



2004

thought leadership • industry expertise
process integration • solution details

Forums



An ASUG & SAP
Collaboration

RFID for Middle Market Manufacturers;

Debunking the myths and de-hyping the hype

**Pete Martin
Senior Partner
EntryPoint Consulting, LLC**



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Learning Objectives

Educate you on the benefits, risks and options for deploying a technology (RFID) that could re-define the customer / supplier relationship.

- Solid understanding (high-level) of the various pieces in an RFID solution; overview of SAP's offering
- RFID deployment strategies; early versus late; pallet versus items, active tags versus passive tags, etc.
- A thorough understanding of the operational risks and financial benefits of deploying smart tags with embedded EPC.

Areas Covered...

- RFID Technology Explained for the layperson
- Drivers for Adoption beyond simple compliance
- How to find the financial benefits from implementing early
- Global industry issues that could accelerate or delay RFID's adoption
- Operational and financial risks of deploying early and deploying late at the pallet through item-level
- Strategies for deployment without breaking the bank and jeopardizing the business

What do these organizations have in common?

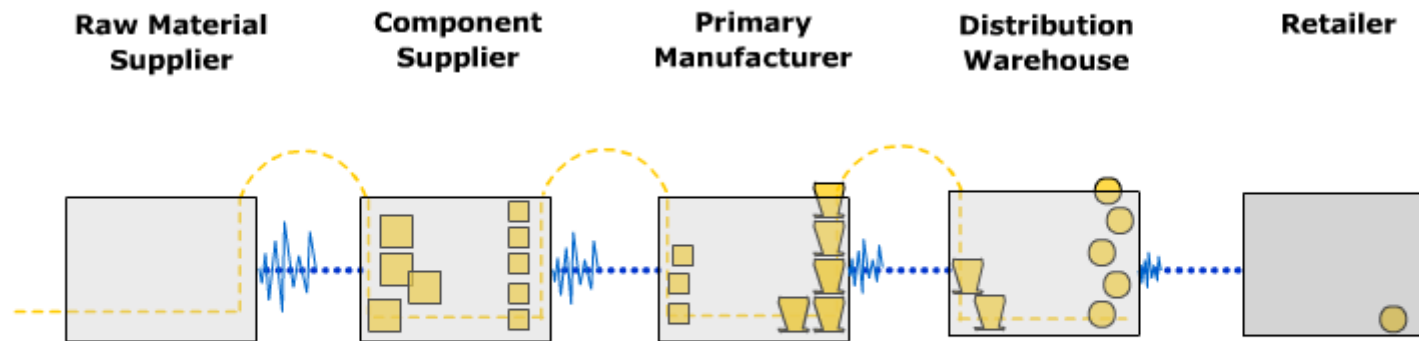


- Cement company
- Danish potato-chip manufacturer
- Almond and pistachio nut farmer
- California state prison system
- Duct tape manufacturer
- Goat's milk soap manufacturer
- Golf cart manufacturer
- Boston law firm
- U.K. Pub



Why do we need RFID?

Typical CPG Supply Chain



- Tier-to-tier demand focus
- Unsynchronized planning cycles
- Assumption-based planning
- Limited visibility and control
- Complex IT environment
- Unsynchronized product data

And 9+ other good reasons...



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Top 10 Consumer Uses for RFID*

1. Locating scissors, tapes or tools lent to children
2. Finding the “other sock”
3. Choosing the right lid to the Tupperware container
4. Identifying keys and cell phones at Lost and Found
5. Finding Nemo
6. Identifying and tracking UFO’s
7. Finding your soul mate
8. Tracking the movements of your teenager
9. Identifying left-overs in the back of the refrigerator
10. “Finding” yourself.

* Compliments of RFID Journal

RFID is an evolving “Mature Technology”



RFID in its current technological form has been evolving over the past 15 years. It is in broad use today in harsh conditions and in high volume, real-time applications such as...

- Inmates at Calipatria prison in California are tagged with ID bracelets that automatically tracks their whereabouts
- EZ-Pass / I-Pass is used by millions everyday to avoid stopping at toll-booths
- Swiss Railroad uses RFID tags for identifying what railcars need servicing by monitoring axle heat
- The European Central Bank (ECB) is putting smart chips in all of its bank notes by 2005 to virtually eliminate fraud and counterfeit
- 6 million people use the ExxonMobil Speedpass key fob to pay for gasoline and merchandise
- Marks & Spencer in the U.K. uses Auto-ID capabilities to track gourmet perishable food items
- The Department of Defense used smart chips in IRAQ to inventory military supplies



The Technology Explained



Automatic Identification (Auto-ID) is a set of technologies for electronically identifying and verifying individual objects such as people or products.

The most talked about technologies in use today and targeted for future **adaptive supply chains** are;

RFID A method of identifying unique items using radio waves. Typically, a reader communicates with a tag, which holds digital information in a microchip. But there are chipless forms of RFID tags that use material to reflect back a portion of the radio waves beamed at them.

