



IBM Pervasive Computing

Real World Radio Frequency Identification *Enabling The Consumer Driven Supply Chain*

Executive Overview
August 20, 2005



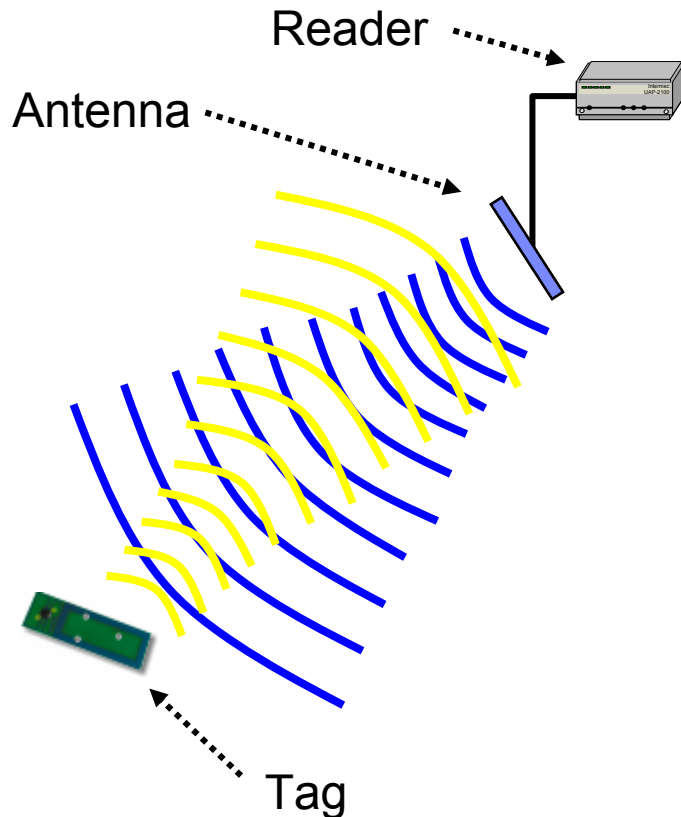
Today's Discussion

- **RFID Basics & the Consumer-Driven Supply Chain**
- **IBM Observations & Point Of View**
- **IBM Solutions Strategy**
- **Real World Client Examples**
- **What's next?**

What is Radio Frequency Identification? (RFID)

“To a surprising extent, businesses operate today on information that has the quality of myths. The arrival of RFID will, in effect, turn on the lights and identify what is really happening...It could eventually mean a whole new way of doing business.”

Kevin Ashton, Executive Director and Cofounder of the Auto-ID Center, MIT; and Associate Director, Procter & Gamble Co.



Data Collection Matching Product to Movement

- Real time
- Comprehensive
- High quality

Value Delivered As an Enabler of Business Processes

- Supply Chain Management
- Asset Management
- Client Interface Management

RFID tag and reader basics

Tags

Active	Includes a power source to help transmit a signal
Passive	No power to transmit signal; relies on readers
Frequency	Radio wave frequency at which signals are transmitted (Telephone example: 900 Mhz, 2.4 Ghz, 5.8 Ghz)
Data Capacity	Many options, will depend on application
Antenna	Device attached to tag to help capture reader signals

Readers

Reader	Interrogators that typically emits a radio signal via an antenna and collects information that is captured from “scans” using some form of “controller software”
Antenna	Device attached to a reader which helps transmit radio signals and captures “scan” readings

RFID vs. the bar code

RFID tags have many advantages over the barcode...

	Barcode / UPC	RFID Tags
Efficiency	Ability to read one tag at a time (line of sight required)	Ability to read multiple tags simultaneously (no line of sight required)
Dependability	Labels easily damaged	Tags less susceptible to damage. Ability to read through paint, mud, etc.
Data Capacity	Limited amount of data can be assigned	Significantly higher data capacity to capture detailed information about product
Flexibility	Static information	Potential for read / write capability, making tags reusable

...and have been in use across several industries

- Military containers: **250,000 containers monitored for the DoD**
- Automotive: **Inventory Management at Ford**
- Baggage Handling Logistics: **e.g., Las Vegas Airport**
- Convenience / Mobil Assets:



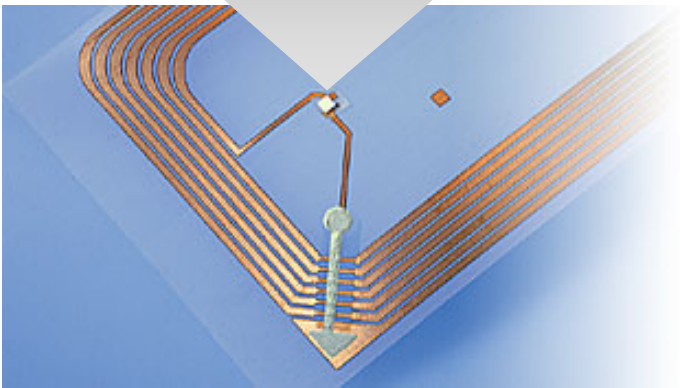
- Other: **Scottish Courage tracks keg assets**

Key Radio Frequency Identification Concepts

RFID (EPC) Technology introduces new capabilities...

