

RFID in the Packaging World

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IDTechEx is an independent strategic analyst on **RFID smart labels, printed electronics and smart packaging. Our core services provide:**

Consultancy	Publications/ Research	Conferences and Exhibitions
<p>Clients include:</p> <p>Shell Oil Hewlett Packard Rexam Whirlpool Europe Guinness UDV Thin Film Electronics PolyTechnos Schiphol Airport...</p>	<ul style="list-style-type: none"> • Independent market and technology research reports covering RFID, printed electronics & smart packaging topics • Smart Labels Analyst journal, Printed Electronics Review and the world's largest RFID case study knowledgebase 	<p>Global Conferences: USA, Europe and Asia</p> <p>RFID Smart Labels Active RFID Printed Electronics</p>

Consumer Packaged Goods

\$3 trillion yearly

\$1 trillion may be unnecessary

Theft, fraud, damage, loss, error, expiry, overpackaging (slow delivery), ignorance of needs.....

RFID can tackle about \$400 billion yearly

The world's supply chains are out of control

- “CPG shrinkage is \$60 billion yearly of \$3 trillion turnover.” *ECR Europe*
- “75% of the cost of a retail product is getting it there.”
MIT
- “Up to 20% of foods are discarded due to spoilage through the supply chain.” *Food and Drug Administration*
- We are still searching for foods containing the Sudan B carcinogen three years later

RFID can assist with many packaging challenges

- Stockouts at retailers cost six percent of sales. One third of these are items in the retailer's store.

Procter & Gamble

- “Medication non-compliance costs the US alone approximately \$100 billion and 125,000 deaths yearly”

US National Pharmaceutical Council

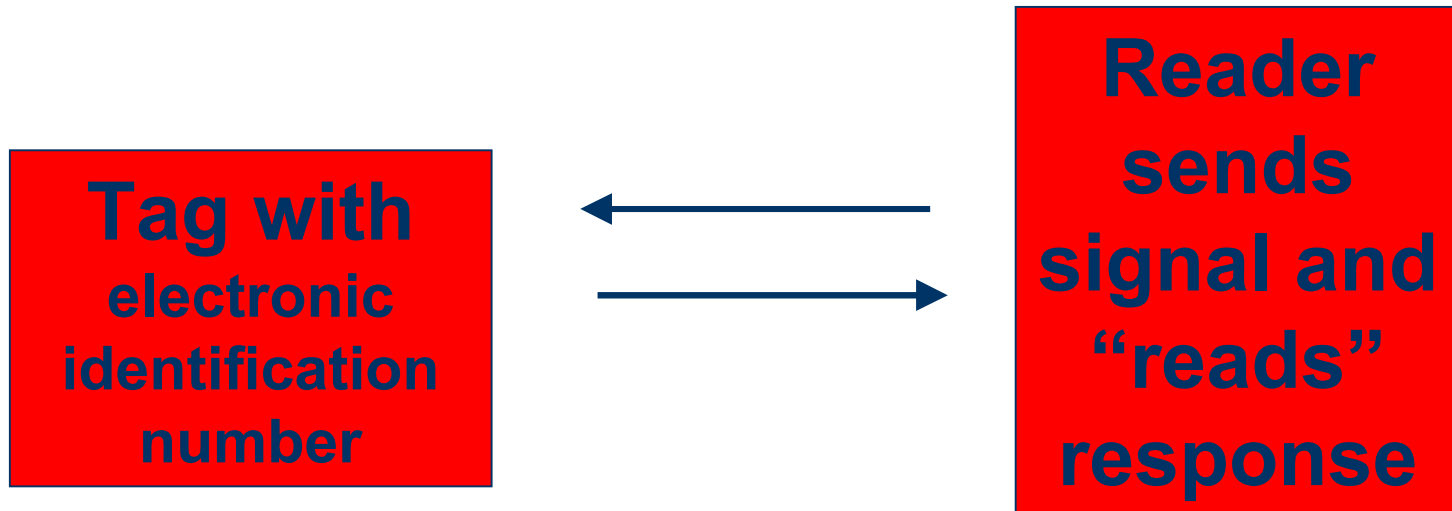
We need packages that record what was taken when, prompt us, display performance.

