



Radio frequency tagging offers many potential benefits. But realising them won't be easy. We asked key frontline players to share their experiences of RFID so far

RFID: can we realise its full potential?

A RETAILER'S VIEW

from Gerd Wolfram, Metro
Düsseldorf, Germany

Please tell us about the main elements of Metro's Extra Future Store in Rheinberg.

GW: It covers four areas – what we call “comfort shopping”, smart checkout, in-store communication, and RFID inventory management.

The comfort shopping concept includes a number of experiments, including a personal shopping assistant to help customers with their shopping, information kiosks, electronic shelf labelling and intelligent scales (which automatically recognise the food shoppers are trying to weigh). The smart checkout includes a personal shopping assistant checkout (where the PSA adds up the cost of items as they are put in the trolley, so the checkout assistant doesn't have to). And RFID inventory management covers everything from transport and delivery to “smart shelves”, tracking items such as possible thefts and out-of-stocks.

How have consumers reacted to the store?

GW: We have organised pre- and post-focus groups, shopper feedback and telephone interviews asking customers about their shopping trips, the technology, customer convenience, switching from our competitors and so on.

There is considerable interest in the technology. Seventy-seven per cent have used it already, and said it had brought improvements. And older people and technology-averse people used the technology as much as everybody else.

But how the technology is used depends on the customer's current mode of shopping. If the shopper is just topping-up on two or three items, he or she will not take the personal shopping assistant, but they will use the quick checkout. If a customer is doing the weekly shop, they will use the personal shopping assistant.

Customer satisfaction in the shop has

People are not coming to the store for the technology itself. They are coming because the technology helps deliver a better experience



increased overall by 20 per cent. Frequency has also increased. Almost 45 per cent more shoppers are using the store. We are stealing customers from our competitors. That's partly because of the novelty and partly because of other aspects of the new store – fresher food, easier shopping, better presentation.

We cannot separate it out. People are not coming to the store for the technology itself. They are coming for the “fresh and easy” concept and the shopping experience, and the technology helps deliver this shopping experience. In this way, we believe, technology can help deliver competitive advantage.

What aspects of the new store do customers like most?

gw: It depends on the shopping situation, but overall it is the intelligent scale in the fresh area because it's easy, followed by self-checkout and personal shopping assistant. Customers are already familiar with kiosks which they use when they want more information. Electronic shelf labelling has only one benefit – the customer can be sure the price is right.

So from your perspective as a retailer, where are the biggest benefits of RFID – and where are the biggest problems?

gw: The biggest benefit right now is the tracking and tracing of cases and pallets in the supply chain. The second benefit is

shelf availability. But here there is a danger of complexity. We would find it hard to cope with new systems covering all 30,000 stock-keeping units (SKUs) so I think retailers will concentrate first on high price, high-value items such as CDs and DVDs, and on high-volume items where there is plenty of turnover.

The biggest problem is that we don't have “plug and play” systems yet. We have to install and adjust every detail according to the specific environment in the store. So if we want to use the technology in other premises, we can't simply transfer what we have done from Rheinberg – because the settings will be different. These problems will be overcome very soon.

Other problems include the cost of readers and the lack of international standards.

The new technology also changes processes, which means employees in the store have to change their way of working. For example, if you pass a reader too fast, it doesn't register the signal. Overall, RFID is changing the way the whole supply chain works.

Another crucial issue is privacy. So far, our shoppers in the Rheinberg store have not raised privacy concerns. But that may be because only a few items out of 30,000 SKUs have RFID tags at present.

I think we need an open discussion of the privacy issues, leading to a sort of “bill of rights” or code of conduct about how

Employees like using the new technology. But they also have to change their work processes – less manual work, more service. And that is not easy

RFID-enabled information will be used. Otherwise, privacy concerns will slow down implementation.

So RFID is very much starting in the supply chain and moving into the store.

GW: Yes. The customer benefits will come later.

Can you have promotions triggered by the individual – where you recognise the individual and give them their own special offer?