The EPC Number (96 bit version)

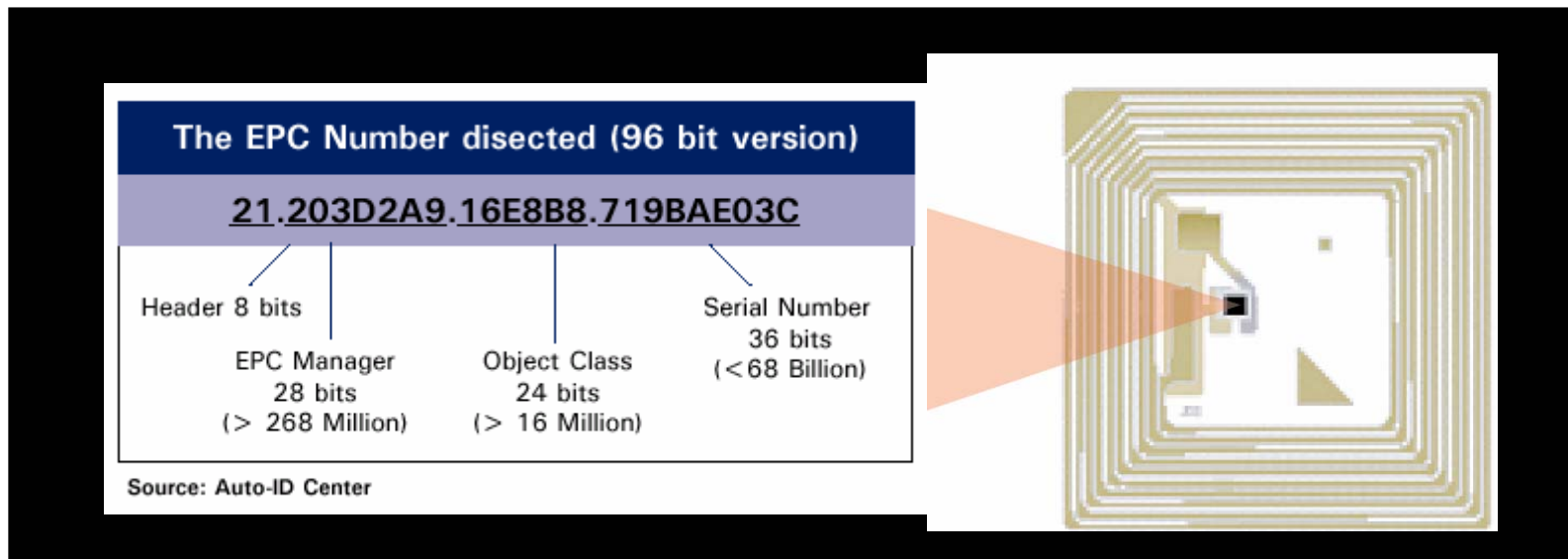
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1. Increased Efficiency & Accuracy
 - Virtually instantaneous
2. Expedite transaction processing
 - no line of sight required
3. Improve product visibility
 - “see” products, perhaps in real-time
4. Identify discrete items (EPC)
 - track & trace and authentication
5. Enable “triggered” processes or automation – replenishment, mfg. operations, alarms, etc

The EPC uniquely identifies objects

A number in a radio tag ...



