



Product Information Management

Intelligent Networks

MIT Smart World 2004

December 8, 2004

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WebSphere Product Center

Networks are both clusters of computers and clusters of people!

- **We now use “network” as a verb**
 - Cocktail Party
 - Distributed Software Development
 - Collaborative Standard Development

- **It is vital to think back and forth between these two styles of networks. There are bi-directional effects.**

- **The Internet has profoundly changed the way we live, work and play.**

Three looks into Intelligent Networks

- **Global Data Synchronization**
- **Electronic Product Code deployment at scale**
- **Compute Farm Networks for On Demand computing**

Keys to building a successful Intelligent Network

- **Start with a layered design – think “big blocks”**
 - Complexity is preserved but can be hidden – try for black box
 - Division of labor – focus skill sets – highly distributed teams
 - Outsourcing opportunities – understanding the skills of partners
 - Flexibility to change components without breaking the framework
 - Re-use of components in other application
 - End points will change over time – be flexible
 - Ready to scale

- **Trust is essential yet its importance is underestimated**
 - Focus on Win-Win use cases first to maintain innovation & commitment
 - Carefully document the use cases and get sign-off from all participants
 - Security must cover both people and devices

Global Data Synchronization Network

Manage Linkages Among Items, Locations, Organization and Trading Partners

Locale specific attributes

- Localized(French/German/Spanish...) description of the item
- Unit of measure (Metric Vs British), net content, net weight
- Currency
- Local government compliance (e.g.: gluten claim, nut/seed content claim etc)
- Business unit, brand family the item belongs to
- Brand or category manager responsible for the item
- Manufacturer/Distributor Warehouses that stock and ship item

Core item attributes

Relationship with other items

- Packaging(each, pack, case, pallet etc)
- Substitution
- Complementary
- Bundles/prepacks

Category specific attributes

- e.g. Cigar Style, Cigar Ring Gauge
- Item map to internal and external category schema



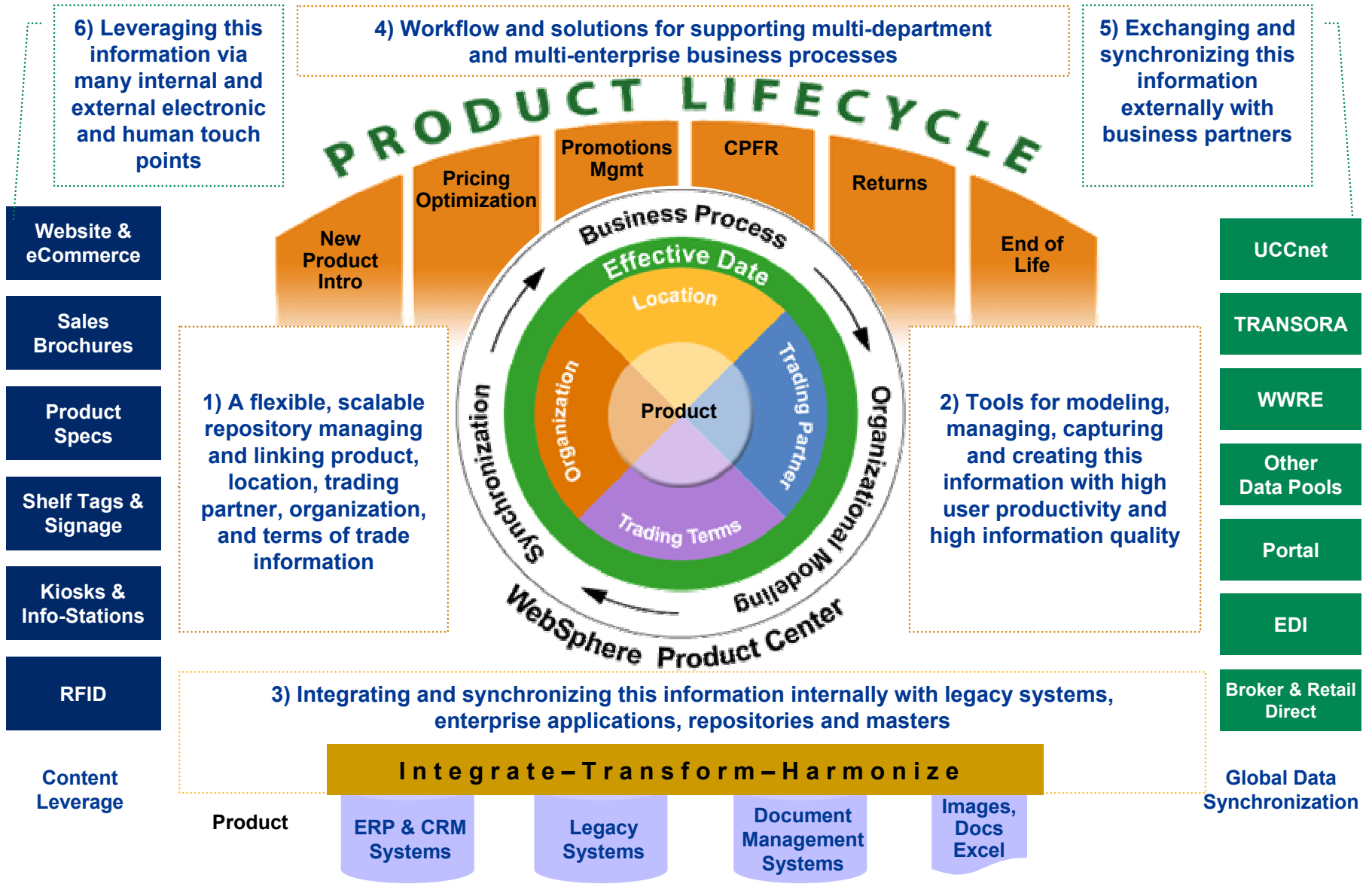
- Retailer warehouses that are authorized to receive and stock the item
- Retailer stores that the item is sold through

