Agile Supply Chains with RFID

Tim Wilkinson
EPCglobal Hong Kong
April 2005





Electronic Industry's Largest Supply Chain

- #1 in material spend – $40B
  - Memory #1
  - Microprocessors #1
  - Windows software #1
  - Hard disk drives #1
  - Laser engines #1
  - Optical disk drives #1
  - LCD panels #1
- #1 in contract manufacturing spend $5B
- #1 in electronics industry logistics procurement $1.7B
- 1M service support parts per month

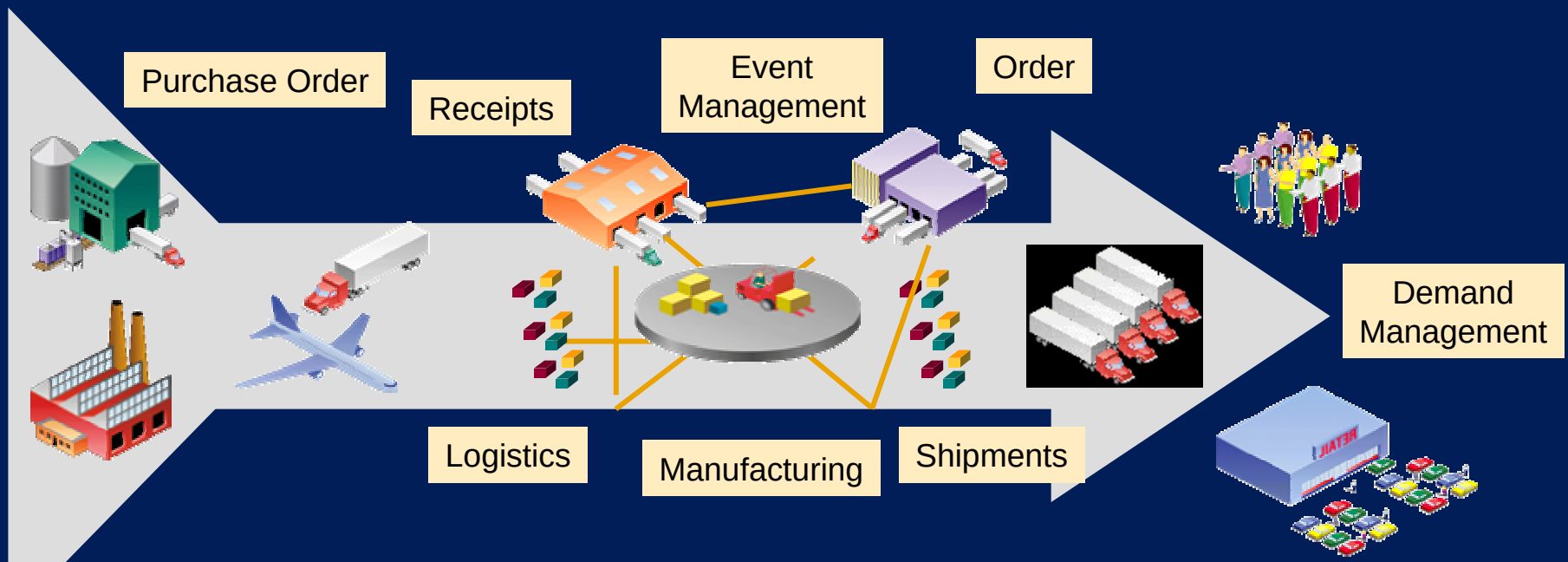
- 1B customers - 178 countries
- 21,000 patents
- 675 new products in FY03
- 142,000 employees

Every day you spend in this seminar,

HP will delivers:

- 1.3 Million Inkjet cartridges
- 110,000 Printers
- 75,000 Personal systems
- 3,500 Servers

Given such a complex Supply Chain:

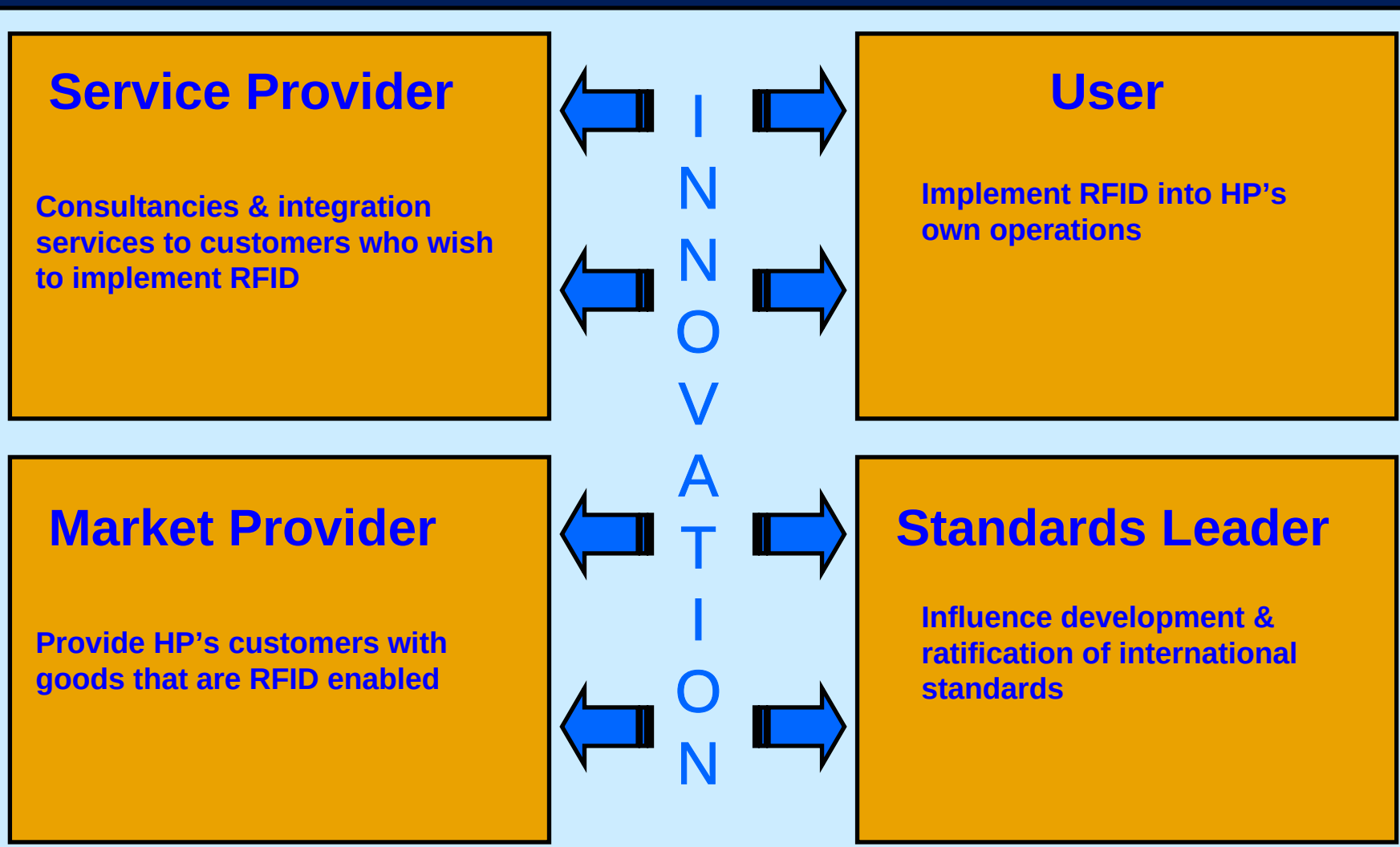


E2E visibility & Process control is a Must !!

