

RFID JOURNAL

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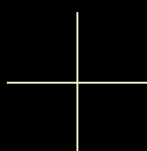
SEPTEMBER/OCTOBER 2012

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COVER IMAGE: ISTOCK PHOTO

tune in online

Coming soon to RFIDJournal.com



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

- **RFID in Harsh Environments:** Companies in the oil and gas, chemical, mining, construction and energy industries are using RFID technologies to increase operational safety and efficiency.
Oct. 2, 10 am to 12 pm EDT
- **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.
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Find products that can help you deploy RFID successfully. Here's an example: The **Ultra Slim RFID UHF Antenna FlexiRay** is a modular, ultra-slim planar antenna that enables companies to create portals and reading zones in entrances, gates, doors and corridors without impeding traffic.



Most-Read Stories In August

- [McCarran International Airport Expands Its RFID Baggage-Handling System](#)
- [J.C. Penney CEO Predicts RFID Will Help Create a Transformational Shopping Experience](#)
- [That 'Internet of Things' Thing](#)
- [About That Problem With Metal and Water](#)
- [How RFID Is Transforming VA Hospital Operations](#)

Top 10 Search Terms On RFIDJournal.com

- 1 RTLS
- 2 NFC
- 3 Library
- 4 Container tracking
- 5 Security
- 6 Walmart
- 7 Oil and gas
- 8 Boeing
- 9 Middleware
- 10 Sensor



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:

- How would I deploy an RFID system for a library containing approximately 6,000 books?
- Can RFID monitor patients' vital signs?
- What is the difference between an RFID tag and an RFID chip?
- How can RFID help to prevent train accidents?

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.



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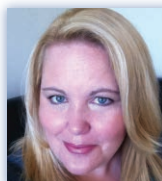
RFID Journal LIVE! Europe—Scandinavia 2012, being held on 24-25 Oct., in Oslo, Norway, will explain how manufacturers, transportation businesses, logistics firms, food and energy companies, and other enterprises across Europe are employing radio frequency identification (RFID) to cut costs, enhance visibility, improve asset-utilization rates, streamline business processes, improve inventory accuracy and achieve many other benefits.

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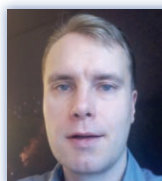
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30 OCT. 2012 • LONDON, ENGLAND

UK

Dexter House

RFID Journal's first event in London will focus on educating end users about how radio frequency identification (RFID) technology is delivering real business benefits across Europe. This one-day program will share how to attain the full benefits of RFID-enabled technology, and provide companies with a greater understanding of how RFID can be used to improve production processes, increase visibility, lower labor costs, reduce theft, track inventory and transform the supply chain. LIVE! Europe—UK will connect attendees with leading end users, industry experts and solutions providers offering the latest RFID systems.

HEAR FROM INDUSTRY LEADERS, SUCH AS:



Michel Lahouratate



Jon Graves



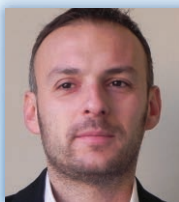
Dr. Bill Hardgrave



Fernando Ferreira Matos



Kevin Francis



Lorenzo Tazzi

Tessilform S.p.A.



Laura Moody



Mark Roberti



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Navigating Troubled Waters

AS I WRITE THIS NOTE, the world is marking the fourth anniversary of the collapse of financial services firm Lehman Brothers, which triggered a global financial crisis. Capital markets seized up. Lending stopped. The world teetered on the brink of a second Great Depression.

While the fast response of governments, central banks and businesses averted the worst-case scenario, the global economy still hasn't recovered from the events of four years ago. The U.S. economy creeps along with meager growth.

Europe struggles with the financial fallout in Greece, Spain, Italy and other countries.

Despite the uncertainty, businesses across Europe continue to deploy radio frequency identification technologies to improve the way they do business, reports contributing writer John Edwards in this issue's cover story (see page 12). Frost & Sullivan, a technology research firm, estimates the European RFID market hovered at around \$1.2 billion to \$1.5 billion in 2011 and will likely surge to \$3.7 billion to \$4 billion by 2018.

RFID continues to attract new adopters because European businesses are starting to view the technology as an immediately available solution rather than as a promising technology, says Michael Liard, RFID analysis director at VDC Research.

Several years ago, European governments subsidized a wide variety of RFID projects. Funding has dried up due to the current euro crisis, but those investments are paying off. How so? Companies such as Gerry Weber International learned about the value of RFID from them and are now investing their own funds to deploy the technology more broadly. Today, many European aerospace and automotive

companies, construction and energy firms, manufacturers, and logistics and transportation businesses have completed RFID pilots and are rolling out the technology to increase productivity and reduce costs (see "Recent RFID Rollouts" on page 15).

Technology improvements also are making it easier for manufacturers in Europe and elsewhere to use RFID technology to track raw materials, work-in-process and finished goods inventory (see Vertical Focus on page 22). New European standards for tracking returnable transport items will allow companies to achieve internal and supply-chain benefits (see Radio Europe on page 38).

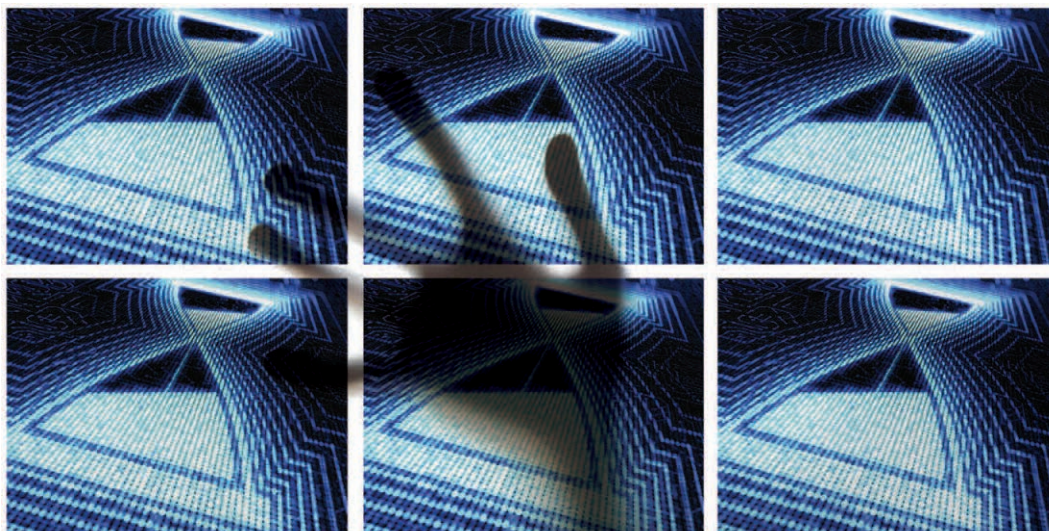
Near-Field Communication (NFC) technology is inspiring many businesses to develop creative applications. In France, for example, supermarket chain Groupe Casino is working on a project that uses NFC technology to help visually impaired people shop safely and efficiently. NFC also is ushering in a new age of gaming, bridging the line between physical and virtual play (see Product Developments on page 28).

I'm pleased that Bill Hardgrave will be writing a regular column for *RFID Journal* magazine, beginning with this issue (see Tuned In on page 33). He will address RFID adoption and business-case issues, and he welcomes your questions.

It's not clear when the global economy will pick up or the euro crisis will be resolved. But one thing is clear: RFID technology is helping companies in Europe and around the world navigate the troubled waters and prepare for smoother sailing ahead.

Mark Roberti, Founder and Editor





SECURITY

Blunting Brute-Force Attacks

Researchers have developed a technique that could make it harder to crack smart-card encryption schemes.

IT'S CALLED A BRUTE-FORCE ATTACK. A software program is set up to systematically check all possible encryption keys until it finds the one that unlocks the data. It's been used to crack a number of encryption schemes on contactless smart cards, which use radio frequency identification transponders to send data from the card to a terminal. Now, researchers at Dartmouth College, the University of California at Berkeley and the University of Massachusetts-Amherst say they have found a way to make brute-force attacks on RFID transponders much more difficult.

"While conducting research on SRAM [static random-access memory] physical unclonable functions [PUFs], we noticed the predictable decay of unpowered memory cells could serve as the basis for an inexpensive hourglass-like throttle," says Kevin Fu, associate professor of Computer Science, Electrical & Computer Engineering at UMass Amherst. "Throttling requests with our temperature-compensated timer raises the bar for security by forcing a hacker to resort to more advanced attack equipment."

SRAM contents are lost when the chip loses power. The researchers developed a technique that can be implemented easily in 50 lines of code and added to the existing micro-controller on a contactless smart card's RFID transponder.

The program essentially monitors the decay of memory and uses the "hourglass" to block the reader from querying the tag for a period of time, which could be from a fraction of a second to 10 seconds or more.

By increasing the interval between tag-reader interactions, the technique, which the researchers call TARDIS (for Time and Remanence Decay in SRAM), can greatly increase the amount of time it takes to execute a brute-force attack. That might not seem terribly ingenious, but what makes TARDIS attractive is it requires no changes to the reader and no design changes to the tag chip (transaction counters or battery- or capacitor-powered clocks would increase the cost of the chip).

"Now, contactless smart cards, most of which have SRAM, can have a defense mechanism against an attack," Fu says. "When a hacker is trying to guess the chip's password hundreds or thousands of times per second, the card can say, 'Go away. You are asking questions too quickly.'"

There would be no hardware cost for implementing TARDIS, and the few additional lines of code should not cost much to implement on typical smart cards. The researchers have applied for a patent and are looking to commercialize TARDIS. —Mark Roberti

SPORTS

What a Racket!

Sensors will enable Babolat tennis rackets to return data, as well as balls.

FRENCH TENNIS EQUIPMENT manufacturer Babolat is developing a racket that will use sensors and a smartphone application to report on how well or poorly players are hitting the ball. The racket will use microelectromechanical systems (MEMS) sensors developed by Movea, a company that specializes in wireless motion sensors. "We think this is the future of sports," says Dave Rothenberg, Movea's marketing manager.