- Retailer and target market specific trade conditions (pricing, promotion...)
- Retailer specific attributes

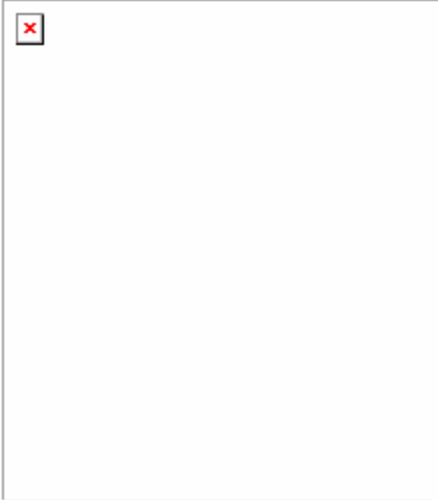
Time



THE GOLDEN SOURCE OF PRODUCT INFORMATION



Master Data Management View of an Item



Shown in:
[view larger image](#)

Available colors:

1969 orig fit

1969 orig fit

SIZE:

price: \$98.00
item: #191458

color:

select one
select one

size:

select one
select one [size charts](#)

quantity:

1

Product Information Management View of an Item (Ecommerce)

Web Hierarchy and Sub Category

1969 Denim Collection

1969 Collection for Men

- [1969 original fit](#)
- [1969 selvage jean jacket](#)
- [1969 boot fit \(dusted\)](#)
- [1969 range fit \(infused\)](#)
- [1969 boot fit \(indigo arctic\)](#)
- [1969 boot fit \(black crunch\)](#)
- [1969 explorer shirt \(tinted black\)](#)
- [1969 western shirt jacket](#)

- [1969 boot fit \(panhandle\)](#)

- [1969 western shirt \(dark indigo\) sale](#)

Images



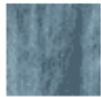
Shown in: **dusted**

Colors

Available colors:



dusted



sagebrush

Marketing Benefits

1969 original fit

1969 original fit

- The Limited Edition
- 1969 Collection:
- Premiere, Authentic GC
- Made from a premium denim fabric in a dark shade of indigo with very subtle whiskering and grinding.
- Sits just below waist. Low rise. Slim, straight leg.
- Five-pocket styling, button fly.
- 100% cotton. Machine wash. Made in USA.