A Brief History of RFID At HP

- **2002**
  - June - IPG investigates possible new business using conductive inks
  - August - IPG updates Supply Chain / Logistics Councils on RFID
  - September - first proof of concept kicked off at IPG Memphis facility
  - October – HP participates in 1st phase of Container Security Initiative with US Homeland Security
- **2003**
  - January - Chester, VA (inkjet pens) chosen as the next RFID pilot site
  - April - Memphis POC completes showing positive ROI, RFID Core Team launched
  - June - Wal*Mart issue first retailer request for tagged goods
  - July - HP launches NA Retail RFID program worldwide
  - September - collaboration starts with Best Buy, HP investigates joining Auto-ID Center
  - October - US Department of Defense RFID requirements – HP launches Warrior program
- **2004**
  - February - HP joins EPC Global, Dick Lampman elected to Board of Governors
  - April - Memphis in production, HP in first 8 suppliers to ship tagged goods to Wal*Mart
  - May - HP starts direct negotiations with China on RFID frequencies on EPC Global behalf
  - November - HP has 21 RFID capable sites in Latin America, Mexico, USA and Asia
  - December – TUSC program launched
- **2005**
  - January - HP granted first temporary licenses to operate RFID UHF in China
  - January – all Asia sites supply Wal*Mart now live. 26 sites in production worldwide

RFID Strategies In Cohesion



The Wal-Mart Requirement

1 EPC tag per carton – 100% read on conveyor

1 EPC tag per pallet – 100% read at Inbound dock

Conveyor speed of up to 600 feet per minute

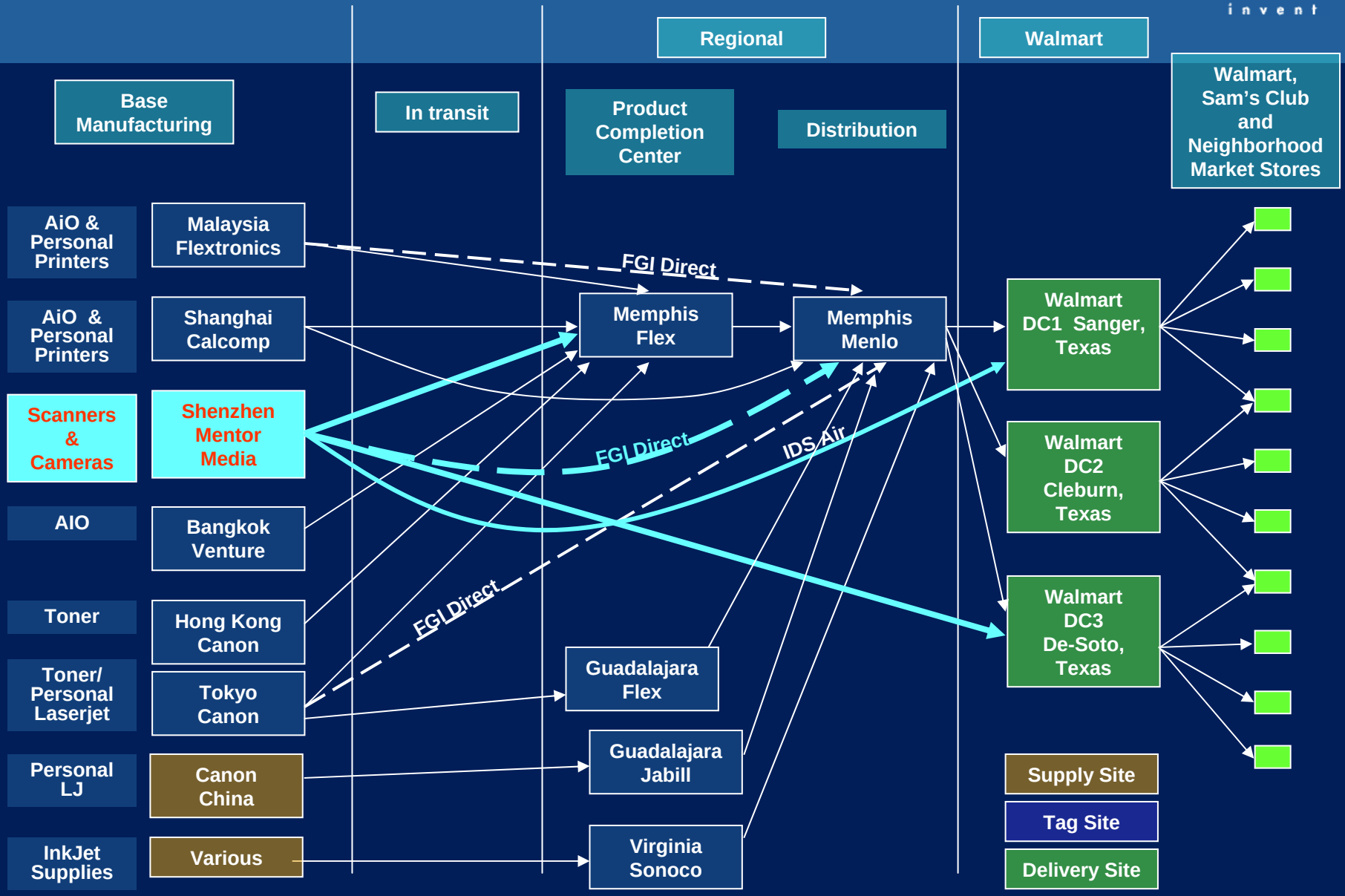
3 Texas Distribution Centers

By January 2005

Today more than 40 tagged products are shipped to Wal*Mart from 26 sites globally and HP is piloting with many of the world's largest retailers

