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# RFID As An eHealth Platform

## Introduction

Radio Frequency IDentification (RFID) is set to revolutionise retailing. It could also form the basis of a number of new and innovative, healthcare related, services. The potential of automated shopping systems, where the customer scans products as they take them from the shelf, will increase markedly as RFID technology is deployed - consumers may even be able to access RFID data using a device attached to a smart phone or Phone Device Attachment (PDA).

While at present there is much talk of consumer resistance to RFID technology, there are a number of other issues retailers should address before deploying RFID systems. RFID technology could support services that, far from threatening their privacy, empower the consumer and enable third parties to influence a shopper's purchasing decisions. In this chapter we consider the threat posed to retailers by RFID based services and steps that should be taken before migrating automated shopping systems, first from a barcode scanning to a RFID platform, and then from a Wireless LAN (WLAN) to a mobile phone network.

Wireless technology is already being used to support automated shopping systems. Here the customer is issued with a handheld barcode scanner as they enter the store. The device is used to scan items as they are taken from the shelf. The handheld scanner is connected, via a WLAN, to a server hosting the store's product database and the customer's account file. The system offers the customer an alternative to waiting in a queue to unload their shopping trolley at the store's checkout desk. While the customer saves time and effort the store can reduce manning levels.

Automated shopping systems can provide healthcare related services: for example, alerting the customer if they have selected a product that is likely to cause an allergic reaction. In the majority of installations these functions are not implemented.

### At A Glance

The current controversy surrounding the deployment of RFID in customer facing applications is centred on the threat the technology poses to the privacy of the consumer.

RFID technology could become disruptive to the retailer's business model if third parties use it to overlay an alternative database on the retailer's operation. This could happen if independent organisations use RFID technology to provide health related data on a wide range of food products.

Retailers could either abandon the deployment of customer facing RFID applications, block third party access to RFID tags, or build their own suite of RFID based services that can be accessed by customers.

## Customers Helping Themselves

If a store's products contain RFID tags then a customer using an automated shopping system no longer needs to scan each item with a barcode reader - instead the entire trolley full of shopping is scanned, in one operation, at the checkout. The trolley can be fitted with a screen and scanner so that the customer can keep track of their purchases and be made aware of special offers at the point of purchase. The screen could also, in theory, be used to display dietary and other healthcare related information. This is how most retailers see RFID being deployed in their stores.

There is however an alternative scenario. RFID could be used to support independent product information services. Such services would be welcomed by public health organisations that are keen to see the deployment of technology that helps people comply with diets and prevents, or manages, diseases such as diabetes.

There are already a number of diabetes management services that use smart phones or PDAs and run over conventional GSM networks. Although RFID technology is still relatively expensive a number of vendors have produced scanners that can be attached to wireless PDAs or smart phones. Once the price of this technology falls to a point where it can be incorporated, as standard, in mobile devices, then automated shopping could develop in ways the retailer can neither predict nor control.

The current controversy surrounding the use of RFID centres on the threat the technology poses to personal privacy. However retailers themselves may find their own privacy under threat as third parties overlay an alternative product database over a store's product line.

This may not happen. After all, barcode readers that can be used with mobile handsets have been available for some time. These devices were designed to support a number of online services that have, so far, failed to capture the public's imagination.



Symbol's technology is used to support an in-store automated shopping system running over a WLAN.



iScan's shopping technology is based on a conventional mobile handset fitted with a barcode reader.

However there are a number of reasons why customer facing retail solutions based on RFID tags may prove more successful than those based on bar codes:-

- Scanning a product containing an RFID tag is simpler than scanning a barcode as the product does not need to be picked up or repositioned by the customer.
- The current generation of smart phones and PDAs are more powerful than the devices on the market when vendors launched services that relied on the consumer scanning a barcode.
- Due to the controversy surrounding its deployment, RFID has captured the public's imagination in a way barcodes did not.