The racket, called Play&Connect, will have a printed circuit board and small battery inserted into its handle. The MEMS sensors

data from the sensors to a smartphone or tablet application via Bluetooth. The software analysis will tell you, for example, what percentage of shots were hit with slice, versus flat or with topspin. And it will tell you how consistently you are hitting shots on the sweet spot. The application will run on any computer, so players can download the data for additional analysis and share it with playing partners.

The racket is expected to sell for \$100 more than conventional high-end tennis rackets, which typically retail for \$150 or more. Babolat plans to produce 200 test/demo rackets before



will reside on the circuit board, with a micro-controller, analog-to-digital converter, power management IC and Bluetooth transceiver. The sensors will determine the moment of impact, impact location (whether you hit the ball on the racket's sweet spot), and racket position. The system will determine how the racket is moving before and after impact, and whether the ball was hit with backspin or topspin.

The system will use onboard algorithms to analyze the sensor signals, and will send the

the end of this year for professional players. The racket will go into mass production starting in the first half of next year.

Rothenberg envisions the on-court and onscreen worlds merging eventually. "Imagine downloading Rafael Nadal's data and your own for a video game match via your set-top box," he says. "That's where I see this going."

Movea is working on a similar system for golf clubs and other sports. Unfortunately, Rothenberg says, the sensors will not help you hit a perfect shot every time. —M.R.



Giving Credit Where It's Undue

Credit-card numbers stolen from online shoe store **Zappos** in 2012:

24 million

Credit-card numbers stolen from the **PlayStation** Network in 2011:

2.2 million

Credit-card numbers stolen from Visa and MasterCard via **Global Payments** in 2012:

1.5 million

Credit-card numbers stolen from **Citigroup** in 2011:

360,000

Credit-card numbers stolen from **Bank of America** in 2011:

85,000

Credit-card numbers stolen from **Subway** restaurants from 2008 through 2011:

80,000

—Rich Handley

Interest Shifts to Internal RFID Applications

Comparing RFID JOURNAL survey data from September 2012 with data from four years earlier reveals end users are more focused on solutions that can deliver value within their four walls.

By Mark Roberti

EACH YEAR, RFID JOURNAL SURVEYS its readers about the content of sessions they would like to attend at RFID Journal LIVE!, our annual conference and exhibition. After gathering the results of this year's survey in preparation for RFID Journal LIVE! 2013, we compared the data with responses from September 2008 (for LIVE! 2009), to see if there has been any change since the global financial collapse that occurred toward the end of 2008.

Responders to both surveys represented a wide range of industries, including health care, manufacturing and transportation/logistics. There was a 2 percent increase in responses in three sectors: aerospace/aviation, probably due to the progress Airbus and Boeing are making toward using RFID for tracking parts and shipments of parts and sub-assemblies; apparel/footwear, no doubt a result of the buzz surrounding item-level deployments by American Apparel,

Macy's, J.C. Penney, Walmart and other retailers; and energy companies and utilities, perhaps because of improvements in rugged tags for their environments.

End users continue to have a strong interest in information about how companies like theirs are using the technology: 96 percent of respondents in 2008 and 95 percent in 2012 said they were interested or very interested in "sessions focused on how companies are using RFID within your industry."

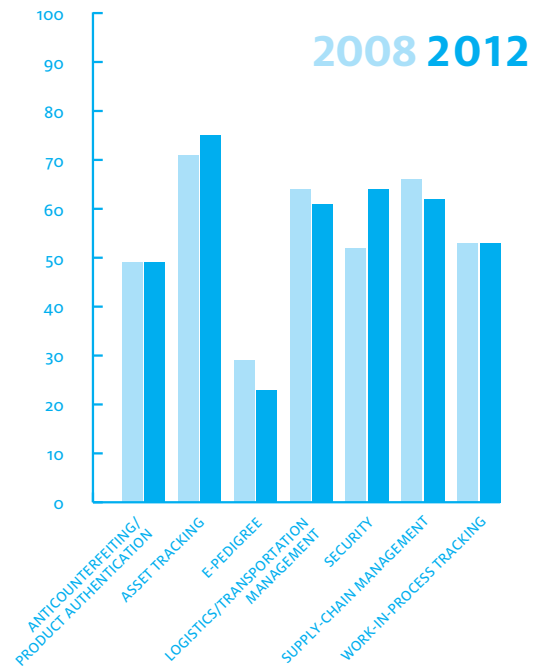
The data that follows highlights two trends: End users are more interested in how they can deploy RFID within their own operations, rather than throughout the supply chain. And more end users are ready to deploy the technology.

RFID Journal LIVE! 2013 will be held in Orlando, Fla., on Apr. 30 to May 2. Based on the results of our survey, we will introduce a track devoted to using RFID to improve internal operations and technical workshops.

Companies Are Interested in Internal Applications

Asset tracking remains the most important application for end users across all industries. The decline in interest in e-pedigree is likely due to fewer pharmaceutical companies seeking to comply with regulations, which seemed imminent four years ago. In general, interest in supply-chain and logistics applications, while still strong, has waned slightly, while interest in internal applications, such as tracking work-in-process and securing premises or assets, has stayed the same or risen.

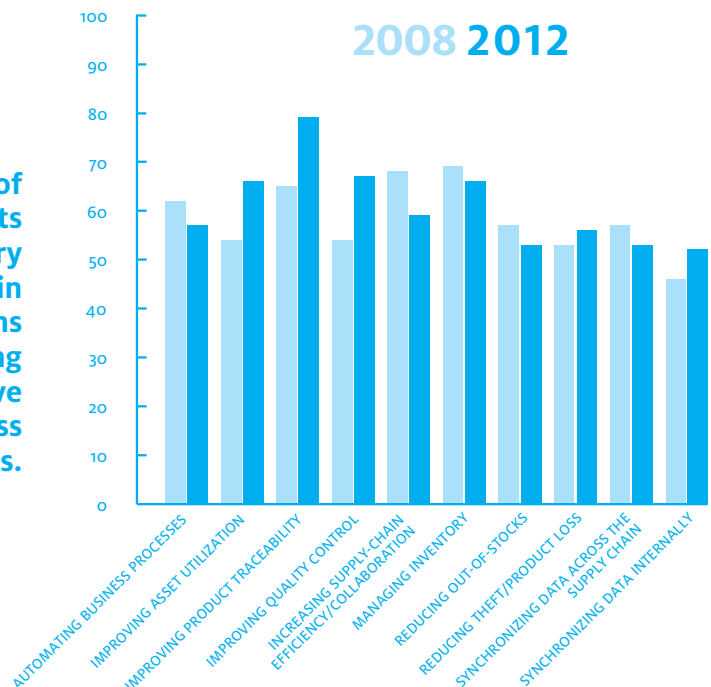
Percentage of respondents interested or very interested in improving their companies' operations.



Companies Are Interested in Achieving Internal Benefits

End users are less interested in using RFID across supply chains. Interest in using RFID to synchronize data across the supply chain declined four points, while using it to synchronize data internally rose 6 percent. Improving product traceability, quality control and asset utilization showed the biggest increases in interest among respondents.

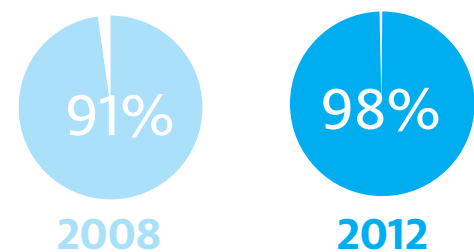
Percentage of respondents interested or very interested in attending sessions focused on using RFID to achieve specific business benefits.



Companies Are Ready to Deploy RFID

Interest in sessions on how to implement RFID systems rose during the past four years, reflecting the fact that more companies have determined how to get the business benefits of RFID and are ready to deploy the technology.

Percentage of companies interested or very interested in attending technical sessions on how to implement RFID.





SOCIAL MEDIA

RFID Gains Traction as a Social-Media Tool

Cadbury, Smirnoff and other companies are using radio frequency identification to connect consumers' real-world experiences to Facebook, Twitter and other networking sites.

FOR THE 2010 SKI SEASON, Vail Resorts, which operates five popular U.S. mountain resorts, introduced EpicMix, a platform allowing visitors to use social-media tools to connect with each other, as well as track and share their ski or snowboard metrics online. This pioneering effort was made possible by radio frequency identification transponders in ski badges, and it's been a big hit.

Since then, more companies and organizations have been using RFID to link consumers' real-world activities to social-media sites, so participants can share their experiences.

During this summer's Olympics, in London, Cadbury, a division of Kraft Foods, held an event in Hyde Park that included an RFID-enabled social-media application created by dwinQ. Visitors to the company's Cadbury House could view an exhibit of its chocolate-making history, play interactive games, sample its confections—and share their experiences and photographs with friends and family on Facebook, by means of a hands-free passive ultrahigh-frequency RFID system. Roughly 3,500 people visited Cadbury

House each day during the Olympics.

Smirnoff, a division of the British beverage company Diageo, has been promoting its vodka products at a series of events that enable guests to share their activities with friends on Facebook, using an RFID-enabled token. The solution, provided by Fish Technology and managed by social-media firm Blondefish, has been used at nightclubs in Belgium, Ireland and Germany during the past year as part of the company's Nightlife Exchange Project and Battle of the Clubs programs. Guests have updated their pages with comments about their locations and activities, along with photos of themselves and friends partying at particular clubs.

This year, thousands of participants in Susan G. Komen 3-Day walks are sharing their progress during the events with friends and family via an RFID solution, provided by Qnectus, that links them to their Facebook pages. Participants in the United States, who walk to raise money and awareness about breast cancer and early detection, receive RFID-enabled ID cards attached to lanyards, which

they wear around their necks. As they begin their walk, an RFID-enabled station captures their information and displays an online message, such as “Today I start my 60-mile journey! Three days! Making an impact in the fight to end breast cancer.”