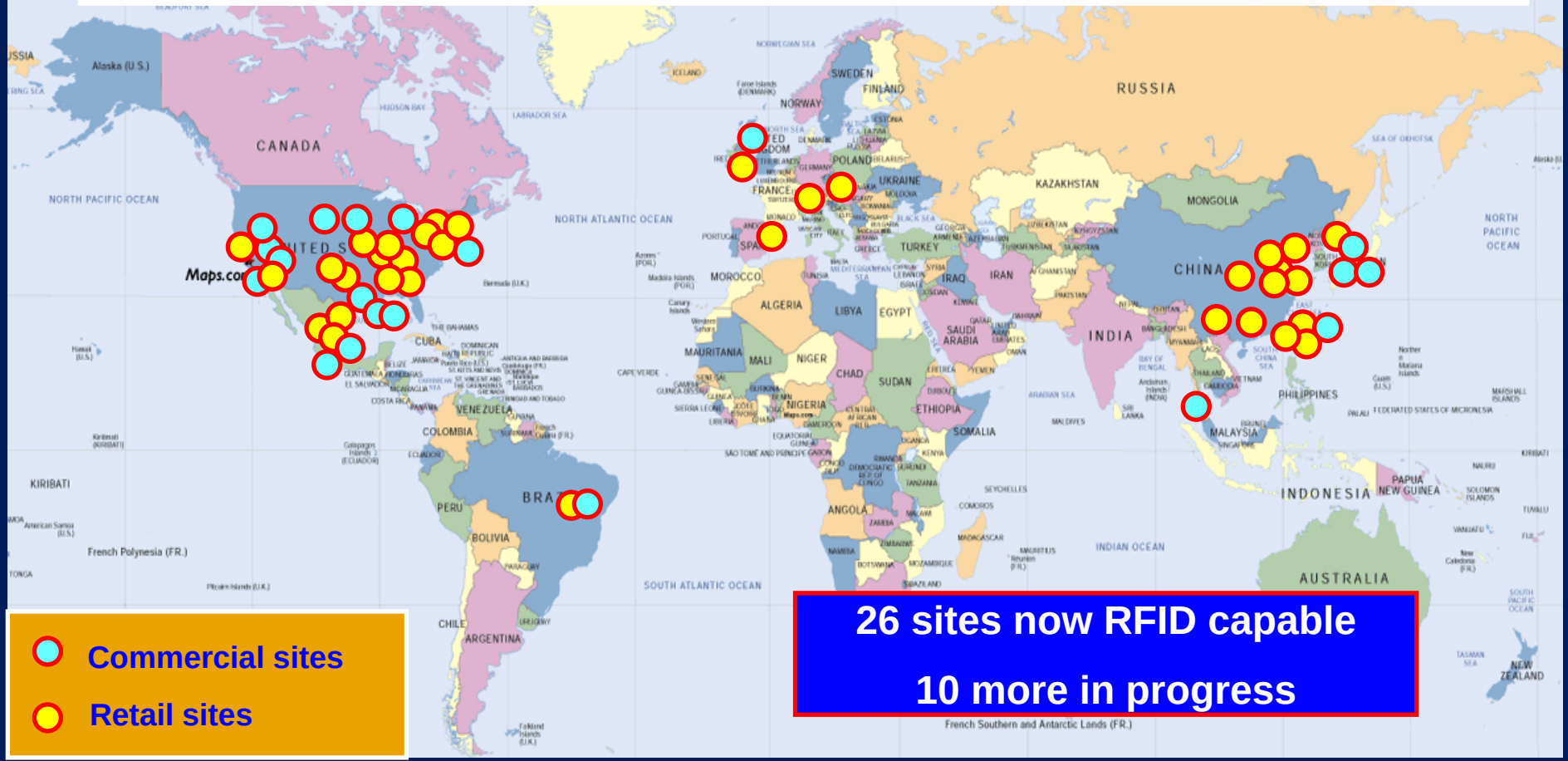
The Squawk Program

Retail IPG RFID Plan



Squawk Geographic Scope

RFID impacts businesses, operations and Customers in all Regions. Therefore program scope is global and pan HP in nature



The Memphis Pilot

First site to go live in volume in August 2004

Tagging pallets & cases with EPC Class 1 Standard tags

We are also working with our large Retailers to synchronize pilot efforts

Chester Plant Pilot

Includes systems changes to Shop Floor Control, PLC's & WMS

Receives inkjet cartridges in bulk & packages them for different markets

Starting at pallet and case level outbound, will then "walk" back up the process chain to Receiving

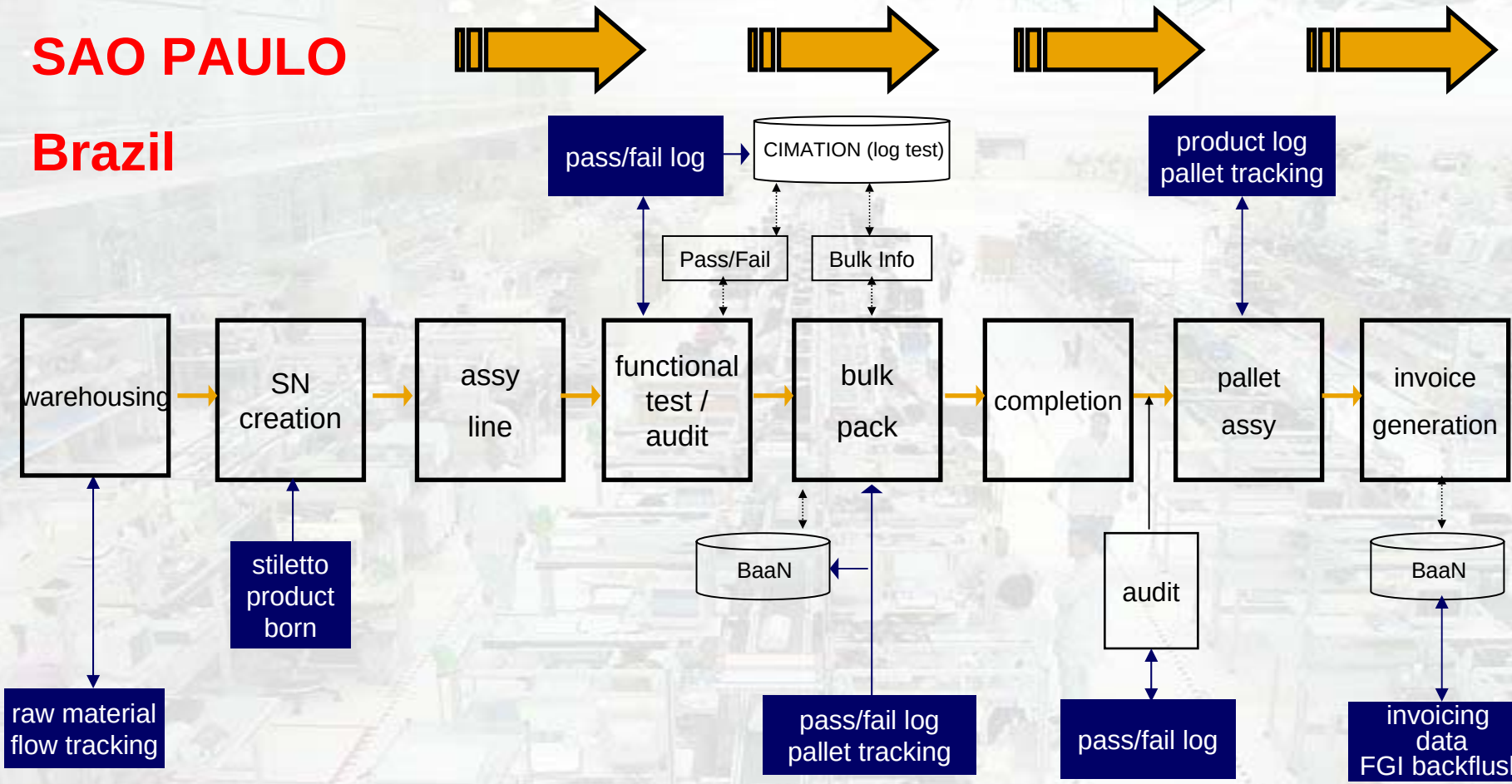
Sao Paolo Printer Plant

Tags carry quality & control data thru the process with the unit as it is built as well as EPC Code

Receives components and raw material, manufactures printers then ships finished goods to Latin America Region

Starting at manufacturing, will then “walk” down the process chain to Shipping

Pilot Horizontal & Vertical Scope Shaping



RFID ROI

We have found that our ROI falls into three distinct categories

I just know that RFID justification is in here somewhere…..