SIZE: 30w x 32l - 36w x 32l

price:

~~\$98.00~~
now \$39.99

item: #191458

color:

select

Sizes

size:

select one

- 30w x 32l
- 32w x 32l
- 33w x 32l
- 34w x 32l

[size charts](#)

Cross-Sell & Up-sell

You'll also like:



[hand-knit zip sweater](#)

~~\$98.00~~
\$59.99

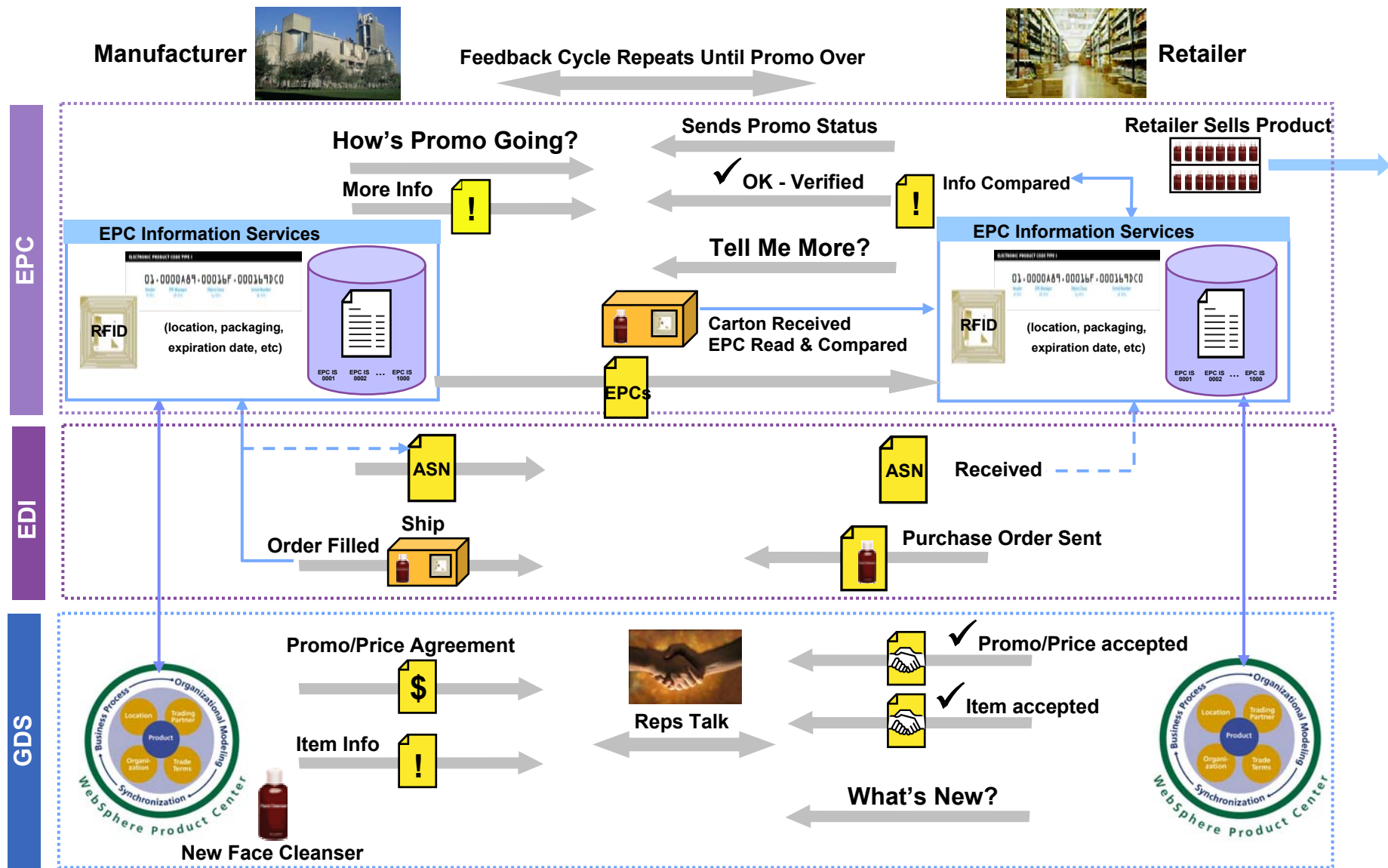


[hand-knit half zip sweater](#)

~~\$98.00~~
\$59.99



Impact on New Item Introduction and Promotion Management



Electronic Product Code Network

**EPC RFID is a linkage of
Physics and IT in order to
enable computers to automatically
Monitor, Decide, and Take Action.**