Factors that could accelerate the deployment of third party RFID based information systems include:-

- Consumers purchasing RFID scanners to verify RFID devices have been deactivated or to detect tags that may be hidden in products they have purchased.
- The use of RFID scanners for applications such as online shopping and counting banknotes.
- The embedding of RFID devices in security passes and exhibition visitor badges.
- RFID based services that provide people who suffer from allergies with relevant information on food products at the point of purchase.

This last service should be of particular concern to the retailer and food producer as it could be extended to cover a range of dietary information regarding a particular product – for example sugar and salt content. While this service would be useful in the promotion of public health, some information provided by third parties could be presented in ways that were at variance with the way the retailer and producer wished to promote the product.



Blueleaf supply a range of handheld RFID scanners and now produce a compact flash card based RFID reader.

Some services offered by third parties may appear to be relatively benign to others, however could be disruptive to the retailer's business model.

One example might be data provided by special interest groups who, for political reasons, have blacklisted a range of products. Another would be a Kelkoo type online service that enables the customer to compare prices in a range of stores at the point of purchase – in the extreme the customer could scan a product in one store using their mobile phone and buy it online from another retailer or even direct from the manufacturer.

## Recommended Actions

A simple healthcare related service could develop into a 'store within a store' making it difficult for the retailer to exercise control over their business. To avert this threat the retailer has three options:-

- They could abandon plans to deploy RFID in its current format and develop a propriety system. The retailer and supplier would forgo some gains from improved supply chain management. They would also miss out on the economies of scale that emerge as chip manufacturers ramp up production of RFID devices.
- They could prohibit or block the use of mobile devices and personal RFID scanners within their stores (the network security specialist, RSA, has already demonstrated a device that prevents unauthorised access to RFID tags). They could also deactivate tags when products are placed in stores. This may be unpopular with customers and controversial if the RFID based service being blocked is providing healthcare related information – it may also prove disruptive to a stores own automated shopping system.
- They could implement their own RFID services by migrating existing automated shopping services onto standard mobile platforms, then enhance these services by adding advanced features such as healthcare and diet planning.



Nokia are planning to supply a RFID development kit, for use with the Nokia 5140, in the summer of 2004.

The retailer is faced with three choices:-

They could postpone or abandon deployment of RFID technology in customer facing applications and use propriety technology.

They could block third party access to RFID data or deactivate tags when products are put on display.

They could build their own suite of RFID based services that customers could access with a mobile device.

## Vendor Profiles And Analysis

### Blueleaf



In seven years Blueleaf have developed a range of RFID scanning technologies that support inventory control applications within the manufacturing and healthcare sectors. The company's scanners are modified versions of readily available handheld devices. When the corporate sector began to show an interest in wireless PDA based applications Blueleaf developed a compact flash card that converted a PDA into a RFID scanner.

The card fits into a standard compact flash slot of handheld devices and laptops and reads a broad range of 13.56MHz tags up to a distance of 50mm. Software drivers are available for Windows CE. As yet the device is not in volume production.

### Blueleaf At A Glance

Founded in 1997.  
Headquarters in the UK.  
Six employees.

Privately owned.  
Turnover for 2002-03 of £250,000.  
Projected turnover for 2003-04 of £350,000.

Primary business is RFID scanning systems - customers include British Telecom and Swindon NHS Trust.

### Analysis

To date most of Blueleaf's scanners have been used in corporate applications such as stock control – now in the compact flash RFID scanner, the company has a product that could sell in volume to the consumer electronics market. As the company is relatively small, it is unlikely to ramp up production of the reader until its customers have rolled out systems built around a PDA or smart phone.

If retailers start deploying customer facing RFID scanning systems, Blueleaf will be presented with a small window of opportunity within which it can either find a partner in the consumer electronics market, or attempt to market the compact flash card itself. It will have to run fast to stay ahead of companies such as Nokia who are already experimenting with RFID peripherals that can be used with top of the range handsets. Given that Blueleaf is geared to providing complete RFID systems, and that it already has some experience of selling through distributors and dealers, finding a partner might be the best option.