Customer Retention – a valued Customer requests tagged goods

Current process refinement - faster / more accurate identification of items within existing process

This is the hidden treasure of RFID

Business process redesign – eliminate unnecessary work, maintain uninterrupted flow of goods thru Supply Chain, identify location of items in more processes with less effort, analyze actual movement of goods at carton level, identify and remove choke points etc.

The Supply Chain Business Case

Visibility… Velocity…

- **Improving Supply Chain Efficiency**
  - Avoid slowing down and positioning material for barcode scan
  - Automatic configuration validation
  - Real time inventory visibility and control
  - Accurate validation / count of multi core and mixed pallets

- **Improved Data Collection**
  - Identify items on the move towards the next process
  - And do so at many more intermediate points in the process
  - Enabling accurate measurement of operations
  - And identification of trends and process choke points

What… Where… When…

Challenge: Business Case

Retain your customers

- Meet their requirements
- Benefits to retain customers

Improved Data collection

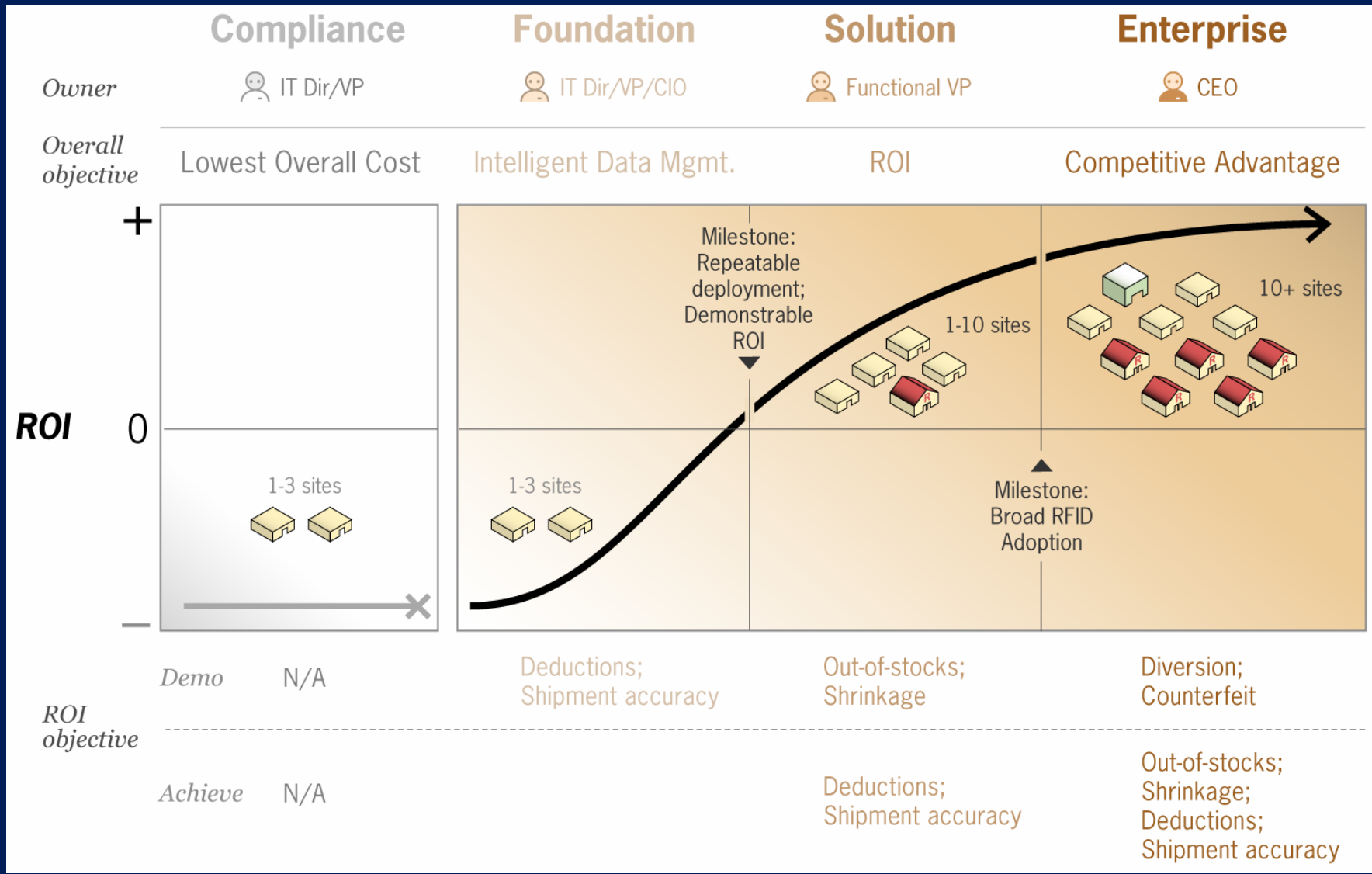
- Data accuracy
- Automation
- Locate objects real time

Why RFID?
ROI?
Shared ROI?