It’s not clear that companies and organizations get a hard return on investment from using RFID for social-media purposes, but that’s not the point. The goal is to engage people

with a cool new technology and have them promote a product, cause or event to others. And it appears to work. In 2010, Coca-Cola held a series of 10 festivals, known as Coca-Cola Village, in Israel. Most of the 6,500 teens who attended the events used RFID technology to share their experiences with friends and family through Facebook. The Coca-Cola Village Facebook page became the most popular page in that country, with some 650,000 daily post views. —Mark Roberti



Look Who’s Jumping on the Social-Media Bandwagon

Activision

Last year, at a two-day live-action gaming event to celebrate the launch of the video game *Call of Duty: Modern Warfare 3*, an RFID system enabled players to post their performance, as well as images taken of them on the course, to their Facebook pages.

www.rfidjournal.com/article/view/8921

Centre Pompidou

The Teen Gallery at the art museum, in Paris, invites young visitors to share their experiences with friends. Teens are given mobile phones with Near-Field Communication (NFC) technology, which they can wave near posters and exhibits equipped with NFC tags to gain information. The phones also can be used to post comments about the artwork, as well as videos of the artists, on Facebook and MySpace. www.rfidjournal.com/expert/entry/7262

Coachella Festival (pictured above)

At the music and arts festival, which ran for two weekends in April, in Coachella, Calif., guests were issued RFID wristbands to gain entrance, as well as to access parking, camping and shuttle buses.

More than 30,000 attendees registered for Live Click, which let them use their wristbands to update their Facebook status at portals positioned at key areas around the festival site.

www.rfidjournal.com/article/view/9524

Great Wolf Lodge

Guests at Great Wolf Resorts, located throughout North America, can use their RFID wristbands to connect to their Facebook pages. The Great Wolf Connect application lets them automatically share photographs taken by the various digital cameras throughout the indoor water parks. www.rfidjournal.com/article/view/8569

Hyundai, Nestlé Philippines and Nike Korea

At an event, show or exhibition, U-Like, developed by UbiU Holdings, lets individuals quickly and easily share their experiences and photos with friends on Facebook and Twitter. The application has been used at Hyundai’s AutoRAI motor show, in Amsterdam; Nestlé’s Nestea Beach volleyball finals, in the Philippines; and Nike’s The Chance soccer talent hunt, in Korea.

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EUROPE

IS

ROLLING

OUT

RFID

In the midst of a financial crisis, many companies in myriad industries are investing in the technology to boost profits.



BY JOHN EDWARDS

GREECE IS TOTTERING, Spain is worried, Italy is hoping for the best and Germany is looking for solutions. Europe is facing difficult financial times, to say the least. Yet, as politicians ponder their options, bankers seek relief and investors search for new possibilities, the radio frequency identification industry is defying financial gravity by helping European customers operate leaner, more productively and with greater insight into key business operations. During a time when money is scarce and people are scared, RFID stands as a beacon of hope and progress.

"The European RFID market is currently growing, and the market outlook looks positive," says Ram Ravi, a senior RFID analyst at Frost & Sullivan, a technology research firm headquartered in San Antonio, Texas. "The future of RFID in Europe looks good." Frost & Sullivan estimates that the European RFID market hovered at around \$1.2 billion to \$1.5 billion in 2011 and will likely surge to between \$3.7 billion and \$4 billion by 2018.

RFID's ability to boost productivity while lowering costs continues to attract new adopters in Europe, even at a time when money is extremely tight, says Michael Liard, RFID analysis director at VDC Research, a technology insights company based in Natick, Mass. He notes that more European

businesses are starting to view RFID as an immediately available solution rather than as a promising technology. "I think the story that needs to be told now... is the value RFID can bring to operations and the cost savings it can deliver," he says. "It is about business process and operational performance improvements before it is about technology change."

Several years ago, the European Union and nations across Europe directly financed a variety of initiatives designed to encourage RFID use in a wide range of vertical markets. Beginning in 2006, the EU-funded BRIDGE (Building Radio Frequency IDentification for the Global Environment) initiative tackled the tough job of creating a technology base that could be shared efficiently across business sectors. In its final 2009 report, BRIDGE Coordinator Henri Barthel writes: "The business work packages identified the opportunities, established the business cases and performed trials and implementation in various sectors including anti-counterfeiting, pharmaceuticals, textile, manufacturing re-usable assets, products in service and retail non-food items."

Government assistance helped Gerry Weber International, a major European fashion retailer, headquartered in Westphalia, Germany, gain experience with RFID technology. After completing an initial project with Metro Group, another

major German retailer, Gerry Weber joined a government-backed venture. “The breakthrough was an... R&D project named Ko-RFID, together with three universities and some industry partners starting in 2006,” says Christian von Grone, CIO of Gerry Weber. The Ko-RFID R&D project was funded partially by the German Federal Ministry for Economics and Technology.

Ko-RFID—which stands for Collaboration and RFID—was one of 11 projects that were part of the German government’s larger Next-Generation Media program, which comprises some 70 participating companies and research organizations. The project, which ran through 2009, addressed the challenges businesses face when sharing information collected via RFID. “Some government support was helpful to establish the base technology standards in the past,” Grone acknowledges.

Today, Gerry Weber uses RFID to track indi-

cent to 3 percent increase in turnover because of improved replenishment after one full fiscal year of operation with the new [RFID] process.”

But now, due to the euro crisis and an ongoing worldwide financial slump, government funding—and, to some extent, government enthusiasm—for new initiatives has mostly dried up. While prospects for a new series of government-sponsored RFID projects appear bleak, many industry observers and players feel the situation isn’t nearly as catastrophic as it might have been had funding disappeared several years ago. “These programs were crucial when no one knew about the technology,” says Francisco Melo, VP of global inventory accuracy and loss prevention at Avery Dennison’s retail branding and information services unit in Watford, U.K. “They’re not as crucial now, because on one hand the technology has evolved, and on the other hand the technology is now known.”

Challenging economic conditions and fewer government-funded initiatives are of little consequence to RFID’s future in Europe, Frost & Sullivan’s Ravi says. “The economic condition is actually bad, but [that won’t] have too much of an impact on the RFID market in Europe,” he notes, adding that retail businesses are the largest RFID adopters in Europe and are able to weather economic downturns better than enterprises in many other fields. “Despite current economic conditions, people do not stop buying essentials such as clothes, food and beverages,” he explains.

Adidas, for instance, is deploying RFID at its youth-oriented Adidas NEO stores in Germany, Ravi notes. In Portugal, fashion retailer Throttleman is planning to roll out RFID in its stores.

“RFID is starting to explode—it’s starting to be widely adopted by retailers,” says Ramir De Porrata-Doria, CEO of Keonn Technologies, a Barcelona company that manufactures a variety of ultrahigh-frequency RFID components. “Of course, there are early adopters and there are laggards, but it’s starting to become a real industry.”



“We see huge savings on EAS [electric article surveillance] and time savings on goods-in in our stores.”

CHRISTIAN VON GRONE, GERRY WEBER



vidual clothing items from point of manufacture to point of sale. The company is currently RFID-tracking approximately 20 percent of the 25 million items it produces annually. The results have been impressive, Grone says. “We’ve increased our logistics productivity by 24 percent,” he notes. There have been other benefits, too. “We see huge savings on EAS [electric article surveillance] and time savings on goods-in in our stores,” he says. “We expect to see a 2 per-

Recent RFID Rollouts

Here's a sampling of how European companies are deploying radio frequency identification technology to increase productivity, reduce costs and boost profits.

AUTOMOTIVE AND AVIATION

Asco Tracks Component-Building Tools via RFID

The Belgian aircraft parts manufacturer has reduced the amount of time its employees spend locating the large tools within its seven-building campus, from weeks to hours.

Continental Tire Plant Increases Productivity, Reduces Waste

The company's French factory is producing 5,000 more tires per day, while decreasing waste of materials by 20 percent.

Metal Fastener Company Improves Production With RFID

Nedschroef, a Dutch manufacturer of metal fasteners for the automotive industry, has reduced the incidence of shipping errors at its plant in Plettenberg, Germany, down to 1 percent.

Portuguese Airline TAPs Into RFID

The national airline uses radio frequency identification to track engine-overhaul components and tools. The system improved visibility into its parts and tools.

CONSTRUCTION

Grunnarbeid Begins Full-Scale Rollout of Tool-Tracking System

The central Norwegian construction company is installing an RFID solution across all its operations.

Swedish Tunnel Uses RFID to Monitor Air Pollution

The nation's transport agency is tracking air quality, to ensure workers are not exposed to excessive levels of toxic gases.

ENERGY

BP Refines Maintenance Operations

The international oil and gas company developed an RFID solution in Germany that streamlines processes, making work safer and more cost-efficient.

Swedish Iron Mines Get Buckets of Benefits From Passive Tags

LKAB's operations have become more efficient, thanks to the use of RFID technology to identify the quantity and quality of ore and rock that loaders are removing.

MANUFACTURING

AL-KO Improves Production Management via RFID

The German manufacturer of industrial air conditioners now has visibility into which parts are arriving at its final assembly plant.

Grupo Vidrala Tracks Bottles From Production to Shipment

The Spanish glass manufacturer is using an RFID system to improve efficiency and reduce errors as pallets of product move through its warehouse and on to customers.

Window and Door Company Doubles Output via RFID

Idealcombi, a Danish manufacturer, has reduced the time required to produce a custom window or door down to about one minute, using RFID tags to automatically adjust the settings on its manufacturing equipment.

LOGISTICS AND TRANSPORTATION

Finnish Transport Agency to Track Railcar Health via RFID

The system monitors the axles and wheels of passing railcars, to identify cars that may require servicing, as well as to monitor traffic conditions.

Metsä Fibre Boosts Accuracy, Speed of Wood-Pulp Shipments

The Finnish company is RFID-tracking the locations of bales of pulp, from the point of manufacture to their delivery to a European paper mill.

Michelin Uses RFID to Track Tire Pressure and Tread for London Bus Company

The system makes it simpler for bus-fleet managers to monitor tire pressure, and thereby improve safety and efficiency.

