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The RFID Oppurtunity for Healthcare

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RFID (Radio Frequency IDentification) devices have been visibly gaining acceptance across a variety of industries, principally for supply chain management in fast-moving areas such as retailing.

As a relatively later entrant, the healthcare sector has benefited from more maturity in the technology gained from real-world application, the emergence of second-generation (Gen-2 security standards) in passive RFID, a different option in active RFID, and the beginnings of a fall in unit price as the RFID user base has grown.

Healthcare and RFID

According to some IT industry leaders, healthcare RFID – especially in the area of pharmaceuticals - offers considerable opportunities – given the sensitive role of tracking drugs for product recall.

On the other hand, healthcare also faces some of the greatest legal and technological challenges, for example in the US, in the form of HIPPA (Health Insurance Portability and Privacy Act) which protects patient privacy; as a result, passive RFID-tagged prescriptions must have guarantees that only a pharmacist will be able to read them.

RFID in Hospitals: Initial Concerns

Healthcare RFID applications date back to 2004, when the US Food and Drug Administration (FDA) allowed hospitals to use passive and active RFID to identify patients and authorise access to medical records – in addition to its more traditional application in workflow and stock management.

Shortly after, US hospitals also began to implant ('tag') patients with RFID. However, within months, the FDA warned of very serious risks – including adverse tissue reactions, internal "migration" of transponders, electrical risks and incompatibility with MRI scanners.

Such concerns tempered the takeoff of healthcare industry applications. However, RFID are both passive and active now steadily gaining widespread acceptance – both for tracking supplies and patients at hospitals, and increasingly, as an added layer of security within the hospital infrastructure – in terms of providing physical and network access to staff.

The Sureties of RFID

In terms of patients, the highest receptivity to active RFID has been in maternity wards (given fears of abduction), and for elderly patients – especially those suffering from diseases like Alzheimer's. Indeed, by early 2004, certain US hospitals were claiming up to 60% reduction in patient watches, thanks to RFID.

In 2005, the Boston Globe reported the case of a patient switching beds to be near the window (a commonenough situation in many hospitals). However, she died after the hospital gave her a blood transfusion with her roommate's blood type. The Globe also reported cases of a Florida woman dying after a technician mislabeled her blood sample and a case in St. Louis, where a man underwent successful heart surgery but died in recovery after staff mistook him for someone else and used the wrong blood bag.

The Globe went on to note that transfusion patients today "are 100 to 1,000 times more likely to get the wrong blood than to get the virus that causes AIDS" and that several hospitals sought to improve safety via RFID. Indeed, in 2005, many hospitals began swapping bar code bracelets with RFID tags. This was also opportune, as several hospitals were at the time also beginning to implement a wireless infrastructure.

In April, Germany's Klinikum Saarbrücken became one of Europe's first hospitals to launch an RFID pilot which sought to improve efficiency and reduce clinical errors. As part of the project, 1,000 tagged patients were monitored by staff using PDAs and tablet PCs and accessing encrypted patient data on their wireless network. Nonetheless, implementation of RFID in many other existing hospitals has usually been limited to closedloop applications and there are continuing issues on radio wave interference vis-à-vis other medical equipment as well as difficulties associated with data integration into existing IT networks. Certain IT managers are apprehensive that RFID data could overload their systems, especially if these are centered around legacy systems.

…. for Hospitals of the Future

Others have, however, moved further. At Denmark's Horsens Hospital, all key personnel are now RFID-tracked, and paper and pagers have been wholly eliminated.

Workflow scheduling, for instance on operating theatres, has been directly impacted. AwareMedia, a cluster of flat-panel screens, posts schedules, alongside indicating the presence of physicians, support staff and patients in operating room, recovery room and wards.

Today, many new hospital projects in Europe are taking RFID applications into their building plans – to install receivers at key points and ensure connectivity to wired and wireless networks. These have been covered in previous HITM issues.

The EU and RFID

On its part, the EU Commission has highlighted the promise of RFID, but warned industry to pay more attention to privacy and security.

At the CeBIT Trade Fair in Hanover in March, EU Information Society Commissioner Viviane Reding said that the potential growth of the RFID market was "huge". She estimated a near-15-fold leap from 500 million Euros in 2006 to 7 billion Euros in 2016, and announced the formation of a high-level RFID advisory 'stakeholder group', with representatives from industry and consumers.

Ms. Reding stressed her commitment to avoid 'topdown' approaches and over-regulation on RFID. She said the new stakeholder group would advice her, especially on the RFID aspects of privacy and e-security, and these, in turn, would be reflected in Commission recommendations to Member States.

Last year, a consultation on RFID organised by the European Commission found that the public was underinformed and that concerns about RFID systems – especially with regard to privacy - needed to be satisfactorily resolved to ensure that the technology was accepted and used to its full potential. At that time, Commissioner Reding noted the need for far "greater efforts to explain the risks and benefits of RFID." It is, she said, no longer "just a playground for technologists and lawyers."

Under the European Union's Seventh RTD Framework Programme (FP-7), RFID research is being focused initially on applications in healthcare, intelligent vehicle and mobility systems, micro- and nanosystems, organic electronics and future networks. At a later stage, the Commission intends to boost funding support in areas such as RFID security, and the development of privacy enhancing RFID protocols and systems.

This is welcome because it shows increasing awareness by the Commission that in the real-world, markets are at least as (if not more) important than technical innovation for its own sake.