Improved Supply Chain

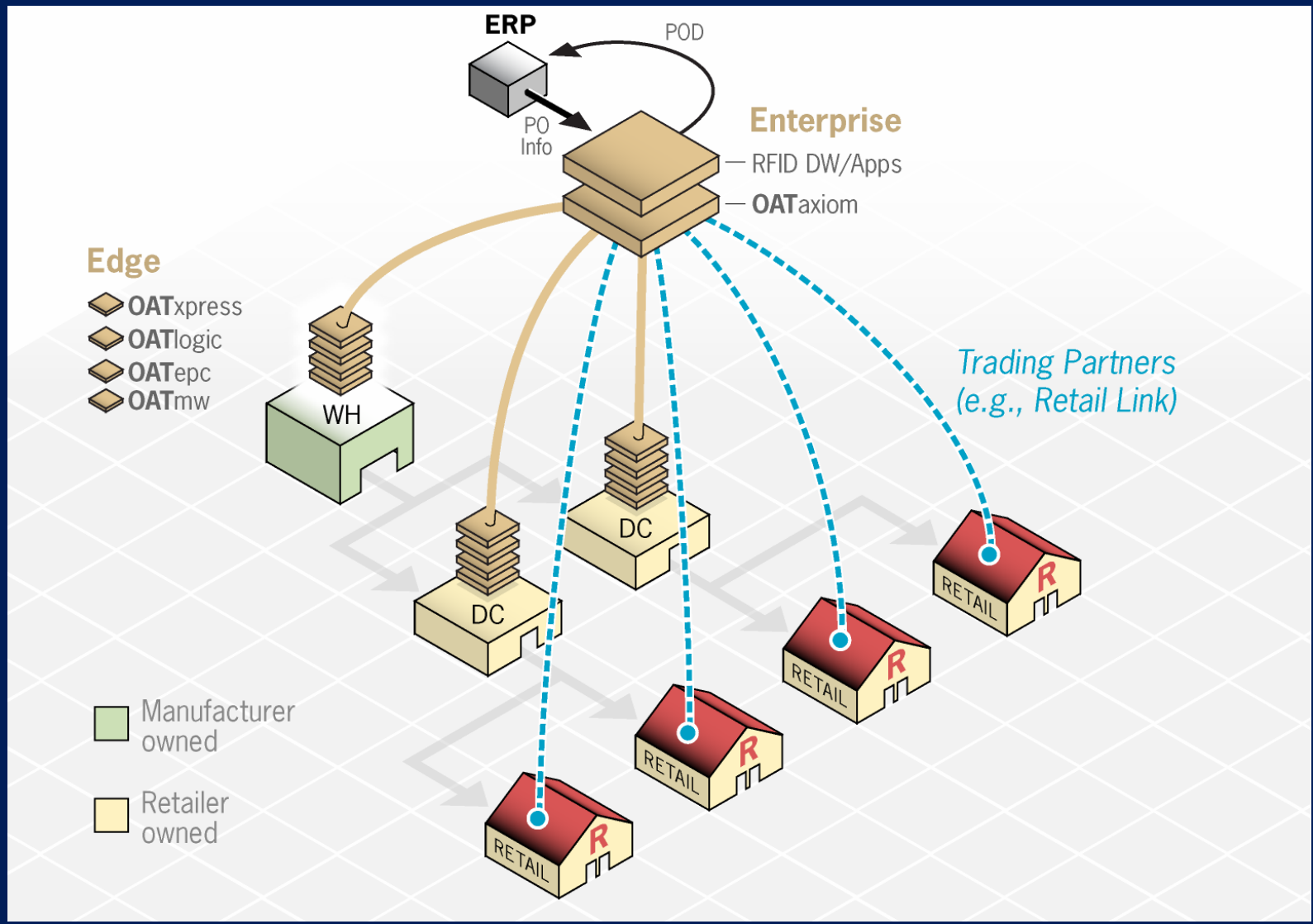
- Do things at less cost
- Do things faster
- Do things better
- Do things at less risk