- **Counterfeits:** Perfume 15%; Aircraft and automotive parts 10%; Pharmaceuticals 10% (In third world 30%); **Thousands of deaths every year**

Industry estimates

RFID has few problems of obscuration, orientation or reading many at a time

RFID System Basics

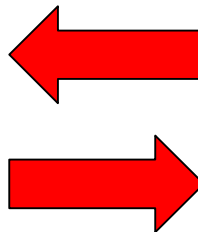
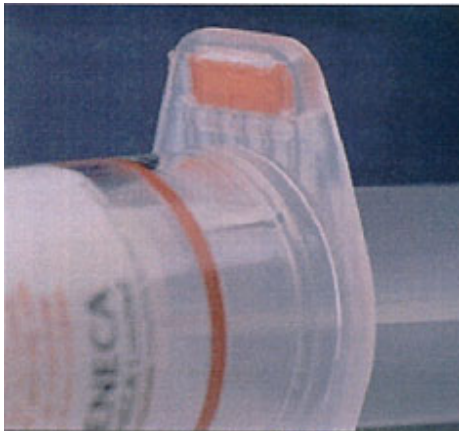


RFID is an enabling technology like the wheel or paper

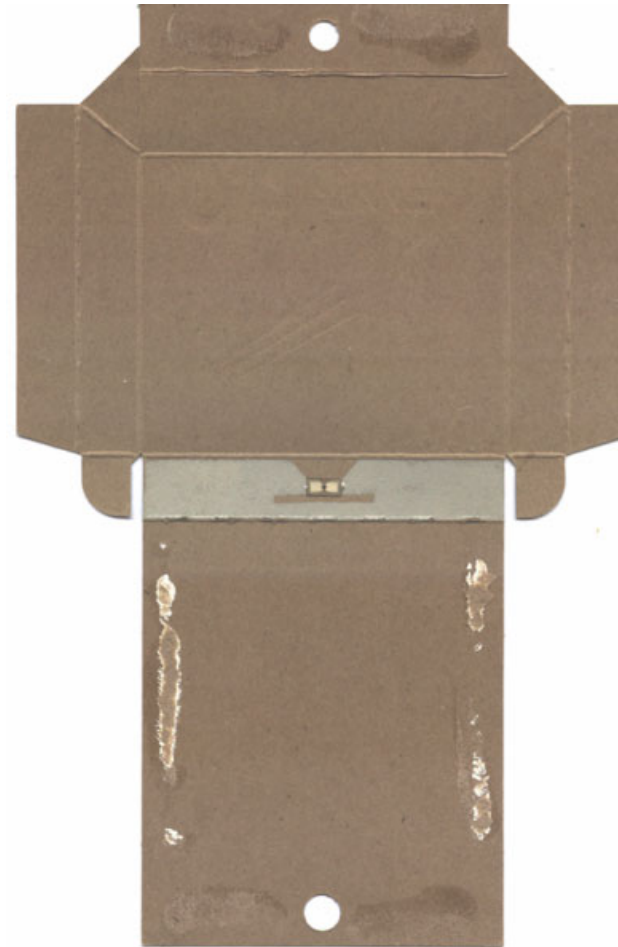
In healthcare it prevents errors and counterfeiting and locates people and assets