RFID Tags A microchip attached to an antenna that picks up signals from and sends signals to a reader. The tag contains a unique serial number, but may have other information, such as a customers' account number. Tags come in many forms, such smart labels that are stuck on boxes; smart cards and key-chain wands for paying for things; and a box that you stick on your windshield to enable you to pay tolls without stopping. RFID tags can be active tags, passive tags and semi-passive tags.

EPC A 96-bit code defined by the Auto-ID Center to one day replace barcodes. The EPC has digits to identify the manufacturer, product category and the individual item. It is supported by EPCGlobal, Inc, a joint venture of the United Code Council and EAN International, the two main bodies that oversee barcode standards.

RFID Readers The reader communicates with the RFID tag via radio waves and passes the information in digital form to a computer system.

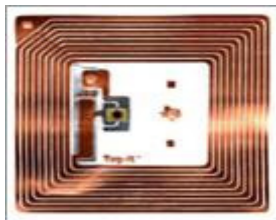


RFID Technology Components

RFID consists of the following technology components...

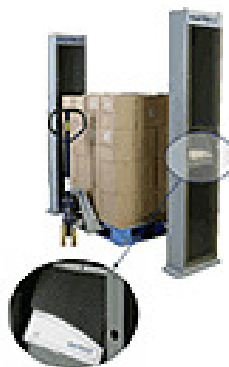
Smart Tags & Antenna

Low power microchips (smaller than a pin head) that wirelessly transmit encoded data when activated by a reader. Antennae provide the radio frequency to signal the reader.



Readers

Automated readers activate the smart tag microchips and read the data encoded in the EPC.



Electronic Product Code (EPC)

The EPC is an analogous to the UPC part of a bar code and contains information about the object.



Software

Sophisticated Warehouse Management and back-office ERP systems are essential to exploit the capabilities of RFID



Different types of RFID Tags...

Frequency Band	Characteristics	Typical Applications
Low 100-500 kHz	Short to medium read range Inexpensive low reading speed	Access control Animal identification Inventory control Car Immobilizer
Intermediate 10-15 MHz	Short to medium read range potentially inexpensive medium reading speed	Access control Smart cards
High 850-950 MHz 2.4-5.8 GHz	Long read range High reading speed Line of sight required Expensive	Railroad car monitoring Toll collection systems

What is EPC?

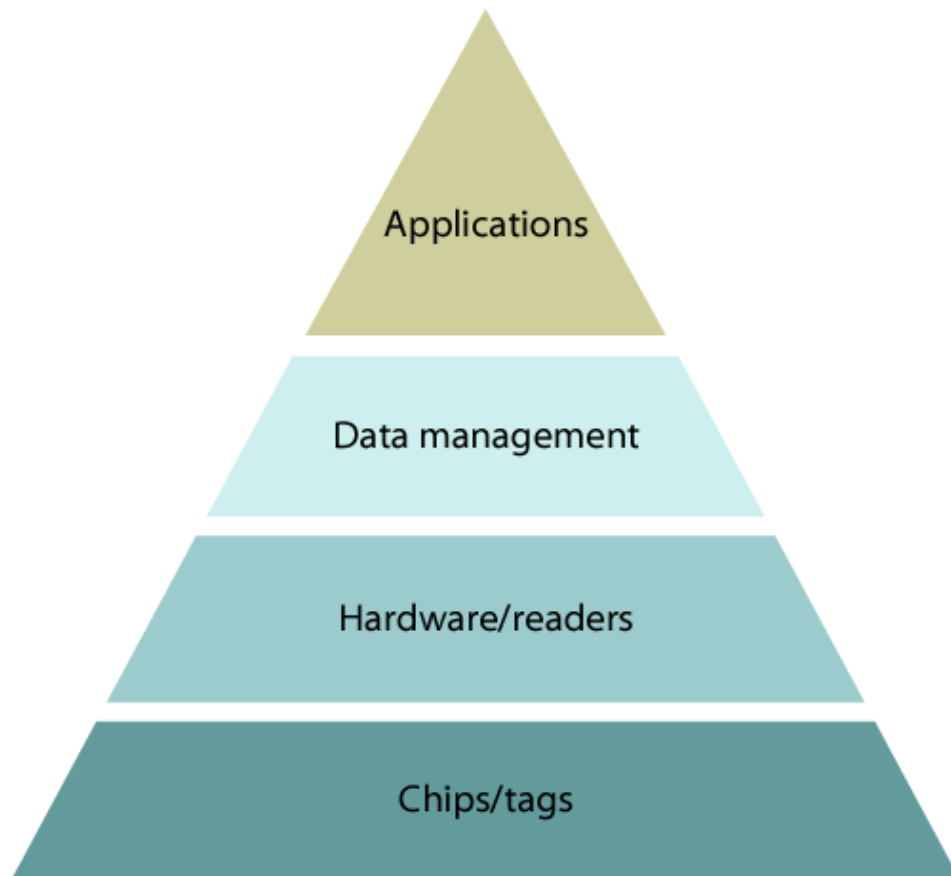


Manufacturer

Product Category – Lot control

Item Detail – Mfg Date, Characteristics, etc.