RFID Adoption Curve

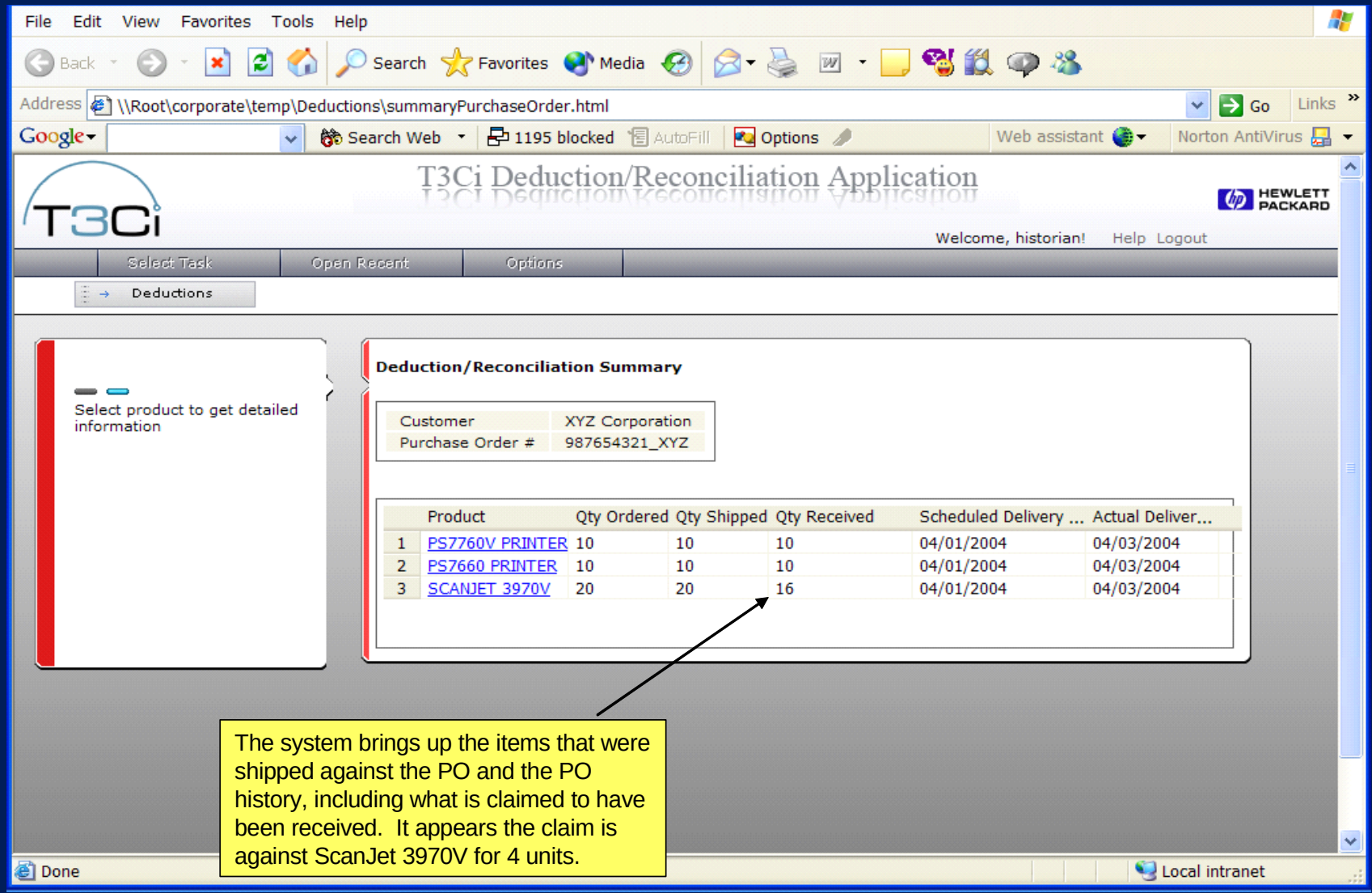


RFID Framework – The Foundation for RFID-Centric Applications

Jeff Woods, Gartner, August 2004



Sample Product Flow Analysis



RFID impact on the cash to cash cycle

Logistics

Suppliers

Manufacturing

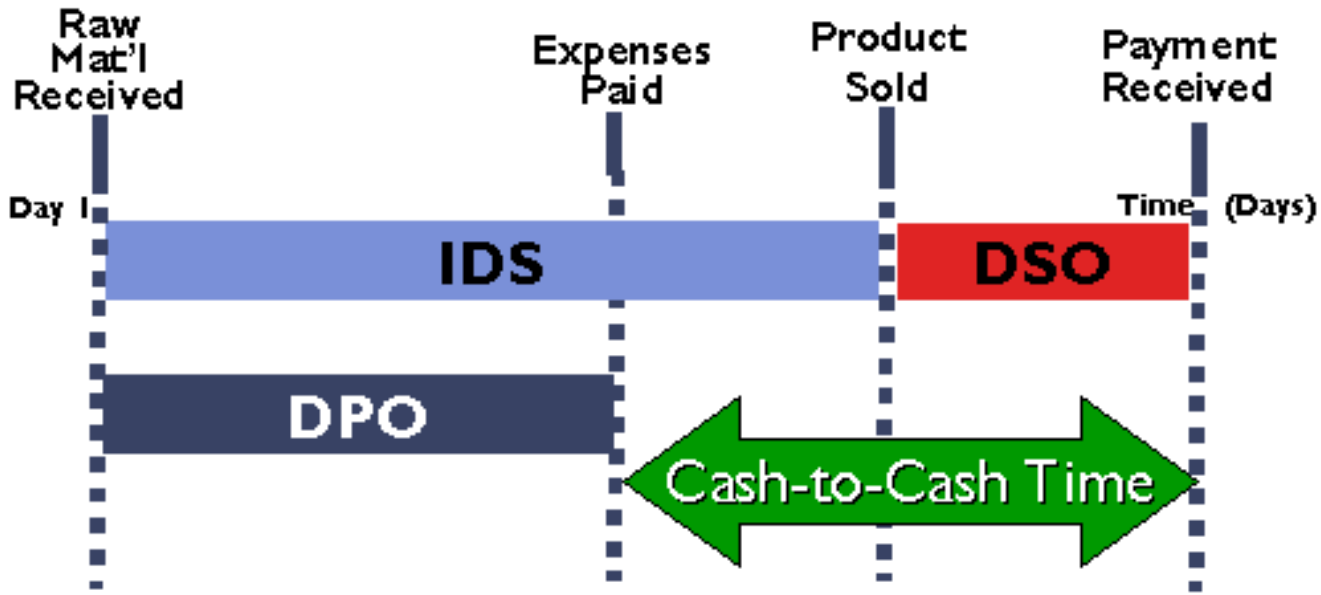
Retail

Customers

APPLICATION	KEY DRIVERS	OPERATIONAL IMPACT	FINANCIAL IMPACT
INVENTORY MANAGEMENT	– Increased Inventory Accuracy – Increased Inventory Visibility downstream and upstream – Improved Customer Service – Customer Requirements	– Reduced Labor and touches – Increased Inventory Turns – Reduced Obsolescence – Improved Service Levels – Enables pull based replenishment	– Reduced Working Capital – Reduced COGS – Increased Sales

APPLICATION	KEY DRIVERS	OPERATIONAL IMPACT	FINANCIAL IMPACT
INVENTORY MANAGEMENT	– Inventory Visibility and Accuracy across the Supply Chain	– Reduced cycle/ physical count – Improved in Stock	– Decrease in Working Capital – Reduced Labor Costs

Cash to cash cycle - Definitions



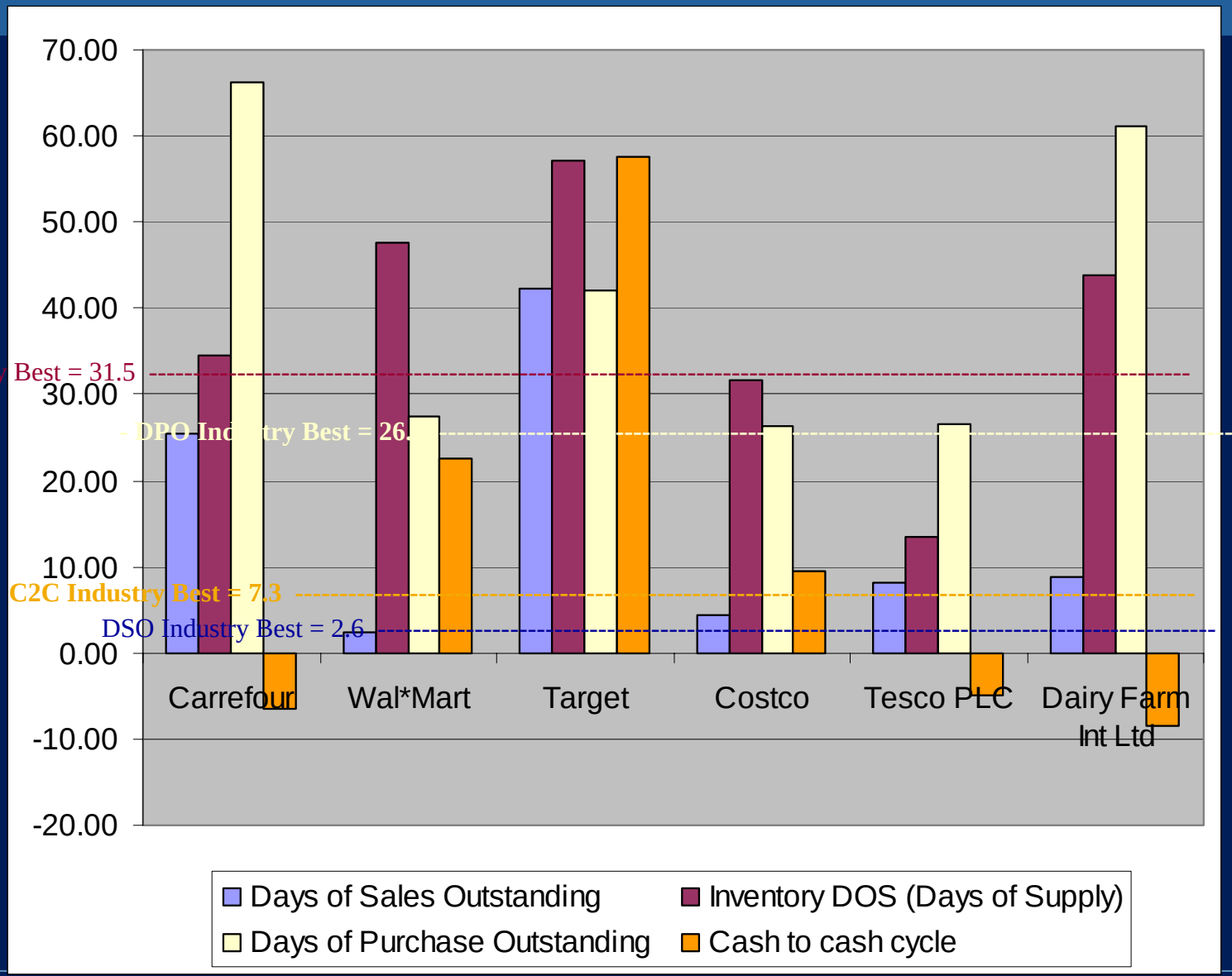
1. **Days of Sales Outstanding (DSO):**
   # of days it takes for a customer to pay

2. **Inventory Days of Supply (IDS):**
   # of days of inventory in the company

3. **Days of Payables Outstanding (DPO):**
   # of days it takes to pay its inventory related bills

