, and the RFID system silently tracks the location of each one.

How big must a company be for an RFID file-tracking solution to be cost-effective? It's not so much the size of the company as the number of files being tracked—and the value attached to those files. "Our smallest deployment is with a company of 50 employees," Mervau says. But, he adds, it probably isn't worthwhile for truly small firms, with only 25 employees and a couple of thousand files.

Financial and legal firms, lenders, insur-

ance companies and medical clinics are among the companies at a crossroads in terms of managing files, Gibson says. They're determining whether to go electronic or stay with paper. Those that decide to stay with paper are considering RFID file tracking, he adds, as it becomes a more accepted technology.

Here's what else you need to know to determine whether your company would benefit from an RFID file-tracking solution. For more details, see the vendor table on page 35.

#### TRANSITIONING TO RFID

Typically, RFID file-tracking solutions include passive UHF RFID tags or inlays to identify files, and fixed and portable RFID readers to automatically monitor documents in file rooms and offices. Companies that are tracking files with a bar-code system can encode an RFID tag with the same information. A conversion station is set up with a fixed RFID reader and a bar-code scanner, ATM's Gibson says. A user attaches an RFID label to a folder, hits the "encode" button and scans the bar-code label on the folder. "Then, they have a file that carries both," he says.

FileTrail's Mervau agrees that the transition from bar codes to RFID is relatively easy. "We convert the existing bar-code number when we do the data migration into the RFID system," he says. "We've had customers with 80,000 folders to convert, and they had employees converting 200 folders an hour. They scan the bar code, scan the RFID tag, and it's done."

An unattended records room is equipped with a fixed reader to automatically monitor files. ATM typically sets up a check-in/check-out station, with a DeskMate plugged into a computer's USB port. It can read 10 to 20 folders at a time. FileTrail installs an RFID portal that can read multiple files—including up to 50 files stacked in a nonmetal shopping cart—as users walk through the door.

To ensure a file doesn't leave a records room without being checked out, an RFID reader can