In retailing/ CPG it reduces costs and increases sales

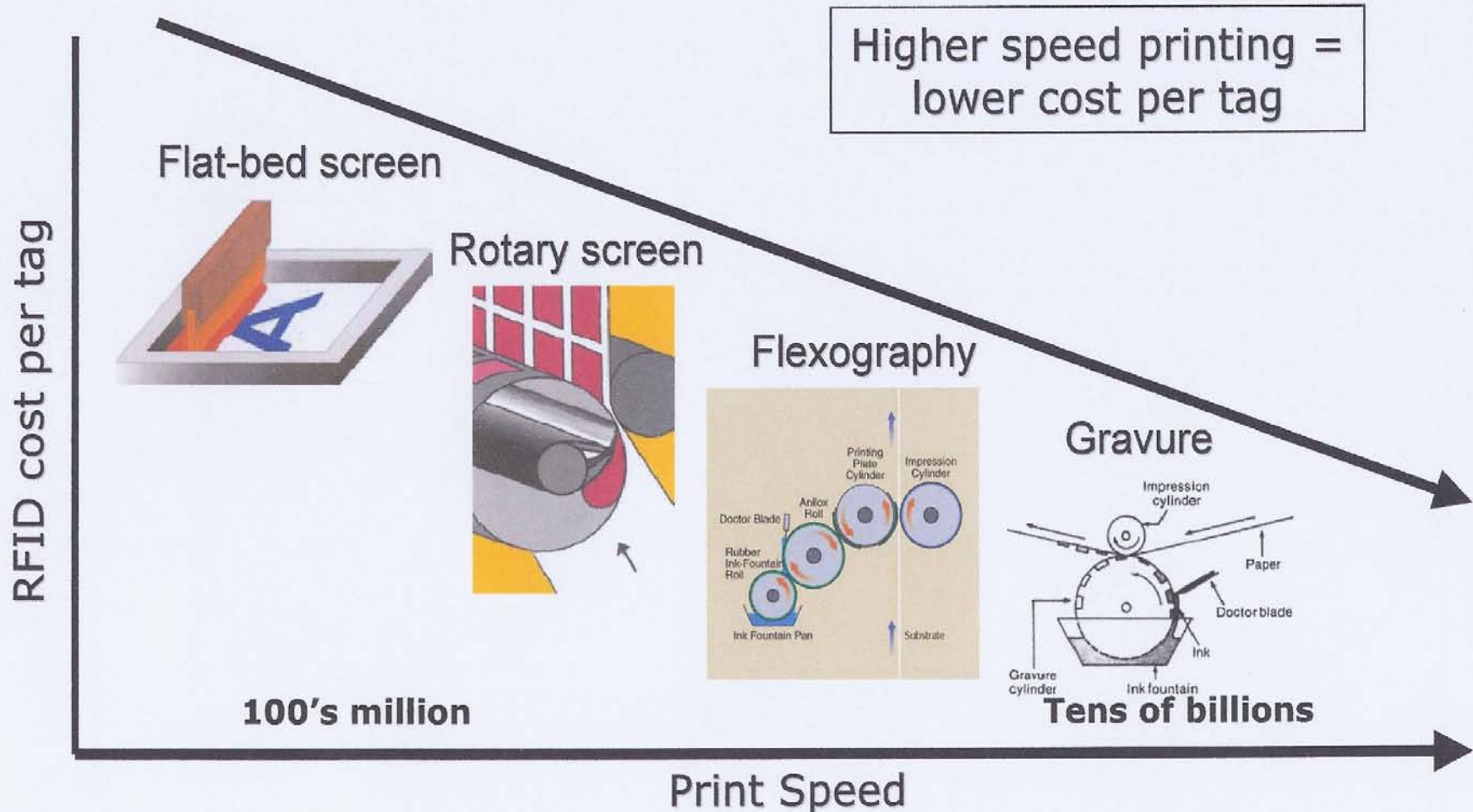
Short Range Passive RFID Examples



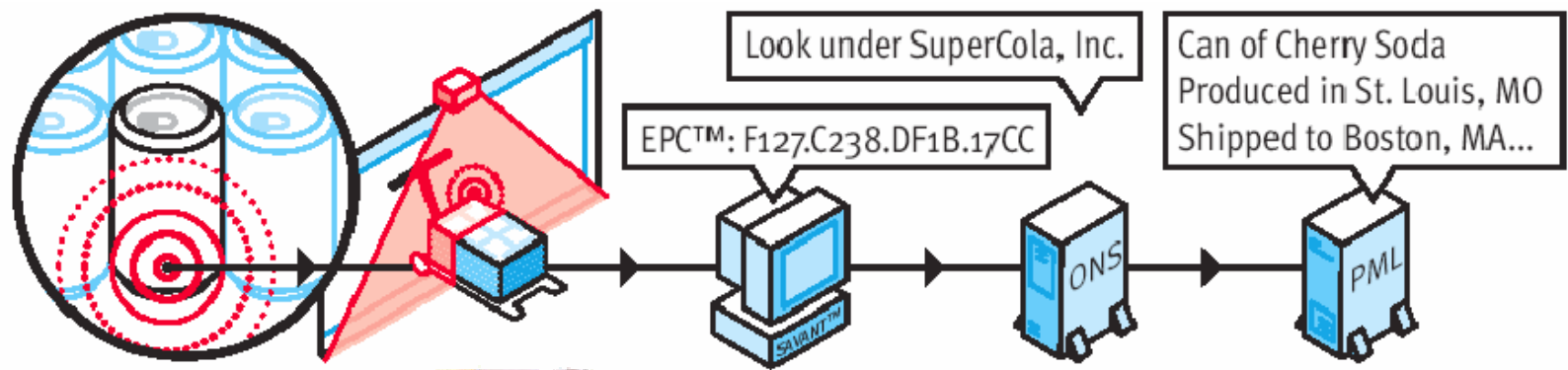
Example: Gillette razor packs



Omron, Avery Dennison etc use gravure to print RFID antennas NOW



The Electronic Product Code (EPC) System – unique electronic ID for everything



RFID Tagged Products, Cases or Pallets

EPCglobal:

- Managed by GS1
- Standardisation of EPC tag types and common infrastructure
- Over 1000 sponsor companies

Example: Smart Shelves



A smart shelf system for DVDs in a Tesco supermarket in the UK that has increased sales by 4% (10%?) due to reducing stockouts

Retail Mandates for pallets and cases

Wal-Mart (\$200Bn +):

RFID enabled 475 stores, 1000 by year end

300 suppliers tagging cases and pallets of top products

Currently receive 3 million tagged cases per week (May 06)

Massive payback for Wal-Mart: Out of Stocks reduced by up to 48%; stores with RFID 63% more effective at replenishing items

Major competitive advantage for retailers

Usually no benefit for CPG companies supplying them

Retail Mandates – pallet and case RFID

Procter & Gamble

Fusion blades – sales increase 19% by timely arrival at shelf

Hanna Candle company

90 pallets worth \$12.6M went missing but were found

Altria Group (\$97Bn), owner of Miller, Kraft, Philip Morris

“Pallet/case tagging is a pain barrier – item level tagging is our utopia”

