



BUSINESS CASE RESEARCH TRACK

FEBRUARY 26TH, 2003

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AGENDA

2:00	Session Opens/BCAG Progress	J. Lo
2:15	EPC Forum Survey	IBM
2:45	EPC Forum Market-Sizing	Accenture
3:15	Auto-ID in Retail	Accenture
3:45	Break	
4:00	Auto-ID in Manufacturing	Accenture
4:30	Auto-ID in Automotive	M. Strassner
5:00	Auto-ID Fare Collection at the MBTA	S. Drobac
5:30	Session Adjourns	



BUSINESS CASE ACTION GROUP CHARTER

Publish a stream of business case analyses that:

- Drive adoption of technology by publishing pragmatic user and vendor business cases across multiple stakeholder groups and industry verticals
- Meet the needs of Auto-ID sponsors
- Follow Auto-ID Center standards for publication
- Use sound and tested data to validate hypotheses
 - Data sources include: field test results, industry data, and interviews



PUBLISHED BUSINESS CASES

The BCAG has been chartered to develop a stream of Business Cases that will ultimately drive adoption. There have been a total of 14 papers published:

Industry	Quick Wins	Market Development	Adoption Tools
<ul style="list-style-type: none">•Value Chain Overview•Consumer Package Goods•Retail Supply Chain•Freight Transportation•Manufacturing <small>New!</small>•Store Operations <small>New!</small>	<ul style="list-style-type: none">•Shrink•Distribution•Product Obsolescence•Product Availability	<ul style="list-style-type: none">•Auto-ID in Automotive <small>New!</small>•Auto-ID case study at the MBTA <small>New!</small>•EPC Forum Survey <small>New!</small>•EPC Market Sizing <small>New!</small>	



UPCOMING DELIVERABLES

Pilot Papers

- Next step in driving EPC adoption
- Purpose:
 - To document lessons learned in pilots
- In order to publish pilot papers, participation from end-users is necessary
 - 2- 3 participants per paper
 - Specific pilot information will be confidential
- Target June '03 publish date

Market Development	Adoption Tools
•Pilot Papers	•Auto-ID Calculator •Change Readiness Guide



UPCOMING DELIVERABLES

Market Development	Adoption Tools
<ul style="list-style-type: none">•Pilot Papers	<ul style="list-style-type: none">•Auto-ID Calculator•Change Readiness Guide

Auto-ID Calculator

- Final programming of Calculator Website
- User Testing to begin at the end of February
- Target completion (Live) date: March 31st, 2003


Change Readiness Guide

- Joint-effort by Application Group and BCAG
- Data gathering phase throughout March
 - AIDC
 - Sponsor Interviews
- Target publish date: June 2003



RESEARCH PAPERS LOCATION

Public Auto-ID site

 **AUTO-ID CENTER**
Identify Any Object Anywhere Automatically

HOMEABOUT THE CENTERABOUT THE TECHNOLOGYHOW TO ADOPTTHE LATEST NEWSEPC SYMPOSIUMPRESS INFOQ&A

*BUSINESS CASES *AUTO-ID CALCULATOR *READINESS GUIDE *EVALUATION KITS *TRY OUR SOFTWARE *ADOPTION FORUMS

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Welcome Back Joyce Lo. If you are not Joyce, [click here](#).

SEARCH

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There is plenty you can be doing now to prepare your organization for the adoption of the new EPC network.


First you need to learn as much as possible about what the Center is developing - go to our ['about the technology'](#) page and read our research papers.

Second, you need to understand and estimate the impact this technology will have on your organization. Read our [business cases](#) and use our [online tool to calculate the value](#) to your business.

Then review the [readiness guide](#) to take you through some simple steps to adoption. But the best way to learn is by doing - by experimenting. Order one of our evaluation kits and try the technology for yourself. Alternatively, [download our free software](#) and learn more about how it can work for you.

Finally, the new EPC network will be launched at a [Symposium](#) on September 15th - 17th at McCormick Place in Chicago (European and Asian symposium will follow shortly).

Sponsors Only site

 **AUTO-ID CENTER**
Creating Standards for Smart Objects

SPONSORS HOMEBULLETIN BOARDBOARD OF OVERSEERSTECHNOLOGY BOARDCALENDARUNPUBLISHED RESEARCH

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Welcome to the Sponsor Site Joyce Lo. If you are not Joyce, [click here](#). To change your password, [click here](#).

SEARCH

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[Research Team](#)

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[13.56 MHz ISM Band Class 1 Radio Frequency Identification Tag Interface Specification: Candidate Recommendation, Version 1.0.0](#)
Auto-ID Center
Published 2/1/2003 Restricted until 5/1/2003
390 Kb [View Abstract](#)

[Auto-ID in Materials Handling](#)
Andrés García, Duncan McFarlane, Martyn Fletcher, Alan Thorne
Published 2/1/2003 Restricted until 5/1/2003
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[Auto-ID Based Control Demonstration - Phase 2: Pick and Place Packing with Holonic Control](#)
James Brusey, Martyn Fletcher, Mark Harrison, Alan Thorne, Steve Hodges, Duncan McFarlane
Published 2/1/2003 Restricted until 5/1/2003
593 Kb [View Abstract](#)

[Auto-ID on the Line: The Value of Auto-ID Technology in Manufacturing](#)
Gavin Chappell, Lyle Ginsburg, Paul Schmidt, Jeff Smith, Joseph Tobolski
Published 2/1/2003 Restricted until 5/1/2003
821 Kb [View Abstract](#)



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IBM BUSINESS CONSULTING SERVICES: EPC FORUM RESULTS

IBM BUSINESS CONSULTING SERVICES

TIG GILLIAM

HERB KLEINBERGER

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OVERVIEW

- Objectives of EPC Forum
- The EPC Forum Pre-Post Survey
- EPC Forum Results
- Conclusions



EPC FORUM OBJECTIVES

- Understand “current perceptions” of Auto-ID areas of opportunities and challenges
- Discuss and gain consensus among participants on key areas within the supply chain where Auto-ID can have maximum impact (referred to as “Application Areas”)
- Select three high priority “Applications Areas” to drive into more detail
 - ✱ Identify the key operational and financial benefits that will drive adoption
 - ✱ Identify key requirements for the Technology Vendors
 - ✱ Capture feedback and perceptions of the challenges and barriers of adoption for these applications
 - ✱ Obtain directional “intent” on scale and timing of “Auto-ID” investments

Results of individual breakout sessions were consolidated into this summary presentation

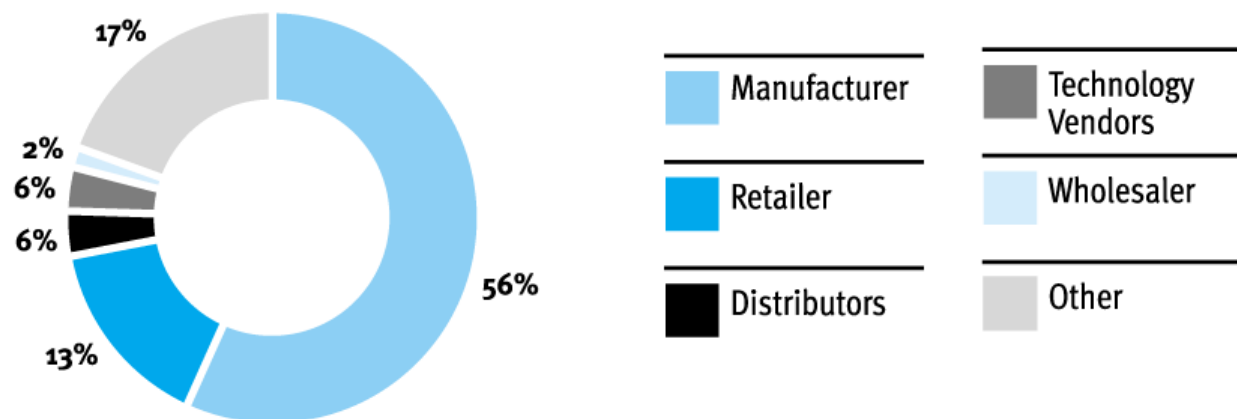


OVERVIEW OF OUR INITIAL EPC READINESS SURVEY

Purpose:

- To get a baseline from which to level set our activities over the next 2 days
- To give some early indication of where industry participants were sizing up the Auto ID technology opportunity
- To give us some areas “to mine” further in our breakout sessions

EPC™ FORUM SURVEY RESPONDENTS



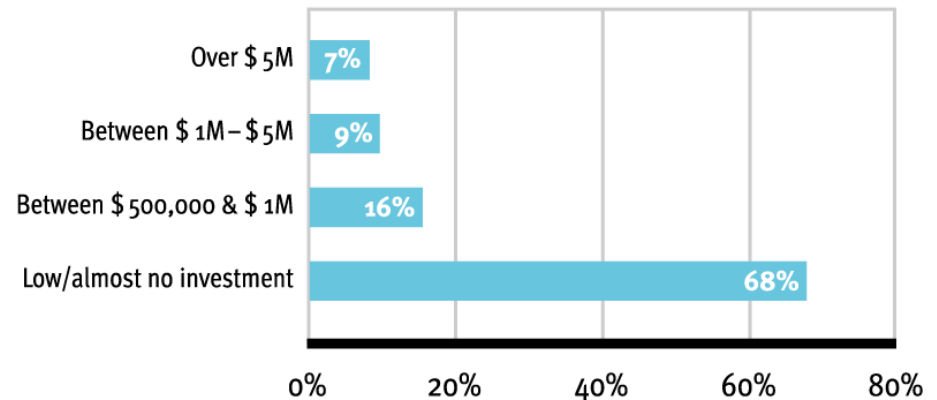


SOME INTERESTING RESULTS...

We had over 180 survey responses

- Representing over 50 companies
- Wide range of functional areas
- Global reach in responses from Europe, Americas and Asia
- Willingness to give feedback and direction setting for each compar

CURRENT RFID INVESTMENT OVER LAST 2 YEARS



Wide range of Auto ID understanding and RFID use today



KEY TAKEAWAYS

- Directional input from manufacturers and retailers is consistent in:
 - ✱ Early priorities
 - ✱ Key barriers & technology considerations
- Significant difference in the expectations of investment and takeup pace
 - ✱ Retailers will pull
 - ✱ Many manufacturers have not heard the message yet
- Pallet & Case level application seen as near term (2002/2003) – in several product categories
 - ✱ Item level varies significantly by product category
- Common themes:
 - ✱ “Standards, Standards, Standards”
 - ✱ “Business needs will drive this - - not technology ‘flash’”
 - ✱ “Let the marketplace work” – not prescribing the technology solution; that’s up to you!



BREAKOUT SESSION OVERVIEW

A total of six sessions were conducted simultaneously.

- ✱ Five Manufacturer Sessions
- ✱ One Retailer Session

The overall “Manufacturer- Retailer” Value Chain was used as the basic framework for the discussion in each session.

Participants in each session

- ✱ Discussed current Auto-ID initiatives and timing of planned Auto-ID investments
- ✱ Prioritized the Auto-ID “Application Areas” across the supply chain
- ✱ Outlined key technology requirements to make the “Application Areas” a reality
- ✱ Discussed key challenges and barriers to implementation





BREAKOUT SESSION OVERVIEW

Participants in each session selected three high priority “Application Areas” to discuss in further detail.