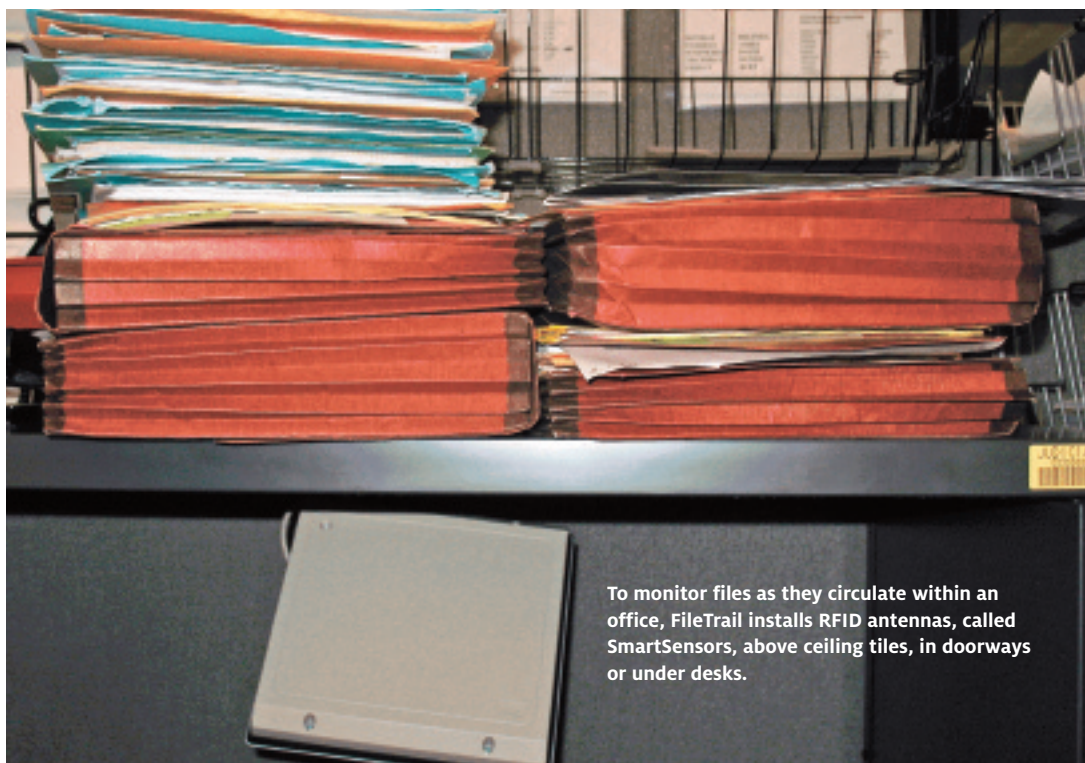


People using the files **don't have to change their behavior at all**. They merely pick up the files and transport them around as they normally would, and the RFID system silently tracks the location of each one.





It used to take the clinic a week to conduct an audit of the records room. With RFID, it takes **four hours**.



be installed in the ceiling, with antennas inside and outside the file-room door. The tracking software can be set to trigger an alert or alarm if an employee removes a file without checking it out. For additional security, employees can be issued RFID identification badges, so the file is associated with the employee who checked it out.

Checking in differs from checking out because it's location-based rather than keyed to an individual, Gibson says. "When you check something out, you want to know who has it. When you check it in, you want to know where it is," he says. "If I have 15 files that are going to a specific doctor, I go to the portal, select that doctor, wave all 15 folders at the reader, and it checks them all out. You can see the time savings over bar coding, where I'd have to individually scan all 15."

To monitor files as they circulate within an office, FileTrail installs RFID antennas, called SmartSensors, above ceiling tiles, in doorways or under desks at most deployments, Mervau says. The antennas are connected by coaxial cable to fixed readers up to 40 feet away. ATM

usually equips each desk or work area with a DeskMate RFID reader.

As with the records room, the tracking software can be set to trigger an alarm or send a text message to a manager if an employee who doesn't have permission leaves the premises with a folder. Another option is to have a camera at the exit automatically take a picture, so the person carrying the file can be identified if the need arises. Still other customers choose to remind employees in a not-so-gentle fashion not to carry out files. "We even have it where a big light spins around flashing and there's a siren noise so you'll be embarrassed," Mervau says.

To locate a misplaced file, an employee can use a handheld RFID reader set in what's often referred to as "Geiger counter" mode; the reader can locate a file within 20 feet. As the user nears the desired file, the reader's tone and status-bar display get louder and larger, respectively.

The Geiger counter feature can also search for a list of files. One of ATM's medical clients, for example, forbids physicians from keeping

a file in their offices for more than 15 days. ATM's MasterTrak software makes enforcing that rule much easier. "Each day, an operator can download a list of overdue files and then go to each physician's office," Gibson says. The Geiger counter will activate whenever it finds any of those files.

A handheld reader also enables companies to conduct audits in record rooms. A group medical practice in Texas with 30 physicians and some 320,000 files, recently adopted the ATM Software Solution, Gibson says. At times, each physician has up to 3,000 folders in his or her office. The ability to know the location of each folder increases productivity, as well as patient confidence. It used to take the clinic a week to conduct an audit of the records room, Gibson says. With RFID, it takes four hours—a big time-saver, considering the clinic conducts

an audit every 15 days, he adds.

Companies that are using Microsoft's SharePoint, a Web application to manage documents, can integrate it with FileTrail for SharePoint, a program that adds physical-records tracking and management capability (see [Black Elk Uses FileTrail-SharePoint Solution to Track All Its Documents, Physical and Electronic](#)). "So many companies are moving to SharePoint to manage all their information assets," Mervau says. "We're able to provide physical-records management, where users can assure compliance around those assets, both electronic and physical."