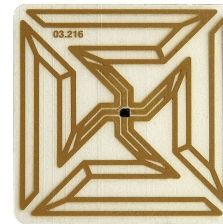
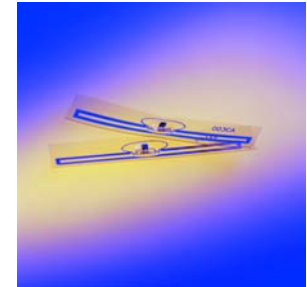
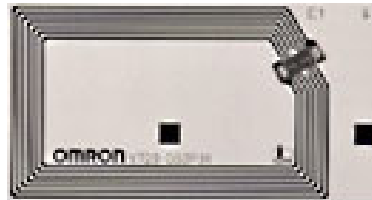
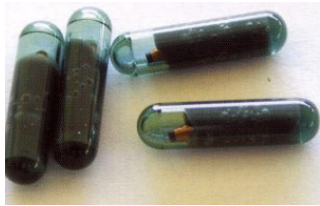
CONTRAST

The US Military shares the benefit with the CPG company

Some European retailers seek mutuality of benefit

Item level tagging (mainly packages) benefits everyone

Passive RFID: Main operating frequencies



125KHz=LF

13.56MHz=HF

UHF

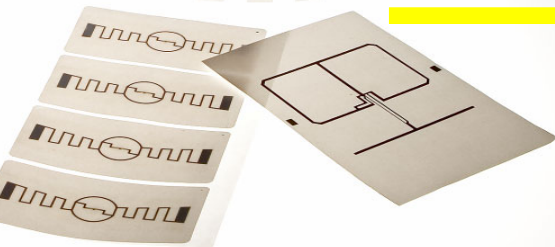
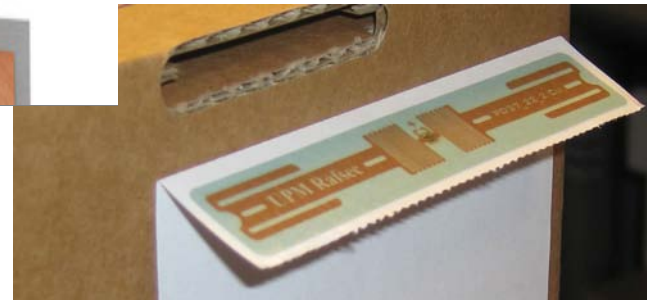
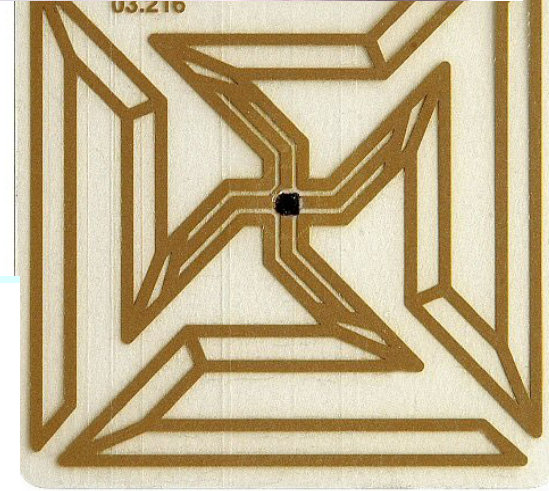
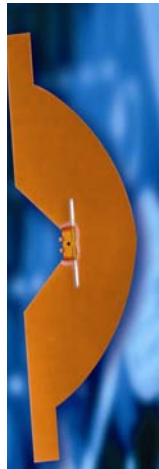
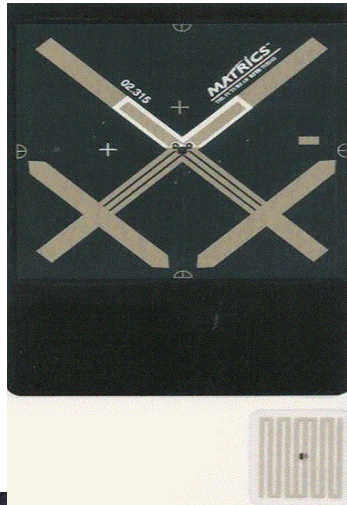
2.45GHz