...which together, uniquely identifies an object

Objects can be tracked as they move through the supply chain

Pallets



Cases



Trays

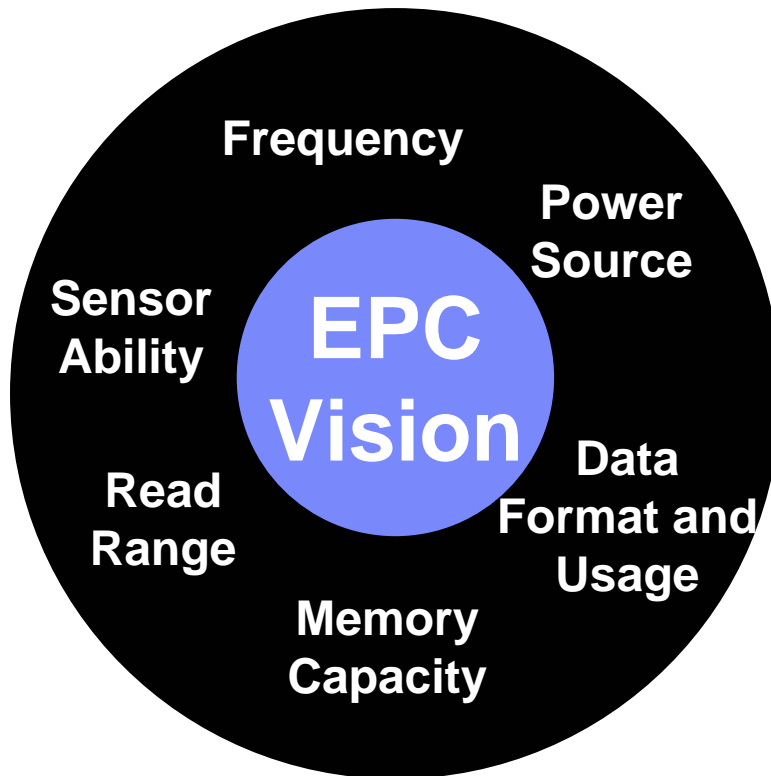


Items



The focus in CP/Retail is the EPC “vision” of RFID

Key RFID Characteristics

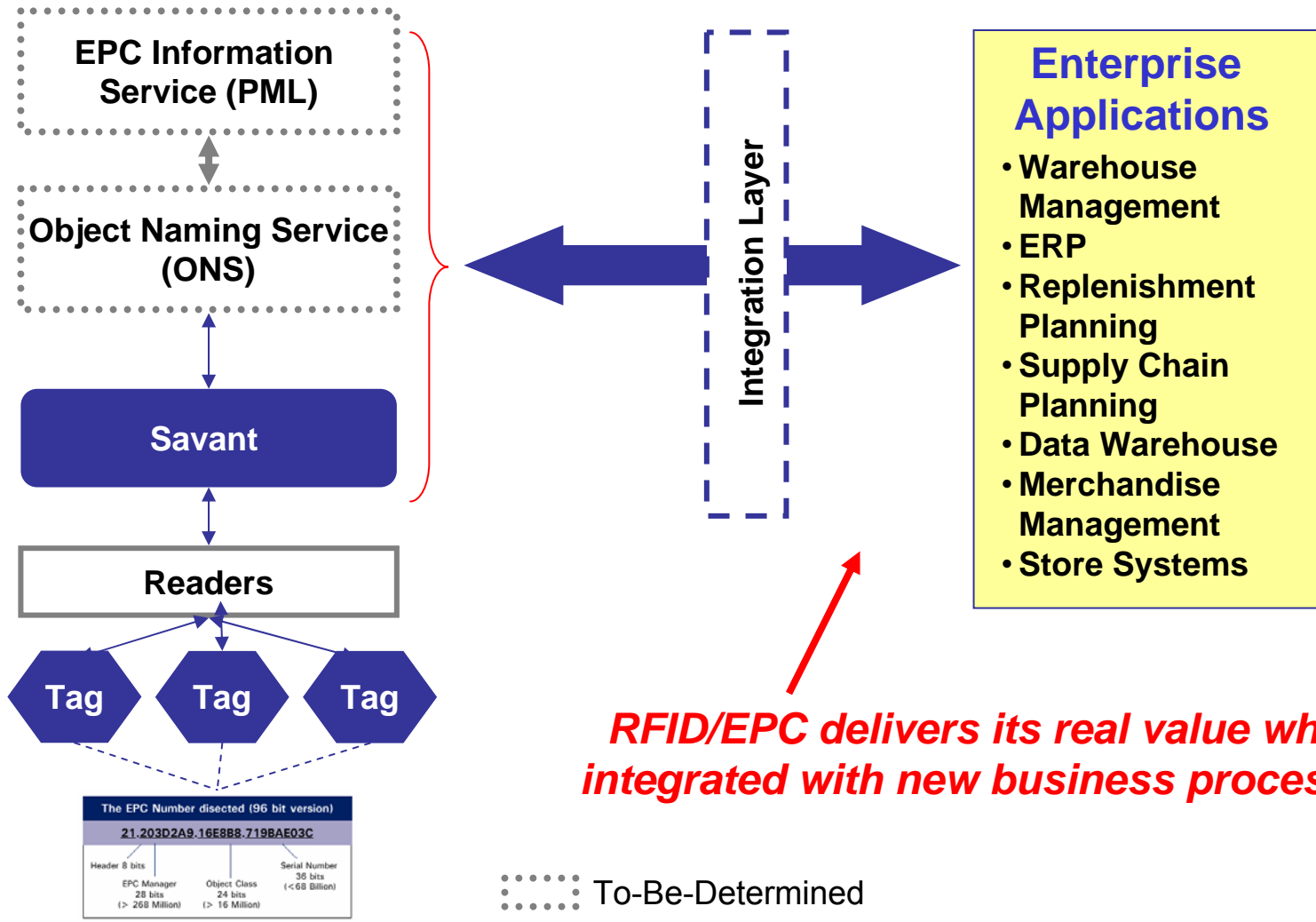


Source: Auto-ID Center, EPCglobal™, IBM Business Consulting Services analysis

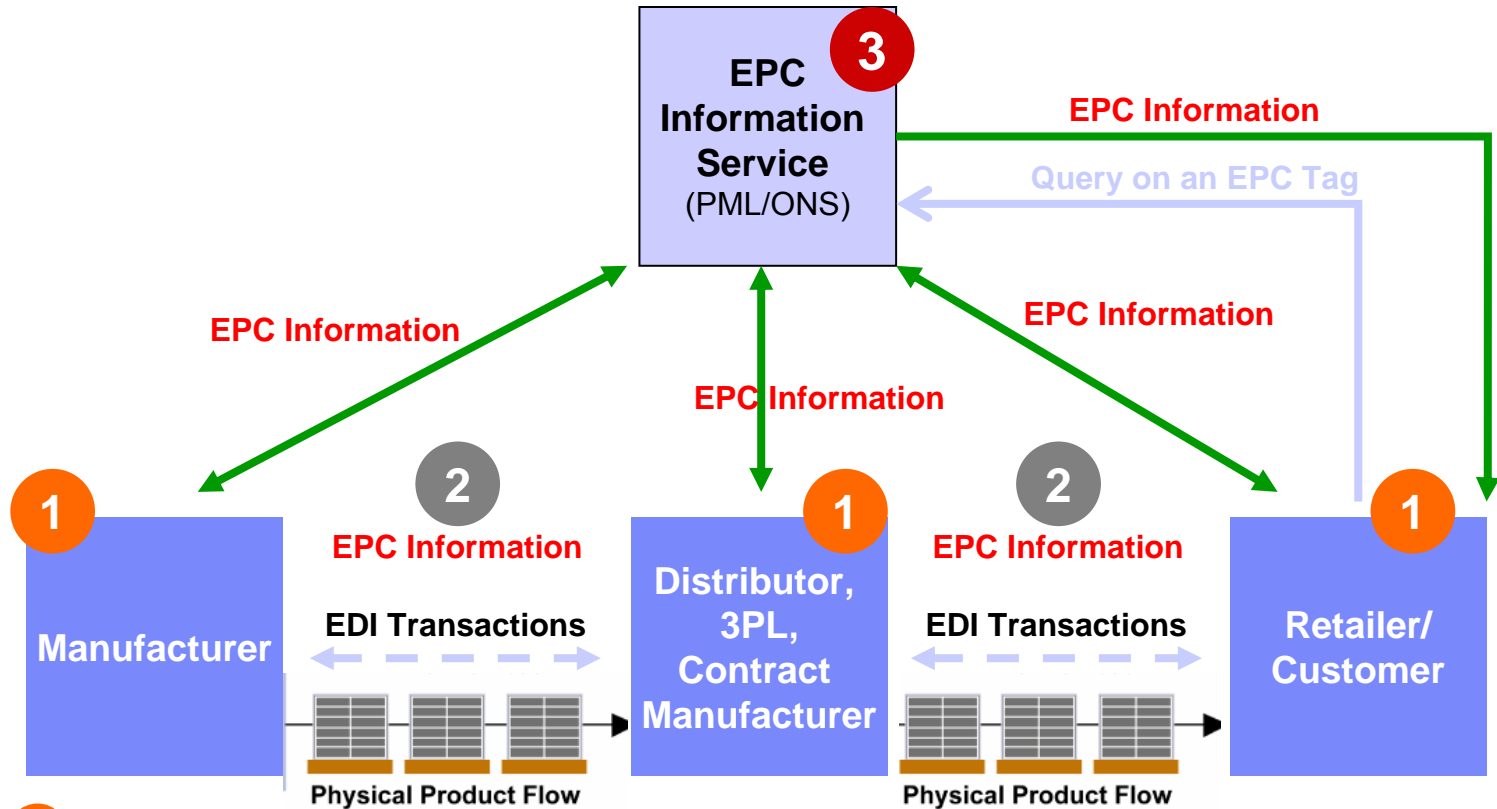
Principles of the EPC Vision

- Inexpensive tags
 - Passive
 - Minimum data on the tag
 - UHF (for now)
- Tags & readers conforming to standards and protocols
- Middle layer between readers and application systems (aka SAVANT)
- Information stored on a network, held once and accessed as needed
- Fully inter-operable components based on open standards