From within SharePoint, users can ascertain the whereabouts of a file, put a hold on it or request it, or send information to a central storage location to compile a box of desired files. The data resides in SharePoint, and users see

## SOME LEADING PROVIDERS OF FILE-MANAGEMENT SOLUTIONS

COMPANY	PRODUCT	READERS	TAGS	SOFTWARE	TRAINING
<b>ATM Software Solutions</b> www.atmsoftware.com	MasterTrak	DeskMate fixed reader; portal readers and antennas from Impinj and Motorola Solutions; Motorola MC319Z handheld reader	RFID inlays; Colorflex preprinted and encoded RFID tags	MasterTrak	Yes
<b>FileTrail</b> www.filetrail.com	SmartOffice	Motorola Solutions readers support SmartSensor antennas that can be mounted under work surfaces or above drop ceilings; SmartMobile portable reader	SmartTag paper labels	FileTrail Professional tracking software; RF Enterprise browser-based middleware; FileTrail for SharePoint	Yes
<b>The Smart Folder</b> www.thesmartfolder.com	The Smart Folder	Motorola Solutions MC9090 handheld reader	Printed RFID color-coded labels	Smart Folder	Yes
<b>Virtual Doxx</b> www.virtualdoxx.com	Virtual Doxx RFID	Alien Technology fixed readers; ATID and Motorola Solutions handheld readers	Alien Technology and UPM inlays; Virtual Doxx labels	Virtual Doxx File Tracking & Records Management	Yes



**Lower costs** have broadened the range of companies that can take advantage of RFID file-tracking solutions.



RFID fixed readers such as the DeskMate, used in Engineered Data Products' ATM Software Solutions products, are small and sleek enough to fit into any office design.

that data as part of their existing libraries. "You can see any item in a single view," Mervau says.

#### THE BOTTOM LINE

Lower costs have broadened the range of companies that can take advantage of RFID file-tracking solutions. "In the early days, it was 40 or 50 cents for a basic label," Liard says. "Now it's around 25 cents." FileTrail's bar-coded RFID labels cost 25 cents each. ATM's inlays cost 24 cents each, and its RFID tags cost 30 cents each.

A complete ATM solution, including fixed and mobile RFID readers, ranges from \$5,000 to \$20,000, depending on how many files must be tagged. It usually takes one to two days to deploy the solution, Gibson says. "We discuss work flow to improve processes in advance, and we can configure the software remotely," he adds.

FileTrail's ExpressRFID is a packaged solution designed to make it economical to get started with a small RFID file-tracking deployment. It includes a handheld reader, 1,000

labels, software and training, and costs \$14,995. "It gets people to understand RFID and see its value," Mervau says. "Most people who use it don't have any system in place at all, so anything will be an improvement." And once they've seen what RFID can do, they can easily expand from there. Depending on size, a FileTrail deployment can take eight weeks to six months to complete, he adds.

In the future, RFID file tracking may become less expensive or bring more options and capabilities. "This is part of printed electronics, and that's a technological area that continues to expand," Liard says. In time, he speculates, end users may be able to print not only labels or documents that contain tags but also the tags themselves, perhaps using some form of specialized paper.

There's no need to wait until then, though, to give RFID file tracking serious consideration. "This solution's not going to go away," Liard says. "The industry has just been challenged with communicating the benefits. It's elegant, it's secure and it will fit into your office environment. It just makes sense." ■



# Building a Visibility Platform

EPCIS adaptors facilitate the exchange of information.

By Jin Mitsugi, Keita Miyazaki and Yuki Sato



Keita Miyazaki, Jin Mitsugi and Yuki Sato

IN JAPAN, we produce some delicious and very expensive melons that are frequently given as gifts. Customers are concerned about their quality and whether they were grown and shipped under safe conditions. And farmers are very keen to receive feedback from buyers and improve customer relations. RFID can monitor how melons and other crops are produced and transported, as well as facilitate communication between customers and farmers.

The Auto-ID Lab Japan, working with GSI Japan, IBM Japan and Daiwa Computer, combined an RFID EPC traceability system with an e-commerce system to monitor melon crops from field to store. We attached an RFID label and a Quick Response (QR) bar code to each melon, and encoded a serialized Global Trade Item Number (SGTIN) to both. We installed radiation sensors (Geiger counters) at the farm to monitor the environment (the numbers were below the natural safety limits). We also assigned SGTINs to the sensors. The data was collected via a ZigBee wireless network and stored in a database. An application periodically retrieved the data and reported it to an Electronic Product Code Information Services (EPCIS) repository, which provides a way for businesses to capture and share EPC data automatically.