Myriad RFID Technology Choices



Example vendors

Manugistics Manhattan Associates RedPrairie SAP Oracle	
ConnecTerra DataBrokers GlobeRanger OAT Systems	
IBM Sun RF Code Intermec	Savi Technology Symbol Tech. SAMSys ThingMagic
Tyco Int. Alien Tech. Matrics Zebra Tech.	Philips Semi-conductor Texas Instruments Avery Dennison

Graphic Source: *Forrester Research*

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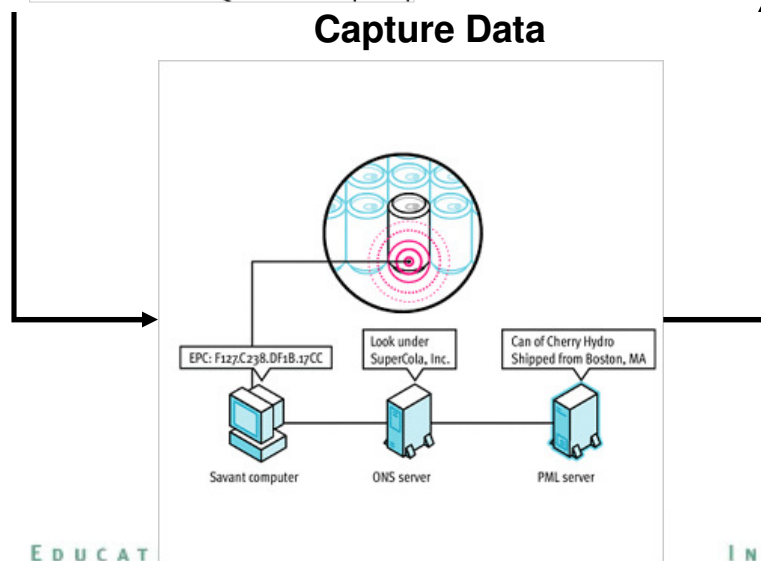
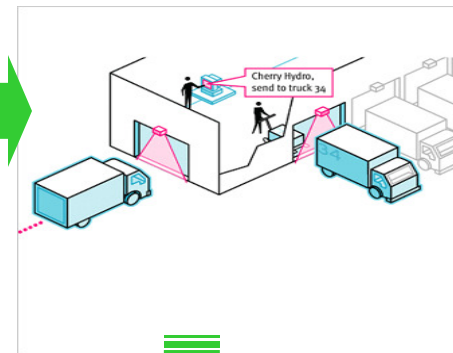
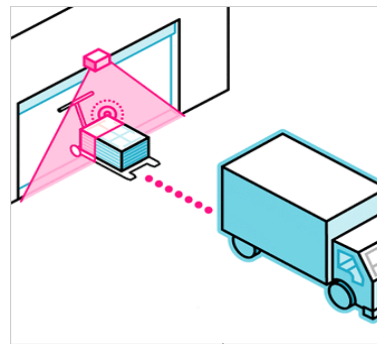
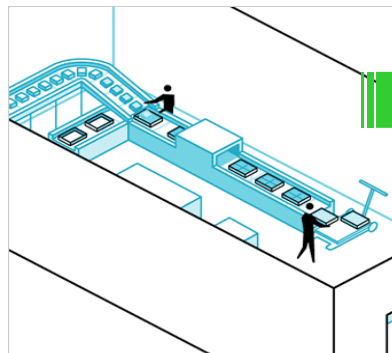
RFID Process Flow



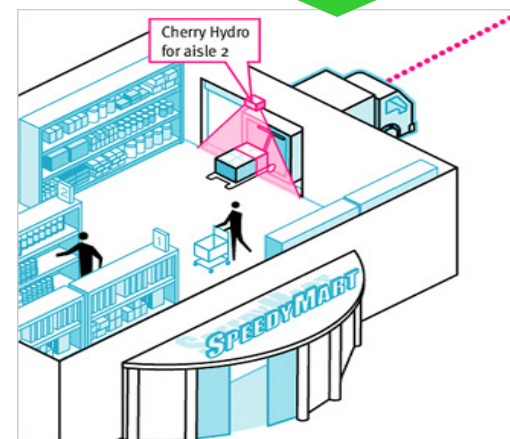
1. Apply the RFID Tags

2. "Wake-Up" @ Shipping

3. Read at the DC



4. Read at the Retailer



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Drivers for RFID Adoption



- **Early Adopters**

- ✧ Inefficiencies in the Supply Chain (receiving, picking, shipping)
- ✧ Poor inventory management at store and DC-level
- ✧ Inadequate systems in place currently
- ✧ Highly efficient connection with retailer and looking to go to the next level

- **Late Adopters**

- ✧ Required to increase collaboration with trading partners
- ✧ Technical standards become ubiquitous
- ✧ Significantly reduced RFID costs (tags and readers)

Survey of 835 Middle-Market Mfrs.