GW: Technically we can do that. But we have to ask what promotions the customer wants. For example, today we have TV promotions but we are not sure if it is the right media. Sometimes there is information-overload in the store.

In future, we should be able to ask the customer whether they want this information – to make it optional on the shopping trolley, for example.

With six months' experience of RFID under your belt, are you more or less enthusiastic about it?

GW: We are more optimistic about the benefits, how they will come, and how the technology will work. It's very positive for our staff and our suppliers who can see it working at Rheinberg and can start thinking about "how could this work in my store or my supply chain? We could do this and that".

Will you be rolling RFID out faster than you thought?

GW: We did not have a plan before. Now we are in a position to make plans.

How about its effects on the workforce? Are there going to be more or fewer jobs?

GW: There is going to be a shift of work – less manual inventory and checking work and more tasks in the shop serving customer. So, for example, we have more people to serve customers in the "fresh and easy" concept, and we have additional people helping customers with the personal shopping assistant. Employees have fun using the technology. They like it. But they also have to change their work processes, and that is not easy.

Overall, what is the effect of the technology?

GW: We are moving from top down to bottom up processes. The only reason we didn't do this before was that we didn't have the technological capability. We still had the Tin Lizzy [the first mass-produced Ford motor car] of the IT industry. But once we enable the distributed mode, we will have much faster decision-making.

Look at how Vodafone (mobile phone service provider) is talking about enabling the end consumer with a peer-to-peer network. We are going to see more of this. It is changing the game for many industries.

The question as to who pays and who gets what has always been there. We simply have to find a way to handle that on a fair basis – like all ECR projects

A MANUFACTURER'S VIEW

from Udo Scharr, Procter & Gamble
Schwalbach, Germany

Where are the main benefits of RFID from your point of view as a manufacturer?

us: The benefits come in two main areas – “hard core” supply chain, and the demand side. The reality of today’s supply chains is that out-of-stock levels are much higher than we and our retail partners want.

We rely too heavily on unreliable forecasts, and have high inventory levels to guard against out-of-stocks – all of which costs us billions of dollars.

At Procter & Gamble we have a vision of a Consumer – or Demand – Driven Supply Network, where all the main production and distribution activities are driven by real-time signals of consumer demand.

To achieve this, we need synchronised production, fast and flexible replenishment systems, and better, simpler, collaborative business planning processes.

All of these things depend on up-to-date information products and their location. It all has to be fed by data, and we think RFID is a promising way to get all the real-time, detailed data we may need.

On the demand side, RFID could be used to make shopping easier by, for example, providing detailed product information by SKU, or by speeding up checkout. Also, RFID could be used to create personalised, real-time advertising and promotional communications with consumers in store.

Those are long-term, potential benefits. What are the immediate benefits of RFID?

us: Tackling out-of-stocks, and inefficiencies within the supply chain, starting with the case and pallet level.

So what are the obstacles?

us: On the hurdle side, we still have a lot to learn. We want to know – will RFID work as we expect it to? Will it pay out? And what will consumers and shoppers do with it?

What are known as the privacy and environmental issues have to be understood and worked. Standards and standardisation are another crucial issue. And critical mass. For example, if we only do it with Wal-Mart, then we don’t get the benefits.

We are only at the beginning. There are lots of things we have to find out. So we have to be a fast learner, pilot stuff, and find out what pays back



There is an issue here about the retailer benefiting and the manufacturer paying, isn't there?

us: You are absolutely right. There are discussions. But this is nothing new. We have been organising ECR projects for years. The question as to who pays and who gets what has always been there. We simply have to find a way to handle that properly and on a fair basis, because in the end, RFID is not something we should do just within the boundaries of our company.

We have to look at the total chain. We can only get real benefit out of it if we do it with the retailer and the consumer.

How are you coping with conflict with the legacy systems of the company?

us: That is the next step. In Europe so far, we have not carried out any linkage with our legacy systems. But we have a study under way, within the Consumer Driven Supply Network, to find out what it means for our systems. We know it means heavy changes.