When the melons were harvested, they were boxed according to the purchase orders in the e-commerce system, which also issued shipping orders. An RFID tag encoded with an SGTIN was attached to each box, and the data was also reported to the EPCIS repository. We

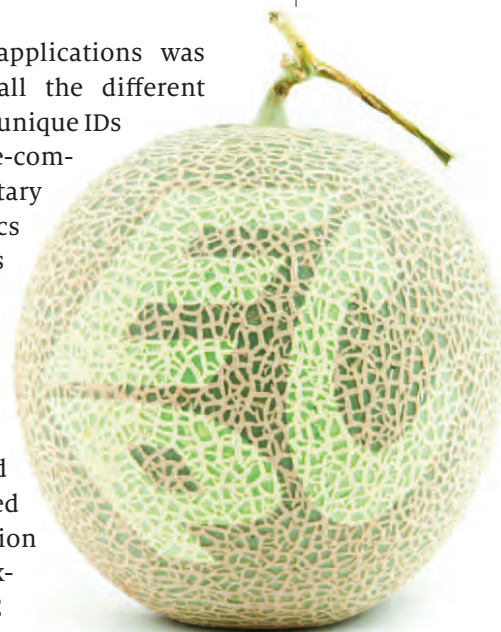
then tracked the boxes from the farm through the supply chain, using the EPCIS standard.

The e-commerce system, which included a payment feature, tracked the delivery of melons and linked to a Facebook page. Customers could scan the QR code attached to each melon with their smartphones to connect to Facebook and get information about the farm and suggestions about the best day to eat the melon. They could also write comments about the particular melon, which provided valuable information to the farmers.

But facilitating these applications was complicated because of all the different identifiers—EPCs, non-EPC unique IDs for purchase orders in the e-commerce system, and proprietary IDs used by the logistics company. It involved a series of queries, which is an impediment to the adoption of EPCIS as the visibility platform.

We developed and added a group of functions called EPCIS adaptors that enabled us to establish an information platform designed to exchange EPC and non-EPC data. This allows the EPC network architecture to accommodate various applications, without putting too much burden on developers. We believe sharing these EPCIS adaptors will help promote the adoption of RFID and EPC technology. ■

*Jin Mitsugi is an associate director of the Auto-ID Lab Japan at Keio University and an associate professor in the faculty of environment and information studies. Keita Miyazaki and Yuki Sato are graduate students who also work at the Auto-ID Lab Japan.*





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# RFID-Labeling Apparel Items

Here's how to set up your printer-encoder software.

By Ken Traub



INCREASINGLY, APPAREL retailers are adopting RFID, and they are asking their suppliers to tag items at the source of manufacture using EPC Gen 2 ultra-high-frequency tags. Each tag is encoded automatically by printer-encoder

software, but suppliers must first set up the software by inputting information about each product and their company—or, if they are outsourcing RFID-tagging, provide that information to their label provider. Here's the information you need, along with the steps you should follow to obtain it.

**Determine your Global Trade Item Number (GTIN).** This is a 14-digit number that is unique for each product and identical for all instances of the same product. If your product carries a Universal Product Code (UPC) or European Article Number (EAN) bar code, simply take that number—12 or 13 digits, respectively—and add one or two zeros to the left to create a 14-digit GTIN. If a private-label product doesn't have a GTIN, contact the GS1 standards organization to get one.

**Determine what portion of the GTIN is your GS1 Company Prefix.** The middle 12 digits of a 14-digit GTIN (excluding the first and last digits) are composed of a GS1 Company Prefix followed by an item number. The number of digits in a GS1 Company Prefix can vary from six to 12 (with the length of the item number varying inversely), and your encoding software will need to know how many digits it is in order to encode the GTIN into an RFID EPC tag. The person in your organization who assigned the bar-code number should know your Company Prefix; if not, contact GS1 for assistance.

**Choose a serialization method.** In addition

to the GTIN, each RFID EPC tag for a given product contains a unique serial number. Your encoding software will assign the serial numbers automatically, but you need to choose an assignment strategy that fits your business. See my columns "[Identifying Items](#)" and "[Serialization Roadmap](#)," or the guide "EPC-enabled RFID Serialization Management for SGTIN-96," available from the GS1 US Web site ([www.gs1us.org](http://www.gs1us.org)).