Packaging Company Tags Its Shipping Containers

Færch Plast, headquartered in Denmark, relies on RFID to monitor the reusable steel cages it employs to deliver plastic trays its customers use to package food products.

RFID Takes Root at Baas Plantenservice

The horticulture distributor, based in Holland, is tracking 3.84 million plant trolleys it has put into circulation across Europe.

Several of these projects will be highlighted in depth at RFID Journal events in Oslo and London. [Click here to learn more ►](#)

"Early adopters are retail companies like Trasluz and Gerry Weber," De Porrata-Doria says. "These companies have been first movers in using RFID at item level and adopting RFID in their business processes. Laggards are all those companies that have delayed the testing and deployment of RFID, because they don't see the advantages or because they prefer to adopt a 'wait and see' approach."

"France and Italy, as hubs of the fashion industry, are expected to continue their investments in RFID," Ravi says. He also notes that Germany, Europe's manufacturing core, is stable economically and will drive RFID investments in the manufacturing industries during the next few years. "The aforementioned factors do not point at economic conditions having an impact on the RFID market," he states. Ravi says Finland's Metsa Fibre, for example, is introducing RFID into production processes across the different mills it owns and is ex-



"The expectations we have... are that it will reinforce combined sales and improve our customers' shopping experience."

VICENTE RODRIGUEZ, ROBERTO VERINO



pected to be RFID-ready by the end of 2012.

Grone sees things the same way. "In Germany, we have a robust economy; it is better than most people believe," he says. He's convinced that RFID is playing a big role in his company's success.

European enterprises generally only begin RFID projects after completing careful research and establishing business partner participation agreements, Grone says. "Traditionally, Euro-

pean businesses have a strong intention to implement new technologies in a thorough way," he says. "Partial implementations are not preferred, although they could be rolled out faster."

Most RFID pilots and evaluation projects aim to cover the complete supply chain and obtain all the major benefits from the outset, Grone says. "This is harder to implement, but adds more strategic value," he says. "This might help in getting budget approval and in stating the importance of this new technology for many parts of the supply chain, thus... involving more people and speeding up implementations."

INNOVATIVE PARTNERSHIPS

As government-funded RFID projects become increasingly scarce, businesses and research organizations are stepping in to fill the void. Preliminary analysis of the results of a pilot project carried out in Italy, and completed in Sept. 2011, shows that RFID-tracking product cartons can reduce the rate of supermarket out-of-stocks and improve product freshness. The project is supported by a consortium of eight Italian businesses, under the leadership of the University of Parma's RFID Lab. The group consists of retailers Auchan, Coop Italia and Conad, as well as goods manufacturers Danone, Lavazza, Nestlé (Buitoni and Purina), Parmacotto and Parmalat.

RFID technology also pops up as an essential element in programs receiving direct or indirect state support. In France, supermarket chain Groupe Casino is working on a project that uses Near-Field Communication (NFC) technology to help visually impaired people shop safely and efficiently. The company, with support from the Institut de la Vision, a vision disease research center, is currently testing its Accessible Shopping system. The technology allows shoppers with NFC-enabled phones to tap NFC tags on shelf labels to view larger,

clearer text than is printed on item packaging. The system also helps users view product details, including ingredients, nutrition facts and recipes. The technology behind the system is provided by Think&Go NFC, a French NFC solutions provider.

With direct government RFID funding drying up, Groupe Casino sought an alliance with an interested partner. "This project is the first partnership between a retailer and scientific research laboratory," says Thibault de Pompery, design director of Saint-Étienne-based Groupe Casino's innovations department. "The purpose is to... improve the accessibility of our packaging, lighting, signage and checkout."

Groupe Casino is now planning an even more ambitious project that, once deployed at retail sites throughout France, will allow anyone equipped with an NFC mobile phone to access product information, fill a shopping cart virtually and pay for products electronically. "NFC is today the best way to shop for lots of products faster," de Pompery states.

Groupe Casino is just one of many European enterprises working to bring NFC to the public, Liard says. "The NFC-in-Europe story continues, which has been really exciting to watch," he says. "If you're looking for a specific country, France has been a key driver of the NFC market."

"Besides being home to one of the hotbeds of the NFC market [technology park Sophia Antipolis], France's status as an NFC leader is further bolstered by its government's support of the technology," Liard says. The French government, for example, has funded a trial of NFC-based public transport ticketing in Nice since 2010. "This initiative will expand to other cities in the near future," he predicts. "In fact, in January 2012, France earmarked 20 million euros for the explicit purpose of expanding NFC-enabled public transportation infrastructure across the country's largest cities." Seventeen cities, including Paris, Marseille and Bordeaux, were selected to receive grant funding.

BUCKING THE ECONOMIC DOWNTURN

Many European aerospace and automotive companies, construction and energy firms, manufacturers, and logistics and transportation businesses have completed RFID pilots and are rolling out the technology to increase productivity and reduce costs (see "Recent RFID Rollouts" on page 15).

The need to drum up new business also is inspiring many European companies to think creatively and to apply RFID in innovative ways. In Spain, RFID innovation has arrived in the form of a system that allows shoppers to try on clothing virtually. The flagship Roberto Verino store in Barcelona features an AdvanMirror system, provided by Keonn Technologies, that enables shoppers to view themselves on a video screen as if they were already wearing a specific garment. The virtual mirror, which is activated by an RFID tag attached to the clothing item, allows the shopper to quickly sample a series of garments without a fitting room.

"Our sales personnel can surprise our customers by using a tablet to introduce them to the different products in our collection," says Vicente Rodriguez, systems manager for the Orense, Spain-based fashion chain. The customer can then ask to see the specific garments and view himself or herself wearing them on the life-size screen.

Rodriguez says it's still too soon to reach any definitive conclusions about the system, which has been tested only for a few months. "But the expectations we have at Roberto Verino are that it will reinforce combined sales and improve our customers' shopping experience."

In Regensdorf, Switzerland, Performance Buildings is employing RFID to put vacant and underused office space to productive use. By allowing businesses that require temporary office, conference or reception space to secure such facilities on a moment's notice, Performance Buildings is providing a useful service

that wouldn't have been possible in the days before RFID.

With technology provided by HID Global, in Haverhill, England, Performance Buildings has developed a business model that focuses on boosting occupancy rates in office complexes that are partially or completely unoccupied. "Our basic idea is that most buildings are very rarely efficiently used," says Vishal Mallick, Performance Buildings' CEO. "If you go into any office building in any company, they may be occupying it, but there are desks that are empty or rooms that are empty."



Performance Buildings aims to maximize the potential of such "lazy assets." "We've taken this whole mobility idea of being able to work anytime, anywhere, but it's through RFID that you really can work in any space, in any building," Mallick says. "With their RFID [tag], users can go into the room they reserved—no one can steal your room because

"It's through RFID that you really can work in any space, in any building... no one can steal your room because only your RFID [tag] will open it."



VISHAL MALICK, PERFORMANCE BUILDINGS



only your RFID [tag] will open it."

Mallick says Performance Buildings' business model meshes well with many existing enterprise RFID systems. "Most employee badges [in Europe] already have RFID in them," he says, "so this just extends their use."

Harm Radstaak, managing director of HID Global's Europe, Middle East and Africa (EMEA) operations, feels Performance Buildings is pioneering an important new business service. "Ultimately, the use of NFC smartphones for

access control will make it possible to deploy inexpensive, robust access systems beyond perimeter access points to include interior doors... where previously it would have been prohibitively expensive to install a traditional wired access-control infrastructure," he says. He sees the instant-access concept moving into other areas, such as the instant acquisition of storage units.

FUTURE TRENDS

Even when bottom-line adoption benefits are solid and apparent, RFID can be a tough sell, especially when a business is worried it may not have enough cash on hand to meet the next payroll. "There's a very tight grip on purse strings in most of Europe now, and companies... are trying to keep their heads above water," says Pat Doody, director of the Centre for Innovation in Distributed Systems (CIDS), a research organization headquartered in Tralee, Ireland, that focuses on industrial RFID applications. Given the current financial crisis, even a project with a short-term payoff potential can sound like a gamble to a beleaguered European business. "You're talking about an ROI that's maybe six or 12 months away—it seems like great value, and it is," says Doody, who is also chair of RFID in Europe, an organization that specializes in RFID education. "But then once there's a capital investment [required], I think companies are struggling with that."

Such concerns are not always unwarranted, particularly when a business is located in one of the weaker Eurozone nations, in which government austerity programs are wreaking havoc in the commercial sector. "The problem with austerity is that it's primarily a cutting activity—there are no incentives to spend," Doody says. "However, I am hopeful that this will change in the near term."

In today's Europe, banks are often reluctant to lend money, even to businesses that are



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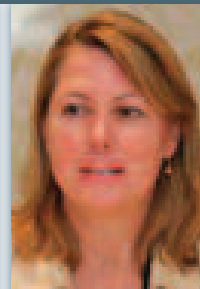
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good credit risks, because lenders are being pressured by authorities to preserve capital. Meanwhile, companies with enough cash on hand to invest in beneficial new technologies often don't move ahead with their plans because they don't know how they'll be affected by the next round of government austerity cuts, which typically include higher taxes and other sales-depressing measures. "In the peripheral countries of Europe, it's, 'Batten down the hatches and try to ride out the storm,'" Doody says.

Nonetheless, for healthy businesses located in strong EU nations, RFID remains an essential key to accessing productivity improvements, competitive advantage and long-term profits. A growing recognition of RFID's importance is allowing the technology to make headway in a number of crucial business areas, Ravi says. "Manufacturing, transportation, cold chain, perishables and automotive markets are

performance and usability.

Data security and privacy rules are exerting a chilling effect on RFID adoption in Europe, particularly on companies using systems that collect any type of personal data, discouraging red tape-wary businesses from acquiring the technology. Ravi notes that the European Commission, the EU's executive body, has released a stream of directives relating to privacy and data security. "All companies implementing RFID must comply with these directives, such as [a] data protection directive, an e-privacy directive and a PIA [privacy impact assessment] framework," he says.