## Symbol

A number of food retailers in the UK have deployed Symbol's Portable Shopping System. Using a handheld wireless device, shoppers scan the barcode on an item as they take it from the shelf. The system eliminates the need for the customer to unload and reload a shopping trolley at the checkout. The store can reduce the number of checkout staff it has on duty and relay special offers – such as two items for the price of one – directly to the shopper at the point of purchase.

The Portable Shopping System is based on Symbol's Spectrum24 2 Mbit WLAN. This network can be used for both voice and data applications, and has been designed to support the IEEE 802.11x standard for wireless communications, and the ITU H.323 standard for multimedia communications.

The wireless scanner is linked to a database that contains the customer's account details. It also retrieves data from the store's product database when an item is scanned. This data could include information on the ingredients of a particular product enabling warnings to be relayed to a customer who has an allergy to certain types of food.



### Symbol At A Glance

Founded in 1975.

Produces bar code scanning equipment. Launched its Portable Shopping System in 1993 and its Spectrum Wireless LAN product in 2000.

Headquarters in Holtsville, New York, USA. Listed on the New York Stock Exchange.

After taking a pre-tax charge of \$72 million, incurred a loss of \$12.9 million during the first three quarters of 2003.

[www.symbol.com](http://www.symbol.com)

### Analysis

Symbol's Portable Shopping System could be used to help people maintain a healthy diet. It could also, in theory, be rolled out on a GSM or GPRS network as an ehealth service. However, for this to happen, the product databases of leading food manufacturers and retailers would have to be more comprehensive than those in place today. In addition, the service would need access to a patient record database. Even though the system could warn nut allergy sufferers not to buy certain products, few stores have implemented this feature.

The Portable Shopping System will face competition from RFID based applications that eliminate the need for the customer to scan items. Many healthcare and diet related services, which could have been supported with handheld scanners, would instead have to be made available to customers using an RFID system and a trolley-mounted scanner.

The emergence of a GSM or GPRS based shopping system, that accessed RFID information and used dietary information provided by an independent vendor, might encourage stores to roll out their own health related services.

## iScan



iScan have developed a barcode reader that can be attached to an Ericsson mobile handset. They also supply an application server Software Development Kit (SDK) to enable third party developers to integrate the iScan reader into existing software packages - or develop new services based on barcode scanning. The company promotes a range of applications in the medical, consumer and agricultural sectors. They also suggest a number of services that could be built around the mobile scanner, such as posters with barcodes that could be swiped if a consumer wanted further information on the product being advertised.

### iScan At A Glance

Founded in 2000.  
Headquarters in Italy.  
Supply mobile barcode reader solution.

Privately funded - seeking finance to develop a RFID scanner.

[www.iscan.it](http://www.iscan.it)

### Analysis

It is difficult to get the general public excited about barcodes. The one application where consumers do scan a barcode – automated shopping – appears not to have been targeted by iScan. To break into this market the company would need the support of a large vendor in the labelling or retail equipment sector. The medical sector, where the company sees some potential applications for its scanner, is already well served by systems running on WLANS. The iScan system could, in theory, assist the migration of these applications from LANS to WANS. However the device was developed for a restricted range of what are now rather dated handsets.

A smart phone based scanner would enable a shopper to store a database of barcode information in the handset rather than rely, as iScan does, on SMS technology to extract data from a central server. If it is successful in obtaining funding, iScan should be able to use its skills and experience to make an attack on the RFID market. However without finance it will remain just a good idea with a web presence.

## Vendor Profiles And Analysis

### Tesco

Tesco has overtaken its main rival Sainsbury's to become the UK's largest food retailer. The company records 14 million customer visits per week and, via its loyalty card scheme and online store, has a relationship with 1 million customers. Its' CRM technology is almost as advanced as that of pure online stores such as Amazon.