Once you start producing tags, do some spot checks to verify that your RFID EPC tags are readable. It is especially important to confirm that the GTIN and serial number are encoded correctly. The free encoder/decoder tool at [www.kentraub.com/aidc](http://www.kentraub.com/aidc) can help with this.

You must repeat these steps for each product you tag. At first, this may seem like a lot of work. But many or all of your products likely share the same GS1 Company Prefix. Also, if your products share a similar manufacturing process and volume, you will probably use the same serialization method. In those cases, after the first product, all you need to determine is the correct GTIN for each subsequent product. ■

*Ken Traub is the founder of Ken Traub Consulting, a Mass.-based firm providing services to software product companies and enterprises that rely on advanced software technology to run their businesses. Send your software questions to [swsavvy@kentraub.com](mailto:swsavvy@kentraub.com).*



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# Move to OHIO

Retailers should let RFID do its job.

By Bill Hardgrave



IT'S TIME FOR all retailers to move to OHIO. I'm not suggesting retailers move their businesses to the beautiful state of Ohio. Rather, retailers need to move to zero (0) Human Intervention in Operations, a term coined by RFID

industry veteran John Greaves. The concept is simple: Eliminate, or at least reduce, the human touch points in operations. Essentially, why have people do something that can be done automatically?

In pilots and early-stage RFID deployments, I have seen several retailers make the same mistake—they treat RFID as a “super bar code.” They swap out bar-code equipment for RFID devices, and keep existing processes in place. In doing so, they minimize the opportunity for gain and maximize the opportunity for mistakes.

Let's look at an example. For complete inventory management, retailers must know when product is received at the store and when it moves from the back room to the sales floor. Retailers that used mobile RFID readers in place of bar-code scanners to track products experienced execution failures. That's because store associates became busy and forgot to read products that arrived at the store. And when they couldn't easily locate a mobile reader, they didn't read products that were moved from the back room to the sales floor. As a result, stores had incorrect inventory counts, and they did not know where items were located.

The retailers depended on store associates to do a job that the RFID system could have done automatically. Instead of simply substituting RFID for bar-code technology and keeping the same processes, the RFID system

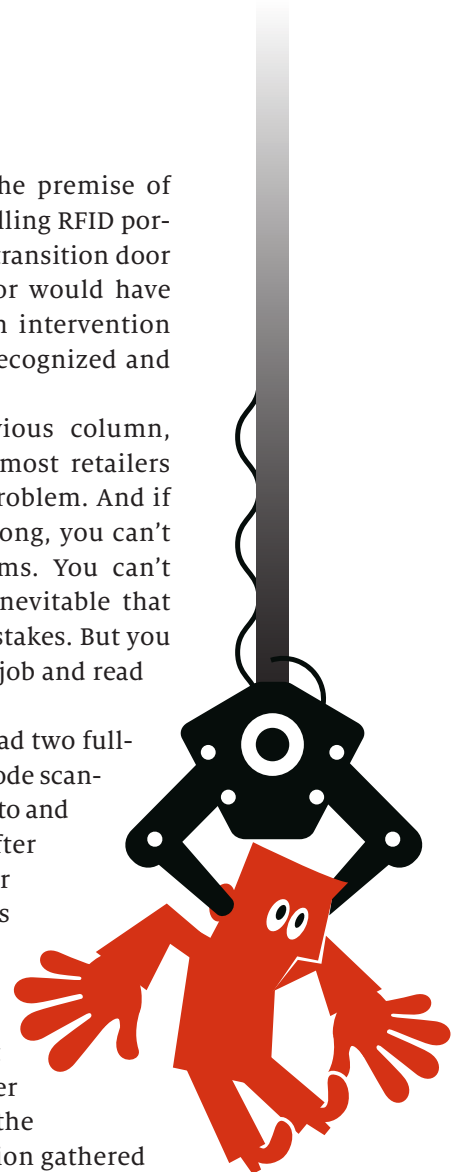
should have been built on the premise of human touch reduction. Installing RFID portals at the receiving door and transition door from back room to sales floor would have removed the need for human intervention and ensured products were recognized and recorded.