Cash to Cash cycle management

How do you decrease your DSOs'? **How do you increase your DPOs'?**



How to free-up cash…Use the RFID data

Receivables (DSO) ↘

+ Inventory DOS ↘ **(-10 IDS → 67m$)** Visibility, VMI

- Payables ↗ Collaboration

= Cash to cash (d) ($) **10 days → 67m$**

Days	Carrefour Dec 03	Wal*Mart Jan 04	Target Jan 04	Costco Aug 03	Tesco Feb 04	Dairy Farm
DSO	25.36	2.36	42.38	4.36	8.18	8.73
Inventory DOS	34.50	47.57	57.20	31.59	13.46	43.88
DPO Payables	66.25	27.38	42.10	26.41	26.56	61.05
Cash2Cash cycle	-6.40	22.55	57.49	9.54	-4.92	-8.42


Lessons Learnt

Security Post 9/11 – CSI Pilot Learning's

- Security prior to 9/11 was focused on assets & personnel. Post 9/11 the focus is on terrorism

- " Cargo security is a linchpin issue, not only for the security of our homeland, but also for our economic security as well." Tom Ridge Dec04

- Challenge of how to secure a global ocean transportation network that has 15 million containers in circulation, with 9 million containers entering the U.S. each year

- Need to balance security and trade facilitation – otherwise risk that "we", not the "terrorists" will cripple a system we all depend on

HP Security Initiatives
Container Security Initiative (CSI)

- A cross functional team participated in two CSI driven POC pilots in 2003.

- Test selected GPS electronic seals and or prototype units to detect tampering and provide real-time status of the container.

- Enhance HP's supply chain security and efficiency, along with minimizing costs and potential for shipment delays associated with CSI.

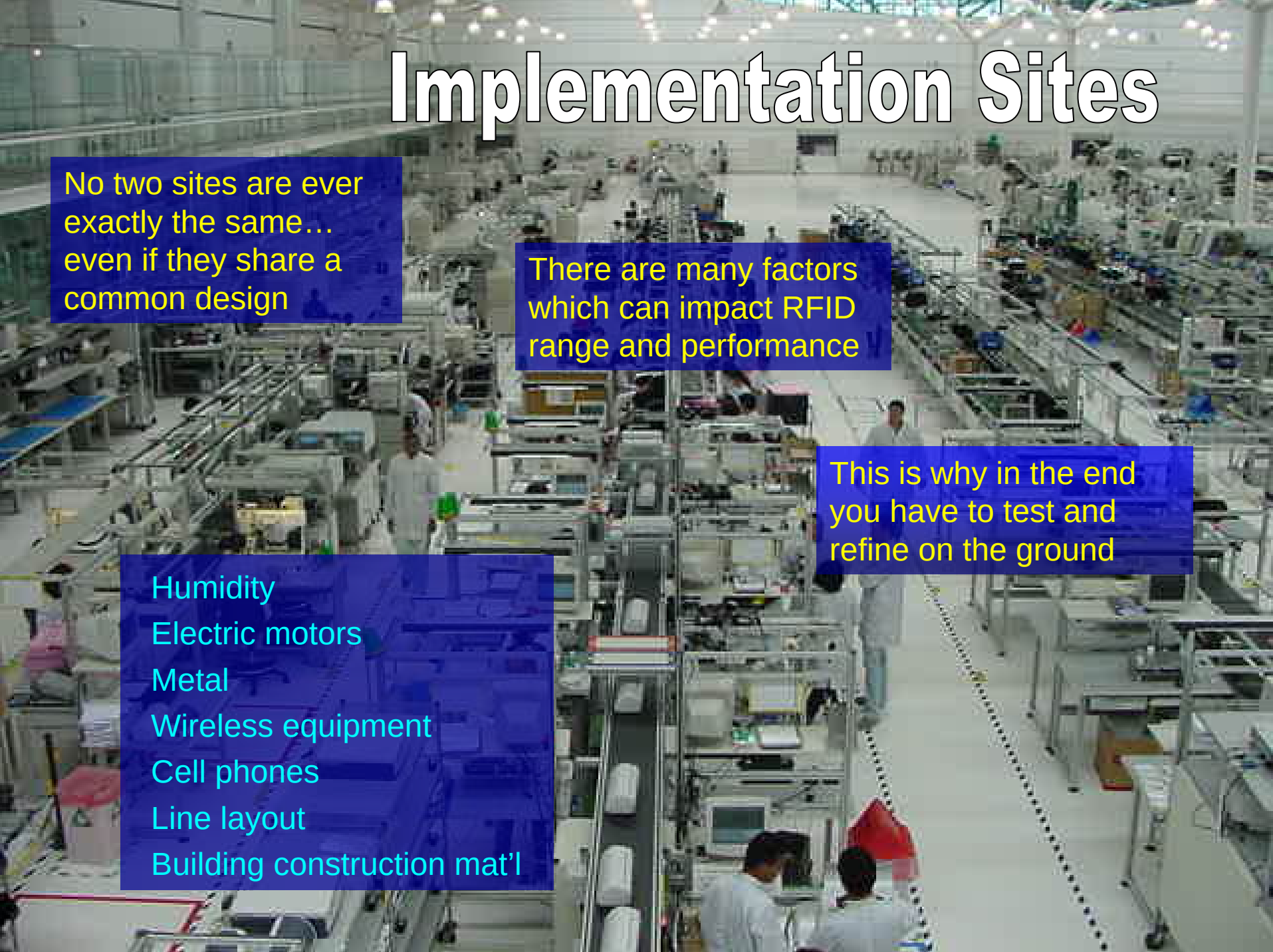
- Position HP to influence the public/private debate on potential legislation, rules and requirements associated with CSI and OSC (Operation Safe Commerce).

Pilot Learning's

- Satellite based system was relatively easy to implement, as it did not require a network of readers and transponders to track the shipments.
- However proposed price point was $400 per device and $30 a month per unit for the satellite fee.
- The second RFID based solution had a significant number of issues that would indicate that implementing this solution would be a very costly and complex undertaking, with a real security benefit not clearly demonstrated.
- The two pilots demonstrated the level of hype (oversell) vs. real (cost effective) significant security benefit.
- "Smart Container" technology is not a silver bullet to address terrorist threat to supply chain security

GPS Tag unit on HP shipment

Smart Container Seal



Implementation Sites

No two sites are ever exactly the same… even if they share a common design

There are many factors which can impact RFID range and performance

This is why in the end you have to test and refine on the ground

- Humidity
- Electric motors
- Metal
- Wireless equipment
- Cell phones
- Line layout
- Building construction mat'l

Readers

Readers are not created equal !

Plug & Pay ! You will need to keep them up to date….

Multi Standard is a must to protect your investment

Multi frequency is useful for manufacturing

Simple Reader

Integrated antenna

Easy to set up

Cheaper

Optimum for single read / write

Less good for high volume of tags in field

Complex Reader

Multiple antennae per reader

More expensive per reader but not necessarily per antenna

Better suited for multiple tag reads such as pallet scan

Tags

Get the right tag for the job !