Manufacturer	Manufacturer DC/ 3PL	Retail DC/ 3PL	Retail Store
<ul style="list-style-type: none">• Inventory Management• Warehouse Management• Transportation & Logistics Management• Customer Service Management• Asset Tracking• Manufacturing/Quality Control• Track and Trace• Trade Funds management• Procurement• VMI		<ul style="list-style-type: none">• Pay on Scan• DSD• Out of stocks• Theft• Product Obsolescence• Order Fulfilment Management• Consumer Insight• Demand Planning• CPFR	



CURRENT-STATE EXECUTION AND PLANNING OF AUTO-ID INITIATIVES

Today: The majority of the retailers present already have plans to invest in some level of Auto-ID initiative

	Completed	Initiated	Planned (6-12 months)
Business Case	23%	38%	31%
Pilots	15%	23%	85%
Roll-Outs	0%	0%	46% *

** Rollout dependant upon success of pilots*



CURRENT-STATE EXECUTION AND PLANNING OF AUTO-ID INITIATIVES

Today: A total of almost 40% of the manufacturers have already/or have plans to invest in Auto-ID initiatives

	Completed	Initiated	Planned (12-18 months)
Business Case	8%	13%	32%
Pilots	5%	12%	39%
Roll-Outs	0%	1%	21%

The majority of business cases have been conducted by manufacturers to date



CURRENT INVESTMENT PLANNING FOR AUTO-ID

Almost 70% of retailers expect to have initiated a rollout program by the end of 2005

	Y2003	Y2004	Y2005	Y2006	>Y2006	No Answer
Initiate roll-out of Auto-ID solutions	8%	38%	23%	8%	0%	23%



CURRENT INVESTMENT PLANNING FOR AUTO-ID

Manufacturer

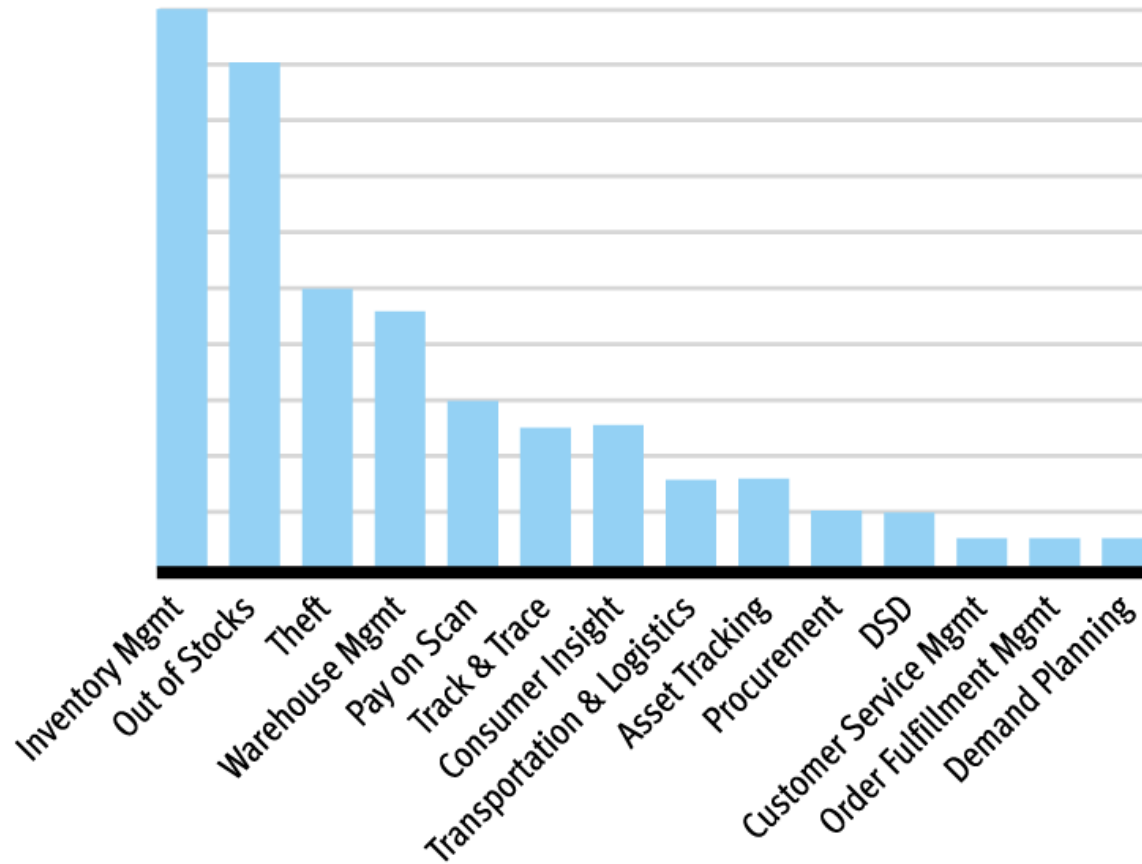
75+% of the manufacturers expect to be complete with a pilot and initiate Auto-ID roll-out by Y2006

	Y2003	Y2004	Y2005	Y2006	>Y2006	
Initiate roll-out of Auto-ID solutions	3%	25%	33%	13%	16%	



APPLICATION PRIORITIES

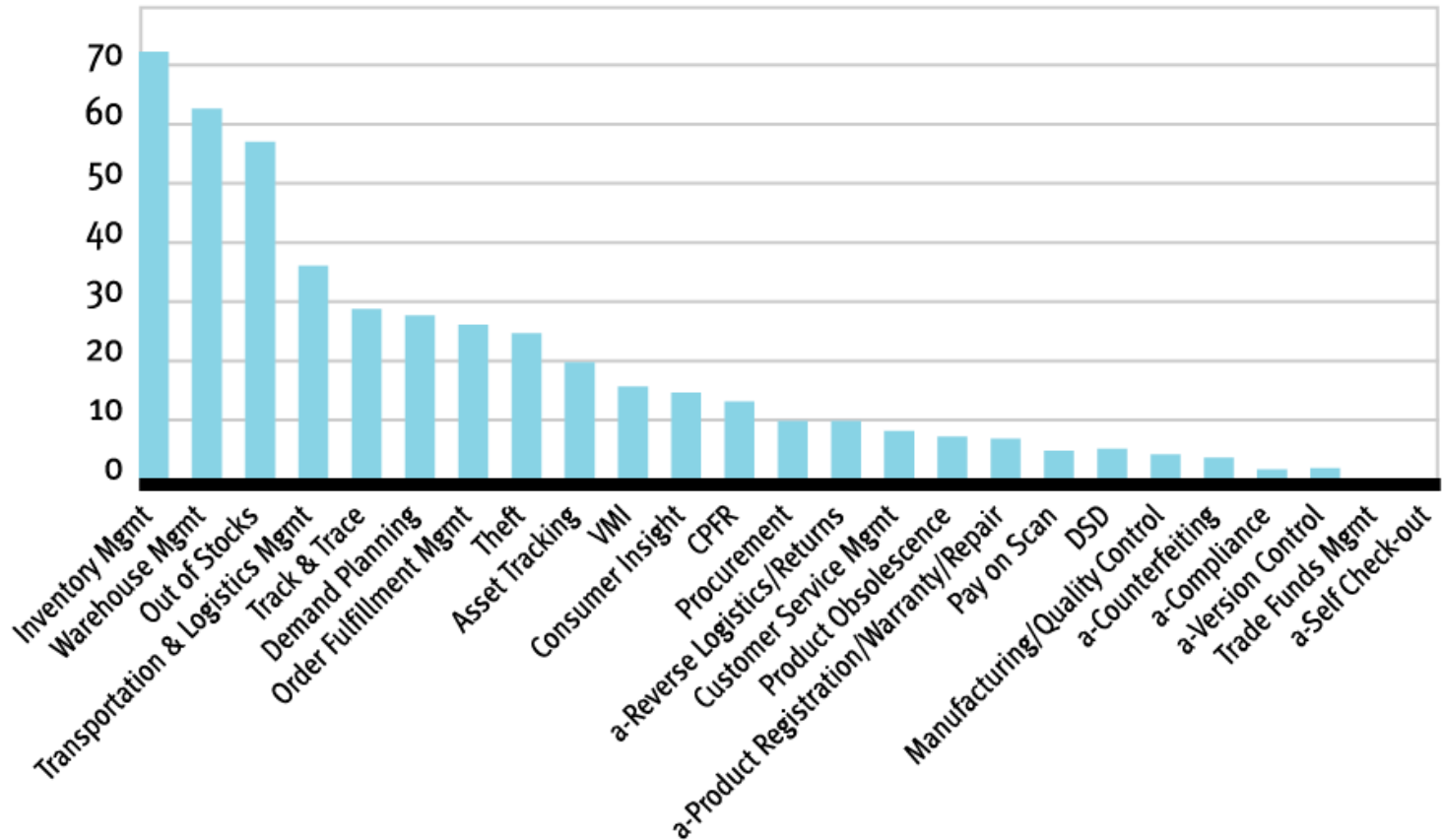
RETAIL APPLICATION AREA PRIORITIES





APPLICATION PRIORITIES

MANUFACTURER APPLICATION AREA PRIORITIES





KEY DRIVERS OF ADOPTION AND BENEFIT AREAS

The top three application areas were:

Application	Key Drivers	Operational Impact	Financial Impact
Inventory Management Out of Stocks	<ul style="list-style-type: none"> • Inventory Visibility and Accuracy across the Supply Chain • Demand/Supply Synchronization • Lost Sales 	<ul style="list-style-type: none"> • Reduced cycle/physical count • Improved in Stock • Improved Promotion Management • Optimized product location(s) 	<ul style="list-style-type: none"> • Decrease in Working Capital • Reduced Labor Costs • Profit Optimisation • Improved Turns • Increase Sales
Theft	<ul style="list-style-type: none"> • Customer Service • Lost Sales 	<ul style="list-style-type: none"> • Increased real time visibility to product status • Improved Measurement Capabilities 	<ul style="list-style-type: none"> • Reduced Cost of Theft • Decrease in LP resources

However, several areas such as warehouse management, pay-on-scan and customer insights also received high scores



KEY DRIVERS OF ADOPTION AND BENEFIT AREAS

Key adoption drivers were identified for each application area, and corresponding Operational and Financial Impact were discussed

Application	Key Drivers	Operational Impact	Financial Impact
Inventory Management	<ul style="list-style-type: none"> • Increased Inventory Accuracy • Increased Inventory Visibility downstream and upstream • Improved Customer Service • Customer Requirements 	<ul style="list-style-type: none"> • Reduced Labor and touches • Increased Inventory Turns • Reduced Obsolescence • Improved Service Levels • Enables pull based replenishment 	<ul style="list-style-type: none"> • Reduced Working Capital • Reduced COGS • Increased Sales
Out of Stock	<ul style="list-style-type: none"> • 8-10% OOS problem, more for promotions • Sales growth • Maintain market share 	<ul style="list-style-type: none"> • Increased Revenue • Increased Customer Service • Ability to measure velocity 	<ul style="list-style-type: none"> • Increased sales • Increased margin/profits • Increased working capital efficiency • Reduce operating costs
Warehouse Management	<ul style="list-style-type: none"> • Accuracy • Labor Efficiency • Throughput 	<ul style="list-style-type: none"> • Picking & Order Accuracy • Automated data capture • Reduced cycle times 	<ul style="list-style-type: none"> • Reduce labor cost • Reduce space requirement



KEY TECHNOLOGY REQUIREMENTS

Our discussion revealed similar technology requirements across each application area

Product Systems	Information Systems	Resource Systems	Other Systems
<p>Cheap tags and Readers with reliable read rates</p> <p>POS and Handhelds with integrated optical and RFID capability</p>	<p>Integration with all tracking systems</p> <ul style="list-style-type: none">• Ordering• Returns• Pricing <p>Allow for EPC/SKU information to feed into current systems</p>	<p>Integration with:</p> <ul style="list-style-type: none">• Data management systems• Analytics	<p>Increased Network Bandwidth</p> <p>Increased Data Storage</p> <p>Middleware capable of scaling with rollout volumes</p>



KEY CHALLENGES AND BARRIERS TO IMPLEMENTATION

The Barriers and Challenges were also seen to be similar across applications

INTERNAL CHALLENGES

- New process design and implementation
- Integration with existing systems
- Competing priorities for business assets
- Replacement of existing systems
- High investment in current solutions
- Lack of executive sponsorship

EXTERNAL CHALLENGES

- Privacy concerns and consumer perceptions
- Intellectual property rights
- Legislation/Government/Policy
- Data synchronization
- External data management
- Engineering challenges
- Selling the benefits to Vendors & Consumers



ANTICIPATED DEPLOYMENT – YEAR ADOPTION BEGINS

	TODAY	2003	2004	2005	2006	2007	NEVER
APPAREL			Pallet	Item, Case			
GROCERY			Pallet	Case		Item	
CONSUMER ELECTRONICS		Pallet	Case, Item	Item			
HPC		Pallet	Case	Item			
MEDIA			Pallet				
PHARMA		Pallet	Item, Case				
TOYS		Pallet	Item, Case				

This page was summarized from several responses. It does not represent a commitment to adopt the technology. In general, participants assumed that “key challenges” on the previous pages have been addressed and are mitigated.