EPC Network Vision: Readers detect the EPC and then link to a network where more detailed object information is stored.



We believe the landscape will evolve in three phases

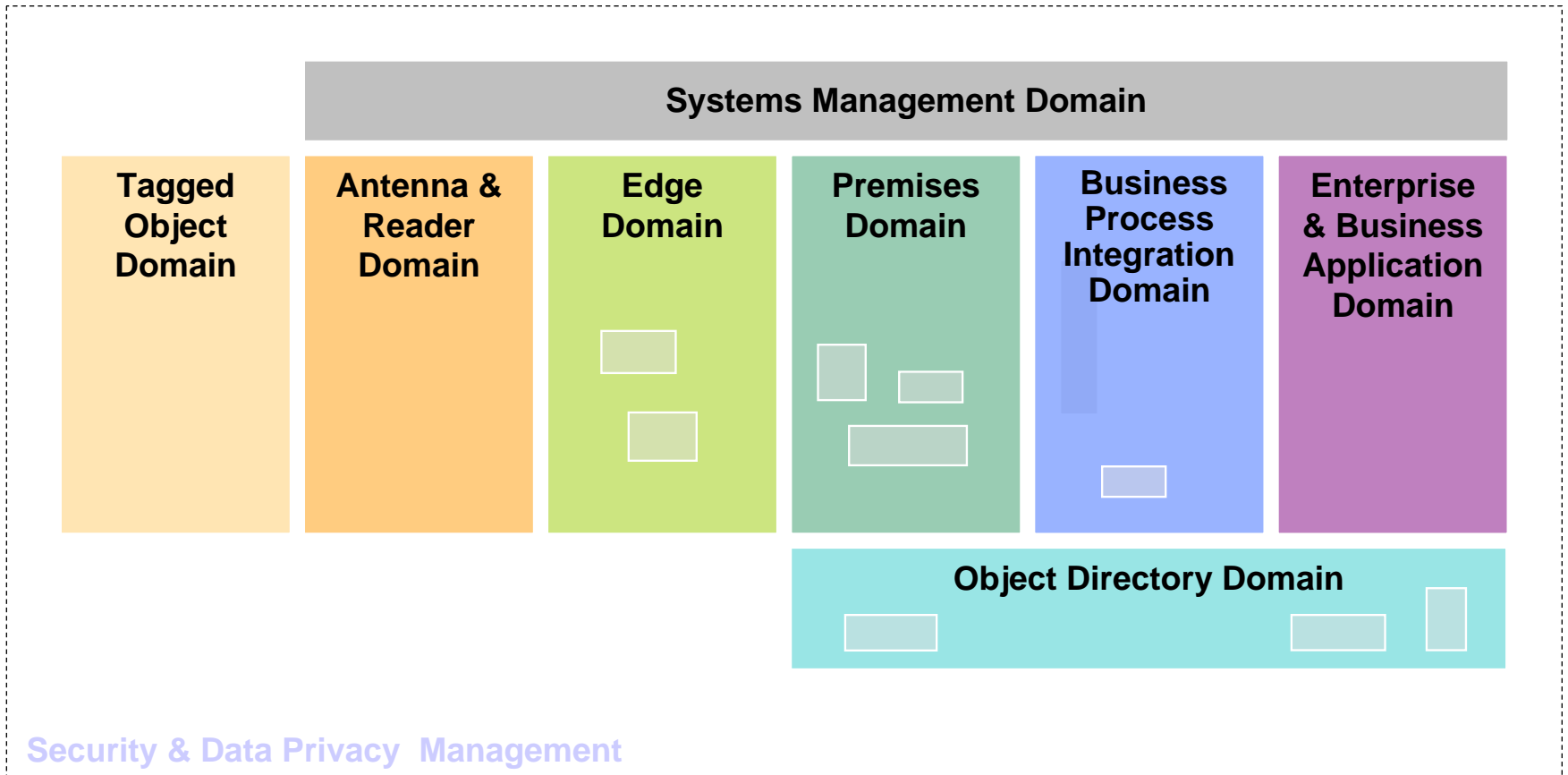


- 1** Internal EPC Network
- 2** Trading Partner to Trading Partner EPC Network
- 3** Industry wide EPC Network

*Key Question:
Will CPG and Retail companies move
from step 2 to step 3?*

RFID Will Be A Powerful Enabler Of Business Transformation

...Arrayed over a set of discrete initiative domains



Key Radio Frequency Identification Concepts

... Which Apply Across Multiple Industries

Client Examples

Industrial Manufacturer

- Goal is to improve visibility and control of hazardous materials
- Deploying RFID in receiving and storage areas of facilities