Regulation-enamored Brussels bureaucrats could further accelerate RFID growth by repealing, or at least simplifying, compliance mandates, but no one really expects that to happen. In the meantime, RFID vendors, consultants and adopters, particularly smaller potential adopters that would be hard-pressed to keep pace with a rising tide of paperwork, must waste valuable time creating plans and filing forms that some say do little to make data safe or private.

Fortunately, RFID is so appealing that even financial and regulatory burdens can't keep it from moving forward. Ravi anticipates strong growth in several areas. "Cloud computing is expected to drive adoption of RFID in many verticals," he notes. "The RFID sensor market is another area that is expected to have huge potential." Ravi adds that RFID-enabled automotive safety systems also are likely to gain traction over the next few years.

Liard points out other bright spots. "We are seeing additional RTLS [real-time location system] deployments in hospitals within Europe," he says. "That's something we've seen pick up in the last year to 18 months, which has been great." Liard also foresees a booming market in electronic identification documents, including national health insurance cards and passports.

"Overall," Liard says, "RFID's future in Europe appears very bright." ■



"All companies implementing RFID must comply with these [privacy and data security] directives."

RAM RAVI, FROST & SULLIVAN



some of the sectors with more [RFID] growth potential, while the fashion and retail industries are the largest in terms of revenue contribution in the European RFID market," he notes.

Some of this good news is being dampened by a growing network of EU regulations designed to protect businesses and people against system weaknesses and abuses. Yet ultimately, the regulations have the effect of increasing costs while hamstringing system



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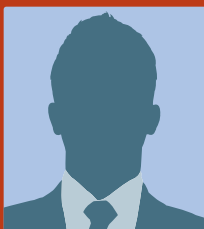
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MANUFACTURING value

RFID provides visibility into parts and processes, improving efficiencies and reducing costs, but manufacturers must take an enterprise approach to maximize benefits and savings.

By Mary Catherine O'Connor

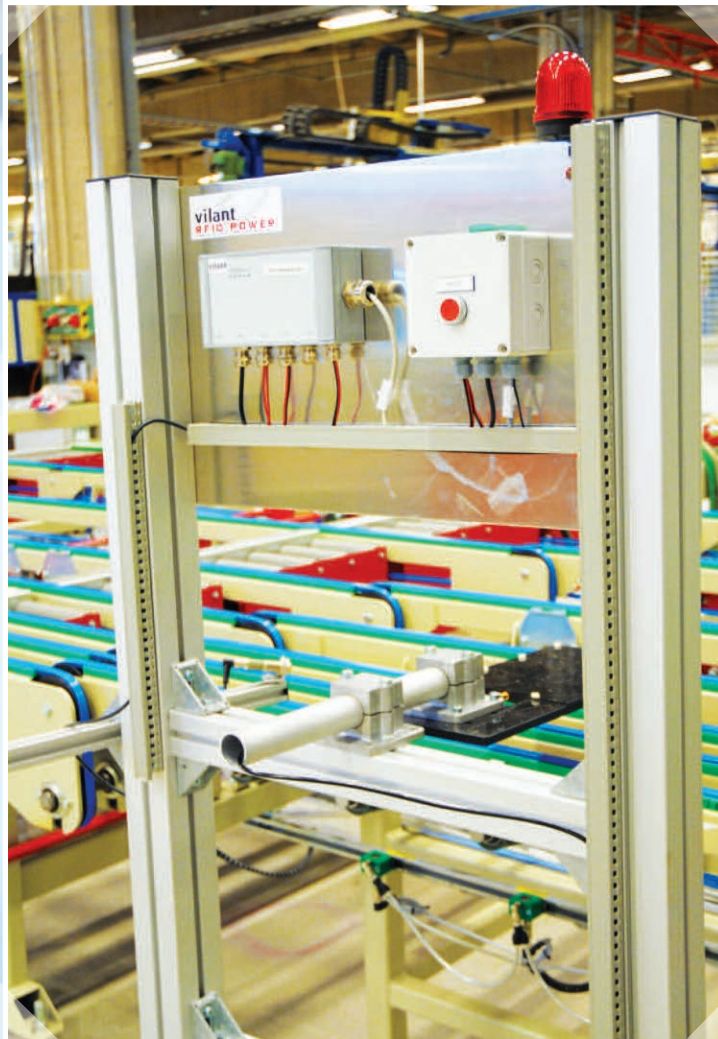
IF YOU'VE VISITED FINLAND or other Nordic countries, there is a good chance you've looked out a window or opened a door manufactured by Fenestra Oy. The company produces more than half a million windows and doors each year, and for the past six years, it has been using radio frequency identification technology as part of a major automation initiative that enabled its transition to a make-to-order manufacturing process. Rather than stocking standard windows, the company now makes custom products, quickly and efficiently, to better meet customers' requirements.

"It is easy to say that we are glad we chose RFID to automate the manufacturing process," says Kari Lahti, Fenestra's production manager.

Before Fenestra adopted an RFID work-in-process (WIP) application, workers had to manually confirm each compo-

nent's specifications before the part was processed. Now, RFID tags attached to individual components, such as window frames and sashes, are identified by an infrastructure of more than 50 RFID readers integrated throughout the production lines at Fenestra's manufacturing plant. Each tag is encoded with a unique identifier that references, in Fenestra's enterprise software, the specific order for which the window or door is being made. This triggers the machine to cut, drill, paint or otherwise process the component to the order's exact specifications.

The RFID system consumes 1.5 million high-frequency passive RFID tags annually. The tags are read 20 million times throughout the process. They have a virtually 100 percent accurate read rate, and are durable enough to withstand the high temperatures, pressures and vibrations the compo-



nents experience during manufacturing.

“Without RFID, Fenestra would have had difficulties in building an automatic make-to-order manufacturing plant,” says Ville Kauppinen, CEO of Vilant, the Finnish RFID systems integrator that developed the WIP solution. “The whole plant was rebuilt and automated, largely to enable RFID. The main benefit was full automation and a significant increase in efficiency and lessened need of manpower.”

While Fenestra and other manufacturers invested in RFID technology before and during the economic recession, many others put their technology investment budgets on lock-

down. But as the economy slowly rebounds, companies are beginning to invest in RFID to improve productivity and reduce costs, to better compete in today’s global marketplace.

In the United States, for example, a recent survey—part of an eight-year study by researchers at Sam Houston State University (SHSU) and Southern Arkansas University—revealed a significant increase in the number of surveyed firms that use RFID for a range of applications, including tracking raw materials, WIP and finished products.

“It’s the ability of RFID to provide near real-time information, integrated with robust information systems,” says Victor Sower, a

One of more than 50 RFID readers integrated throughout the production lines at Fenestra Oy’s manufacturing plant, to track work-in-process.



Victor Sower
Sam Houston State University

“It’s the ability of RFID to provide near real-time information, integrated with robust information systems.”

professor of operations management at SHSU and one of the researchers. RFID has enabled supply-chain visibility, more efficient operations and better outcomes for just-in-time manufacturing systems, he adds, which helps companies that invest in the technology be “more agile, more effective.”

The growing use of RFID in manufacturing also can be attributed to the steady rise in the quality and capability of RFID technology. “RFID technology has a lot going for it right now, particularly in the manufacturing environment, where you need standards-backed technology,” says Michael Liard, RFID analysis director at VDC Research. “You need the technology to work in a harsh environment, which many manufacturing hubs are. A few years ago, passive UHF wasn’t ready for prime time, and now it’s at its highest point in terms of technology innovation and development. So it can serve these previously underserved markets, with viable, scalable solutions that can be done in a cost-effective manner.”

In fact, Sower, Liard and end users agree

that to get the most value from RFID technology, manufacturers should consider standards and scalable solutions.

Tracking Raw Materials

Sumitomo Electric Lightwave, a North Carolina manufacturer of fiber-optic cables, began exploring RFID about five years ago, because it wanted to automate inventory tracking in its warehouse. The company had been relying on its employees to faithfully scan the bar codes on raw materials, but they often failed to do so, says Cosby Dudley, the company’s production planning manager.

In 2009, Sumitomo Electric deployed an inventory-management system, developed by Mid-South Marking Systems (see “Wanted: Expert Help” on page 27). It uses EPC Gen 2 ultrahigh-frequency tags to track a wide range of raw materials, such as steel tape reels, Kevlar yarns and boxes of plastic materials, from the warehouse to the manufacturing area.

Today, the company’s inventory of raw materials is significantly more accurate, Dudley says. “We meet every week to review the inventory levels in our ERP system, and it tells us what [raw materials] to buy, based on present inventory levels,” he says. “We used to leave the meeting and go down and count stuff manually, because we didn’t trust the data in the ERP.”

The company also worked with Mid-South Marking Systems to expand its use of RFID. In 2011, it developed a mobile RFID reader cart to perform regular cycle counts to check portions of its inventory. The company had still been performing its twice-annual full inventory counts of the entire warehouse manually, Dudley says, because he didn’t feel completely confident in the cart reader’s ability to capture all the RFID tags. After the cart was used to perform a mid-year full inventory in June, an audit revealed that the RFID-based inventory count was more accurate than previous counts conducted manually. “It works great,” Dudley says.

Since adopting RFID, Sumitomo Electric has been growing its business. It now pro-

duces 40 percent more product annually than before it deployed the technology. But thanks to the inventory-tracking system, it has not had to hire additional warehouse employees. In addition, the RFID system has allowed Dudley to decrease the amount of raw materials inventory he has on hand at any time. This lowers the company's costs and moves it toward a lean, just-in-time manufacturing system, he says, because the company is confident it has all the needed raw materials at the right time and correct place.

Managing Work in Process

Manufacturers are using RFID to automatically track WIP to solve a variety of problems, many stemming from manual production and human errors. For Fenestra, it ensures the correct components are processed to exact specifications. It also creates a standard and predictable pace of production, so the company knows how many products it will make in a given time period.

Hewlett-Packard Brazil deployed an RFID WIP system in 2006 to analyze the processes used to manufacture and distribute printers. The company has been able to decrease downtime on its manufacturing lines, reduce its printer inventory in the supply chain and move closer to perfect order fulfillment.