CONCLUSIONS

- Companies are planning to invest but cautiously
- Initial investments are strategic and point solution based
- Companies are looking to implement integrated solutions
- Interoperability of components and participation in an effective standards management process are essential
- There are early indications of priority application areas both for retailers and manufacturers
- Inconsistent expectation on adoption timing and rollout priorities
- However, Auto-ID/RFID is expected to be a cost of doing business in the future



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BUSINESS CASE WHITE PAPERS

AUTO-ID CENTER BOARD MEETINGS

ATLANTA, GA

FEBRUARY 26-27, 2003



OUTLINE

- Three Research Papers
 - ✱ If You Build It, They Will Come: EPCTM Forum Market Sizing Analysis
 - ✱ Auto-ID on the Line: The Value of Auto-ID Technology in Manufacturing
 - ✱ Auto-ID in the Box: The Value of Auto-ID Technology in Retail Stores



OBJECTIVES

- EPCTM Forum

Align End-Users of Auto-ID technology to the critical common requirements for broader deployment of Auto-ID solutions and then communicate these requirements to the technology community

- Market Sizing

Provide insights to the technology community and help them understand how big and in which direction the Auto-ID market will grow



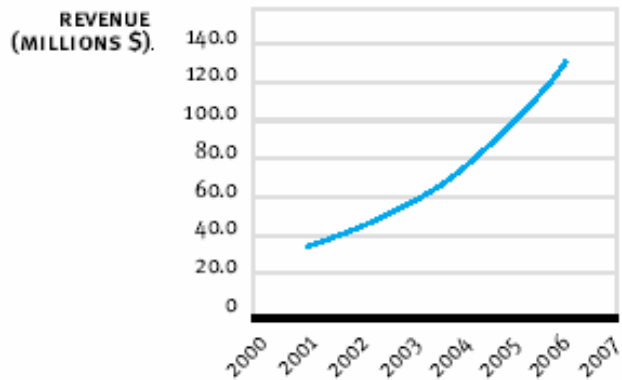
APPROACH

- RFID market growth projections based on secondary research
- EPC™ Forum pre-event survey
- EPC™ Forum breakout sessions

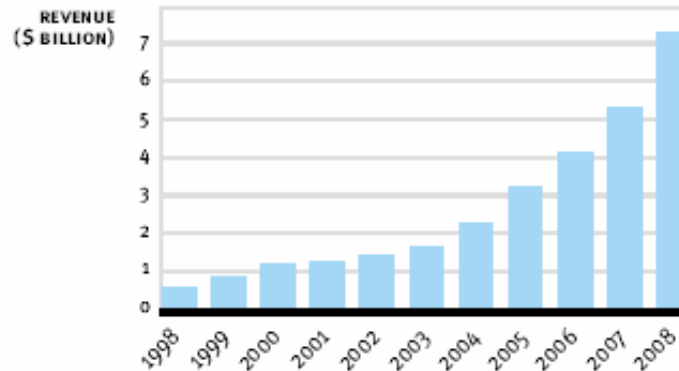


MARKET GROWTH

LOW-COST RFID REVENUE GROWTH



TOTAL RFID-BASED APPLICATIONS MARKET: REVENUE FORECASTS (WORLD), 1998–2008

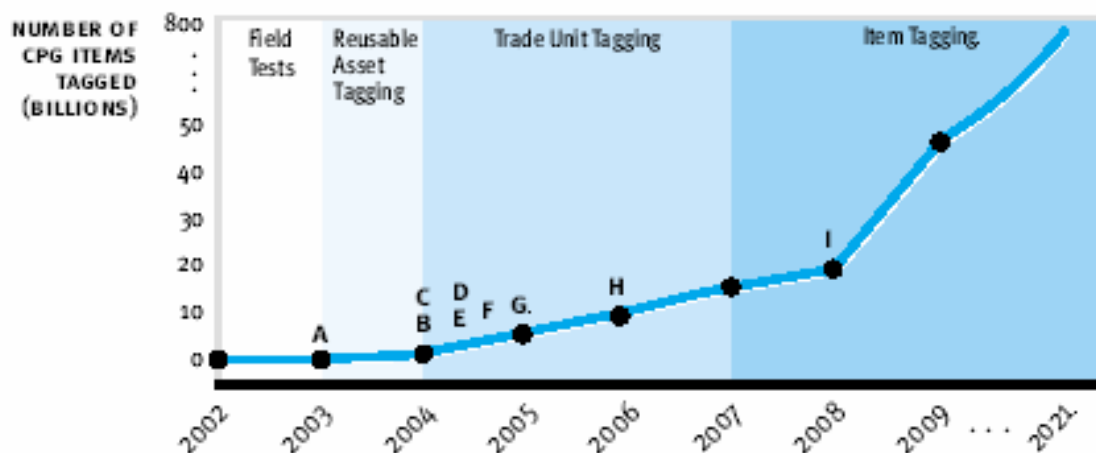


Data Source: Frost and Sullivan, "World RFID-Based Application Market," August 2002, Depak Shetty.



MARKET GROWTH

DRIVERS FOR AUTO-ID ADOPTION



A 2003, Government

Regulation for Cross-Border Trade
GB nations pass regulations calling for computerized customs inspection and quicker exchange of information on the contents of freight containers.

B 2004, Software Standards

SAP, Savit Technology and other software vendors standardize the middleware required for RFID supply chain deployments.

C 2004, Data Standards

EPC™/RFID pilots like the Field Test drive adoption of data standards for passive identification.

D 2004, Lower-Cost Tags

Tags reach \$0.05 with 1 billion chips produced for use across all manufacturing sectors.

E 2004, Supply Chain Vendor's Investments

CHEP tags its wooden pallets and other reusable assets – which means that 25% of the reusable

logistics assets in the CPG supply chain are “intelligent.”

F 2004, Wal-Mart's Support

Once tags reach \$0.05, Wal-Mart pushes for RFID at pallet level – and case level for products prone to stock-outs.

G 2005, Other Retailers' Support

Following the lead of early adopters, most retailers require RFID at pallet level – and case level for products prone to stock-outs.

H 2006, US Food Safety Regulations

Forrester expects Hazard Analysis and Critical Control Point (HACCP) regulations to drive RFID adoption for cases of perishable goods because of growing concerns about food safety.

I 2008, Tags Reach \$0.01

On the heels of case-level tagging, making feasible item-level tagging for goods like over-the-counter drugs, cosmetics and cigarettes.



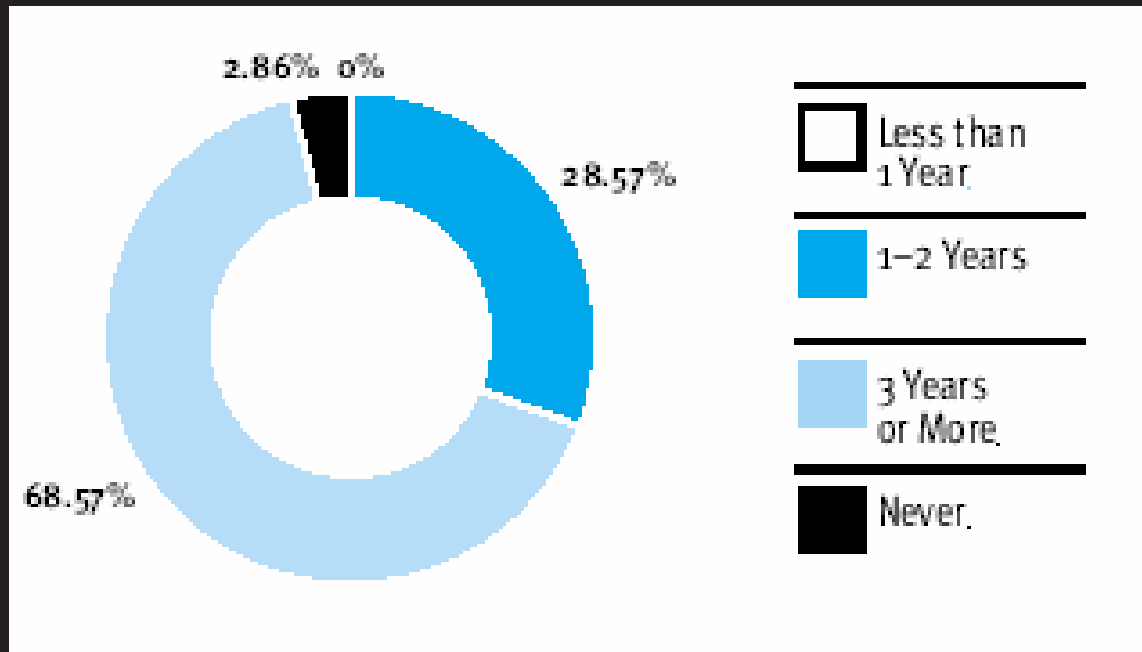
MARKET GROWTH

- “...many vendors and analysts come and talk to me. They always ask what direction my budgets are going – up, flat, or down. If I indicate down they tend to be discouraged and walk away. If they bothered to stay and ask a follow up question on what I’m doing with the budget I have, here’s what I’d say... Spending is clearly down on ERP since we’re now in maintenance mode. However, spending is up on new and coming technologies like supply chain solutions and EPC™ and the hardware and software it requires...”.

Steve David, CIO, Procter & Gamble

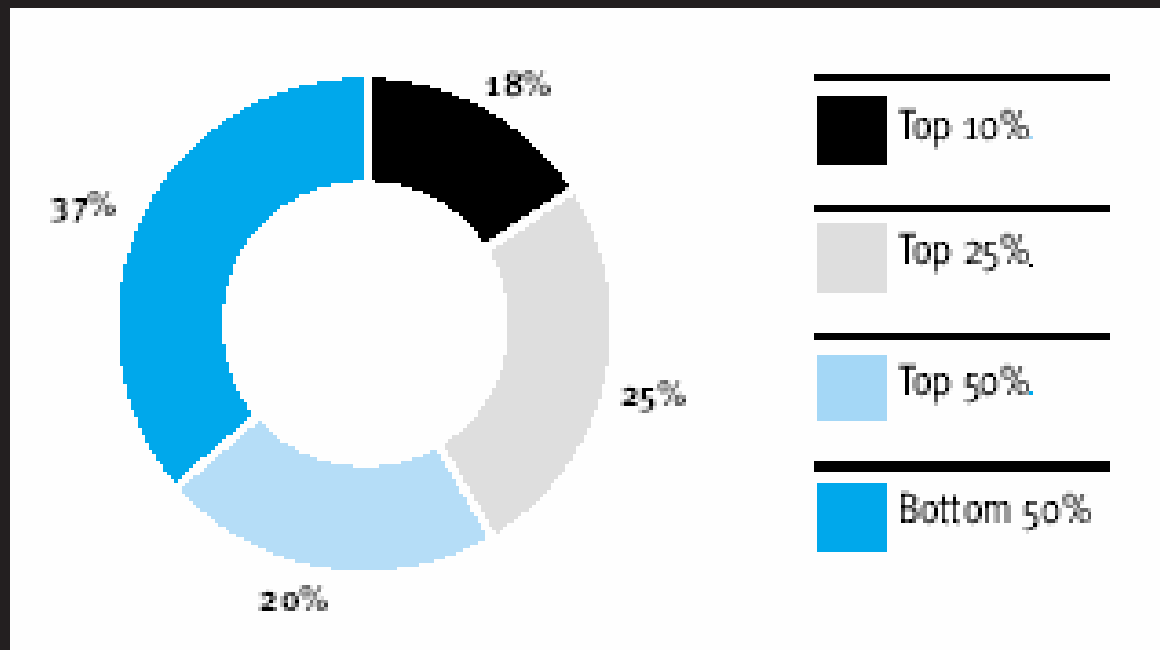


WHEN DO YOU ANTICIPATE YOU WILL USE AUTO-ID AT MASS SCALE?