Is there really a big opportunity in using RFID for better communications with the consumer?

us: There are many question marks. We know that traditional tools such as TV advertising are no longer efficient, but we still believe in advertising. So we have to find alternatives.

In-store communication has potential, but we still don't know what it really can do for us. It is interesting enough to try it.

But you could make shopping a nightmare, crowding shoppers out with intrusive measures every time they take another step down the aisle.

us: You know the movie *Minority Report*? It is a horror story. We need to find out what does the consumer accept, and what adds value for him or her? If we are not adding value for the consumer, there is no discussion.

We have to manage it in such a way that if people don't like or don't want it, they can do their shopping in the traditional way. So there are lots of things we have to find out.

We are only at the beginning.

So the real message is – we have so much to learn, the trick is to be a fast learner.

us: Yes, to be a fast learner, to pilot the stuff, and find out what pays back.

A typical frozen goods warehouse could generate 2.4 million signals of data a day. How do you find business-meaningful data in this haystack?



A SOFTWARE DEVELOPER'S VIEW

from Kurt Kammerer, VI Agents
Cambridge, USA

What do you see as the main challenge of RFID?

KK: The main challenge will be to exploit the theoretical benefits of having a full identity between physical flows of goods and flows of information. The challenges are how to cope with data overload; how to get business-meaningful information from the data; and how to execute decisions on the basis of this business-meaningful data.

This needs to be done in the context of the value network, which may go well beyond the boundaries of the company, to include other companies.

Take data overload. Today, a frozen goods warehouse might handle up to 1.2 million cases each week. In an RFID environment, you would probably get ten times more signals than you have cases, so you are talking about 12 million signals a week or 2.4 million signals of data a day.

If we push that amount of data on to the screen of the decision-maker, he or she would soon want to leave the company forever. Somehow, we have to identify the needle of business-meaningful data in the haystack – while the haystack is growing exponentially.

So how do you identify that needle?

KK: Manually searching through the haystack is not helpful if we want to do things in real-time. Only by automating routine jobs will we be able to get our arms around the growing haystack. This, we believe, will be done by intelligent software agents which take care of routine jobs by themselves.

Thus, for example, an “intelligent order” will be a software agent which monitors and manages each individual order to make sure the goals of that order are met – using all the necessary information such as due data, process data, order rules, local measurements and analytics, and so on.

These intelligent agents will be designed around existing business priorities such as the service levels by which a distribution centre is measured. It is the business relationship or contract that determines what is relevant.

The agents will sort all incoming data at a local level against these preset criteria, and will respond with context-sensitive actions for certain kinds of events. Most responses will take the form of automated actions of preset processes.

Bottom-up management handles complexity and unpredictability issues which couldn't be managed by centralised ERP or warehouse management systems

But some will be passed on to decision-makers behind the steering wheel.

The agent will say, "This is what we have found out. Something is obviously incorrect, but it is not me as an algorithm to determine what should be done".

In this way, we will move from today's centralised, top-down information and management systems towards tomorrow's bottom-up, distributed systems.

What are the implications of these software agents for how retailers and manufacturers currently run their information systems?

KK: We will see different warehouses in future. Today's warehouses are controlled by a centralised governing software which handles everything. But if you think about smart appliances within the warehouse, and orders that are considered active parts of the game, then you have many more active players.

This bottom-up management resolves complexity issues which couldn't be managed in the past by ERP or warehouse-management systems. Instead, we put these complexity questions in front of much more granular and localised entities which can resolve those issues.

Does this mean you're giving up on optimisation? So that, for example, you have milk runs based on true customer demand, driven more by what we sell

than economic principles such as "full truck loads"?

KK: Real-time industries are developing a new concept of optimisation as economics are driven by what is practically achievable in a given moment rather than theoretically desirable.

Traditional OR concepts, such as maximising capacity utilisation on trucks, will not go away completely, but will have to complement the new form of event-driven optimisation.