In 2010, German heating technology manufacturer Vaillant Group adopted an RFID WIP system to prevent errors in the assembly of residential boilers that would go undetected until the product was tested.

Each boiler is assembled on a wheeled cart, which a worker pushes from one assembly station to the next (there are 15 stations in total) in a precise order. An RFID reader mounted at each station collects the unique identifier encoded to the battery-assisted passive UHF EPC Gen 2 RFID tag attached to each cart. In the back-end software, the RFID number is coupled with the serial number of the boiler being produced. If a worker brings a cart to a station out of sequence, that station's machinery will stop, preventing the worker

from further assembling the boiler.

The WIP system generates an ongoing, electronic register of all the boilers being manufactured at any time throughout the plant. This gives plant managers a quick, accurate overview of the production system, and helps them keep the entire system running smoothly.

Vaillant Group first deployed the WIP system on one assembly line at its U.K. plant in Belper, Derbyshire. When that proved successful—it reduced production errors six-fold, the company reports—the system was expanded to the other three assembly lines in that factory. Today, a total of 16 assembly lines, in France, Germany, Slovakia and the United Kingdom, use RFID to track WIP in the production of residential boilers.

The RFID system has been very successful, says Harald Brokamp, who manages Vaillant Group's test and assembly systems. It provides visibility into the manufacturing process that was previously unattainable, he

When Sumitomo Electric Lightwave used its mobile RFID reader cart to perform a full inventory of its warehouse, an audit revealed it was more accurate than previous counts conducted manually.



PHOTO: SUMITOMO ELECTRIC LIGHTWAVE



Michael Liard
VDC Research

Manufacturers should continue to look for ways to exploit RFID technology.

says, and gives managers new tools for supporting manufacturing workers.

Monitoring Finished Products

RFID also can be a valuable tool after a finished product leaves a factory or warehouse. In 2011, HP Brazil began leveraging the RFID information in its tagged ink-jet printers to facilitate the recycling of plastics (see [“Extracting New Value From Old Printers”](#)). “The great part is that RFID tags are still alive from five to six years ago,” says Marcelo Pandini, HP Brazil’s country operations manager.

In 2009, the Indian government set an aggressive goal to increase the amount of energy generated via solar power and to make the energy source cost-competitive with other types of generation by 2022. The government also mandated that each solar—or photovoltaic (PV)—module placed into use must carry an RFID tag, so it can be easily identified and tracked throughout its useful life. The objective is to link PV module manufacturers

to solar power deployments—which, in some cases, contain many hundreds of modules.

PV manufacturers are taking different approaches to meeting this requirement. Some are embedding RFID tags directly into the solar module during the manufacturing process, while others are attaching tags externally.

Either way, the power companies that purchase the modules—and the government agents who will inspect them periodically—will be able to quickly access information by reading a module’s RFID tag, to determine whether panels are operating at peak performance, and to locate and replace modules that are outdated or recalled. The tags also will provide an efficient and accurate method for tracking modules that must be removed from installations for repair.

Waaree, a Mumbai-based solar module manufacturer, deployed an RFID system that not only complies with the government mandate but also provides a number of internal benefits. The company is tagging PV modules at its manufacturing plant, rather than at a later point along the supply chain, such as at a distribution center, to maximize the technology’s benefits, including greater inventory visibility and management, improved manufacturing and shipping efficiencies, and reduced inventory levels.

In 2011, Swire Coca-Cola HK, a soft-drink manufacturer, began using rugged passive RFID tags to track the 10,000 carbon dioxide cylinders and tanks transported to roughly 3,000 customer facilities throughout Hong Kong daily. Before deploying the RFID solution, Swire estimates it lost 500 tanks and cylinders annually. Now, RFID readers mounted at its own warehouse and at customer sites provide near real-time visibility of its inventory’s whereabouts, reducing the number of lost cylinders and tanks by 50 percent, and decreasing the amount of time employees spend conducting inventory checks by 30 percent.

But the RFID system’s value extends beyond asset tracking. It facilitates compliance with government regulations to inspect

cylinders every five years. It also enables Swire to automatically monitor when containers require maintenance and cull those that have expired. And, in the event of a product recall, the company can collect only the containers that carry recalled product, rather than all of those in circulation, which it had to do in the past due to its inability to identify cylinders individually.

The Enterprise Approach

The challenge for manufacturers as they consider RFID is to start small but think big. To derive as much value from the technology as possible, manufacturers need to avoid taking a “parochial view” of how and where RFID should be used, Sower says. Instead, they need to look across many departments for potential applications.

“People tend to have a laser focus and might want to start with one application, where they use RFID as a form of wireless auto-ID,” Liard

says. “That’s great, because it’s getting them, as an organization, comfortable using RFID.” But, he says, manufacturers should continue to look for ways to exploit RFID technology. “You might start with tagging parts on the assembly line, but do you want to track workers and make sure workflows are improving? Do you want to track certain bins of tools? What can you layer on the initial applications? I think that is something the vendor community and systems integrator community need to work on quite aggressively.”

Standard technology and business practices have enabled Deere & Co., one of the world’s largest manufacturers of agricultural and construction equipment, to deploy an RFID asset-tracking solution in 2005—and, in 2007, roughly a dozen RFID systems in factories and warehouses, as well as put in place the infrastructure to readily expand the use of RFID into new areas when the need arises. The company says its ultimate goal is to use RFID to provide end-to-end visibility in the value chain. ■

Wanted: Expert Help



WHEN COSBY DUDLEY, production planning manager for Sumitomo Electric Lightwave, began exploring RFID, he found vendor expertise and tag performance lacking, to put it politely. The North Carolina manufacturer of fiber-optic cables wanted a tool to automate inventory tracking in its warehouse.

“We were stunned,” Dudley says. “This was probably four or five years ago, but we got some just outrageous proposals [from perspective vendors]. I would say what we wanted, and they’d come back with \$10,000 proposals—just to test the warehouse to see if the technology would work. My response was, ‘This either works or it doesn’t.’”

Mid-South Marking Systems, a solution provider in Memphis,

Tenn., agreed to work with Sumitomo Electric, providing the equipment and software needed to develop a system, free of charge. The trial led to a permanent solution, in 2009.

“In my opinion, a good partner is someone who is going to help you up front without spending a lot of money,” Dudley says. “I would also suggest end users educate themselves as much as possible about RFID and its capabilities. Attending RFID Journal LIVE! in Florida in 2011 was a real eye-opener. I wished I had done that in 2008 or 2009, when we were trying to learn about RFID by reading online articles and sitting through webinars. Those were good, but not nearly as good as the demonstrations one gets at the RFID expo.”

It’s essential for end users to align themselves with RFID experts who understand their specific business requirements and potential benefits, says Michael Liard, RFID analysis director at VDC Research. “End users prefer to work with vendors who understand their industry-specific needs, wants and goals.”—M.C.O.C

NFC

Technology Brings New Life to

Games



Kids, toy makers and technology providers all benefit, as the line between physical and virtual play blends.

By Jennifer Zaino



"SKYLANDERS IS MY FAVORITE VIDEO GAME," says my 9-year-old son, as he positions his Legendary Bash action figure atop the Portal of Power accessory and watches the figure come to life onscreen in his Wii gaming system. "It's cool," he says, though he's not referring to the Near-

Field Communications (NFC) reader in the Portal of Power that reads the NFC tag in the action figure. "It's easy to switch characters during the game, and I can play at my friends' houses with my action figures and their system knows it's my guys."

He's not the only one enthralled with *Skylanders: Spyro's Adventure*, released last fall by Activision Blizzard. The game is available for Nintendo, PlayStation and Xbox gaming consoles, as well as PC and Mac computers, in addition to the Wii. While reporting its second-quarter earnings, in August,

Activision Blizzard said the game was one of the top three titles so far this year in North America and Europe, and *Skylanders* toys were the top-selling action figures in the United States in the first half of 2012.

NFC—a short-range wireless technology that enables device-to-device data transfers—is ushering in a new age of gaming, opening up a world in which kids of all ages can bridge the divide between physical and virtual play. In addition to NFC gaming systems, NFC mobile phones allow gamers to interact with each other and with real-world objects. And some organizations are inviting players to use NFC mobile devices to search for clues in their environment to win a game or contest.

NFC technology is not designed to handle large amounts of information, but the quantity of data that must be transferred in *Skylanders* is not significant. That means several tagged action figures can interact when simultaneously placed on the Portal of Power.



Activision Blizzard clearly has capitalized on the fact that there's gold in those action figures. A *Skylanders Starter Pack* with the *Portal of Power* costs approximately \$60, but I know from personal experience that kids will want the additional characters and Expansion Packs needed to gain access to new adventure levels. "Now vendors are not just selling video game discs, but they are selling characters that probably cost relatively little to produce," says John Shuster, a VDC research analyst. "And if you are a heavy gamer, you probably will spend whatever it costs to buy multiple characters, especially to facilitate progress in the game. But there are benefits on both sides of the fence, because it is a more fun and interactive experience for those playing the game."

Nintendo's Wii U tablet controller, sched-

uled to be released for the holiday season, will include NFC technology. And the upcoming *Skylanders Giants*, the sequel to *Skylanders: Spyro's Adventure*, will be available for the Wii U as well as the Wii, according to reports. "By installing this [NFC] functionality, it will become possible to create cards and figurines that can electronically read and write data via noncontact NFC and to expand the new play format in the video game world," said Nintendo President Saturo Iwata during the company's third-quarter briefing.

"It's cool to say it's there in products like the Wii U," Shuster says. "But there have got to be apps to make use of it. We are still in the very early days."

We are just seeing the beginning of a promising trend, says Jeff Miles, VP of mobile trans-

Kids from the Children's Aid Society of Boys and Girls Club attended the *Skylanders Spyro's Adventure* launch event, hosted by basketball star Amar'e Stoudemire, on Oct. 14, 2011, in New York City.

actions at NXP Semiconductors, which makes the NFC technology used in one of today's most popular gaming products. "Different game makers will start to create different ways of using physical objects in games. Think of reality games where you could bring an object from a store [with an NFC tag in it] and suddenly it's a device that someone has in the game."