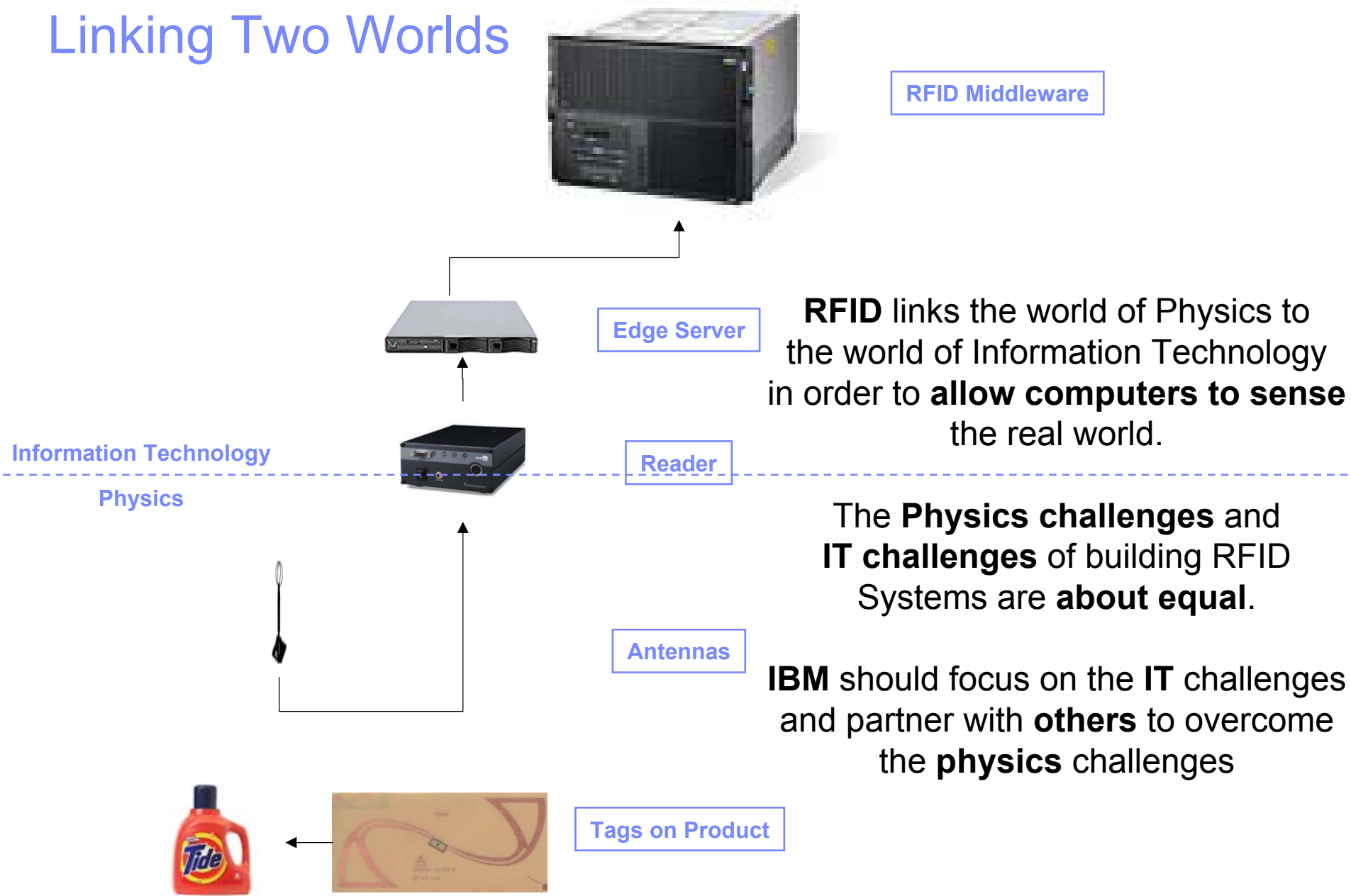
Sensor Networks

It is essential that:

- Always architect for massive scale
- Never move data unless you have to
- Sensors must be:
 - Plug and work
 - Authenticated
 - Remotely monitored
 - Remotely configured
 - Remotely upgraded
 - Optional data encryption
- Architectural layers must:
 - Hide complexity
 - Provide flexible filtering
 - Provide programmers with a higher level abstraction



Linking Two Worlds