The advantage of event-driven optimisation is that it also works in environments which are difficult to predict. In such environments, smart exception handling determines economics more than traditional optimisation with its preset assumptions for the behaviour of the world.

So you are optimising the flow in real-time, rather than optimising separate assets.

KK: Yes. For example, look at a Wal-Mart distribution centre. It is a huge flow engine. Of course, it is important to operate at the right capacity, but this is not a capacity utilisation game only.

The P&L of Wal-Mart is as much driven by the speed of the flow of goods as by individual sales margins. Optimising assets separately is an outdated concept for today's world in which assets have to be in sync, like musicians in an orchestra.

Standards bring scalability, portability and affordability to business processes. They offer both savings and the chance to seize new opportunities

A STANDARD SETTER'S VIEW

by Sabine Ritter, GCI
Cologne, Germany

Aligning to global standards and best practices.

It is four years since the Global Commerce Initiative (GCI) was founded as a voluntary network of companies.

Now co-chaired by Lee Scott, CEO of Wal-mart and Antony Burgmans, Chairman of Unilever N.V., one of the objectives of GCI is to drive the consistent implementation of standards and best practices across the consumer goods industry.

Standards bring scalability, portability and affordability to the enabling business systems and the business processes they support. They speed up the supply chain and reduce errors. They protect technology investments and ensure system-to-system interaction and interoperability. They offer both efficiency savings and the chance to seize new opportunities.

These benefits can only be realised if global standards achieve critical mass.

Widespread adoption of standards isn't just about creating a "level playing field". Companies can gain competitive advantage through optimal implementation of standards. They are doing this by aligning relevant internal

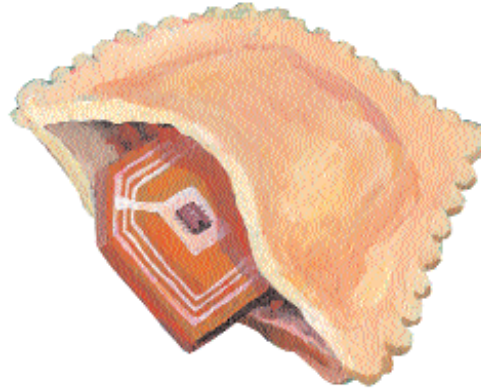
functions and processes with the external standards development, and building standards implementation into their internal business processes.

The GCI roadmap

Drawing on the experience of companies co-ordinating their engagement with EAN-UCC's Global Standards Management Process (GSMP) and with organisations such as GCI, the ECR organisations and VICS, GCI has published the following key steps to optimal standards implementation:

1. Ensure you have board level sponsorship! Standards are driven by – and drive – business vision. Linkage to the corporate vision is critical in order to be able to allocate the right resources and support internally.
2. Assess where you currently are. Use the GCI Global Scorecard (www.globalscorecard.net) to assess where you are with the implementation of global standards and best practices and to benchmark yourself against the industry:
 - within your company – across geographies and categories
 - with your trading partners.

The industry as a whole is not clear how to implement RFID or what its full business implications are. Hence the need for a roadmap



3. Define an internal strategy describing the role – or roles – that your company wants to play across the standards spectrum, from development to implementation. Identify the benefits your company will gain from that position, set priorities for standards implementation and define an action list on each priority. Finally, develop an internal business case for the implementation of global standards and best practices which focuses on business benefits such as a reduction in invoice errors, or improvement in time-to-market for new item introductions. (Please also check the GCI business case for global standards).

4. Create your own internal standards organisation or network – define clear responsibilities, align resources and keep focused!

5. Introduce an information-sharing platform for your network and the wider community.

6. Ensure effective and consistent communication.

7. Test, pilot and roll out.

8. Finally – measure to make things happen!

The resulting network needs to have both an external face (engagement with GCI, GSMP...) and an internal face (implementation). The network will only succeed if it addresses and integrates both these external and internal activities.

For more details, check at www.gci-net.org under GCI achievements, where you can download the guideline.