Automobile Distributor

- Goal is to improve inventory visibility and track assets real time
- Deploying RFID as an inventory / yard management solution

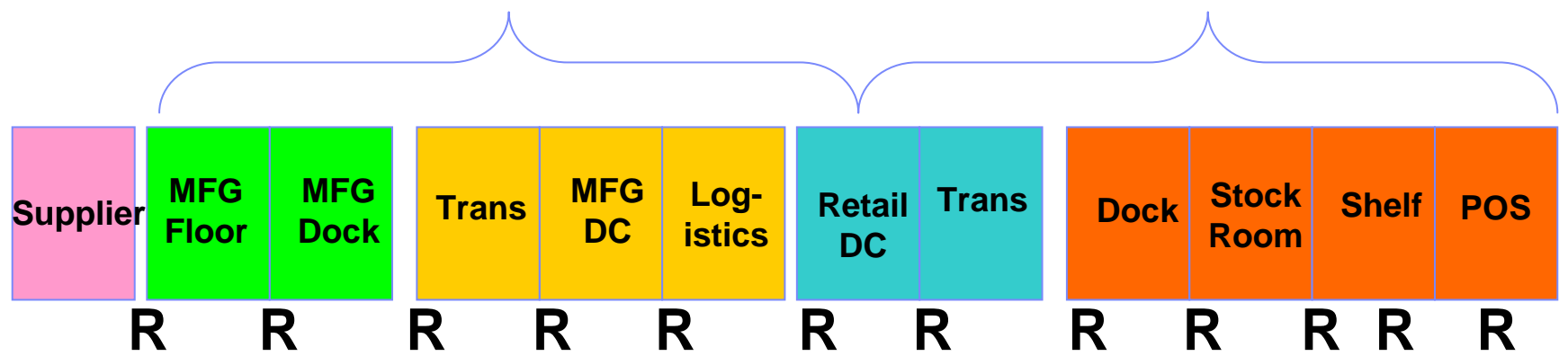
Pharma Manufacturer

- Goal is to reduce product handling and material tracking costs
- Testing RFID in temperature controlled mfg facility

Food Manufacturer

- Goal is accurate raw material usage tracking and recipe mgmt
- Piloting RFID in raw material receiving areas

A Simplistic View of What Sense and Respond Could Mean Requirements Of The Consumer Driven Supply Chain



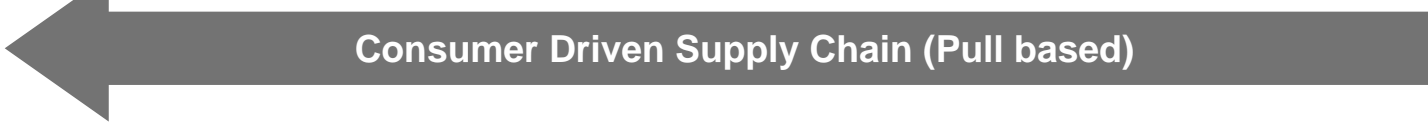
Store Movement Visibility
(future Triggered Shelf Stocking)

Dynamic Replenishment Algorithms
(more frequent, more accurate)

Flow Through Distribution / Dynamic Deployment

Lean Manufacturing Concepts (*Produce to demand*)