As I explained in a previous column, “*Tracking Your Competitors*,” most retailers have an inventory accuracy problem. And if your inventory counts are wrong, you can't solve other business problems. You can't change human nature—it's inevitable that store associates will make mistakes. But you can let the RFID system do its job and read products without intervention.

One retailer, for example, had two full-time store associates use bar-code scanners to track the items going into and out of dressing rooms. After adopting RFID, the retailer replaced the bar-code scanners with RFID mobile devices and was disappointed to find there were no benefits. That's because the process hadn't changed. When the retailer installed RFID readers in the dressing rooms, the information gathered was better, and dressing-room associates were free to help customers.

When evaluating existing processes, ask the question: How can I remove the requirement for human intervention at this step? Or, perhaps it's easier to remember: OHIO. ■

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







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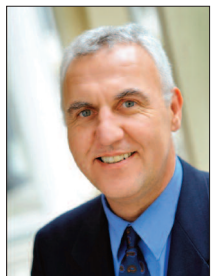
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# European Privacy and Security Standards

Compliance with regulatory requirements will help, not hinder, RFID adoption.

By Henri Barthel



IT'S NOT SURPRISING that the European Union (EU)—an economic and political partnership among 27 countries, with 23 official languages—encompasses a diversity of cultures, laws and regulations, including many

related to security and privacy. In 2006, the European Commission (EC), the executive body of the EU, launched a number of RFID initiatives and research projects to encourage RFID adoption across the EU. At the same time, the EC took the view that Europe needed a consistent approach to RFID adoption, and security and privacy regulations had to be improved and harmonized.

In May 2009, the EC published its recommendation “on the implementation of privacy and data protection principles in applications supported by radio-frequency identification.” The EC then mandated that the European Committee for Standardization (CEN), European Committee for Electrotechnical Standardization (CENELEC) and European Telecommunications Standards Institute (ETSI) implement the recommendations.

From 2010 to 2011, ETSI led the first phase of the work, consisting of analyzing the standards landscape, identifying gaps and suggesting areas in which new European standards and technical specifications would be relevant. A comprehensive report outlining several proposals aimed at promoting confidence and trust in RFID technology and its applications was issued. The EC approved the report and appointed CEN to develop the recommended standards and technical reports. This work started in January 2012 and is due to be completed in early 2014.

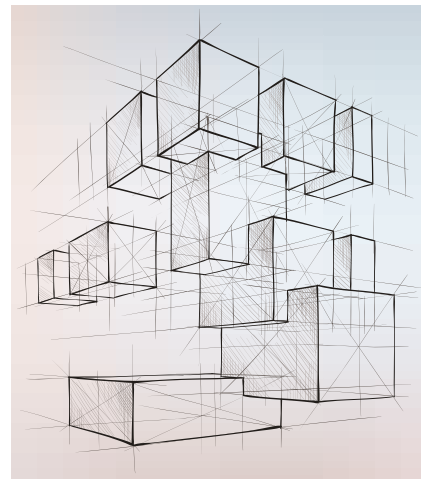
One major deliverable will be a formal

European standard on Signage and Emblem, which will specify the data and graphics to be applied in areas where RFID is used. Another will be a formal standard on Privacy Impact Assessment, which will specify normative and informative procedures to enable a common European method for undertaking an RFID PIA. The PIA standard will be generic, with a special focus on major sectors, including banking, e-ticketing, libraries and retail.

Other deliverables will include technical reports analyzing the features of RFID devices that must be taken into account in assessing privacy, a report on RFID penetration testing, an RFID threat and vulnerability analysis, and a report on potential threats associated with the use of mobile phones as RFID readers. We expect the forthcoming CEN standards will be referred to by EU legislation, at which time they will become mandatory for RFID applications in Europe.