Ten years ago Tesco was gathering sufficient data to allow it to make assumptions about the impact of external factors, such as weather or an economic downturn, on its' customer base. The CRM technology the company employs today enables the retailer to determine how a particular customer's purchases will be influenced by external factors. This level of granularity would be particularly useful in ehealth applications; as the efficiency of healthcare service could be increased dramatically if it was known in advance how a particular patient would react during an epidemic.



#### Tesco At A Glance

£1.3bn profit during 2002 - 2003.

The UK's largest private sector employer logs 14 million customer visits per week and, via a loyalty card system, has a relationship with 1 million customers.

[www.tesco.co.uk](http://www.tesco.co.uk)

### Analysis

Tesco has dominated the UK retail sector, pioneering the introduction of advanced CRM and leading the way with diversification into non-food areas.

Tesco claims it is customer led, and would not make a move into healthcare unless it perceived a need for it amongst its' customer base. However, it was the threat from online operators such as WebVan that encouraged the company to expand a remote shopping service, which enabled housebound people to order groceries by fax, into Tesco Online.

The arrival of Wal-Mart in the UK's already crowded food-retailing sector is likely to increase the pressure on Tesco and other large food retailers to diversify. Wal-Mart is already strong in clothes retailing in the UK and is also moving into pharmaceuticals.

Tesco might wish to further expand and diversify its pharmacy operation while it still has the advantage of being the market leader. It could - as has been rumoured - purchase Boots. Tesco might even be able to breathe life into the Wellbeing brand. However, just because someone has all the right tools does not mean they are willing to do the job.

## Boots Wellbeing

In 2001, when the dot com market was still in its ascendancy, it was important for companies to have a 'digital strategy'. For Boots, the UK's leading high street pharmacy, Wellbeing was its 'multi-platform proposition'. In partnership with the TV company Granada it merged its own Internet presence ([www.boots.co.uk](http://www.boots.co.uk)) into a combined digital television channel and website.

Boots was then - and is now - under pressure from supermarkets, in particular Tesco, which were opening in-store pharmacies. Wellbeing was seen as a way of diversifying out of the pure health and beauty retailing market (which was thought to be worth £11bn per annum) into the broader healthcare market (£90bn per annum). Along with other retailers caught up in the excitement of the times they saw Wellbeing as a platform that would eventually support PDAs and WAP phones.

The dot com boom ended before Wellbeing reached mobile device users - or the users of monitoring devices sold within Boots stores. The company's digital strategy dissolved and the Wellbeing brand has since been used for a range of in-store medical services extending from dentistry to aromatherapy. Now even this service has been scaled back to cover only dentistry - for which it has 150,000 registered patients at 56 locations in the UK - and chiropody. One of their UK stores hosts a NHS Direct drop in advice centre.



### Boots At A Glance

Under the Wellbeing brand the UK's largest dispensing chemist still provides chiropody and dentistry in 56 of its stores, even though other healthcare services have been abandoned.

150,000 registered patients for dentistry.

Operates loyalty card system with basic CRM support.

Hosts an NHS Direct walk in centre in one of its stores.

[www.wellbeing.com](http://www.wellbeing.com)

### Analysis

Perhaps if the dot com boom had continued, Wellbeing would have grown into a 'multi-platform healthcare proposition' which encompassed wireless telemedicine and health monitoring services. However, like many pioneering companies, Boots got little in the way of rewards for blazing a trail - save for a few arrows in its back.

In some respects Boots is better placed than any other retailer to offer advanced NextGen primary health services. It has a CRM driven customer loyalty scheme, and through its pharmacy business, has a large number of people with healthcare needs referred to them by GPs. Boots also retails a number of basic monitoring devices; some of which already have PC interfaces. Pulling these elements together into a single service offering proved difficult - especially at a time when the company itself seemed to lose focus. Whilst turning floor space over to marketing electronic consumer goods during the Christmas period may have lifted revenues, it did little for the Wellbeing brand.