- More than 80 percent said administration had to intervene manually at least once to complete a customer order.
- The number of interventions in the warehouse increased tenfold.
- In purchasing, commodity managers spent about 30 percent of their day tracking inventory in transit.

The result: lost productivity, charge-backs, late orders and other problems.

Sources: Consumer Goods Technology, ChainLink Research

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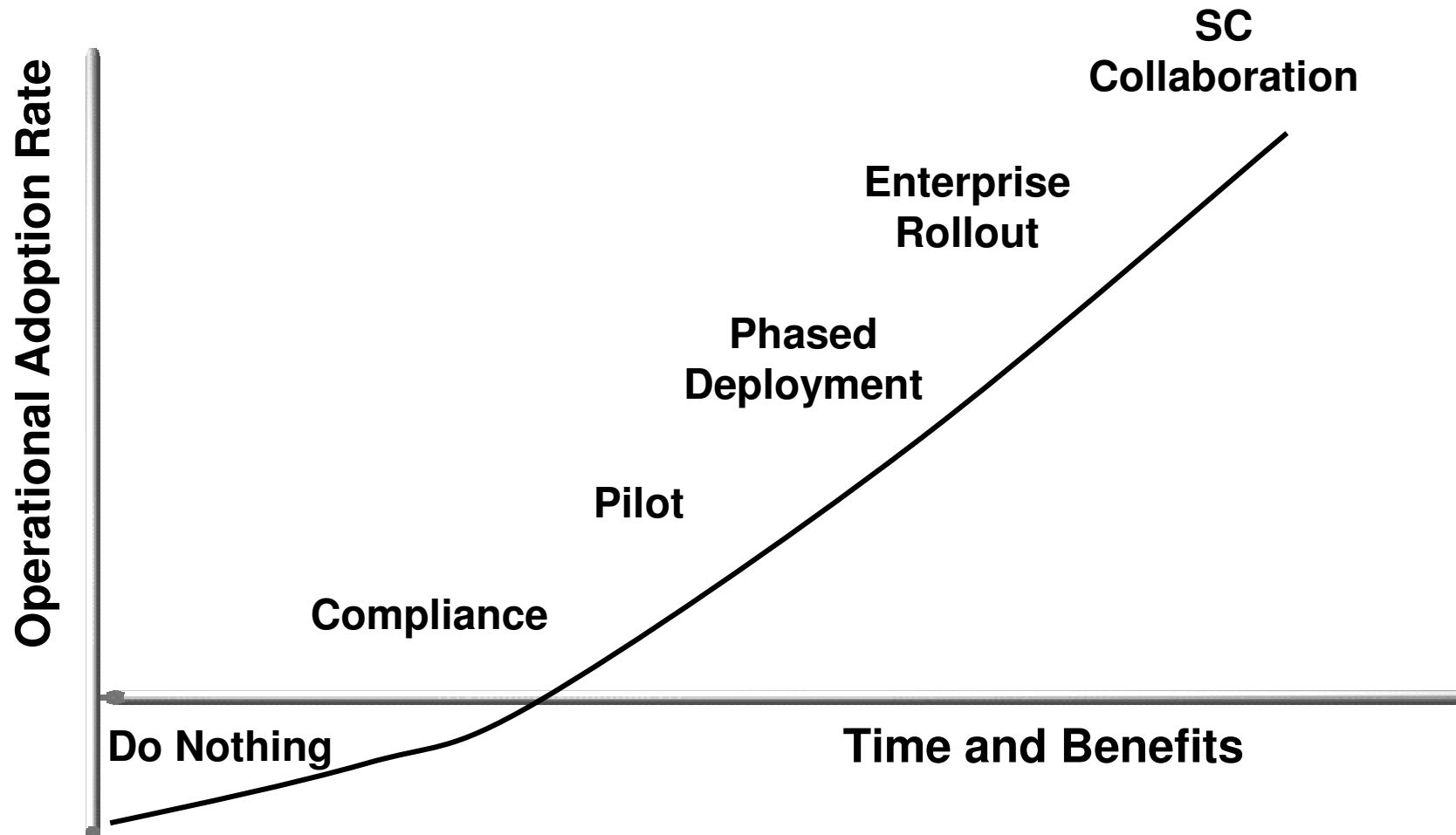
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RFID Adoption Curve



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Financial Benefits of Deploying RFID