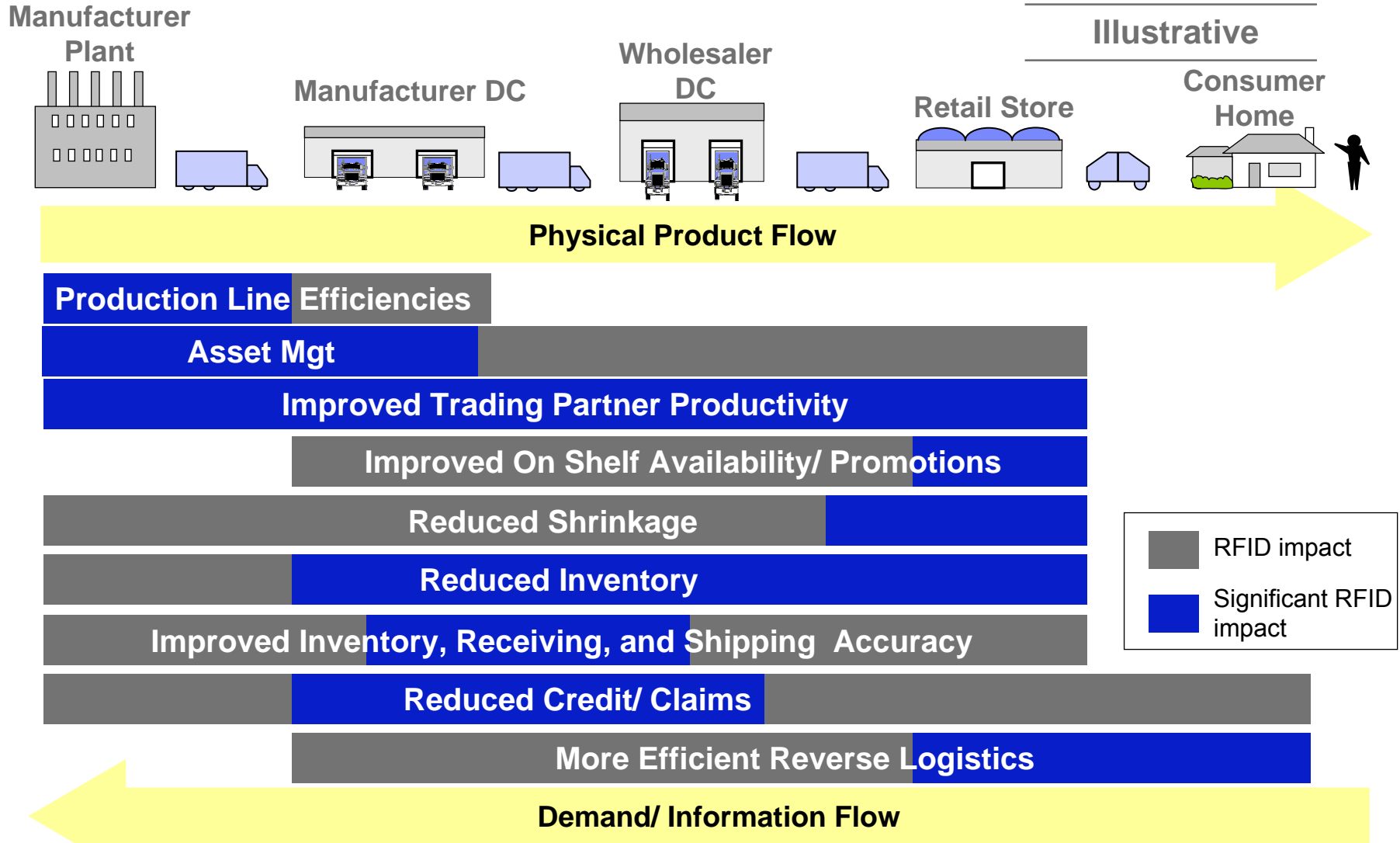
Aligned Suppliers



This model depends on RFID Enabled Supply Chain Visibility

RFID Observations

...Benefits Cut Across Value Chain Boundaries...



RFID Observations

...But its not just about tags and readers

- Tags + readers ≠ Transformation
 - Tags + readers = Efficient data collection & New Visibility
 - + Business Process Change
 - + Proactive Decision Making
 - + Integration to enterprise systems and infrastructure
- = Transformation

To achieve transformational results, RFID (EPC) should be viewed as one enabler among many in an overall supply chain or business strategy.

IBM Recognized The Value of RFID Early On

Committed to Supporting the Industry

- Early Research in RFID technology and many patents
- Use of RFID at Semiconductor Manufacturing Plant
- Member of Auto-ID Center Technology Board
- Member of EPCglobal™
- Facilitator of the “knowledge transfer” process
 - IBM Auto-ID Business Case White Paper Series
 - Global Commerce Initiative (GCI) “EPC Roadmap”
- Consulting partner for leading industry players
 - Over 50 client engagements for CPG/Retail
 - Business Case, Pilot planning, delivery and management



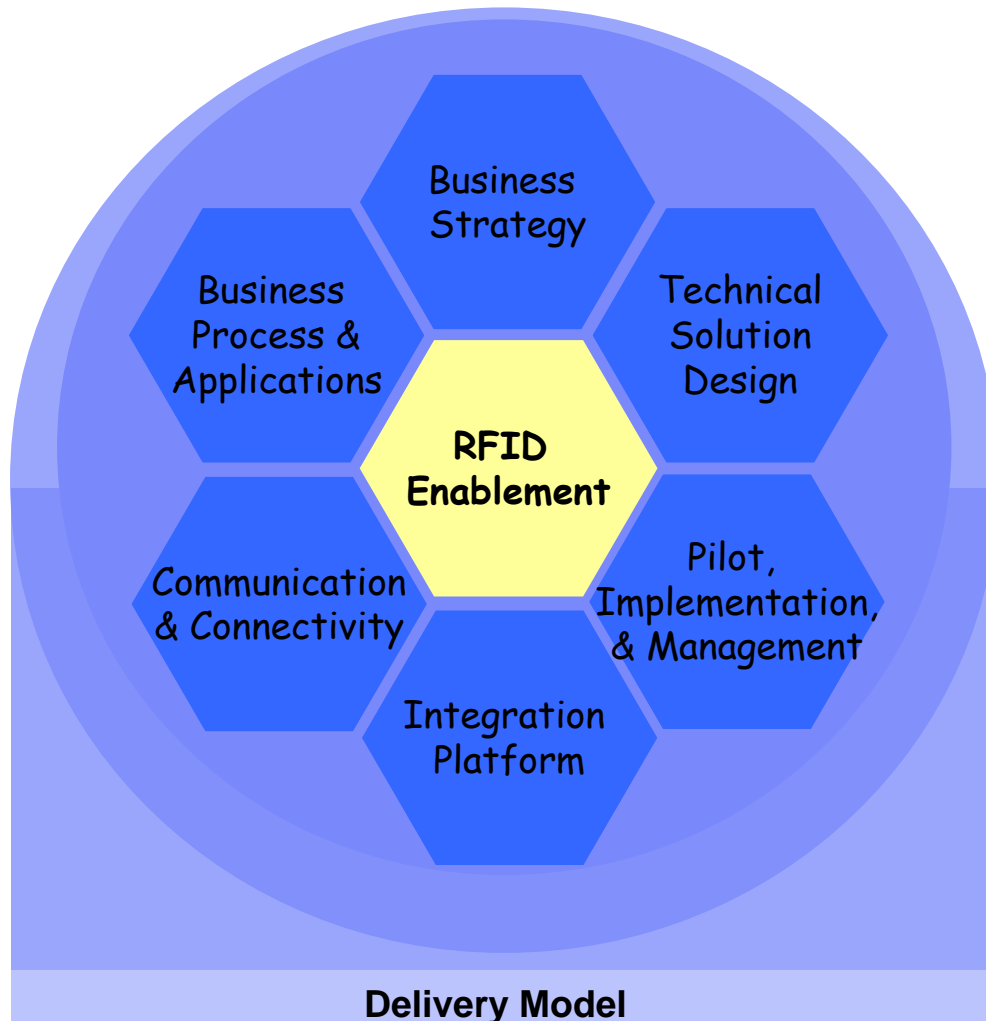
IBM's Point of View

Achieving Return on Investment

- Build your own experience through trials and controlled pilots. **There is no substitute for hands-on learning.**
- **Recognize that standards & technology capabilities will evolve** over time, and plan your deployment, partner selection and solutions accordingly.
- **Build a foundation** today that you can scale with future growth
- **Business transformation and long term success will require flexible, scalable and manageable infrastructure.** Start thinking about strategies for application integration and data sharing.
- **Integrate RFID into the context of a broader business strategy or transformation program** , such as “Consumer Driven Supply Chain”. Compliance alone will not deliver value.
- **Gain benefits today** by applying RFID capabilities to improve specific business processes. Manage expectations since this transformation will take some time.