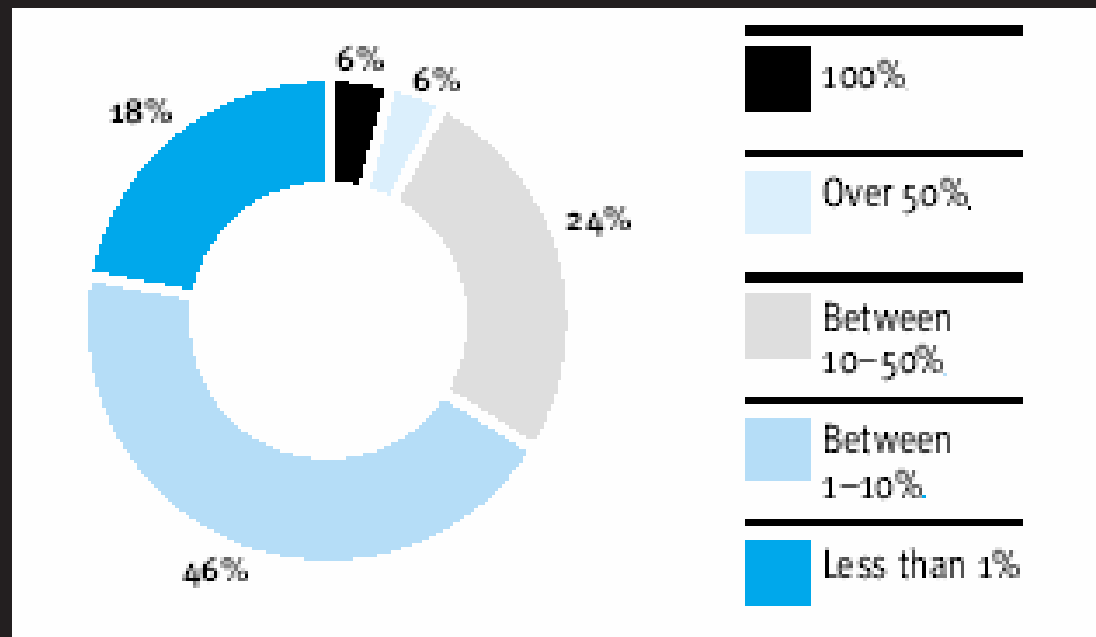


WHERE DOES AUTO-ID FALL ON THE LIST OF COMPANY PRIORITIES?



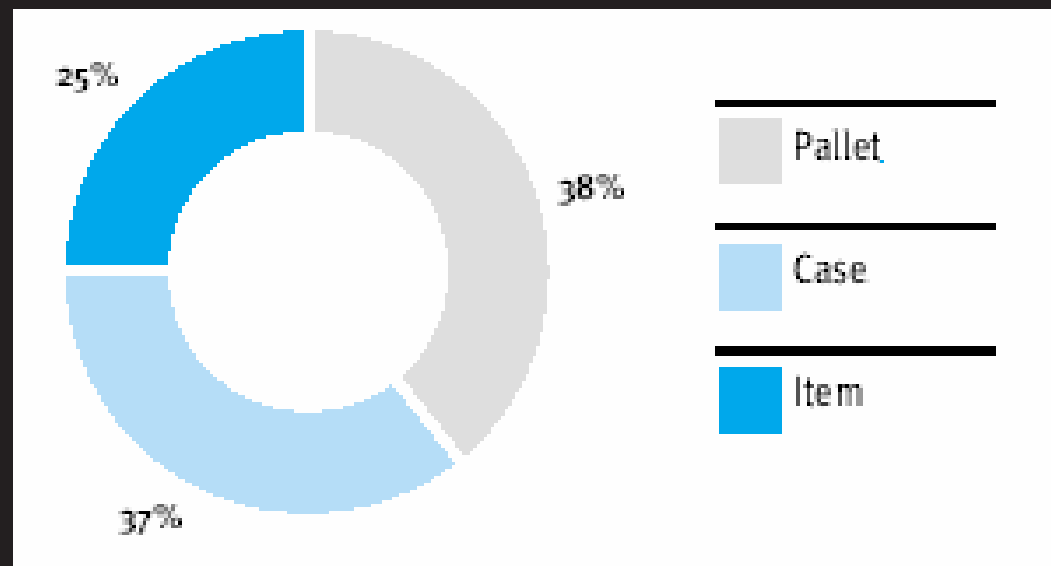


WHAT PERCENTAGE OF PRODUCTS DO YOU EXPECT YOUR COMPANY TO BE TAGGING BY THE END OF 2004?



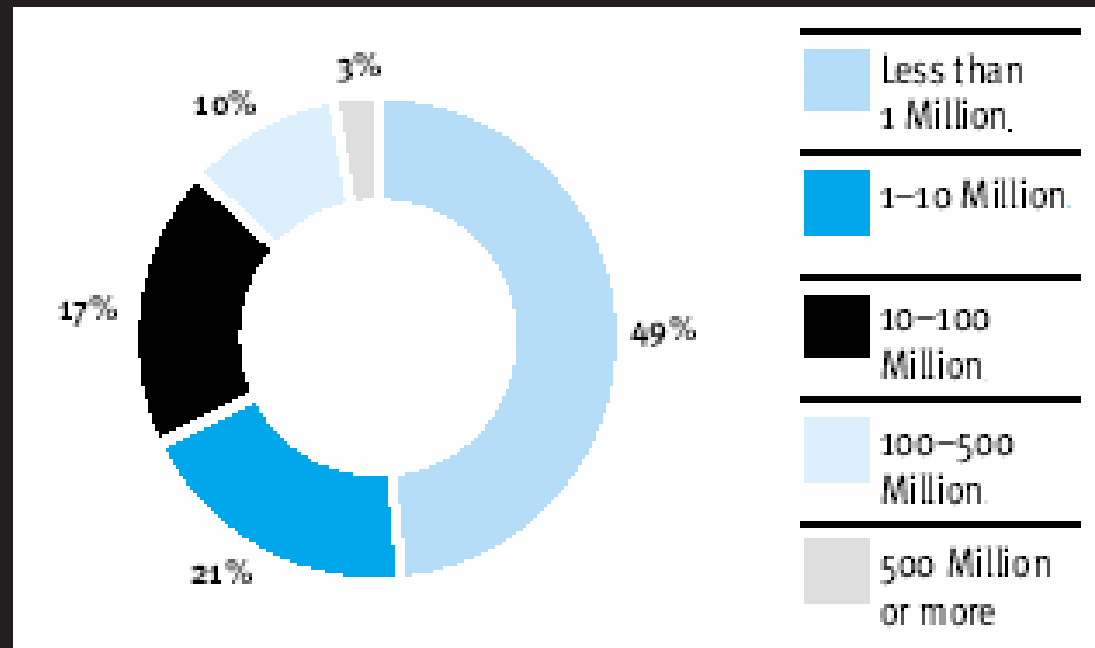


AT WHAT LEVEL DO YOU ANTICIPATE YOUR COMPANY WILL BE TAGGING PRODUCTS OVER THE NEXT TWO YEARS?





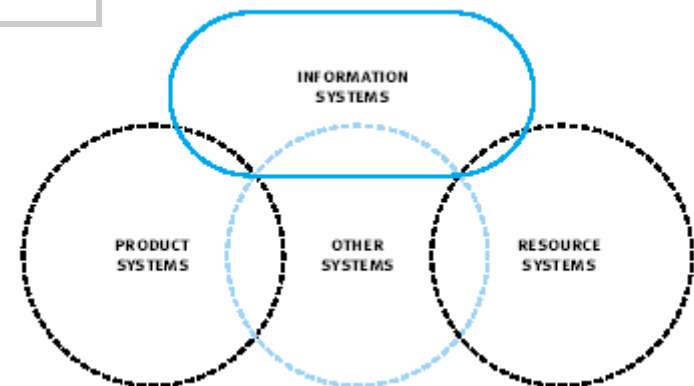
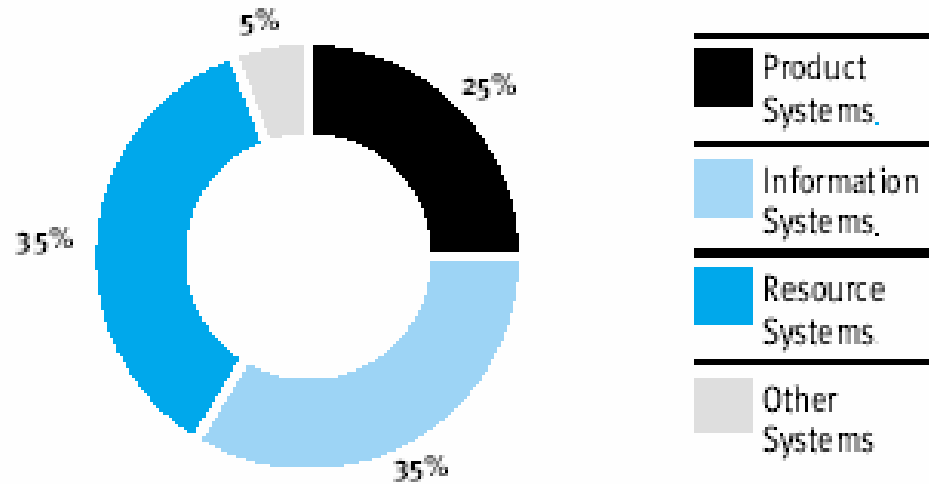
HOW MANY TAGS DO YOU ANTICIPATE YOUR COMPANY WILL PURCHASE BY THE END OF 2004?





TECHNOLOGY SOLUTION COST ALLOCATION

TECHNOLOGY SPEND ESTIMATES





NEAR TERM PLANS

RETAILER

	COMPLETED	INITIATED	PLANNED*
BUSINESS CASE	23%	38%	31%
PILOTS	15%	23%	85%
ROLL-OUTS	0%	0%	46%

MANUFACTURER

	COMPLETED	INITIATED	PLANNED*
BUSINESS CASE	8%	13%	32%
PILOTS	5%	12%	39%
ROLL-OUTS	0%	1%	21%

*(12-18 Months)



