Raise the tag high

Radio tagging is set to replace the barcode, but there is more at issue than controlling the supply chain, says *Joe Figueiredo*

The printed microcircuit of an RFID tag

TAKE A GOOD LOOK AT THE bar code on the tin of soup the next time you visit your local supermarket; you may be looking at an endangered species, soon to be replaced by its smarter, chip-embedded cousin, the radio frequency identification (RFID) smart tag.

Although the timing is a bit of an exaggeration, the inevitability is not. The modern bar code, immediately identifiable by those familiar black stripes, did not really take off until international standards were introduced. By the 1980s, it had crept into a myriad of industries and applications, to become a ubiquitous sight. Although it has served industry and consumers well, the bar code has finally reached its level of incompetence (to borrow a phrase from Peter's Principle) and is on its way out.

Improved efficiency and effectiveness are driving industry into making wider use of information and communication technology. The RFID tag derives its intelligence from an embedded microchip, and deploys electronic memory to hold data, and an antenna to transmit it to a remote reader. With tag readers linked into a computer network, this data can be used to access detailed information about the object on a database. RFID technology also offers fast reading rates and excellent accuracy, but without the line-of-sight limitation of a bar code scanner.

Still-evolving RFID tags can be currently classified as "passive" or "active". Simply put, passive RFIDs do not contain their own (battery) power supply, and active ones do. This limits a passive RFID's functionality (many types of tags cannot have their memory changed), reading range (between 10mm and 5m) and storage capacity. But passive tags are also cheaper (under 17 euro cents) and can be printed (including electronic circuit) as self-adhesive tags. Active RFID tags have broader functionality, a wider reading range (tens of metres) and a larger rewritable memory, making these tags reusable. However, they are also the size of a cigarette pack and cost considerably more, between €20 and €25.

Industry has pounced on the obvious application of RFID technology:

remote identification, location and tracking. Take Philips, the Dutch consumer electronics giant, as an example. It started an RFID trial (using passive tags) in late 2003 to support its semiconductor logistics operations in Taiwan and Hong Kong. Following a very successful pilot, Philips Semiconductors is rolling out this RFID technology to its entire Asian supply chain. "We want to increase operational excellence throughout our business by creating a seamless supply chain," says Heinze Elzinga, Philips Semiconductors' Global Strategic Alliances and Programs Manager.

According to Elzinga, Philips Semiconductors has already significantly reduced its lead-time for finished products by reducing inbound and outbound throughput times by 50%. "We also benefit from increased inventory turns, improved stack lead-time and warehouse efficiency, enhanced shipped-order reliability, and realised a 25% labour-reduction in material handling."

Another Dutch company, Broekman Group, is also currently deploying an RFID-based real-time location system (RTLS), to cover its total 750,000 sq m vehicle logistics terminal at the port of Rotterdam. Deploying this wireless tracking system, Broekman will be able to precisely locate any one of the 40,000 vehicles parked in the harbour facility at any given time.

Set to become the largest of its kind in the world, this RTLS is replacing a time-intensive, manual process. Significantly, it is expected to increase the throughput of more than 250,000 new vehicles each year at Broekman's Rotterdam terminal, by "allowing us to dramatically reduce our call-for-delivery cycle time and expedite vehicle delivery to dealers [across Europe] to keep up with consumer demand," reported Wim Milder, general manager of information and communication technologies for the Broekman Group in a recent article. What is more, Broekman expects to completely recoup its investment in under a year.

RFID has been kicking around for some 20 years, so what is stopping it from really taking off? "There are two issues: one is technical and the other cost," says Joseph Owusu, consultant and partner with Rotterdam-based

business integrators, Mieloo & Alexander, prime contractors for the Broekman project. "Even though standards seem to be well on their way, they are however relatively new and untested. This also means that RFID technology based on these standards is only now coming on the market, and wide-scale RFID adoption will depend largely on its technical performance, especially in the area of readability."

And costs, another important factor in the RFID equation, need to fall. The good news is that tag prices have already dropped significantly over the last 18 months, and the five dollar-cent mark – the psychological threshold for many potential users – could be breached within several years.

New applications, such as the intelligent changing room, are pioneered at the RFID Innovation Centre in Neuss, Germany

co-founder of Bits of Freedom, a Netherlands-based digital-rights lobby.

But are these protests effective? "Definitely," reports Liz McIntyre, member of the international privacy group CASPIAN, and co-author of a book on "spychips". "Remember the notorious Gillette 'spy shelf' that used RFID to secure razors and secretly photograph Tesco shoppers? Once we alerted consumers with help from the British *Guardian* newspaper, there was a protest and Tesco was forced to remove the shelf. In another scandal, German shoppers protested outside the Metro Extra Future Store when CASPIAN and German privacy group FoeBuD revealed the store's Payback loyalty cards contained hidden RFID tags. Metro was forced to recall all 10,000 of the spychipped cards. These are just two examples."

Owusu decries such alarmist talk. "What is driving these activists is an unfounded fear of this technology's capabilities, rather than what is likely to happen in practice. Firstly, these passive RFID tags [attached to consumer goods] have a limited reading range and would be therefore difficult to track. Furthermore, consumers do not currently object to retailers gathering information on them through

" Privacy-rights lobbies object to RFID tags on consumer items. They claim the technology's tracking abilities can be abused "

Despite these hurdles, consumer-goods manufacturers, such as Gillette, Kraft and Procter & Gamble, are already RFID-tagging some of their products; and retailers, like America's Wal-Mart, Britain's Tesco and Marks & Spencer, and Germany's Metro, are implementing RFID-based consumer applications. However, one major obstacle for these RFID users is the increasingly vociferous protests from privacy-rights lobbies on both sides of the Atlantic.

Activists object to the item-level RFID tagging of consumer goods. They claim the technology's tracking abilities can be so easily abused, and advocate removing or disabling these tags at the checkout counter.

"RFID is a technology that should be used to track goods in the logistic chain, not people," says Maurice Wesseling,

loyalty and other plastic cards, and subsequently using it to track and influence their buying patterns."

Of course, such privacy issues could be ultimately resolved through legislation, public opinion, technology or better corporate citizenship, but nothing is certain. However, RFID's potential to significantly improve supply-chain efficiency – through reduced labour costs, increased inventory velocity, advanced supply chain communication and better market and customer intelligence – will undoubtedly remain a driving force, according to Owusu. These and other business arguments are bound to fuel demand for RFID. Unsurprisingly, we could see it grow, from tens of billions of tags in 2006 to hundreds of billions by 2009, if recent predictions are to be believed. ∎