Increased
Sales/Margin

Reduced Costs

Reduced Working
Capital

Value Added
Products and
Services

Reduced
Counterfeiting
and Diverting

Supply Chain
Efficiency

Vendor
Managed
Inventory

Improved
Turns

Quality Data
& Process
Monitoring

Unique
Product ID

Automated
Handling and
Tracking

Real-time
Customer
Information

Real Time
Inventory

Financial Benefits of Deploying RFID



Benefit Area	How the benefits are obtained
Revenue Increases	<i>Reduce stock-outs by having better replenishment data, reduce unsaleables by tracking demand, increase efficiency of VMI relationships</i>
Labor Cost Reduction	<i>More efficient receiving, shipping and exception handling</i>
Compliance Cost Reduction	<i>Better product tracking through multiple channels allows for better product recall, reduced theft, date/lot tracking</i>
Working Capital Reduction	<i>Better demand visibility for capacity leveling, increased inventory turns and less safety stock.</i>
Fixed Capital Reduction	<i>More accurately track fixed assets like pallets, totes, etc. as well as need for less forklifts.</i>

P&G estimates that its stock-outs average 10 – 16% at any moment.

“Reducing that number by 10 – 20% could mean a revenue boost of 1-3% equal to \$400,000,000 in incremental revenue.”

Larry Kellam, Director B2B Supply Network. P&G



RFID Benefits – Supply Chain

	Business Function	Financial Benefits		
		Increased sales	Reduced cost	Reduced WC
A- Supply Chain	Demand Planning	x	S	x
	Item / Lot tracking	x	x	
	Security	x	x	
B- Manufacturing	Procurement & material storage		x	x
	Production		x	x
C- Warehousing	Receiving		x	x
	Picking / Order selection	x	x	
	Shipping		x	
	Exception product location	x	x	
	Loss prevention	x	x	
	Asset utilization		x	x
D- Transportation	Asset management		x	x
	Yard management		x	x
	Contract compliance		x	
	Routing		x	
E- Store operations	Receiving	x	x	x
	Store planogramming	x		
	Exception merchandise	x	x	
	Loss prevention	x	x	
	Shelf maintenance	x	x	x
	Checkout		x	x
	Returns & reverse logistics		x	
	Post-sales service		x	

Operational Areas to Apply RFID



Receiving

As goods enter the DC, reader captures EPC codes into the WM System and reconciles with P.O. and Inbound ASN

Get suppliers to affix RFID chips

- ✓ Improves throughput of dock-to-stock
- ✓ Reduces check-in time by 60-93%
- ✓ Inventory accuracy goes to nearly 100%

Put Away / Staging / Picking

Use to streamline and synchronize the flow

Helps move more goods with less people

- ✓ Could eliminate physical counts
- ✓ Saves 35%+ in picking labor
- ✓ Increases inventory visibility

Shipping

Automated load scans, invoice matching and generation of shipping docs

No human labor nor verification for Outbound ASN

- ✓ Eliminates need for dock audits, staging and loaders
- ✓ Lower return rates due to higher accuracy
- ✓ Improved DSO from order accuracy and faster order confirmation

SC / Inventory Visibility

Targeted recall in the channel

Streamline replenishment

Information on current and changing demand

- ✓ Allows for less conservative planning approach



Typical RFID Cost Considerations

Core Hardware Cost Elements:

- Tags \$.30 to \$.75 per tag
- Readers \$200 to \$10,000 per reader
- Antennae \$25 to \$500
- Multiplexers \$500 to \$2000
- Controller PC \$1000 to \$3000
- Cabling \$10/foot between reader and controller

Other Cost Elements:

- Installation \$\$\$ varies
- Tuning \$\$ varies
- Software \$\$\$ varies
- Back End Integration \$\$\$\$ varies
- Maintenance \$\$ varies
- Process Changes \$\$ varies

Average Warehouse Cost
~ \$100,000

Legend:

\$	Minor Cost
\$\$	Medium Cost
\$\$\$	Heavy Cost
\$\$\$\$	Very Heavy Cost



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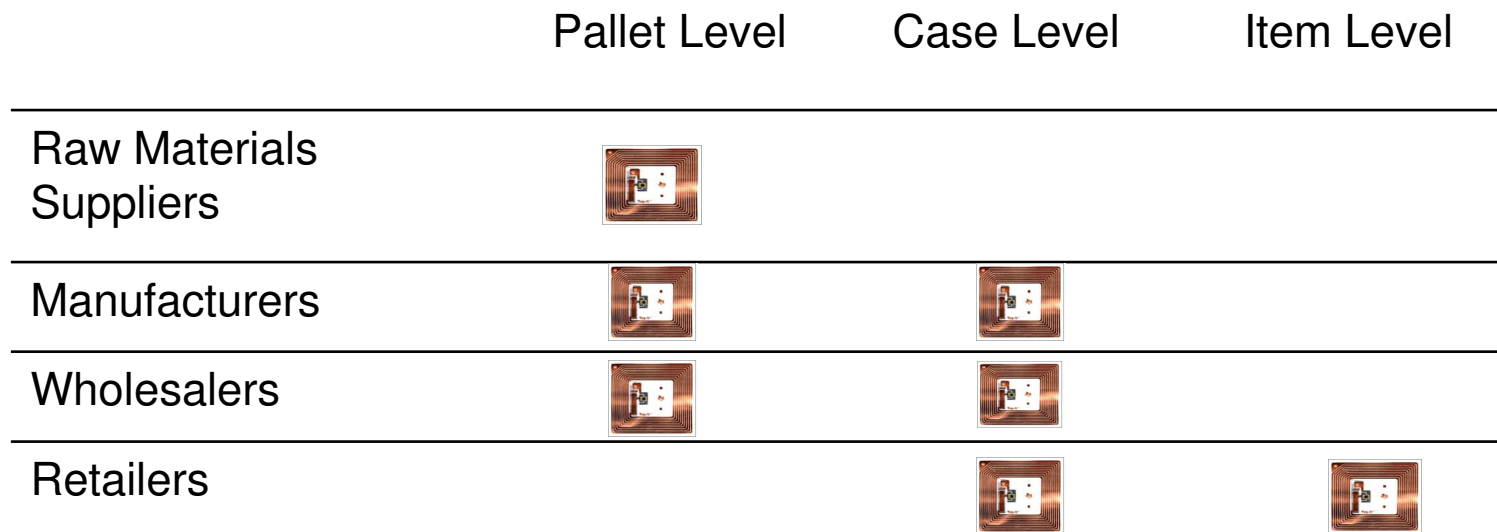
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Cost of tags...

More than 30 billion smart labels / radio tags / yr needed to hit 5 cents cost

- If just 5 retailers insist on tagging of *cases* we will see >10 billion tags a year
 - Wal-Mart and Tesco already committed
 - Carrefour 2 billion
 - Metro 1 billion
 - Target 1 billion
 - Tesco 1 billion
 - Wal-Mart 10 billion
 - Expect use at *point of sale* to drive second wave
 - Could see >100 billion radio barcodes a year

The 'Item Level Dilemma' – who pays / who benefits



Security Issues....

- Counterfeiting - Replacing tags with counterfeit tags with wrong information
- Corporate Spying - Scan entire stock of a competing retail outlet – by walking around
- Eavesdropping / RFID Spying – Listening to traffic
- RFID Denial of Service Attacks using an electromagnetic field

Privacy...



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How quickly should you begin?



Early Adopters

- Frequently lose revenues from stock-outs and theft
- High dollar/high margin items (> \$5.00)
- Products reach consumers through many channels and product recalls are likely

Early adopters may see early benefits from item-level tagging, will spend the greatest on technology, may take a short term profitability hit but will increase market share.*

Aggressive Followers

- Theft/gray market is not a problem
- Moderate dollar price/margin items
- More direct distribution model to the retailers

Aggressive followers will pay less for technology and will maintain market share.*

Wait-n-See Followers

- Technological problems with RFID
- Low dollar price/margin commodities

Wait and See Followers will realize little benefit and will lose market advantage and share.*

* Harvard Business School. "Working Knowledge" 09/2003

Risks & Issues

Technology Risks

- ✦ Hardware obsolescence – new standards are evolving
- ✦ Technology is not developed enough to deliver highly accurate (> 95%) reads in complex, high-velocity warehouse conditions
- ✦ Prices of readers and tags will continue to drop significantly (readers > 70% and tags > 90%)

Supply Chain / Trading Partner Risks

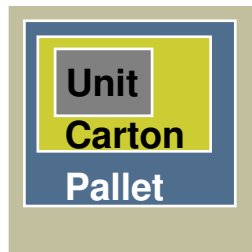
- ✦ Trading partners may not share information and data with you (i.e., Wal*Mart widely accepts and confirms ASN's)
- ✦ Developing standards (EPC Global, EAN and GCI) are widely adopted and deployed
- ✦ Privacy concerns are overcome
- ✦ Retailers and their suppliers can reconcile the cost/benefit/risk formula (pallet → case → item)

Systems & Implementation Risks

- ✦ Lack of skilled RFID technicians
- ✦ Existing assets may need to be upgraded, modified or replaced (ERP, WMS, Network, metal shopping carts, conveyor systems, etc.)
- ✦ Business processes may need to be changed
- ✦ The “physics” of implementing the technology overcome current challenges

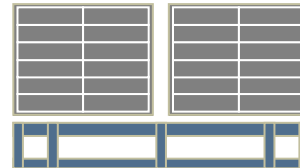
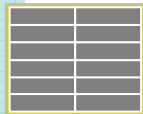
Potential Granularity of RFID Tags

Identify and track each object as it moves along the value chain, from manufacturing all the way to the consumer.