LONG TERM PLANS

RETAILER

	2003	2004	2005	2006	> 2006	NO ANSWER
INITIATE ROLL-OUT OF AUTO-ID SOLUTIONS	8%	38%	23%	8%	0%	23%

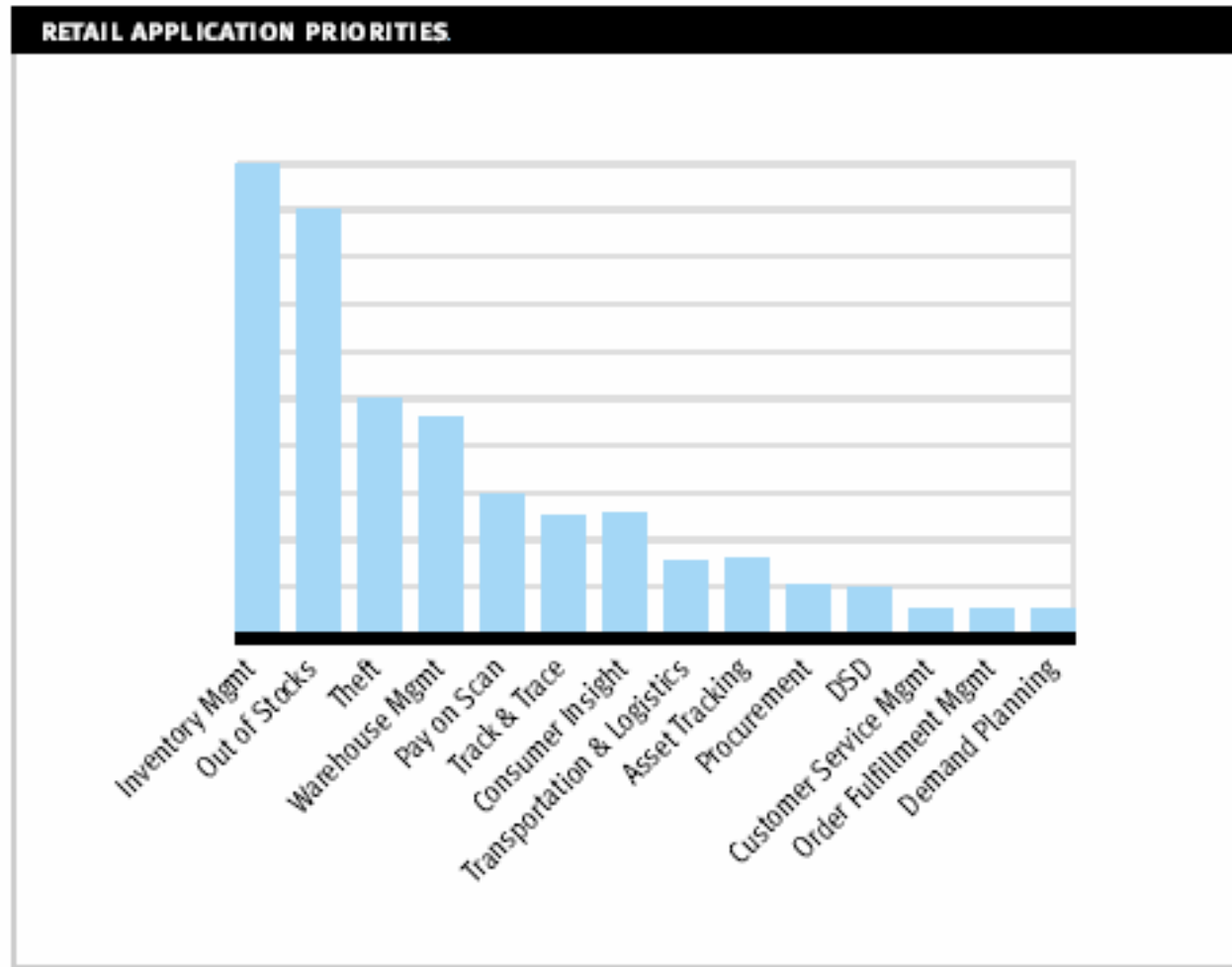
MANUFACTURER

	2003	2004	2005	2006	> 2006	NO ANSWER
INITIATE ROLL-OUT OF AUTO-ID SOLUTIONS	3%	25%	33%	13%	16%	10%



APPLICATION PRIORITIES

RETAILER

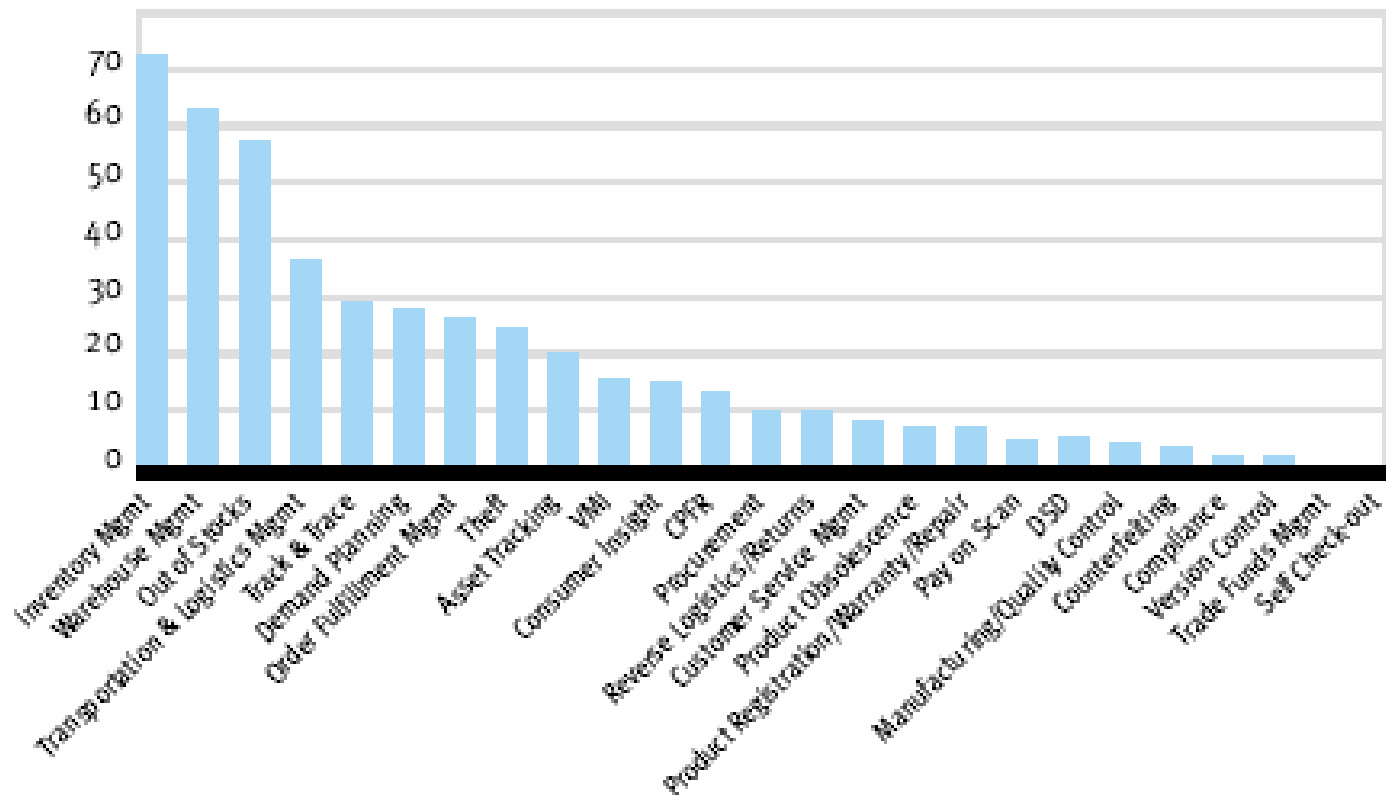




APPLICATION PRIORITIES

MANUFACTURER

MANUFACTURER APPLICATION PRIORITIES





HIGH PRIORITY APPLICATIONS DETAILED DISCUSSION

RETAILER

- Inventory Management
 - Out of Stocks
 - Theft
- Key Drivers to Adoption
 - Key Technology Requirements
 - Internal & External Challenges



HIGH PRIORITY APPLICATIONS DETAILED DISCUSSION

MANUFACTURER

- Inventory Management
- Out of Stocks
- Warehouse Management

- Key Drivers to Adoption
- Key Technology Requirements
- Internal & External Challenges



ANTICIPATED DEPLOYMENT

RETAILER

	TODAY	2003	2004	2005	2006	2007	NEVER
GROCERY			Pallet	Case		Item	
CONSUMER ELECTRONICS		Pallet	Case, Item	Item			
HPC		Pallet	Case	Item			
MEDIA			Pallet				
PHARMA		Pallet	Case, Item				
TOYS		Pallet	Case, Item				
APPAREL			Pallet	Case, Item			



ANTICIPATED DEPLOYMENT – PALLET LEVEL

MANUFACTURER

	TODAY	2003	2004	2005	2006	2007	NEVER
GROCERY							
CONSUMER ELECTRONICS							
HPC							
MEDIA							
PHARMA							
TOYS							
STATIONERY							
FIREARMS							



ANTICIPATED DEPLOYMENT – CASE LEVEL

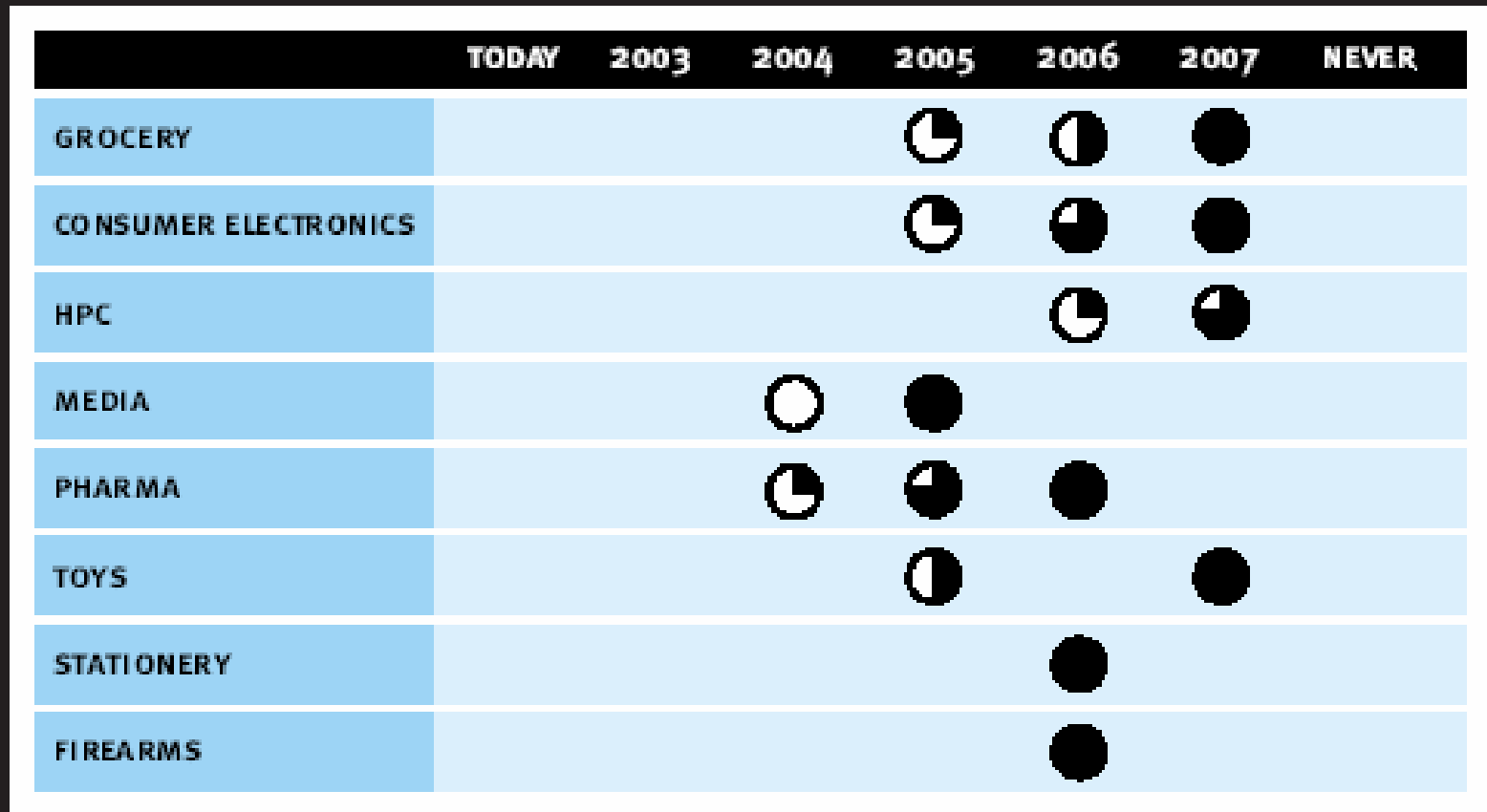
MANUFACTURER

	TODAY	2003	2004	2005	2006	2007	NEVER
GROCERY							
CONSUMER ELECTRONICS							
HPC							
MEDIA							
PHARMA							
TOYS							
STATIONERY							
FIREARMS.							