Inductive antenna - flooding

Electric antenna - beaming

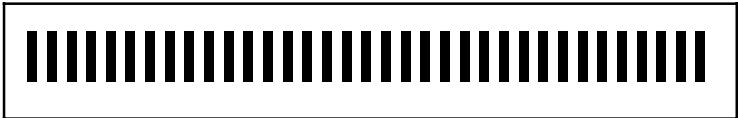
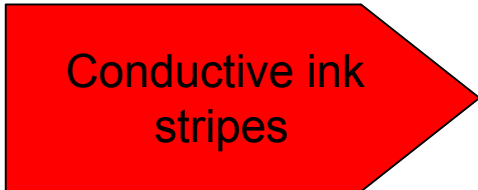
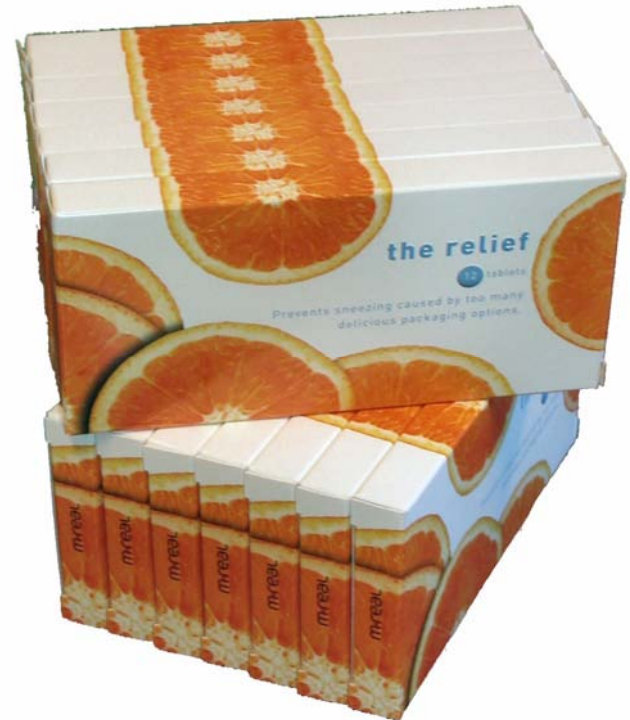
Very Popular

UHF tags need very different antennas IDTechEx for different applications

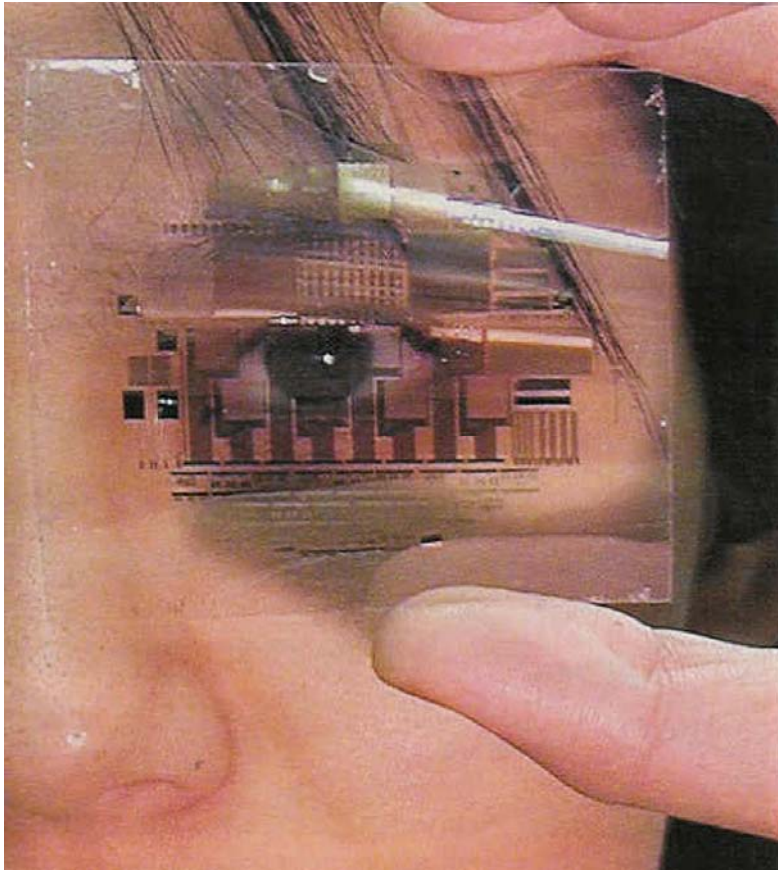


RFID without a silicon chip – printed directly onto packaging

Trials of this primitive
form of RFID by
Mreal Finland,
Acreo Sweden and
Somark USA