Some businesses and RFID solution providers are concerned that compliance with regulatory requirements will slow or discourage RFID adoption. In reality, the contrary is true, because the availability of precise standards throughout Europe will provide clarity and legal certainty. It will build confidence that organizations can implement RFID in a way that is secure and fully respectful of people's privacy. ■

*Henri Barthel is chairman of CEN/TC 225, the European standards committee on automatic identification technologies and applications. He also is VP of system integrity and global partnerships for GSI.*



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# 15 Minutes of Fame

Journalists at CES in search of the next big thing turn the spotlight on the Internet of Things.

By Kevin Ashton



2013 STARTED with a flurry of headlines announcing that this will be the “Year of the Internet of Things.” Writers and bloggers for *Forbes*, *The Washington Post*, *Time* and other mass-media and technology sites heralded the Internet of Things (IoT), the network that promises automatic and ubiquitous connectivity. Suddenly, the technologies the RFID industry has been developing and selling for decades to build the IoT were fashionable.

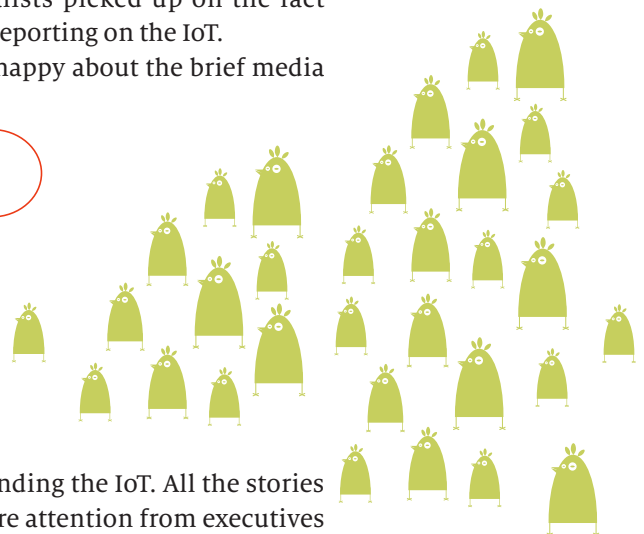
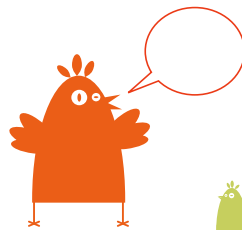
What was behind the headlines was an annual event called the Consumer Electronics Show (CES), which takes place in Las Vegas each January. CES has become one of the biggest trade shows in the world—roughly 140,000 people attend. In previous years, attendees have witnessed some historic moments in technology: The videocassette recorder, the compact disc, Microsoft’s Xbox and the plasma television all made their first public appearances at CES. As a result, a fair proportion of those 140,000 annual attendees are journalists, there to report on the next big thing, and they need a good story to tell.

But in the world of the Internet, smartphones and social media, news travels faster and farther than any plane to Vegas ever could. And breakthrough technologies are not like birthdays; they do not come around every year, whether you like it or not. On display at this January’s CES were bigger-than-ever TVs and thinner-than-ever laptops—but large TVs and slim laptops have been covered before.

Many companies (full disclosure: including my own) demonstrated new technologies for managing Internet-connected appliances—from coffee machines to thermostats—often taking advantage of the now

global infrastructure of Wi-Fi and smartphones. Suddenly, everyone was talking about smart devices and the Internet of Things. While the IoT was not completely new, it hadn’t made headlines for a while, so some writers and bloggers declared it was news. Once the IoT became headline news in a few places, it became headline news in many places, as journalists picked up on the fact that others were reporting on the IoT.

We should be happy about the brief media



sensation surrounding the IoT. All the stories help RFID get more attention from executives and investors. But I say brief, because what happens next is predictable. The IoT is not going to be built in a day, a year or even a decade.

In a few weeks or months, the snake will eat its own tail (2013 is also the Chinese Year of the Snake, by the way). When the IoT does not appear everywhere instantly, the headlines will change. Look for something like: “Whatever Happened to the Internet of Things?” or “Why the Internet of Things Will Never Happen.” Those writers and bloggers will move on. But journalists in the know will continue to report on IoT developments and applications, because the Internet of Things truly is the next big thing. ■

*Kevin Ashton was cofounder and executive director of the Auto-ID Center.*





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