ANTICIPATED DEPLOYMENT – ITEM LEVEL

MANUFACTURER





EPCTTM FORUM MARKET SIZING CONCLUSIONS

- Manufacturers and Retailers both:
 - have consistent view of the priority applications, key barriers, and requirements
 - have inconsistent expectations on the timing of adoption
- Pallet/Case level tagging will occur soon; item level tagging will vary by product economics
- Information sharing between trading partners will be critical to obtain benefits



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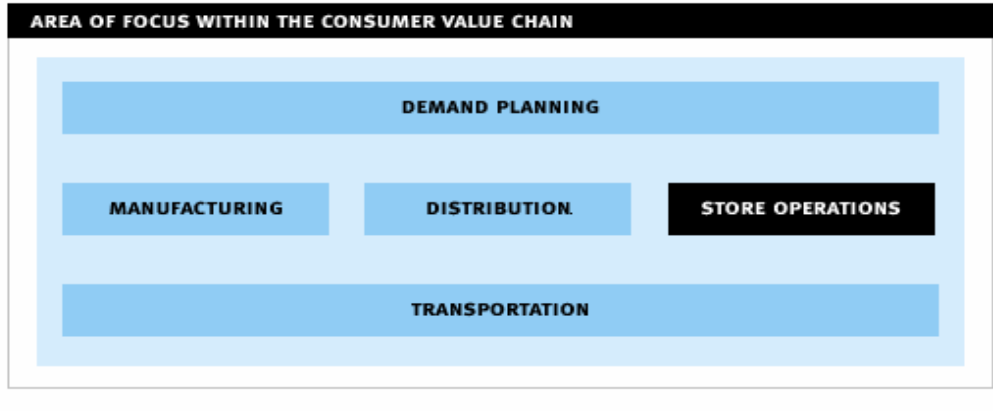
OUTLINE

- Three Current Business Cases
 - ✱ If You Build It, They Will Come: EPC™ Forum Market Sizing Analysis
 - ✱ Auto-ID in the Box: The Value of Auto-ID Technology in Retail Stores
 - ✱ Auto-ID on the Line: The Value of Auto-ID Technology in Manufacturing



AUTO-ID IN THE BOX: THE VALUE OF AUTO-ID TECHNOLOGY IN RETAIL STORES

Scope of Store Operations Paper

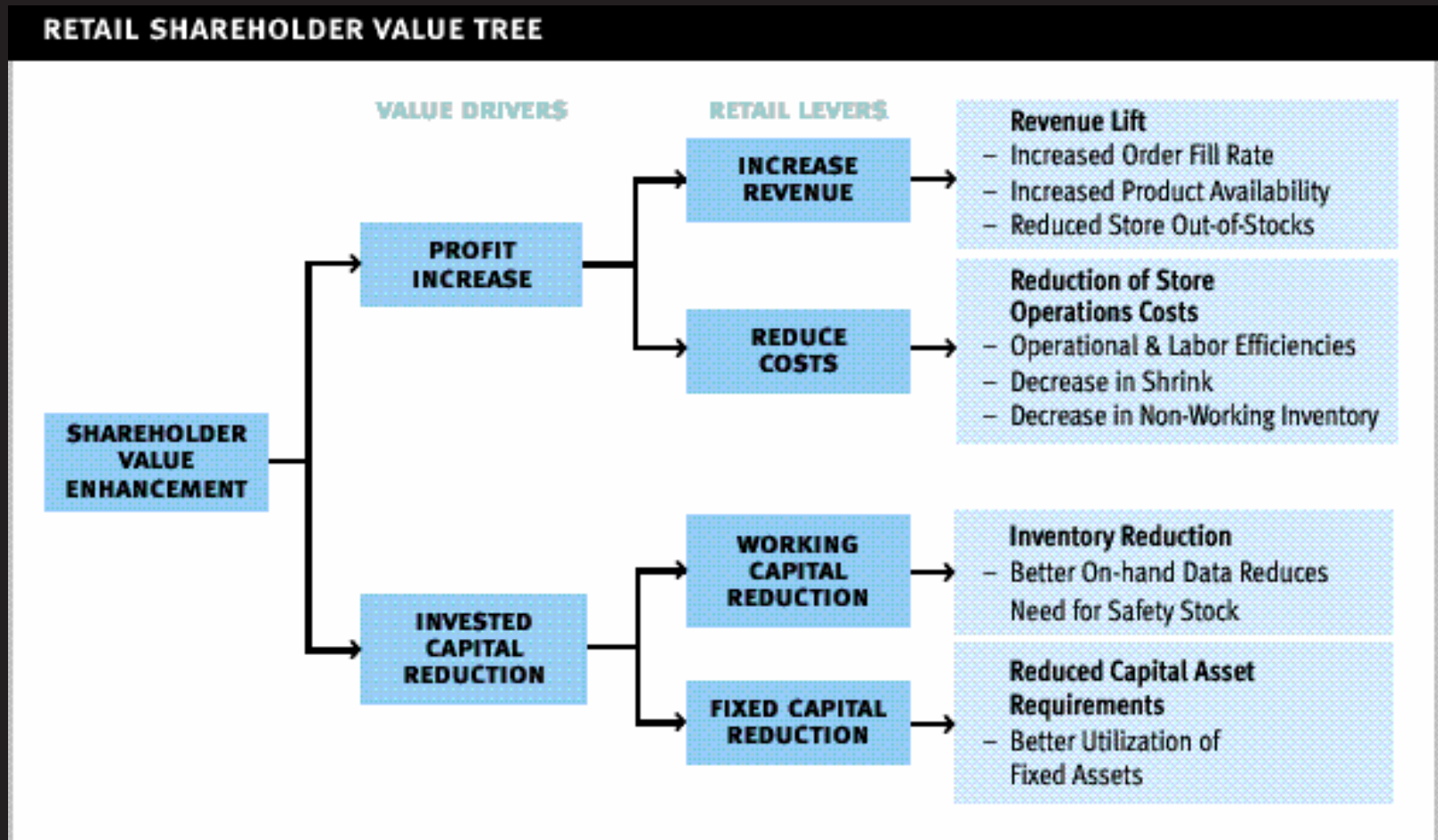


- Retail store operations for this paper encompasses:
 - Store Processes such as receiving, stocking, inventory control and checkout
 - Product Merchandising
- Problems:
 - Many stores suffer from in-store out of stocks for items consumers wish to purchase
 - Shrink is a continual issue
 - Labor requirements prevent store associates from serving customers
- Solutions:
 - Monitor inventory location and status to maintain store in-stock position
 - Automate time consuming tasks to allow for improved customer service or reduced labor costs
- Impact:
 - Improved in-stocks
 - More efficient use of labor



AUTO-ID IN THE BOX: THE VALUE OF AUTO-ID TECHNOLOGY IN RETAIL STORES

The Impact of Speed, Efficiency, Accuracy





AUTO-ID IN THE BOX: THE VALUE OF AUTO-ID TECHNOLOGY IN RETAIL STORES

Case Study: Store Operations

BENEFIT CATEGORY	CASE LEVEL (\$)	ITEM LEVEL (\$)
INCREASED SALES THROUGH BETTER IN-STOCKS	60,000,000	200,000,000
DECREASED LABOR EXPENSE	141,275,000	218,900,000
DECREASED SHRINK	42,267,500	157,180,000
REDUCED INVENTORY WRITE-OFFS	2,820,000	6,000,000
TOTAL ANNUAL BENEFIT	246,362,500	582,080,000

Savings Potential

COST CATEGORY	CASE INFRASTRUCTURE UP-FRONT COSTS (\$)	ITEM INFRASTRUCTURE UP-FRONT COSTS (\$)
READER COST	16,900,000	133,000,000
COMPUTERS	952,000	7,500,000
STORAGE COSTS	726,000	5,722,000
DATA MANAGEMENT SOFTWARE	1,900,000	15,000,000
INFRASTRUCTURE INSTALLATION	2,200,000	16,600,000
SYSTEMS INTEGRATION	3,600,000	28,200,000
TOTAL	26,200,000	203,400,000
AVERAGE STORE COSTS	34,920	\$ 271,245
ANNUAL MAINTENANCE COSTS		
SERVICE/REPLACEMENT	1,700,000	13,000,000
AVERAGE	2,250	17,380

Implementation Costs



AUTO-ID IN THE BOX: THE VALUE OF AUTO-ID TECHNOLOGY IN RETAIL STORES

OUR CONCLUSION

By implementing Auto-ID solutions, Retailers have the potential to achieve tremendous benefits in store operations through :

- ✱ Increased In-stocks
- ✱ Labor Reductions or Improved Customer Service
- ✱ Reduced Shrink



AGENDA

2:00	Session Opens/BCAG Progress	J. Lo
2:15	EPC Forum Survey	IBM
2:45	EPC Forum Market-Sizing	Accenture
3:15	Auto-ID in Retail	Accenture
3:45	Break	
4:00	Auto-ID in Manufacturing	Accenture
4:30	Auto-ID in Automotive	M. Strassner
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OUTLINE

- Three Research Papers
 - ✿ If You Build It, They Will Come: EPC™ Forum Market Sizing Analysis
 - ✿ Auto-ID in the Box: The Value of Auto-ID Technology in Retail Stores
 - ✿ Auto-ID on the Line: The Value of Auto-ID Technology in Manufacturing



THE IMPACT OF CERTAINTY IN MANUFACTURING

- Production Management
 - ✱ Production Execution and Quality Control
 - ✱ Product Tracking and Genealogy
- Asset Utilization
 - ✱ Reusable Asset Utilization
 - ✱ Maintenance, Repair, and Overhaul
- Inventory Tracking and Visibility
- Labor Productivity



SCENARIO 1 - PAXKO

BENEFITS (PER FACTORY)

VALUE LEVER	CURRENT AMOUNT	ADJUSTMENT	%	AMOUNT		BASIS
REVENUE	\$ 190,476,190	Increase	0.5	952,381	Recurring	Improved quality & customer service
COGS	\$ 95,238,095	Decrease	1.0	952,381	Recurring	Improved equipment efficiency and labor productivity
CURRENT ASSETS	\$ 19,047,619	Decrease	5.0	952,381	One-time	Reduced RM/WIP/FG inventory
LONG-TERM ASSETS	\$ 62,857,143	Decrease	2.0	1,257,143	One-time	Improved plant and equipment utilization



SCENARIO 1 - PAXKO

COSTS (PER FACTORY)

CATEGORY	QUANTITY	AVG PER UNIT COST	TOTAL COST
Tags on assets and at “chokepoints” within plant	11,000	\$ 5.00	\$ 55,000.00
Read Points* (1) hardware & installation to control plant production	44	\$ 3,269.00	\$ 143,846.00
Read Points* (2) hardware & installation to enable downstream tag use	8	\$ 3,269.00	\$ 26,154
Computing Infrastructure	1	\$ 60,000.00	\$60,000.00
Business Process, Application and System Integration	1	\$ 1,425,000.00	\$ 1,425,000.00
Total One-Time Costs			\$ 1,710,000.00
Recurring In-Plant Tags & Other Maintenance Costs (3)	1	\$ 307,800.00	\$ 307,800.00
Recurring Outbound Pallet & Case tags	1,524,158	\$ 0.39	\$ 594,422.00.



SCENARIO 2 – NORTHERN FINE FOODS

BENEFITS (PER FACTORY)

VALUE LEVER	CURRENT AMOUNT	ADJUSTMENT	%	AMOUNT		BASIS
REVENUE	\$ 400,000,000	Increase	1.0	4,000,000	Recurring	Improved quality & customer service
COGS	\$ 240,000,000	Decrease	2.0	4,800,000	Recurring	Improved equipment efficiency and labor productivity
CURRENT ASSETS	\$ 40,000,000	Decrease	5.0	2,000,000	One-time	Reduced RM/WIP/FG inventory
LONG-TERM ASSETS	\$ 132,000,000	Decrease	1.0	1,320,000	One-time	Improved plant and equipment utilization