"Today, for kids, a toy is an iPad... but we want kids also to be interacting in natural physical play patterns."

—MIKE NORTH, NUKOTOYS

Blending the physical world of toys with the virtual world of games is where Nukotoys is heading. "Today, for kids, a toy is an iPad. That is the number 1 requested toy," says Mike North, Nukotoys CTO. "But we want kids also to be interacting in natural physical play patterns." The company's games, *Animal Planet Wildlands* and *Monsterology*, are played on the iPad, but kids collect trading cards that, in *Wildlands*, for example, can be tapped on the

screen to search for hidden items, run races and trigger educational videos.

Since the iPad doesn't support NFC yet, North says, the games rely on Printechnologies' Touchcode technology, an invisible electronic code printed on media that can be put on a tablet display to read data. But Nukotoys has experience developing games with RFID technology. The company designed an educational game for schools, called *Mission to Planet 429*, as part of a PBS Kids project. RFID readers were installed in custom cases of iPods given to children, to read the game's trading cards and serve as an interface to the computer application.

Mobile Matchups

While NFC gaming is still in the early stages, it's getting a boost from the growing number of NFC-enabled phones and tablets. Google has been a public supporter of NFC with its Android platform, and Microsoft has integrated the technology into Windows 8 and Windows Phone 8. Barnes & Noble plans to incorporate NFC into its Nook e-reader, and the bookseller recently created a partnership with Microsoft, forming a subsidiary that will include its Nook business. Forrester Research predicts some 100 million NFC-enabled mobile devices will ship globally this year.

The Nokia Research Center has made available a series of games users can play on Nokia Symbian NFC-enabled smartphones. To play, you need NFC tags—those you buy separately or those in transit cards, ID badges or hotel key cards. Then, you just tap or wave the phone over the tags or cards to play, for example, a world flags matching game or one in which you try to complete quotes from Shakespeare. "The research I'm doing here at Nokia is basically creating new ways to use NFC, not just for payments but actually as a tangible user interface," explains Luis F.G. Sarmenta, a principal scientist at Nokia Research Center, in a video on the Nokia Beta Labs NFC Games site. "This will enable basically a new class of games limited only by the creativity of the developer."

Nokia took NFC gaming outside the lab,

when it announced last year that all Nokia NFC-enabled devices would come preinstalled with Rovio Mobile's *Angry Birds Magic* as an exclusive. In a peer-to-peer implementation of NFC technology, tapping two NFC phones together unlocks new levels in the game. Players also can wave their devices in front of NFC tags in official merchandise or designated locations, such as Angry Birds Activity Parks, to unlock levels or earn rewards. Similarly, players on NFC-enabled smartphones running the Symbian Belle operating system can download the NFC version of Halfbrick Studios' *Fruit Ninja*, to unlock contents by handshaking with another Nokia NFC smartphone. Nokia now is transitioning its models to the Windows Phone operating system.

Handshaking goes to an altogether different level with a game called *TapThat*, described on the TapThat Web site as "Google Wallet, But With Sex." The game was a finalist in Tap Into Innovation: NFC Global Competition 2012, sponsored by the NFC Forum and WIMA, and a winner of global communications agency Isobar's Create 32 NFC Hackathon. *TapThat* invites players to assume an identity, such as Homer Simpson or Lady GaGa, and then "get physical" by tapping their NFC phones together.

NFC has some advantages over Bluetooth, the predominant way of bringing people together to play games on mobile devices, says Andrew Song, CEO of TapThat. Bluetooth involves hassles, he says, because users have to go to their Bluetooth menu, switch it on, choose the "make discoverable" option, type in a password and wait for it to pair. "With NFC, the barrier to entry to join a game is a lot less," he says. "It's gotten easier. Just tap your phones and they talk."

That said, Bluetooth or Wi-Fi technologies could be used in conjunction with NFC mobile games, according to Song. *TapThat* is all NFC, since it's just passing a couple of packets between users, he explains, but on its own NFC "can't transfer enough data to make a rich gaming experience" with, say, music or video.

"NFC can enhance the user experience of applications that use Bluetooth technology by

making it virtually effortless to select and securely connect to a Bluetooth device and start an application on it," says Debbie Arnold, NFC Forum director. "For example, with the touch of an NFC mobile phone to a Bluetooth gaming headset, a game player can quickly begin play, rather than using set-up menus."



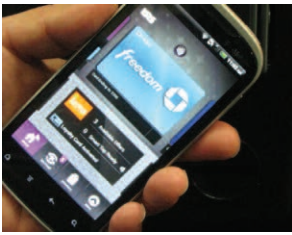
"With the touch of an NFC mobile phone... a game player can quickly begin play, rather than using set-up menus."

—DEBBIE ARNOLD, NFC FORUM

Hi-Tech Scavenger Hunts

In 2009, visitors to the Lappeenranta Sandcastle, a walk-through sand sculpture in Finland, were able to play an interactive game, created by NFC provider Red Solution. They borrowed an NFC phone, then touched it to a series of smart posters installed nearby to answer questions about the Sandcastle and win prizes.

Last year, at the Sundance Film Festival, in



In the near future, gamers could tap an NFC phone with a mobile wallet application to an NFC-enabled entertainment console or set-top box to immediately purchase access to new game levels or capabilities.

Park City, Utah, people using NFC-enabled Nexus S phones had 120 hours to stop a fictional viral outbreak, by tapping their phones to unlock clues in NFC-tagged objects placed around the city. Vectorform created *Pandemic 1.0* as part of Lance Weiler's *Pandemic 41.410806, -75.654259* transmedia experience, which incorporated film, social gaming and data visualization. "There was no typing in codes," says Kevin Foreman, director of product vision for Vectorform, a multiplatform interactive design company. "It was a seamless experience, and an interesting and innovative way to tell the story."

The designers created a mock Centers for Disease Control room, where players could see which virus had been unlocked and how it was spreading across Park City. By putting their phones on a Microsoft Surface table-size, multitouch computer, they could see all the pictures that people playing the game had taken during their hunts. "It was a cool way of integrating the digital and physical world into one overall experience," Foreman says. "When Lance came to us, one thing he asked was that there be seamless integration between phones and objects, and with our partnership with Google at the time, we knew the Nexus was coming as the first Android phone to support NFC. Google saw this as a big splash opportunity and gave us the devices and all the tags."

Although players didn't earn points, badges or rewards, *Pandemic* provided an element of "gamification," in which games or contests featuring NFC mobile devices are spearheaded by companies that want to promote a product or engage an audience. "NFC is going to have a major play in gamification, as well as gaming," says Theresa Billy, president and founder of NFC consultancy Near Field Connects. "You will see people motivated and being driven to activities through gamification. And NFC is going to let you take gamified activities and make experiences better."

Foreman expects the awareness and exposure brands can gain from integrating NFC into an experience of some sort to be a compelling reason for them to explore the technology's

potential. "A positive brand experience will get tied with your brand," he says.

Future Play

Apple had been expected to integrate NFC into its iPhone 5, but those rumors didn't pan out. That's not to say Apple doesn't have interest in NFC. The vendor reportedly has filed a patent application for an iPhone-NFC controls system, in which the mobile device could control a video game system, among other connected home scenarios.

"The idea of an ecosystem clearly is the aim," says NXP Semiconductors' Miles. "The ability to connect different devices or network systems—probably one of the key functions of NFC, and key directions of key operating system players—is really tying those things together as credential pairing: connecting TV set-top boxes, laptops, peripherals, accessories, the whole gamut of devices."

Mobile wallets—such as the NFC-enabled Isis Mobile Wallet, Microsoft Wallet or Google Wallet—also could come into play. Imagine, for instance, tapping an NFC phone with a mobile wallet application to an NFC-enabled entertainment console or set-top box to immediately purchase access to new game levels or capabilities. "Laws allowing, you can even imagine casino gambling in a hotel room," says NFC Forum's Arnold. "You can envision going up to the hotel TV, touching it with your phone and making a payment" to purchase, for example, a few rolls of the on-screen dice. But, she acknowledges, "once you start getting into payments, that is a whole different level of complexity."

The future may be closer than we think. Nintendo's NFC-enabled Wii U controller could support possibilities including "using it as a means of making micropayments," Iwata said during the company's third-quarter financial briefing. That means gamers might be able to buy new apps and other in-game content without having to share credit-card information over the network. I know one 9-year-old gamer who'd probably love that idea, but I don't think I'll share it with him just yet. ■

Tracking Your Competitors

Why you should care where you are in the RFID adoption phase.

By Bill Hardgrave



"WHEN IT COMES to RFID, am I ahead of, behind or out of the game?" That's a question I am often asked by U.S. retailers, at conferences, by phone, in e-mail, on Facebook and via LinkedIn. Clearly, RFID adoption is on their

minds, and with good reason. To be competitive, retailers must have high inventory accuracy. And studies conducted by Auburn University and the University of Arkansas with many U.S. retailers have shown that RFID can improve inventory accuracy from an industry average of 60 percent or less to more than 95 percent. With 95 percent accuracy, many retail problems are solved or attenuated—out-of-stocks go down, safety stock or unnecessary stock declines, and sales and/or margins improve.

Getting back to the retailers' question, I tell them: If you have fully deployed RFID throughout your stores—tagging all items in all stores—you are ahead. If you have not started considering potential uses for RFID in your stores, you are behind. If you're anywhere else, you're—well—in between.

In the past few years, RFID adoption by U.S. retailers—particularly those in apparel (both specialty and department stores)—has picked up significantly. Of those using RFID, I estimate roughly 10 percent are on their way to full deployment (none are fully deployed). Another 30 percent are at the beginning of phased deployment. The other 60 percent are evaluating how RFID can help them solve business problems and/or using pilot projects

to set their strategies for phased deployment.

While the majority of end users are still in the early stages of RFID adoption, at least they are actively investigating and/or implementing the technology. I am concerned about the many retailers who are not yet asking about RFID deployment.