The GCI EPC roadmap

Intelligent tagging or Radio Frequency Identification (RFID) is a concept and technology which is likely to trigger major changes in the way supply chains are managed.

Progress on the commercial applications of this technology has been rapid in recent years, although many challenges and barriers to a broad implementation of RFID remain.

Some manufacturers have led the way with the application of tags to items, cases and pallets. At the same time, retailers' requests to suppliers to attach tags to pallets and cases have generated significant publicity.

However, the industry as a whole is not clear how to implement RFID or what its full business implications are.

The GCI EPC roadmap, published in November 2003, aims to help companies understand RFID, to encourage a standards-compliant implementation of RFID, and to provide an analysis of the requirements for a successful implementation in the industry.

Why an EPC roadmap and not an RFID roadmap? The GCI executive board strongly recommends implementation of RFID based on open, global standards.

The full implementation of the EPC vision will take some time. If the industry does not get the groundwork right now, take off will be delayed

Standards for RFID have just started to be published. The Auto-ID Center has been working for some years on a concept for RFID, the EPC network.

EPC stands for Electronic Product Code, which is the key identifier and content of the tag. The establishment of a new organisation, EPCglobal™, was approved in September 2003 as a joint venture of EAN International and the Uniform Code Council to support the industry with standards for EPC.

GCI wants to promote the practical application of the EPC network, and has therefore named the roadmap accordingly.

At a high level, the roadmap answers five key questions within the consumer goods sector:

1. What is the EPC and what is the vision behind it?
2. What are the key application scenarios and why should companies consider adopting it?
3. What is the current situation and what do we need to do to make the EPC vision a reality?
4. What does a company

implementation roadmap look like?

5. What can the industry jointly do to remove any barriers for broad industry adoption?

The full implementation of the EPC vision will take some time. If the industry does not get the groundwork right and implement the standards across the industry now, it will hinder broader implementation before the technology has even started to take off. This will prevent companies from gaining the full benefits the EPC can bring.

GCI is convinced that with global voluntary standards both retailers and manufacturers will benefit from a streamlined supply chain. As the industry does not want to repeat the mistakes of the past, leading companies encourage the industry to support the emerging standards and the work driven through the EPCglobal™ organisation.

The roadmap can be downloaded at www.gci-net.org. If you have any questions, contact the GCI management team at ritter@ccg.de.

We tested supplier production lines, trailers, depots and store environments. We tested tags at minus 200 deg C and at 100 deg C. They still worked

A RETAILER'S VIEW

from Ian Mumby, Marks & Spencer
London, UK

In the Marks & Spencer food business, we are currently trialling RFID in the intake process in one of our depots. We strongly believe RFID is not a fashion, a myth or a bandwagon. It is becoming a reality.

We have more than 4,000 own-brand food products, and at least 70 per cent of this business is in chilled fresh foods, requiring an exceptionally fast and responsive supply chain. Clearly, if RFID can deliver on its promise it will have important implications for our business.

That is why we are testing it “to destruction”. Here are some of the things we have learned so far...

The lessons

Cost An individual bar code label costs around 1.5 cents, so 300 trips over ten years will cost around €4.5. With reusable RFID tags which are fixed to returnable trays, the 75 cent base cost of the tag can be spread over the 300 trips that tray might make in ten years. So cost is not an issue once we have a tag which is reused.

Frequency Our trial is based on 13.56 megahertz tags which are able to cope with the environment of our supply chain. We required multiple read/write

capability to enable tags to be reused to keep costs down, and we needed to be able to read multiple tags quickly. And 13.56 megahertz gives us that. Meanwhile, multi-frequency read/write equipment is already on the horizon, and changing frequency should then be as simple as tuning a radio.

Interference The initial technology trials we undertook used 300,000 trays tagged with temporary labels. The trials were carried out in the real world and not in an artificial environment. We tested supplier production lines, trailers, depots and store environments. One of our major suppliers even tested trays filled with metal foil, and successfully read the tags on those trays with no problem.