- RFID Tagging can be applied at varying levels
- Application levels will have correlation of margin to cost*

Container

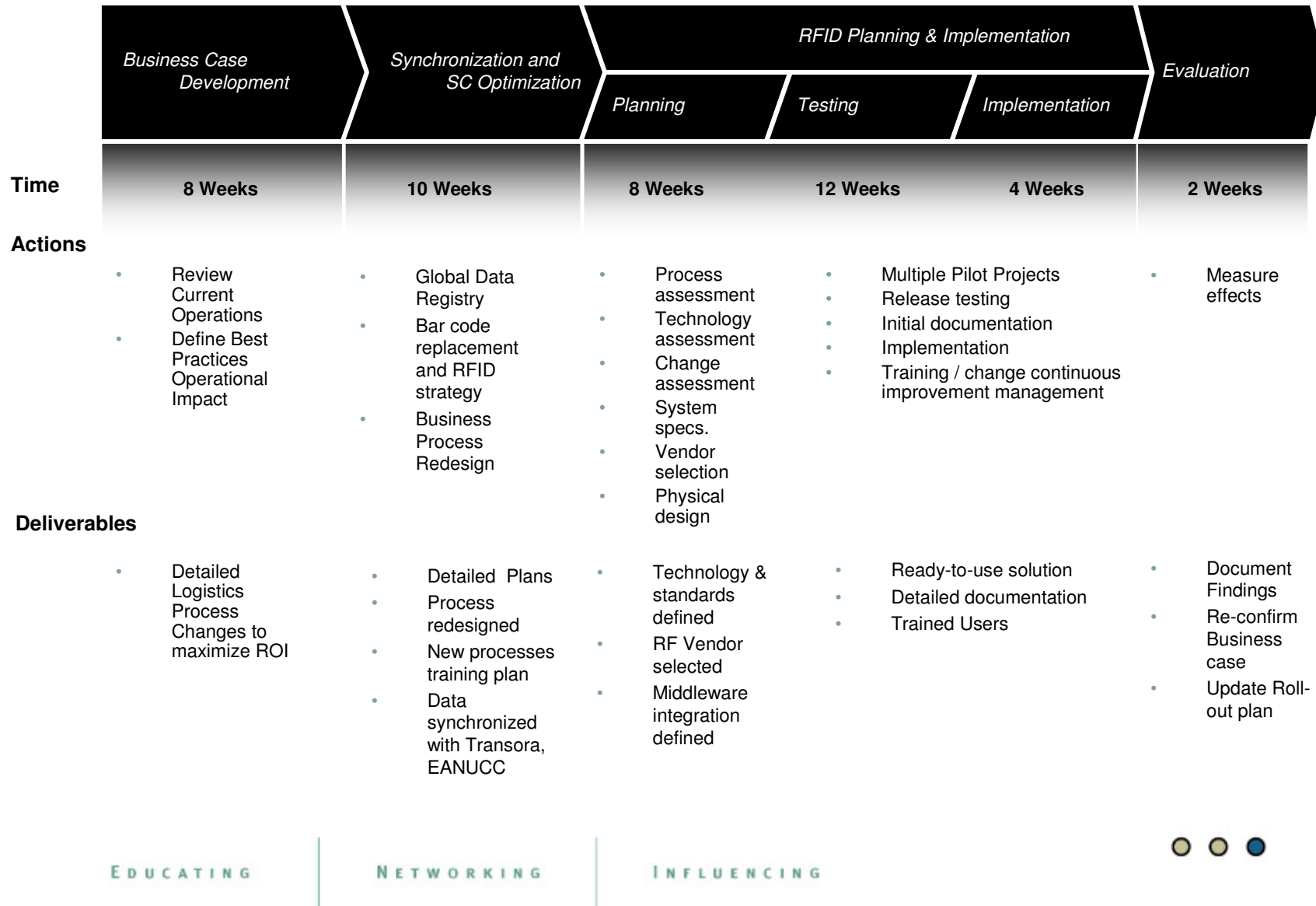


* Cost will be tag, plus portion of infrastructure and integration



- Units MUST be associated with a Carton; Pallet
- Cartons Pallets
- Container

Deployment Roadmap



Strategy for Mid-Market Manufacturers



“Manufacturers face a difficult choice: They must decide whether they will be early adopters, aggressive followers or ‘wait-and-see’ adopters.

There is a very strong case for major manufacturers to move early in order to cement their major customer relationships and to position themselves for significant growth.

What can a smaller retailer or manufacturer do to stay competitive? **The answer is to be an early, aggressive innovator, positioned strongly as an “emerging” company on the service differentiation matrix.** This will require a certain amount of capital. But much more than that, especially in the early stages, it will require clear management vision, willingness to innovate and partner, and absolutely reliable follow-through.”

Great Managers Pursue Risk, Not Avoid it.....

*Jonathan Byrnes, “Working Knowledge. Alumni Insights from the Field”
© Harvard Business School. 9/1/2003.*



Risk Mitigation Approach



1. Get educated.
2. Develop a global RFID Policy that supports the business.
3. Identify the business opportunities and build a business case to support the investment
4. Focus on the business process change – NOT the technology
5. Get the users involved and get management commitment.
6. Choose good partners.
7. Start small, flush out the kinks, and then strive for self-funding projects.





