100 billion new computers the size of a grain of sand. Archive video.

[youtube:http://uk.youtube.com/watch?v=1vxdaj9Z-Bw auto]

RFIDs: GREAT NEW LOGISTICS BUSINESS OR BRAVE NEW WORLD?

(Presentation by Dr Patrick Dixon at national UK conference on RFID use - January 2004 - see also RFID slides)

Get ready for the biggest manufacturing, distribution and retail revolution since the net. The next ten years will see a new techno-revolution which will allow total automation from manufacturing to point of purchase, using wireless technology to create "radio barcodes".

A world, where everything that moves can talk to everyone, everywhere all the time. That means cartons of milk, bottles of wine, clothes, wallets, tyres, cars, pets and people.

Radio bar-codes embedded into billions of different things and organisms which have value, including animals and possibly some human beings - sending out radio signals about what they are, where they are, and possibly what they are doing or how their bodies are working. Like mobile phones, they cannot communicate to each other direct, but can exchange information via send / receive base stations.

These devices are tiny micro-computer systems which already cost as little as 25 cents, expected to fall to less than 5 cents by 2005. They are going to change all our lives, containing hardware, software, and permanent memory stores. They transmit and receive data and have their own built-in power generators which could in theory last up to 100 years. Activated by a high-intensity burst of electromagnetic radiation from a distance of less than two metres, the devices respond with short bursts of data.

So-called Radio Frequency Identification Devices (RFID) are already being introduced rapidly by chains such as Wal-Mart for larger consignments. RFIDs have been around a long time.

Since 1997 you'll have found the same technology in Ski passes in Switzerland , in Swatch watches, some of which can store credit, as well as more recently in London Underground electronic tickets.

Within the current decade, more of these RFIDs will be made each year than there are people alive on earth. Once prices fall to less than 2 cents per tag, retail usage will explode with anything from 20 - 40 billion tagged products sold a year.

"RFID - logistics and supply chain"

[youtube:http://uk.youtube.com/watch?v=0VbMr2gnGDE]

Alien Inc has a machine the size of a small room able to make 10 billion Radio Frequency Identification Tags - or radio barcodes. Ten of these machines could provide 100 billion tags a year. Since Wal-Mart alone will need 5 billion just to tag pallets and boxes, it is clear the market is going to grow fast and prices will tumble - perhaps reaching as low as 3.5 cents per device.

The technology is ingenious. I have in my pocket 100 chips in a small bottle. These automatically find their way in solution into identically shaped slots in a plastic membrane where they become permanently attached, so that they can be separated, and mounted onto a piece of paper on which is printed an aerial in special ink. They are then fully active with hardware, software, permanent memory, operating system, and ability to write and receive data.

RFIDs mean that a retail outlet can watch goods going out of the door and know who is taking them, even which card to charge. RFIDs prevent theft, help guarantee quality, provide absolute 100% precision about what stock remains in the food store and when products are close to sell-by dates. RFIDs allow factory owners to watch products moving off the shelves in shopping malls the other side of the world, triggering automatic increases in production, extra transportation, as well as instant requests for more raw materials to the factory door.

RFIDs mean I can pay for products and services ranging from bottles of wine to travel tickets,

using a card that never leaves my pocket. They mean an end to stock control, inventory audit, confusion about location of orders, mistakes in warehouse picking or delivery. RFIDs mean accurate and fair road-use charging, and traffic management - as well as car components such as tyres or brake pads which shout to the garage for help when they are nearing the end of their safety margin.

RFIDs will reduce waste, keep stock levels to the minimum, shorten lead times, and allow some retailers to slash prices by more than 20%, by eliminating cost at every level. Laundry tracking, ID cards for employee security and staff location inside offices, data for customer loyalty programmes (we know you bought another one of these yesterday so here's a special discount today), automated guided vehicles in assembly lines, automated airline baggage systems - use will be almost universal across all industries.

At the same time, expect huge emotive discussions about personal privacy, and data leakage, with demands that next-generation RFIDs contain a reliable switch which can be turned off by a consumer after a product is bought. Pressure groups will campaign successfully in some nations against data-leakage, where all kinds of information could theoretically be transmitted about an individual without their knowledge or consent, by tags in their shirts, shoes, gloves, belts, car seats, credit cards and so on, in response to unscrupulous use of scanners which could be as easy to conceal as mobile phones.

In theory, RFIDs could enable me to read all the numbers and expiry information on the credit cards in your pocket as you walk by, as well as where you do most of your clothes shopping, and the model of the portable computer you are carrying in your briefcase.

In pratice, that would mean cracking the communication systems used, reading the RFID number and checking it against the company product list to learn what that number actually corresponds to.

Hacking into RFIDs is not so difficult. Devices at present have such tiny memories and processing power that hacking is less of a technical challenge than entering a corporate server - and once you succeed, hundreds of millions of tags are then wide open for reading and writing data. An easy way to hack would be to steal one of a vast number of hand-held readers and writers that will be made for retailers like Wal-Mart, and either use it directly, or to clone the built-in security system.

In theory, RFIDs could also enable me to track you (probably by what you are carrying or wearing) as you pass by from one scanner to another, not only in and out of buildings, but on and off trains, planes, in coffee shops and in supermarkets. Of course, the technology already exists for this, using mobile phones. For a small fee you can already watch on your children or partner walking around the streets of London on a web-based location map using data provided by cell-phone companies.

In practice, tracking by RFID would be very inneficient, since these tiny tags don't transmit very far, unless stimulated by an unusually intensive burst of high energy electromagnetic radiation. However, as the number of compatible scanners grows, we may be surprised at how the data connects together, in a similar way to how police are able to rebuild someone's movements by looking at the output of all closed circuit TV cameras along a route.

Privacy is a major and very sensitive issue: one that has not been properly addressed by passive RFIDs so far - as a recent incident showed at an international conference where it transpired that all delegates were tagged without their knowledge or consent, using concealed RFIDs inside every badge.

We will also see a whole new crime industry built around identity theft - not just of people and their credit-worthiness, but also imitating the electronic signals of all kinds of products - for example disguising empty pallets, supposedly containing many thousands of pounds of pharmaceuticals. Virtual counterfeiting will mean freight loads travelling around the world that talk all the right electronic talk, but contain nothing but ballast inside.

So then, price-falls in technology will have to go hand-in-glove with tightened security measures or there will be a risk that ordinary men and women may decide that RFIDs do not, after all, promise *them* a better kind of world.

Take hold of the future or the future will take hold of you.