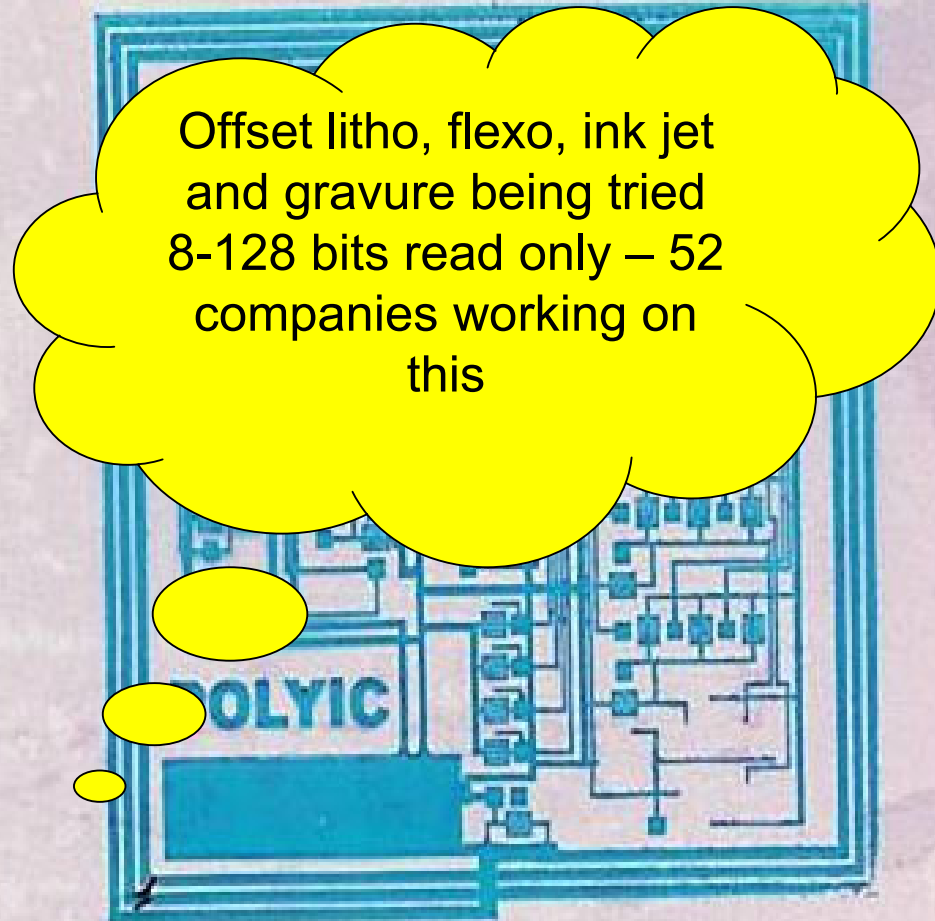
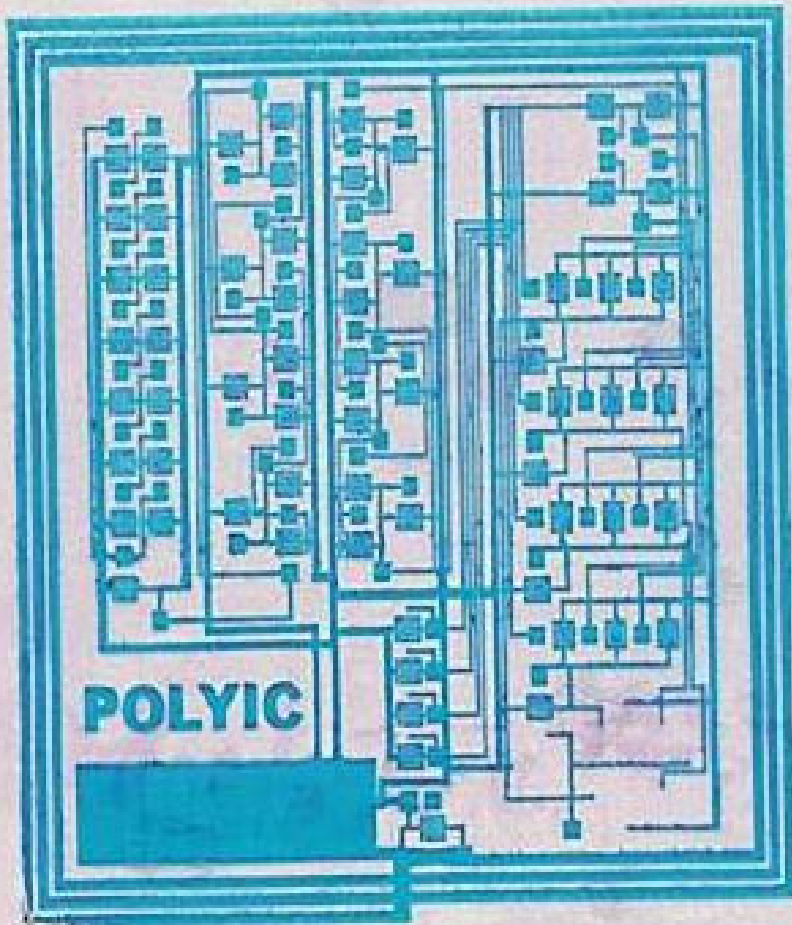
Printed Thin Film Transistor Circuits on Plastic Film (and eventually packaging)