The fact is, any retailer without RFID has an inventory accuracy problem. Many retailers know they have a problem but do not want to admit it. Others truly do not realize they have a problem—they look at existing data and assume all is well, when, in reality, they are relying on bad information. And some retailers realize they have a problem and spend lots of resources trying to correct it. (Typically, they hire more workers to manually scan the bar codes on items, which is expensive and inefficient.)

Remember, the first step to solving a problem is acknowledging you have one. Then, you need good data to fix the problem. And third, you must address the related cost concerns. Tracking items with RFID provides good data and is more cost-effective than increasing labor resources.

In the near future, retailers will require RFID to be competitive. It's time for all retailers to ask, "Am I using or planning to use RFID to improve inventory accuracy?" If the answer is no, it's time to take steps to get into the game. ■

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 other RFID adoption and business-case issues in this column. Send your questions to hardgrave@auburn.edu.

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How to Choose the Right RFID Technology for Your Application

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Wearable RFID Tags

Antennas must be lightweight, low-cost and powerful enough to support sensors in health-care applications.

By Damith Ranasinghe and Thomas Kaufmann



Ranasinghe and Kaufmann

THE MINIATURIZATION of sensors and wireless systems is generating explosive growth in applications based on wearable electronic devices. At the Auto-ID Lab at the University of Adelaide, in Australia, we are working with the Queen Elizabeth Hospital and the Hospital Research Foundation to develop wearable sensor-equipped passive RFID tags for use in health-care applications, such as monitoring the daily activities of the elderly in hospitals and at home. Part of our research is aimed at developing lightweight, low-profile, low-cost antennas.

It is a considerable challenge to develop antennas that can be integrated with passive tag circuitry capable of delivering the power required to run the tag logic and sensory circuits, such as accelerometers. In particular, the antennas need to be concealable, flexible and designed for comfort, especially during the wearer's sleep. It's also essential that the electrical connections remain intact when the tags are worn around the clock.

Another challenge is that most antennas are easily detuned when located on or near a human body, resulting in reduced read range. Thus, the effects of human tissue, such as skin and fat, in close proximity to the antenna must be included in design considerations.

To address these problems, we are taking advantage of recent developments in conductive fabrics. Instead of using metal foil to construct an antenna, we use fabrics made from silver thread and conductive plastics. Generally, eliminating the effects of the human body on antenna performance requires the use of large metal sheets between the body and the antenna

(ground plane). Such designs are not desirable for a wearable tag, so we use conductive fabrics to produce a barrier and achieve good performance. This produces a flexible antenna and a garment that can be easily laundered. In addition, we are building the antenna on low-cost, highly flexible substrates, such as foams, which ensures that the overall antenna structure does not cause discomfort to the wearer.

With our design, the sensor-equipped ultrahigh-frequency tags have a read range of more than 4 meters (13 feet). This will reduce the cost of deployment, because fewer readers will be needed to capture the patient's data at critical locations, such as near beds or chairs.

Our newest wearable tag antenna is designed to snap on and off, to facilitate laundering garments in hospitals. The ability to discard the tag supports protocols to control the spread of contagious diseases. Generally, hospitals prefer to discard used items, so keeping tag cost low is important. We estimate each tag would cost less than \$3.

With the cost concern in mind, we are exploring other designs. One possibility is a snap-on tag that can be sterilized and reused. Another is to embroider antennas into fabric to create more flexible structures that can be easily integrated into clothing. We also plan to explore ways to ensure that the chip can survive the laundry process. ■

Damith Ranasinghe is the research director of the Auto-ID Lab at the University of Adelaide, in Australia. Thomas Kaufmann is a senior lab researcher.



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By starting with the right data format, it's easy to achieve interoperability in business applications.

A professional headshot of Dr. Robert J. M. van der Linde. He is a middle-aged man with dark, curly hair and a mustache, smiling at the camera. He is wearing a blue button-down shirt and a red patterned tie. The background is a soft, out-of-focus brown.

It's important to decode these different formats into a business-level representation at the lowest level of software—ideally, within the RFID reader or bar-code scanner, or with middleware, software that resides between readers and scanners and enterprise applications. Essentially, you're translating RFID and bar-code data into well-established GS1 codes.

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.



Managing RTIs

New standards for tracking returnable transport items will allow companies to achieve internal and supply-chain benefits.

By Stephane Pique



EUROPEAN COMPANIES in almost every sector use returnable transport items (RTIs) to carry a variety of assets within their own facilities or through the supply chain, yet only a few actually know how many of these often expensive items are in circulation or where they are located.

Myriad companies have demonstrated the business case for managing RTIs with RFID, and the application has been recognized as a fast and easy way to reduce costs.

But most RFID implementations to manage RTIs are based on proprietary identification schemes or technology, and, therefore, the infrastructure cannot be used with supply-chain partners or for other internal applications. To enable businesses to get more value from RTI applications, GS1 Switzerland and some European companies established, in 2011, a working group called “RTI Management Using GS1 Standards.” The goal was to standardize RTI processes, technology, identification schemes and infrastructure.

The group developed a technical solution based on GS1 standards, to support and simplify the handling and transport of RTIs, including boxes, containers, crates, dollies, pallets and trolleys; it does not apply to sea freight containers. The solution is explained in a guideline called “The Management of RTIs by GS1 Standards,” which is available (in English and German) to all GS1 members.

The group recommends identifying RTIs with two ultrahigh-frequency Gen 2 RFID tags and GS1-128 bar codes, using the GS1 key sGRAI-96 as the unique identification number. The key is also available in a human-readable form. EANCOM is used as an infrastructure for the exchange of commercial data, and

EPC Information Services to track and trace the items.

The core of the guideline is a description of 36 “to-be” processes, designed to help all companies within the supply chain—RTI manufacturers, RTI owner/pool operators, businesses shipping and receiving RTIs, and RTI carriers—manage these assets more efficiently. The processes include procurement of new and existing RTIs, ordering and delivery of goods using RTIs, and return of RTIs.

The guideline also documents significant business benefits that can be achieved by using standards to manage RTIs, and allows companies to calculate their potential savings. In addition to reducing the number of transport items that go astray and production downtime due to those missing items, benefits include a decrease in administrative costs on receipt of goods and a reduction in expenses in the search for RTIs. Companies that implement standards to manage RTIs can expect a fast return on investment, possibly within several months.

In addition, the guideline demonstrates how to implement these standards, and shows which standards relate to each function, for companies considering a modular implementation. ■

Stephane Pique is an RFID business consultant to global companies. He works for GS1 Switzerland, and is co-founder and managing director EMEA of the International RFID Business Association.



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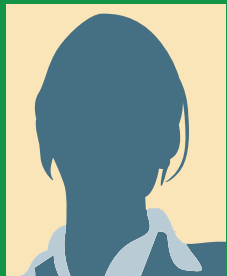
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It Fries Your Brain and Reads Your Mind

What the RFID industry can learn from the protest against electric meters.

By Kevin Ashton



IN THE PAST FEW YEARS, people have been getting very excited about electric meters. The reason? Electric utilities are replacing their manual meters, which have rotary numbers like the odometers in old cars, with smart meters that have built-in radios. The radios communicate with the electric companies, most often over ZigBee-based mesh networks.

The technology's supporters include electric companies, meter makers and ZigBee radio manufacturers. The new devices save money for the utilities, which no longer have to pay meter readers to visit each customer's house. And the smart meter and ZigBee manufacturers get to sell stuff to the utilities.

Opponents include a worldwide quilt of consumer coalitions desperate to stop the use of electric meters. Google "smart meter" and you will find them quickly. Their major complaints revolve around issues of safety and privacy.

When it comes to safety, the concern is that smart meters emit radiation that can cause cancer. Professes one online commenter: "Smart meters transmit radiation every few seconds all day long, which adds up to hundreds of times more radiation exposure—even at many feet away—than that of cell phones. Children, pregnant women, seniors, people with immune deficiencies and people with medical implants are especially at risk. Also pets and plants."

The sources of this information are cited as the World Health Organization and the International Agency for Research on Cancer, which state that electromagnetic fields are a Class 2-B carcinogen. Now, Class 2-B means "limited evidence of carcinogenicity in humans and less than sufficient evidence of

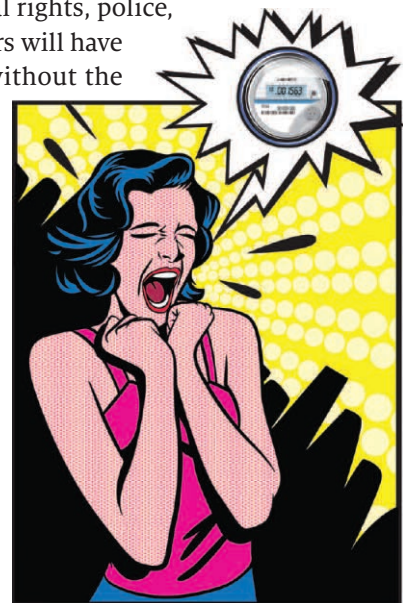
carcinogenicity in experimental animals." This means smart meters, which have not been specifically investigated, emit something that almost certainly does not cause cancer.

As for privacy, they claim: "The easily hacked RF data may fall into the hands of hackers who may be thieves or terrorists... In violation of your constitutional rights, police, government agencies and others will have access to your lifestyle data without the need for a warrant." But in reality, the only data the meter sends is how much electricity the house uses—information that is publicly available on the side of every house with an old-fashioned meter.

The evidence against smart meters may be shaky, but the uproar is not surprising, given the use of an unfamiliar technology, the fact that nobody was given much choice about using it—some electric utilities even charge consumers who want to opt out of the program—and, most important, there is no discernible benefit for the homeowner. Who wants to be pressured to use a new technology that doesn't do them any good?

The RFID industry has a lot to learn from how the electricity industry has—and has not—dealt with the protests. Before deploying any new technology near members of the public, make sure it benefits them as well as you. And give them a free choice. The few people who are truly concerned must be able to opt out instead of being pushed to spread fear, uncertainty and doubt online. ■

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



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