IBM Is Executing An End-To-End Solution Strategy

...Matching up against each of the required components



Business Consulting

- Strategy / business case
- Process change
- Integration / application development
- Pilot and program management

Technology Services

- Site surveys
- Tag & reader testing
- Network / infrastructure
- Installations

Software and Solutions

- IBM RFID SW products
- Middleware products
- OEM products (devices)
- Open stds / source champion

Research

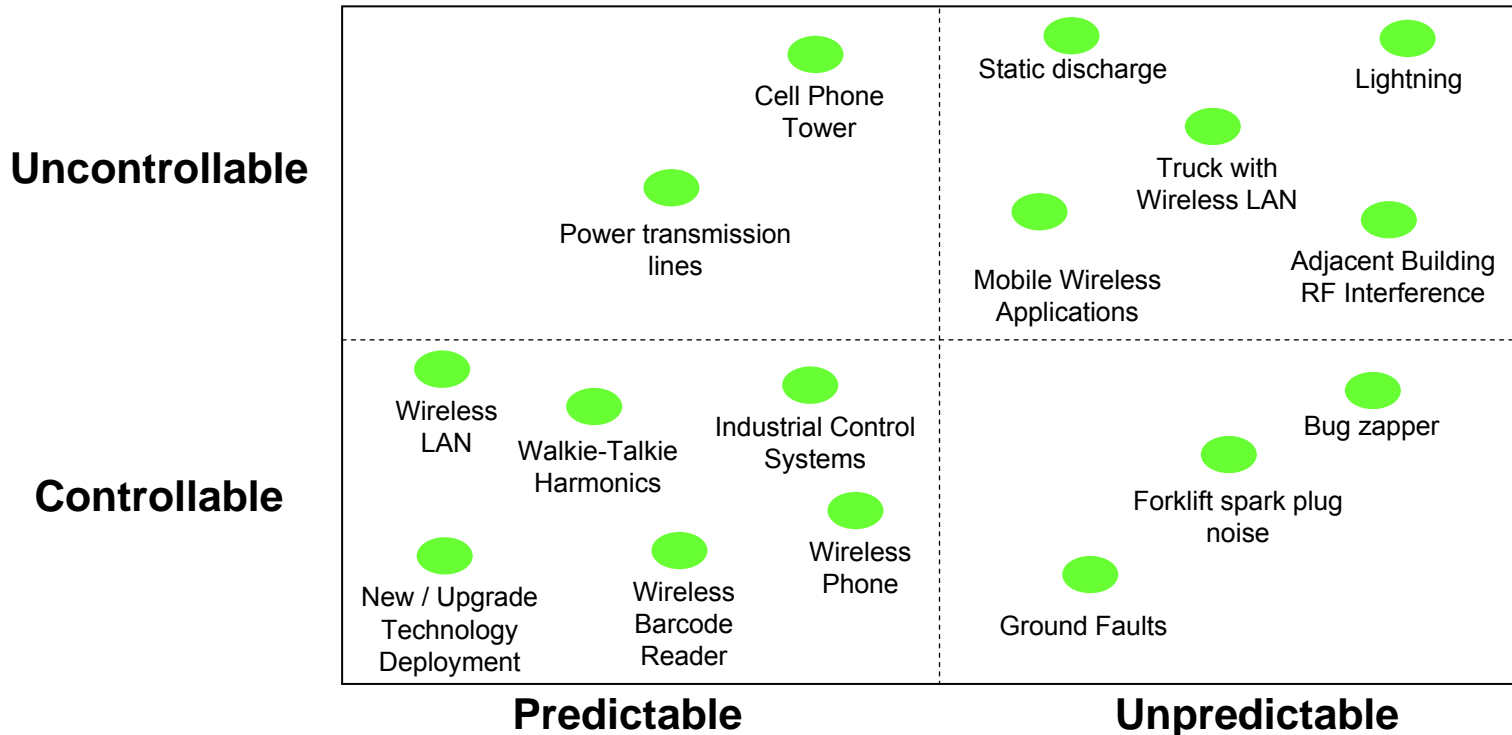
- Physics and IT challenges

Alliances

- Tag and reader vendors
- Other SW vendors

RFID site surveys are critical because RF interference can impact the success of your deployment

Client Example



Actions you should take:

- Identify sources of interference
- Determine mitigation strategy

Source: IBM Integrated Technology Services

Real World Example

Heinz RFID Strategy, Business Case and Testing

BUSINESS CHALLENGE:

With a number of leading retailers mandating the use of radio frequency identification (RFID) and the growing use of RFID to track goods within supply chains, Heinz sought to determine how it could use the technology most effectively to both meet retailer requirements and deliver maximum benefits internally.



SOLUTION:

IBM Business Consulting Services is working with Heinz to study market trends, develop a solid business case and test RFID technology to determine best-in-class vendors and how to most effectively incorporate RFID across its entire supply chain. IBM uses an RFID business cases modeling tool to estimate the potential costs and benefits.



BENEFITS:

- Study helped company move beyond a "slap and slip" RFID strategy to incorporating the technology along its entire supply and manufacturing line for maximum benefits and ROI
- Testing enabled company to meet retailer mandate of implementing RFID
- Provided company with clearer understanding and projections about an increasing market trend
- Helped position Heinz to develop effective business strategy and meet technology challenges

Real World Example

Metro Store Transformation

BUSINESS CHALLENGE:

Grocery retailer Extra, a METRO Group AG subsidiary, was unable to respond quickly to sudden changes in demand, resulting in shelves that were empty of popular items, and overstocks in other merchandise. Extra turned to METRO's IT branch, Metro MGI Informatik GmbH, to transform its supply chain to enable it to better respond to changing consumer demands.