60+ companies

**Philips, Plastic Logic,
Epson, Canon, Xerox, IBM,
PolyIC, OrganicID,
Infineon, 3M...**

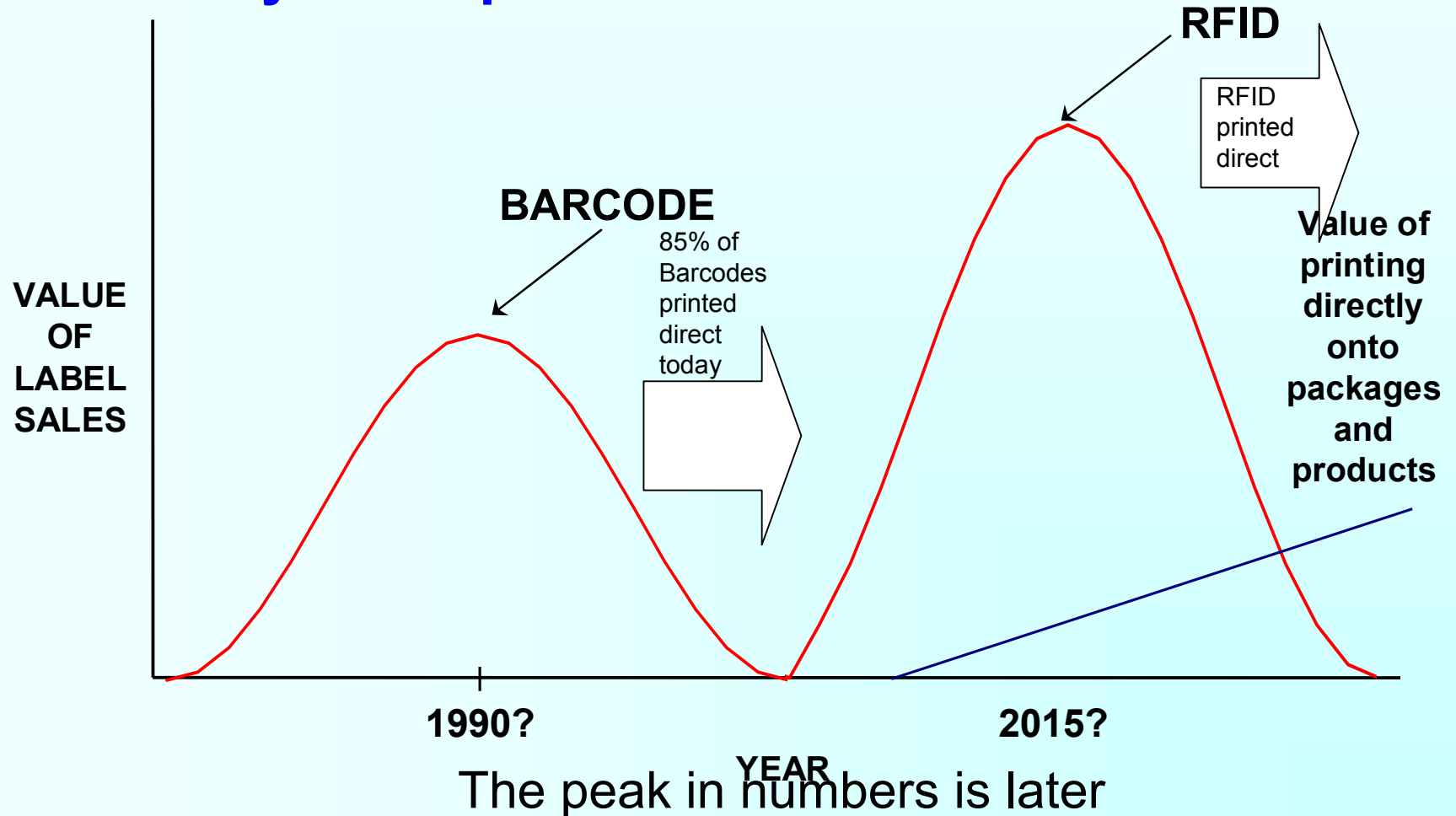
Experimental fully printed RFID labels - insulating, semiconducting, conducting and protective patterns



Offset litho, flexo, ink jet
and gravure being tried
8-128 bits read only – 52
companies working on
this