Temperature Temperature can cause problems with tags, particularly the temperature shock of going from one extreme to another. We tested this using liquid nitrogen which exists at around minus 200 deg C. The tags went to sleep but were readable once the temperature rose again to the point at which the readers could function. In hot conditions, the tags work up to 100 deg C. Above this, they do not read, but when they cool down

We have managed to read 44 tray tags in less than five seconds. We got this down to three seconds, but below that readings were incomplete

again they become readable. All of this testing, coupled with several weeks in a frozen chamber at a depot, leads us to believe that temperature will not be a problem.

Water Trays obviously have to be washed regularly, so the potential for hot water damage was a concern. We have washed trays 500 times without any impact, and we can also write the date of washing to the tags for due diligence purposes. The washing process can also be used to identify and remove failed tags from the supply chain for investigation and rectification.

Read distance We have worked on increasing read distance since the beginning of the trials. The ideal is a door portal which reads across the width of a door in a depot. This would make it simple to read all the trays on a wheeled or wooden pallet, as it is moved from truck to depot or vice versa. We're not there yet, but we have prototypes in operation and are pushing the technology to extend the read distance.

100 per cent accuracy Many people believe RFID will give them 100 per cent accuracy in the supply chain. Unfortunately, the data on the tag can still be wrong, or not up-to-date, and there can be discrepancies between the tag data and the physical products in the tray. However, the speed inherent in RFID tag reading does create time for checks in ways that are not

possible with a bar code.

Longevity How long will the tags last? We have tags which are 10 years old and still work today. There is no reason why the tags currently being manufactured and fitted to trays shouldn't last even longer.

Trial results

We are using the tag to carry data rather than as a licence plate. This approach enabled a faster implementation of the trial, with a smaller impact on central IT systems – and therefore a lower cost.

We are focusing on depot intake because that seems to offer the best opportunities for productivity improvements and immediate supply chain benefits.

Trays from the 15 suppliers involved in the trial are wheeled through or past the reader, the data written to the tag on each tray is captured, systems are updated, and the operator is told where to position the pallet in the depot for picking.

We are testing two types of readers in the trial depot. One looks like an airport security gate, and the new second generation “pillar” reader, where pallets are pushed past, not through. We're also working on a hand-held reader which would give much greater flexibility and cost less.

In stress-testing we have managed to read 44 tray tags in less than five seconds. We have got this down to three seconds in

RFID is an area of massive innovation. The technology is still evolving and there is a lot of work to do. But it is not a fad. Its future is very exciting

a test environment, but below that, readings can be incomplete.

The target is to have a read success rate at least as good as the 99 per cent achieved for bar code reading. As long as suppliers write to the tags, the trials suggest we can certainly achieve that.

Benefits

RFID is an enabler which will allow us to achieve benefits in obvious areas such as visibility, product-tracking and inventory accuracy. There is also the potential to save substantial time which could give our suppliers the opportunity to have longer and later production runs while still delivering within the tight timescales which we require in our supply chain.

We are already seeing some exciting results from the trials, the most obvious of which is the time it takes to scan product into the depot.

Currently it takes around half-a-minute to scan a stack of trays using a hand-held bar code scanner. By inputting the number of trays on to a screen on the reader and wheeling the same stack past the reader, we can cut this to around five seconds.

This also gives us the opportunity to improve vehicle turnaround by 30 to 50 per cent, once all the trays on an individual truck are tagged and have been written to by suppliers.

Eventually, we will be able to save on

labels used for picking and improve tray utilisation by better knowledge of where trays are in the supply chain at any point in time.

In future, there could be the opportunity to segregate product for individual chilled cabinets in store by picking based on RFID technology. This would significantly reduce the amount of labour required in store for replenishment. There is also the obvious opportunity to improve real-time stock accuracy with consequent benefits in terms of availability, sales and waste.

This is still an area of massive innovation, and although RFID technology has been around for some time, it is still evolving.

There is a lot of work still to do. But the future for RFID is very exciting.