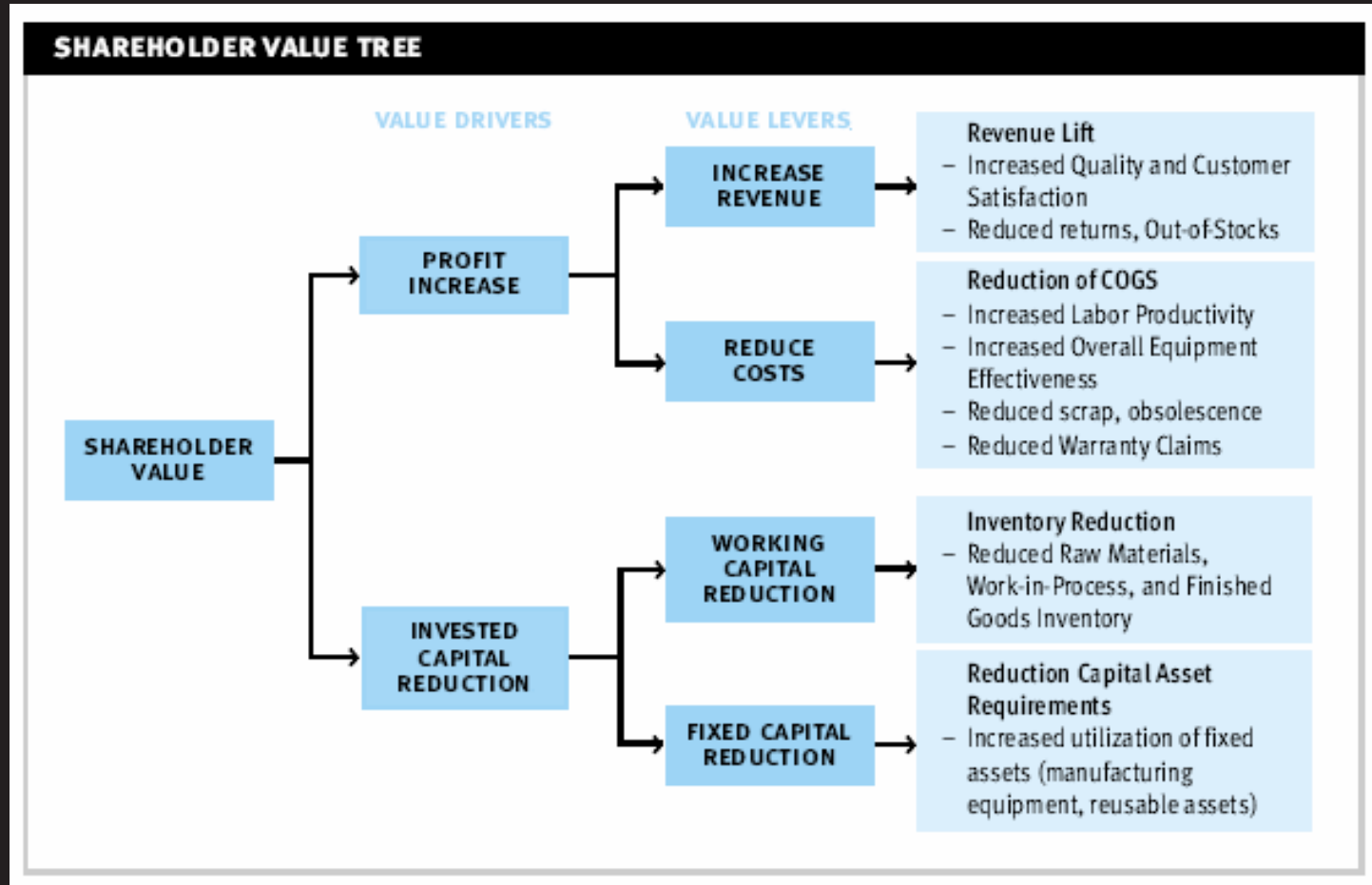
SCENARIO 1 - PAXKO

COSTS (PER FACTORY)

CATEGORY	QUANTITY	AVG COST PER UNIT	TOTAL COST
Tags on assets and at “chokepoints” within plant	17,100	\$5.00	\$85,500.00
Read Points* (1) hardware & installation to control plant production	66	\$3,115.00	\$205,615.00
Read Points* (1) hardware & installation to enable downstream tag use	12	\$3,115.00	\$37,385.00
Computing Infrastructure	1	\$60,000.00	\$60,000.00
Business Process, Application, and System Integration	1	\$1,942,500.00	\$1,942,500.00
Total One-Time Costs			\$2,331,000.00
Recurring In-Plant Tags & Other Maintenance Costs (3)	1	\$419,580.00	\$419,580.00
Recurring Outbound Pallet & Case tags	7,561,728	\$0.30	\$2,268,519.00



BOTTOM LINE IMPACT



UP TO 1%

UP TO 5%

UP TO 8%

UP TO 5%



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M-LAB

THE PROMISE OF AUTO-ID IN THE AUTOMOTIVE INDUSTRY

MARTIN STRASSNER

M-LAB, UNIVERSITY OF ST. GALLEN, SWITZERLAND



TEAM

- Joyce Lo, Project Manager
- Stan Drobac
- Elgar Fleisch, M-Lab
- Martin Strassner, M-Lab



AGENDA

- Objectives of the Report
- The Automotive Value Chain
- Application Overviews and Example
- RFID Adoption and next steps



OBJECTIVES OF THE AUTOMOTIVE REPORT

- Current RFID applications and their costs and benefits
- The business need for advanced Auto-ID technology in various areas of the automotive value chain
- Likely scenarios for adoption of Auto-ID technology
- Drivers and challenges on the adoption path



APPLICATION OF THE AUTO-ID CONCEPT

- The Electronic Product Code™ (EPC™)
- The Smart Tag that carries the EPC™ code
- The Physical Markup Language (PML)
- The Objects Name Service (ONS)
- The Savant™ software

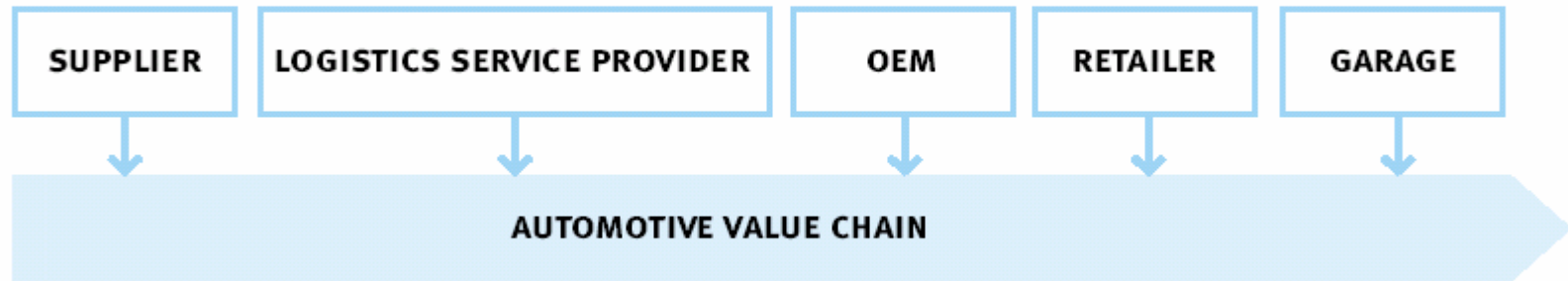


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THE AUTOMOTIVE VALUE CHAIN

THE AUTOMOTIVE VALUE CHAIN



e.g. GE, Bosch,
etc

eg. Hapag
Loyd, Chep, etc

eg. BMW,
DaimlerChrysler
Ford, GM,
Volkswagen

e.g. Auth. dealers,
Switzerland:
AMAG

e.g. Auth. dealers,,
Pitstop, etc.



SCENARIO SOURCE TAGGING

	SUPPLIER	OEM	DEALER	GARAGE
COSTS	<ul style="list-style-type: none">– tagging– changes in production process– reader infrastructure	<ul style="list-style-type: none">– reader infrastructure– integration into existing IT infrastructure	<ul style="list-style-type: none">– reader infrastructure	<ul style="list-style-type: none">– reader infrastructure
BENEFITS	<ul style="list-style-type: none">– distribution– theft control	<ul style="list-style-type: none">– inventory management– theft control– brand authentication– assembly– distribution– support for recalls– recycling	<ul style="list-style-type: none">– distribution– theft control– brand authentication	<ul style="list-style-type: none">– maintenance– brand authentication



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CLASSIFICATION OF AUTO-ID APPLICATIONS

PART TRACKING	CAPITAL ASSET MGT	VEHICLE RELATED
Inventory Management Assembly Theft Control Brand Authentication Maintenance Recall Recycling	Container Management Tool Management	Car Identification Access Control Tire Pressure Monitoring



PART TRACKING APPLICATIONS

- Processes: **SCM, CRM**, Collaborative
- Strong need for a **common infra-structure** (standards for data management)
- **Open loop** scenarios
- Mainly **passive** transponder technology
- How can costs and benefits shared equally across the **Value Chain** ?

→ Positive Business Cases can only be achieved by Low Cost RFID like provided by the concept of the Auto-ID center.

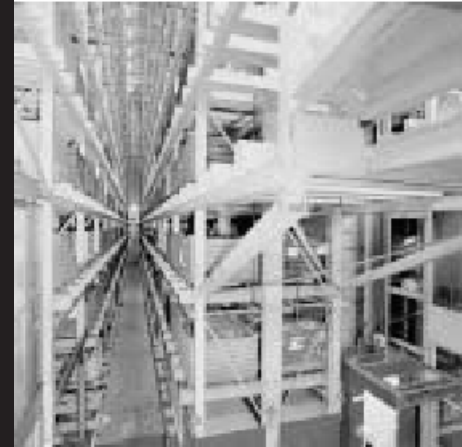
PART TRACKING

Inventory Management
Assembly
Theft Control
Brand Authentication
Maintenance
Recall
Recycling



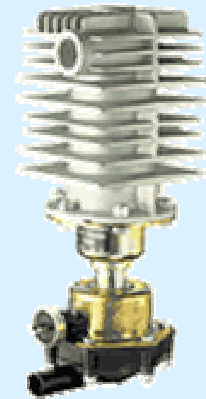
INVENTORY / REPLENISHMENT MANAGEMENT

- Tracking and localization of parts at the production site is a key application
- Three scenarios:
 1. Item level tagging
 - requires source tagging
 - open loop, expensive
 2. Packaging level tagging, (e.g. e-waybill)
 - open or closed loop
 3. Container tracking (soft tracking)
- **Benefits:** Reduced safety stock, prevention of material outages, more accurate and faster flow of parts, fewer high-cost emergency orders, no lost inventory, no manual stocktaking required, no search for misplaced parts, check-in and check-out processes can be automated, supports vendor managed inventories (VMI)
- Example: Soft tracking based replenishment management at Ford



BRAND AUTHENTICATION

- 10% of all spare parts sold are counterfeits
(Source: Ms. Lalk-Menzel, DaimlerChrysler)
- Two types of counterfeits:
 - Copies of third companies (mainly Eastern Europe and Asia), Sometimes bad quality
 - Overproduction of authorized suppliers
- Tagging pays off for all parts where profit per sale is approx. ten times higher than the price for the tagging
- Collaboration of OEMs and Retailers required (common infrastructure)



Is this a counterfeit?



FROM AUTOMATIC LOGGING TO FULLY AUTOMATED ASSEMBLY

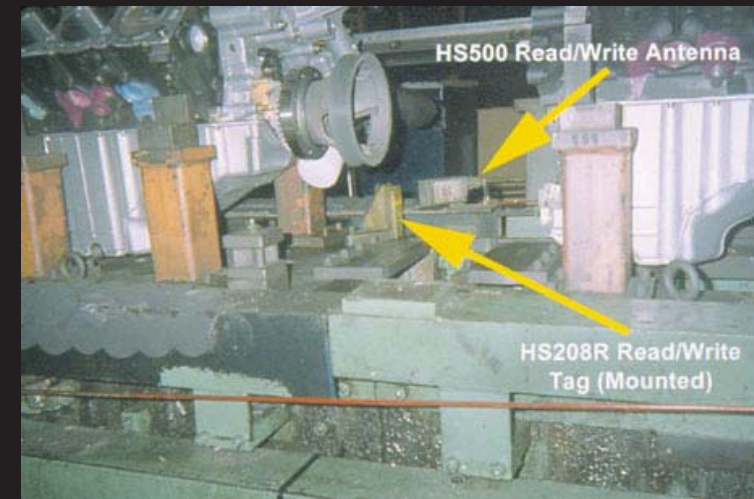
Three scenarios for assembly automation:

1. Work-in-progress Tracking
one tag attached to the car/porter
Examples at BMW, DaimlerChrysler, Ford, Volkswagen
2. Build-to-order Management
tags attached to some parts
3. Fully automated assembly
all parts are tagged
elimination of human intervention



TODAY: WORK-IN-PROGRESS TRACKING AT FORD

- Ford (Essex) uses RFID tags to identify different types of engines that are leaving the production line in a mixed order.
- The entire work sequency and additional test data is stored on the transponder.
- Each station communicates with the tag
- Benefits:
 - Quality control
 - Status about Work-in-progress
 - Avoidance of errors in engine identification



Source: EMS



EXAMPLE CASE TIRE TRACKING

- First standard for RFID based item tagging

AIAG B-11

manufacturing plant, manufacturing date, tire size, unique serial number, vehicle ID, ... stored on the tag

UHF based

First product available from Intermec

Linkage of tire ID to VIN required by US law

Further benefits

Support for recalls

Distribution

- Could be path breaking for further applications with item level tagging





CAPITAL ASSET MANAGEMENT

- Processes: SCM
- Closed loop scenarios
- Active and passive transponder technology
- Quick ROI possible

→ Auto-ID concept (common infrastructure) will lead to efficiency gains and outsourcing potential.