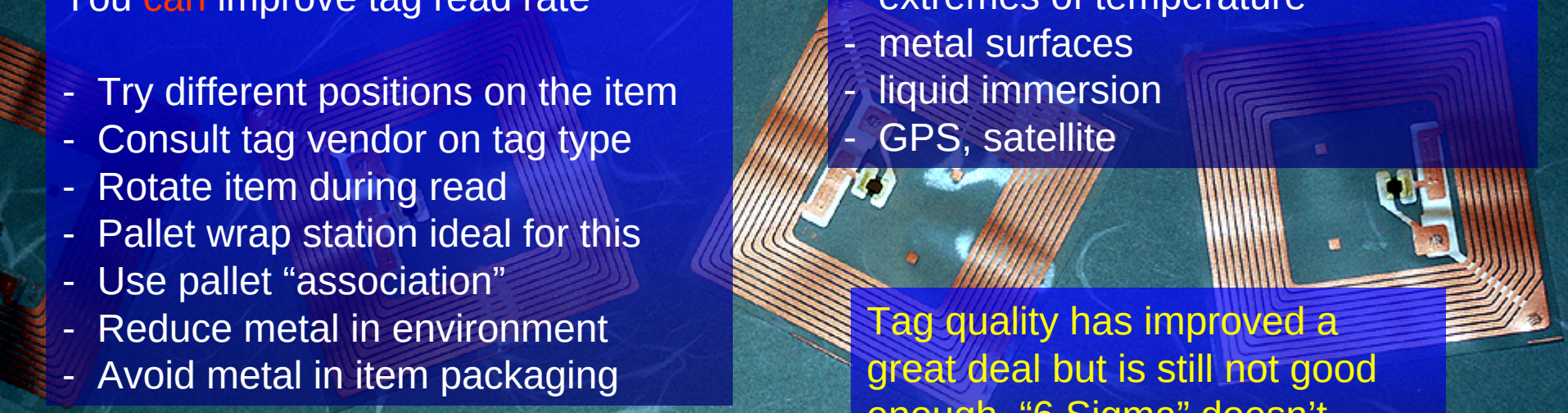
Polarity should match the reader

You can improve tag read rate

- Try different positions on the item
- Consult tag vendor on tag type
- Rotate item during read
- Pallet wrap station ideal for this
- Use pallet “association”
- Reduce metal in environment
- Avoid metal in item packaging

Special conditions require special tags

- extremes of temperature
- metal surfaces
- liquid immersion
- GPS, satellite



Tag quality has improved a great deal but is still not good enough. “6 Sigma” doesn’t mean 6% failure rate !

Tag pricing is directly related to quantity produced. Just like PC’s, volume is the name of the game. The more who get going, the more can get going !

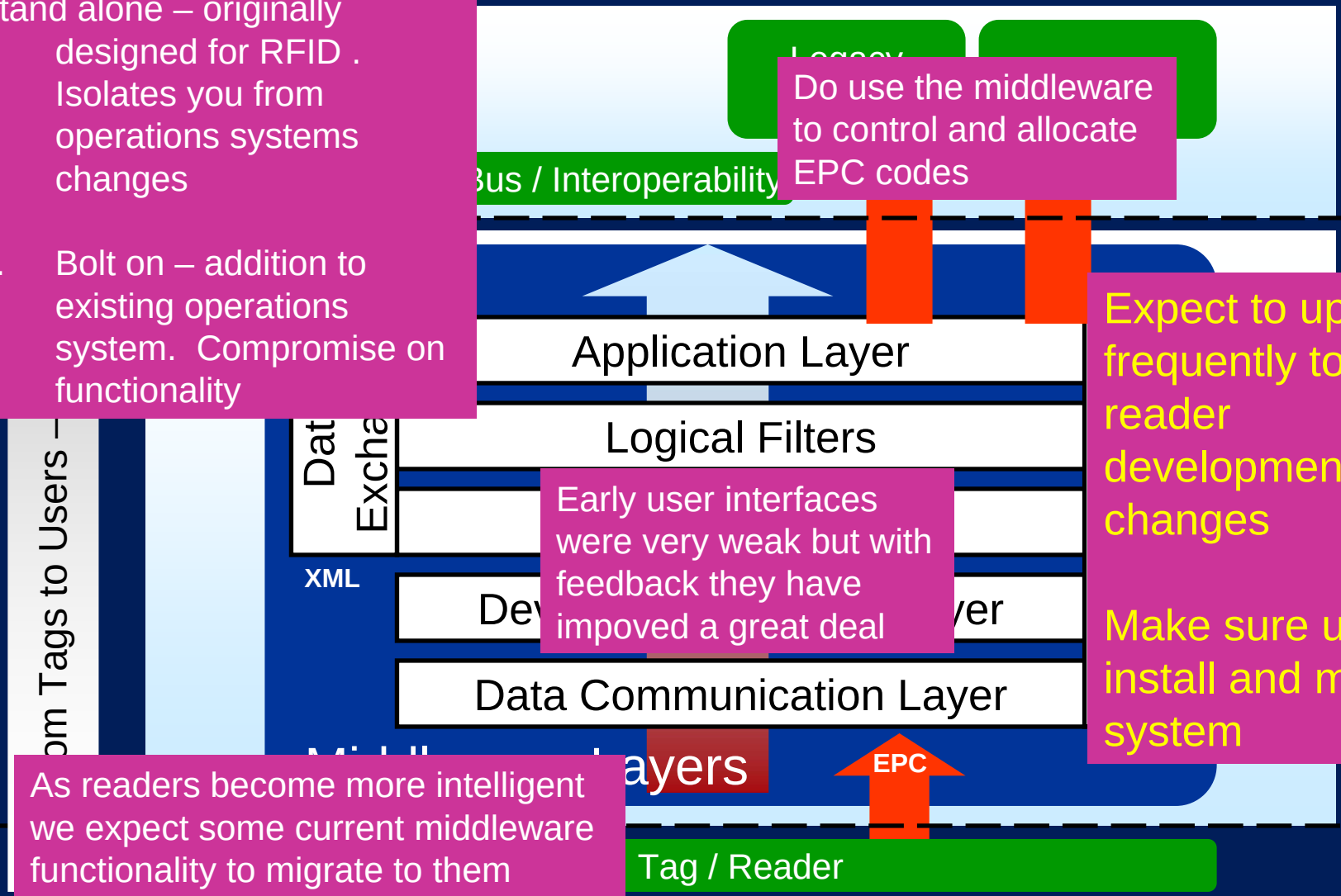
The earlier in the process you apply the tag, the more opportunities you will have to benefit from it thru process improvements

Middleware

Comes in two flavors:
Stand alone – originally designed for RFID . Isolates you from operations systems changes

1. Bolt on – addition to existing operations system. Compromise on functionality

Don't mix RFID and operational tasks



Do use the middleware to control and allocate EPC codes

Expect to upgrade frequently to match reader developments and changes

Make sure user can install and maintain system

Early user interfaces were very weak but with feedback they have impoved a great deal

As readers become more intelligent we expect some current middleware functionality to migrate to them

But Most Of All

Our most important lesson of all….

Was that in the end you could only really succeed

If you took the plunge in the first place….

Dive in soon…..


hp
invent