SAP's Solution for RFID



- “Slow and steady pioneer”: In research since 1998.
SAP was the first software vendor to join Auto-ID.
- SAP Auto-ID Infrastructure (Netweaver) – Manages RFID tags and reading devices, filters and aggregates data
 - mySAP ERP Extensions – supports process control with real-time RFID messages
 - SAP Event Management – manages the tracking and pooling of data and information exchange

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Key Action Items

- ✓ Start with your customer strategy
- ✓ Strategize on HOW you can use the new information for competitive advantage
- ✓ Treat RFID as a customer-strategy (versus SC strategy) and you will begin to outsmart your competition.
- ✓ Take small concrete steps to prove out your strategic thinking above
- ✓ Let others solve the physics problems and reduce the technology costs

How much should you spend in 2005?

- In 2004, middle-market companies are spending 2% of their IT budgets on RFID
- In 2005, RFID budgets will increase by 12 – 24%



Chainlink Research, AMR


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Building the near-term business case

Project	Strategic goal	Tactical RFID project	Short-term benefits
Lean manufacturing	Demand-driven replenishment	Be part of an RFID kanban	<ul style="list-style-type: none"> • Shorter cycle times • Reduced inventory
Receiving operations	<ul style="list-style-type: none"> • Improve accuracy • Cut warehouse costs • Improve velocity of throughput 	<ul style="list-style-type: none"> • Automate receipt of tagged pallets • Match to advance shipping notice 	<ul style="list-style-type: none"> • Reduced inventory management costs • Reduced cycle counts • Improved payment process to supplier
Six Sigma/ Quality control	<ul style="list-style-type: none"> • Reduce defects • Retain more customers 	<ul style="list-style-type: none"> • Faster feedback to address root cause of defects 	<ul style="list-style-type: none"> • Reduced service costs



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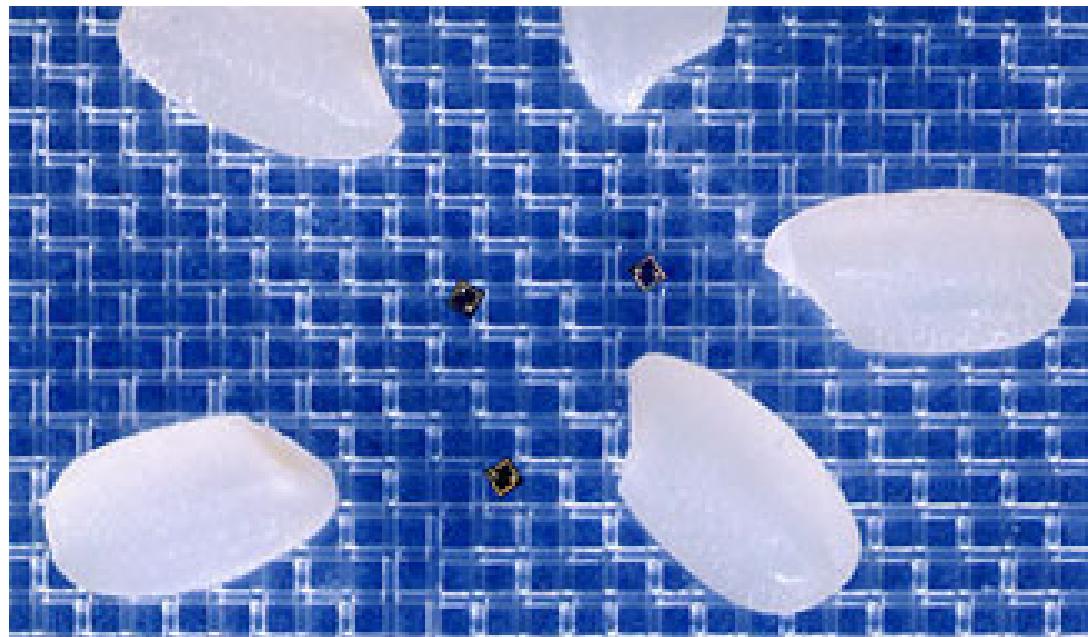


Our Unique Point of View



- RFID is a **not the next transformational technology**; merely a good technology with tremendous business potential.
- Mid-market manufacturing companies should conduct due diligence to **identify the impact** and value of RFID on their operations well before compliance is required.
- Companies **can realize a near-term (3-yrs.) return on their investment** in RFID but work needs to be done to identify the value.
- Companies who adopt RFID EARLY **will increase their market share.**
- Companies **should not implement RFID simply to comply** with the Wal*Mart or Department of Defense (D.O.D.) initiatives.
- **Real benefits from RFID come from using the information** to compete more effectively. The process changes provide incremental benefit; the information provides transformational benefit.

Another contest...



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- RFID deployment strategies; early versus late; pallet versus items, active tags versus passive tags, etc.
- A thorough understanding of the operational risks and financial benefits of deploying smart tags with embedded EPC.



Questions?

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