CAPITAL ASSET MGT

Container Management
Tool Management

EXAMPLES FROM THE AUTOMOTIVE INDUSTRY

- E.g., in the german automotive industry are at least 60M small and medium sized plastic containers and approx. 40M racks in use.
 - Tracking
 - Reduced cycle time
 - Efficient use of resources
 - Less shrinkage
 - Maintenance history
 - Payment based on cycle time
- Pos. ROI in less than one year
- Example: Special rack tracking at VW





VEHICLE RELATED APPLICATIONS

- Adds functionality (e.g. safety, convenience) and new services (e.g. toll collection)
- Application related and technology standards necessary
- Examples:
 - Toll collection
 - Electronic number plate
 - Maintenance record
 - Theft control

→ A variety of applications in combination of vehicle identification and object history data could use the Auto-ID infrastructure.

VEHICLE RELATED

Car Identification
Access Control
Tire Pressure Monitoring



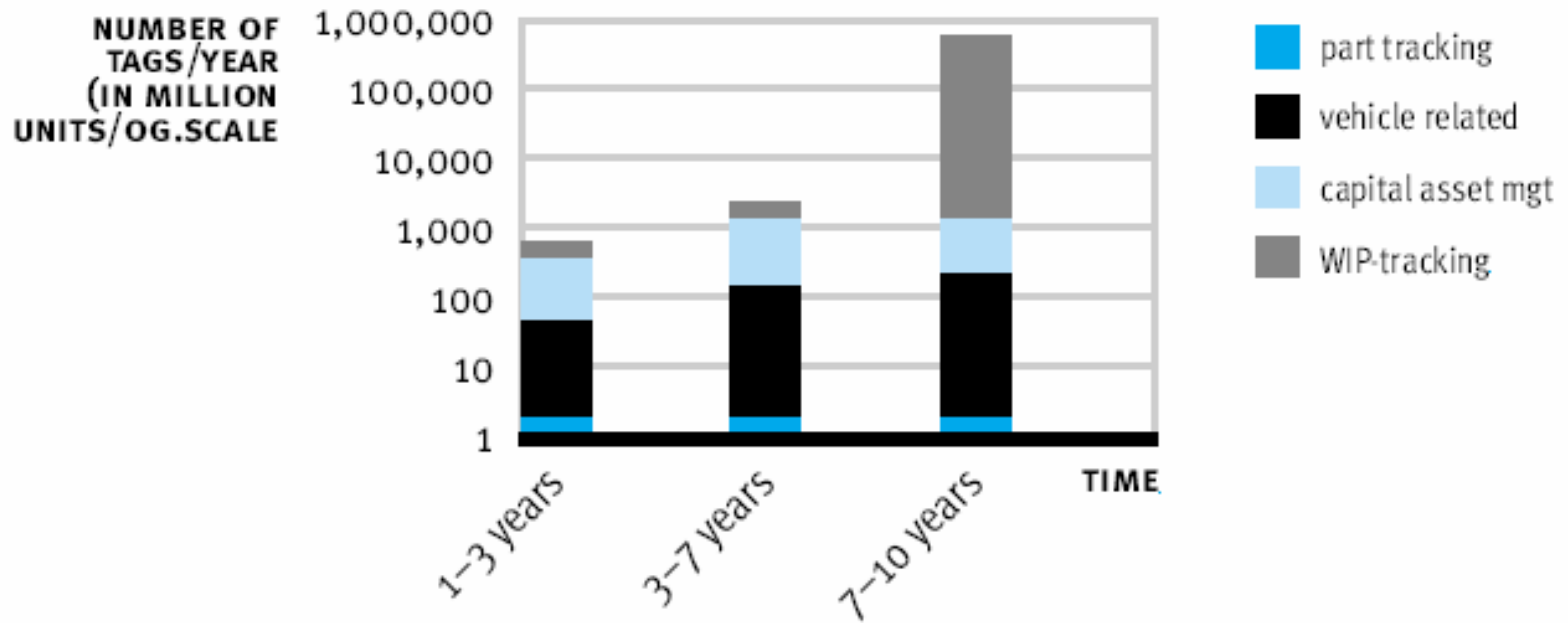
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RFID ADOPTION PER APPLICATION

RFID ADOPTION IN THE AUTOMOTIVE INDUSTRY



13,000 tagged parts/vehicle → Total 650 billion tags worldwide



DRIVERS OF RFID ADOPTION

- Benefits of applications:
Especially Replenishment management, Brand authentication,
Container management
- Advantages over barcodes
No line of sight, durability, resistance against dust and heat, data
capacity, rewritable
- Awareness at Automotive associations
eg. AIAG, VDA
- Leading position in technology adoption of the auto industry
- Successful examples like tire tracking
- Compliance by law



CHALLENGES IN RFID ADOPTION

- Lack of standards/common infrastructure (→ open loop scenarios don't pay off)
- Proven 2D barcodes seems sufficient for most applications
- Interferences between passive transponder technology and metal
- Tag price
- Unequal distribution of costs and benefits across the automotive value chain



NEXT STEPS

- M-Lab project about RFID in spare parts logistics at Volkswagen
- Possible business cases for the most promising candidates like container management, brand authentication & theft control, and replenishment management
- ISAR (Intelligent and Standardized Applications with RFID) project with VDA to get visibility



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AUTO-ID BUSINESS CASE ACTION GROUP



MIT Sloan School of Management

BUSINESS CASE STUDY:

AUTO-ID IN MASS TRANSIT FOR SINGLE-USE PASSENGERS

BY:

BRANDON BEAN

ROBERT DUDLEY

HIDEAKI TOMIKAWA

PRESENTED BY:

STAN DROBAC



AGENDA

- Project Description
- Fare Collection at the MBTA
- Case Study Questions
- Qualitative Assessment
- Quantitative Assessment
- Conclusion



PROJECT DESCRIPTION

- Assignment: Develop an Auto-ID business case for a market outside CPG/retail

Qualitative and quantitative assessment

Analysis to assist industry players in making adoption decisions

- Selected market: Mass transit

Low-cost RFID tags as single-use tickets

MBTA (Boston) as a case study

- Objective: Determine if and when adoption makes sense



FARE COLLECTION AT THE MBTA

Fare collection system upgrade set for spring 2004:

Ticketing Approach

Multi-use Passengers:

Smart Card technology, a higher cost, stored value RFID solution, will replace existing magnetic stripe technology

Single-use Passengers:

Magnetic stripe technology will replace existing token solution

Capital Expenditures

672 new Fare Vending Machines (FVM) in all terminals

535 new subway turnstiles with RFID and magnetic stripe readers

1700 new bus fare collection devices with RFID and magnetic stripe readers

State of the art Telecommunication infrastructure



CASE STUDY QUESTIONS

Consider low-cost RFID (LCRFID) for single-use passengers instead of magnetic stripe

- What are the non-economic benefits?
- What are the limitations?
- What price point makes sense financially?



QUALITATIVE ANALYSIS

LCRFID benefits :

- Security – More difficult to counterfeit
- Reliability – More robust in demanding environments
- Convenience – Contactless; speeds entry/boarding; important for the elderly and disabled,
- Flexibility – Adaptable to new technologies or pricing strategies
- System Consistency – Simplifies management, purchasing, maintenance by eliminating second reader technology



QUALITATIVE ANALYSIS

LCRFID limitations :

- Unproven – Magnetic technology well-established, while low-cost RFID is not
- Standards – Operators don't want to risk obsolete or unserviceable equipment

Current solutions can be proprietary, though ISO 14443 has some momentum and is compatible with smart cards.

EPC may be the best long-term solution



QUANTITATIVE ANALYSIS

Acceptable price-point determination:

- What costs can be eliminated by choosing an all-RFID solution?
- What additional costs are incurred?
- What is breakeven point per ticket for single-use passengers?



QUANTITATIVE ANALYSIS

1. Potential savings from proposed system:

- Mag stripe readers in subway stations and on buses
- Maintenance of mag stripe readers (personnel and supplies)
- Mag stripe card encoding equipment and associated labor
- Mag stripe fare cards
- Fare evasion losses (partial)



QUANTITATIVE ANALYSIS

2. Additional costs of LCRFID solution

- RFID tickets



QUANTITATIVE ANALYSIS

3. Current breakeven:

- Based on current single-use passenger volume of approximately 60 million
- Based on 2002 cost figures, low-cost RFID tickets must reach a price-point of 7.2 cents to be justified on purely financial terms.
- Current low-cost RFID tags cost significantly more

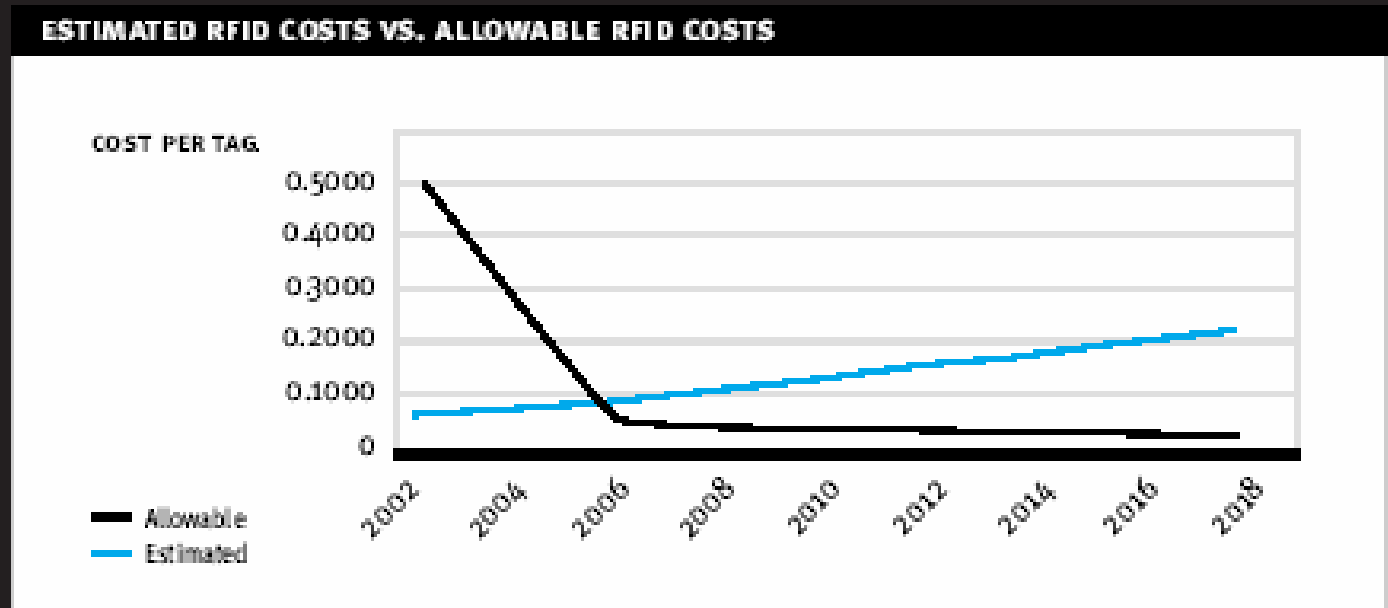


QUANTITATIVE ANALYSIS

4. Future breakeven:

Assumptions:

- Mag stripe system costs increase with inflation and passenger conversion to multi-use
- RFID costs decrease due to technology improvement and adoption



Crossover will occur in less than 3 years.



CONCLUSIONS

The MBTA, and perhaps other systems, should transition to low-cost RFID for single-use tickets

- LCRFID is qualitatively superior to mag stripe due to *Security, Reliability, Convenience, Flexibility, and System Consistency*
- Quantitatively, while not currently more cost-effective, low-cost RFID will be financially advantageous in the near future.



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DINNER

6:50 Meet in Lobby of Crowne Plaza Ravinia

7:00 Bus departs for Villa Christina Restaurant
4000 Summit Avenue