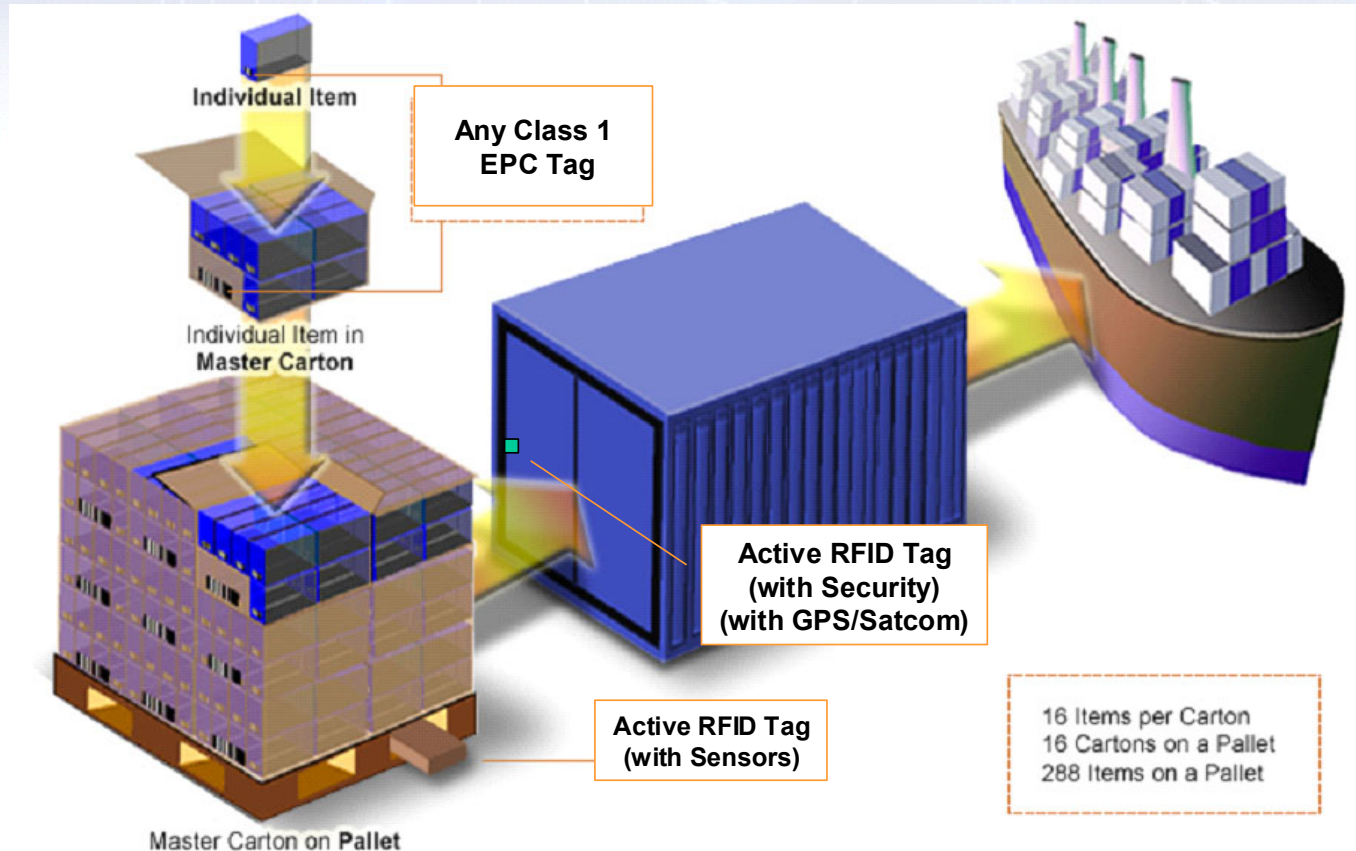
High volume item level RFID tagging

History will repeat itself - almost



Total Asset Visibility – Active RFID in the military

Continuous visibility of items while nested inside packaging & conveyances



Global Potential (Billion/Year)

Library	0.1
Laundry	0.1
Animals	1
Tires	1
Tickets	1
Cards	2
Military items	2
Blood	2
Test tubes	2
Archiving paperwork	2
Air baggage	2
Air freight	2
Drugs	30
Pallets, cases	40
Books	50
Cigarette packets	100
Postal	650
Retail items	10,000

RFID Leadership

Singapore
Europe
Thailand, S America, US, Eur.
Europe
Japan, Europe
China
US
Europe/US
Europe/US
US
US, China
US
US
US, Europe
Japan
China, US
Europe
Europe/Japan/US

ITEM LEVEL IN RED

IDTechEx Forecast For RFID 2006

(Range over 0.5cm, digitally-encoded)

2006

- \$2.71 billion
- 45% tags (passive and active)
- 43% passive RFID systems (excluding tags)
- 12% active RFID systems (excluding tags)

Printed transistor circuits making little impact as yet

For further information read:



RFID Forecasts, Players, Opportunities 2006-2016

Active RFID 2006-2016

Item Level RFID 2006-2016

Real Time Location Systems 2006-2016

The RFID Knowledgebase

Over 2100 case studies listed and growing every month.
Covering more than 2200 companies, 82 countries
Learn from the successes and failures of others



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