## In-Store eHealth Services

In recent months three supermarket chains have joined the list of retailers offering healthcare services. Tesco, in conjunction with U-First Healthcare, held GP consultations in selected stores across the country. The GPs carried out tests on over 1500 Tesco customers. In the US, Wal-Mart provided in-store blood sugar testing during diabetes awareness month. Abbot's Ross Products division and Novartis supported the diabetes screening services. Customers visiting Wal-Mart were offered a number of free diabetes related products.

Perhaps the most interesting in-store healthcare service is the one now on offer at US based Basha's food stores. Customers concerned by unusual blemishes on their skin, can pay £20 for a skin cancer screening service. Rather than waiting for the results, a digital image of the customer's skin is sent to a laboratory via a telecoms link. Once a skin specialist has examined the image the results of the test are transmitted back to the store. At present the clinicians, supporting what is essentially an outsourced medical procedure, are supplied by the dermatology department of Arizona University. In the long term a separate company, Telemedco ([www.telemedco.com](http://www.telemedco.com)) will manage the service.

The ability to provide a medical service from a remote location has opened up the ehealth market and made relatively advanced clinical processes accessible to next generation health providers. Specially adapted mobile phones can now be used to take heart rate readings. These phones are supported by companies such as SHL Telemedicine, whose call centres are located around the world. The Indian outsourcing company Wipro has also entered the outsourced medical services market, and is attempting to introduce outsourced radiological services to the UK.

While it may be some time before the UK has walk in radiography centres - which already provide same day test results for people in India - companies such as SHL and Wipro open up a number of interesting possibilities for retailers.

### Basha's At A Glance

Established in 1932.

Employs 10,500 people in 127 stores in the US - principally in Arizona.

Its healthstyles clinics, which offer vision testing, flu injections and breast examinations, have served over 400,000 customers.  
[www.bashas.com](http://www.bashas.com)

### SHL At A Glance

Established in 1987.

Operates medical call centres and personal telemedicine services. In conjunction with Philips provides remote heart monitoring.

250,000 clients worldwide.

[www.shl-telemedicine.com](http://www.shl-telemedicine.com)

### Wipro At A Glance

Established in 1945.

Provides outsourced IT and call centre services. Entered the medical outsourcing market in 1990 and bought out GE Medical Systems in July 2002.

[www.wipro.com](http://www.wipro.com)

## Analysis

Today all parties - the retailer, the health provider and the sponsors - gain something from in-store health services, so no one is too concerned with the bottom line. In Wal-Mart's case the store itself gains publicity and adds value to its in-store pharmacy, while Novartis and Abbott gain exposure for their diabetes related products. Tesco too enhance their in-store pharmacy offering while their partner, U-First, is using Tesco as a launch pad for their personal GP service.

However to be sustainable in the long term, in-store medical services must pay their way – especially if they are to support a diversification away from low margin food retailing. Here Basha's skin cancer screening shows some promise. The service is relatively simple to set up, and as the clinicians are remote from the store, skilled medical staff can be shared amongst a number of participating outlets.

For the retailer, outsourcing remote health screening could be as straightforward as re-badging the financial services they are selling to their customers. A number of outsourcing companies, like SHL Telemedicine and Wipro, are marketing offshore, outsourced health services based in countries where labour costs are low. Wipro have tried, unsuccessfully, to interest the NHS in outsourcing, and are now seeking alternative markets for their services. SHL, in conjunction with Philips Medical Division, already operate a heart monitoring service based on a modified mobile phone that monitors the users heart rate and keeps track of their location.

Basha have over a decade of experience of in-store medical services. They have recognised that while people only go to their GP when something is wrong, they visit a food store almost every week. This puts the food store in a relatively strong position in the preventative healthcare market. The arrival of outsourced ehealth services offers a selection of tools the retailer can use to leverage its position in the next generation healthcare sector.

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