SOLUTION:

IBM and METRO MGI overhauled Extra's store infrastructure and supply chain integration using state-of-the-art technologies, such as radio frequency identification (RFID) tags, electronic shelf labels and wireless networking, to capture realtime inventory data. Streamlined business processes, such as stock tracking, monitoring and replenishment, allow Extra to optimize its supply chain to sense-and-respond dynamically to changing consumer demand.

BENEFITS:

- Increased customer satisfaction through dynamic merchandise management
- Improved inventory monitoring
- Increased sales, because store shelves are better stocked
- "The tremendous success of the Metro 'Future Store Initiative' is also driven by IBM's contribution to this innovative project. In particular IBM developed a RFID Middleware and integrated a complex RFID solution with multiple functions on pallet, case and shelf level." Dr. Gerd Wolfram, Executive Project Manager, Metro Group Future Store of the Future



METRO Group
Future Store Initiative

Real World Example: Large Grocery Retailer

Three Phase Delivery – 9 DC's, 13 Stores, and 20 Suppliers

- DC (check in & check out)
- Back Of Store (check in & check out)
- Store Floor (RFID check in + barcode POS (Managing Out Of Stock Events))
- Sharing EPC data with key suppliers



The first 100 days of the project show a 15% drop in "out of stock" situations, an 18% drop in stock losses/shrinkage and a 17% increase in process efficiencies.

Real World Example

IBM Eats Its Own Cooking

BUSINESS CHALLENGE:

Building a 300mm-wafer semiconductor manufacturing facility was a competitive imperative for IBM. Labor-intensive, error-prone and fragmented, the traditional 200mm processes were draining resources, stalling production and preventing realtime information-sharing. IBM needed a resilient, fully automated manufacturing environment that would allow greater efficiency across the value chain and increased responsiveness to employees, clients and suppliers.

SOLUTION:

IBM Business Consulting Services helped design the first “touchless” 300mm manufacturing facility in the U.S. The fabrication plant runs continuously and efficiently, leveraging integrated, realtime manufacturing systems; a security-rich, Linux-based IBM infrastructure; SAP; and leading-edge tools and wireless devices.

BENEFITS:

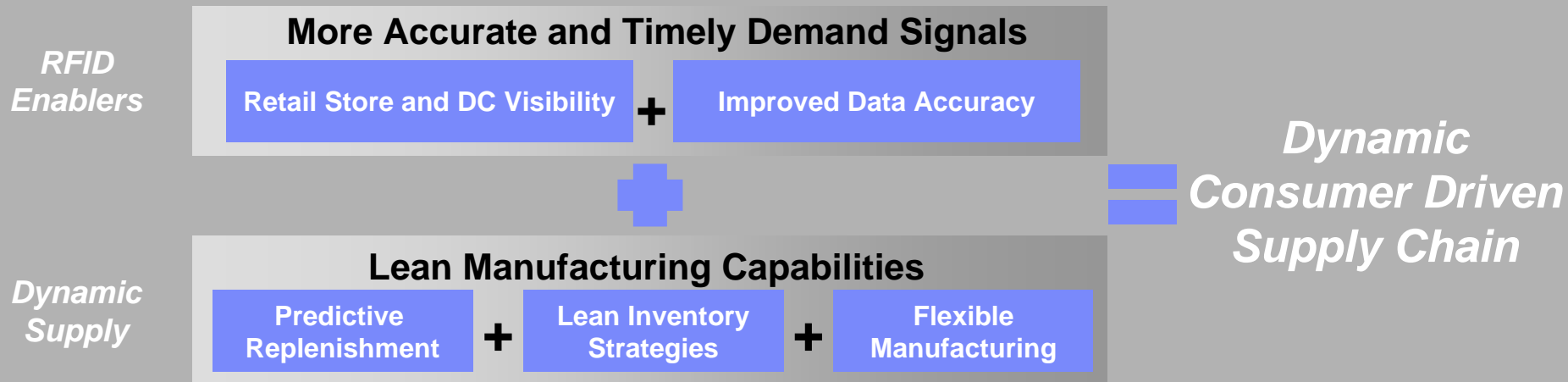
- cost savings of approximately 40%, with dramatic increases in turnaround times and production yields anticipated
- one-day commitment times on 80 percent of new job orders
- dynamic product customization, enabled by realtime, automated processes and integrated wireless technologies
- rapid development of innovative chip designs



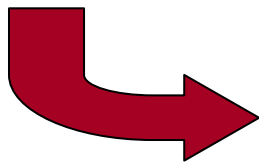
An example of agile, realtime operation

Summary

RFID & The Consumer Driven Supply Chain



- Retailers share product movement data with manufacturers
- Manufacturers use this data for short term forecasts, CPFR and replenishment
- Manufacturers complement this new demand data with make-to-demand inventory and manufacturing principals to reduce cycle times and improve flexibility



- Reduced Inventory
- Improved Fill Rates
- Lower Out of Stocks

What's next?

- Pallet, case tagging: Pilots → Production
- Gen 2
 - Smarter, more robust readers
 - 128-bit tags
- High-frequency tagging of 'difficult' products
 - Jewelry, e.g.
- Cheaper tags → Item-level tagging
 - Pharma drugs, high-value items
- Anti-counterfeiting
- Global interoperability
 - Standards evolution
 - Technical breakthroughs
- EPCIS maturity
- Privacy issues - e.g., tagging...people?
 - Kids
 - Medical records
 - Opposition to RFID
 - e.g., C.A.S.P.I.A.N. (www.nocards.org, www.spychips.org)



Q & A