In the RFID area, the largest of the EU-funded projects involve seven pharmaceutical and healthcare organisations, using RFID to trace drugs from the manufacturing plant to delivery at a hospital or pharmacy. The project is part of a wider initiative known as BRIDGE (Building Radio-frequency Identification solutions for the Global Environment) – a Euro 7.5 million, three-year project falling under the ambit of the previous Sixth Framework Programme for Research and Technological Development (FP-6), and aimed at driving acceptance of EPCglobal standards in Europe.

EPCglobal, which is leading development of industrydriven standards for the Electronic Product Code (EPC) to support RFID use across different industrial sectors, is a spin-off from the Massachussets Institute of Technology (MIT). With members from the IT, healthcare, consumer goods industries and the US military, it has the continuing involvement on its management team of MIT's RFID pioneer, Dr. Sanjay Sarma.

BRIDGE was created to research, develop and implement tools enabling EPCglobal applications and to drive the acceptance of EPCglobal standards in Europe. It is launching pilots to test EPC Gen 2 RFID in five industries - retail, pharma, maufacturing, logistics and services.

The biggest, known as the Pharma Traceability Pilot, will be dedicated to tracking pallets of medicines from manufacturer to pharmacy, and involves a consortium of manufacturers, packagers and retailers as well as Barts and the London NHS Trust. The first phase of the Pharma Traceability Pilot is due to last until late spring 2008 (March or April) and use both 2-D bar code labels as well as passive EPC RFID tags. The promoters of the pilot state that such a hybrid environment will enable validating the pluses and minuses of each technology.

As the product moves through the supply chain, RFID will be used to document location and ownership, as well as custody– that is, who received them, at what date and time, and when it was shipped out. Some 22 products will be involved in the pilot – and, instead of bulk shipments, they will be packaged in blister packs and other forms of direct dispensing to patients at pharmacies. For comparative purposes, bar codes will also be present, and the pilot will use a network-based system to allow for the storing, access and analysis of data collected.

RFID Technology: An Overview

The Product

RFIDs consist of a tag attached to a product with a microchip which contains data about the product, and an antenna which broadcasts this data to a receiver. RFIDs can either be active or semi-active (with an internal power source) or passive (without power); the latter are activated by specific receivers.

In lay terms, RFIDs are futuristic versions of barcodes, and much easier to use – since they do not require a line of sight for scanning. This allows for much swifter product throughput. Indeed, one of its recent definitions is 'The Internet of Things'.

An emerging area is socalled 'chipless RFID'. This allows for identifying tags without an integrated circuit. It is cheaper than traditional RFID and allows tags to be printed directly on to products.

RFIDs are compared on the basis of several parameters. The most common ones are: power output, read distance, receive sensitivity and interference rejection.

Of Spies and Fighter Jets

The roots of RFID allegedly date back to the Soviet KGB's infamous bugs. Though passive listening devices rather than ID systems, there are believed to be strong parallels. There also is a military connection in terms of the IFF (identification friend of foe) transponder systems used by warplanes to this day. However, the first patent explictly using the term RFID dates to the early 1980s.

Current Uses

RFID is already widely used in logistics (for tracking products from warehouse floor to destination), in motorway tolling systems, and above all, in retail shops. US retail giant Wal- Mart is one of the largest RFID users in the world. In September 2007, Metro unveiled an end-to-end RFID system at its Galeria Kaufhof high-end retail store in Essen, Germany, which fully integrates itemlevel tagging, supply chain visibility, back room inventory visibility, smart shelves, smart mirrors, point of sale (POS), and theft prevention. In the UK, a pilot project is under discussion for tagging airline baggage, while other similar initiatives are being planned in the US, Singapore and Australia. Security advantages of RFID are especially strong in areas such as drugs and aircraft spare parts – where counterfeiting is a perpetual menace. Boeing and Airbus plan to store parts' histories on tags, while pharmaceutical firms are considering the use of tags to create secure "electronic pedigrees". In the future, many countries are also planning to use RFIDs in passports and identification documents.

Privacy Concerns

In Europe, there have long been major concerns about privacy – especially in terms of convergence with GSM telephony, GPS satellite positioning and closed circuit TV, which would allow intrusively-rich images of users.

In Britain, demonstrations have been held outside Tesco supermarkets as far back as 2003, when tests were started on RFID tags in Gillette Mach 3 Razor blade packages. In Germany, Metro has faced similar opposition from consumer groups about its use of smart tags in stores.

So far, industry has sought to address concerns about data privacy in several ways. Some firms have propagated self-regulation: to inform consumers about RFID use and assure them that there is no link to personal identity. This is unlikely to be much of a buy-in, since much of industry's push on RFID is post-sale loyalty programs and/or to associate a purchase with a credit or debit card.

Others are looking at more novel approaches. One of these is to mechanically clip the RFID antenna, and thereby reduce its range from 10 metres to 10 cms.

European Initiatives

European RFID users and vendors have recently launched CE RFID, an initiative for 'Coordinating European Efforts for Promoting the European RFID Value Chain'.

CE RFID aims at improving the conditions of competition for RFID technology and its further development in Europe and at reinforcing political environment for RFID at European level. The initiative directly contributes to the Working Group RFID/Logistics within EPOSS - the European Technology Platform on Smart Systems Integration. Members so far principally consist of Austrian and German RFID solution providers.

Efforts are also being made to inform users and the general public. In Germany, a website launched at the end of last year by Informationsforum RFID aims to educate the public about RFID applications in everyday life. Informationsforum RFID is also working with partners in the Netherlands (RFID Platform Nederland) and the UK (National RFID Centre), to increase awareness and acceptance of RFID technology and ensure that RFID projects are implemented in a responsible manner.

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