RFID Middleware

Edge Server

Reader

Antennas

Tags on Product

RFID links the world of Physics to the world of Information Technology in order to **allow computers to sense** the real world.

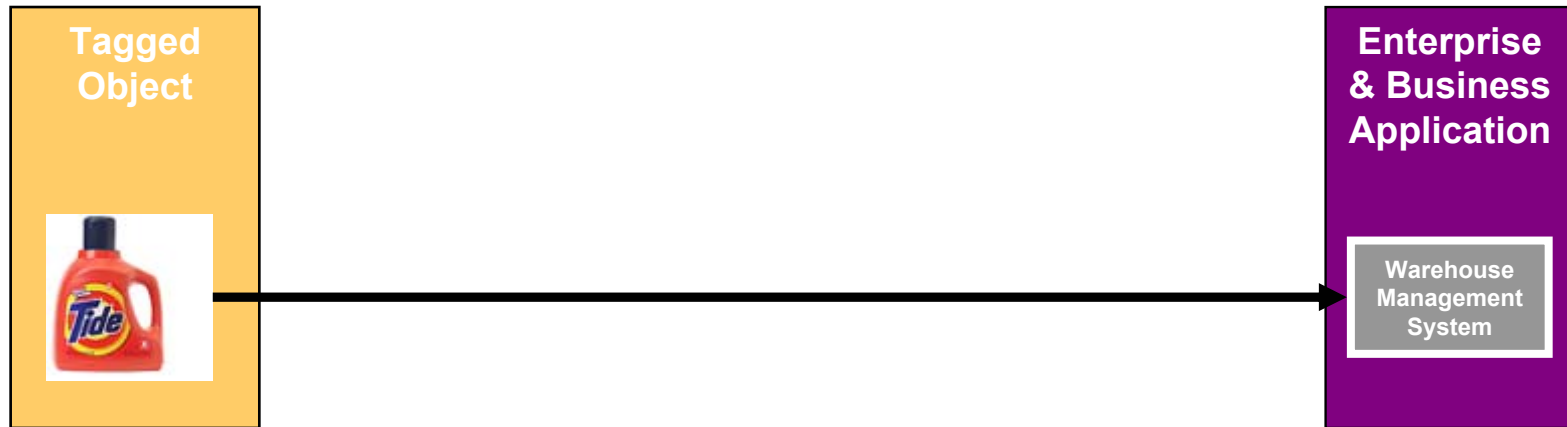
The **Physics challenges** and **IT challenges** of building RFID Systems are **about equal**.

IBM should focus on the **IT challenges** and partner with **others** to overcome the **physics** challenges

Information Technology

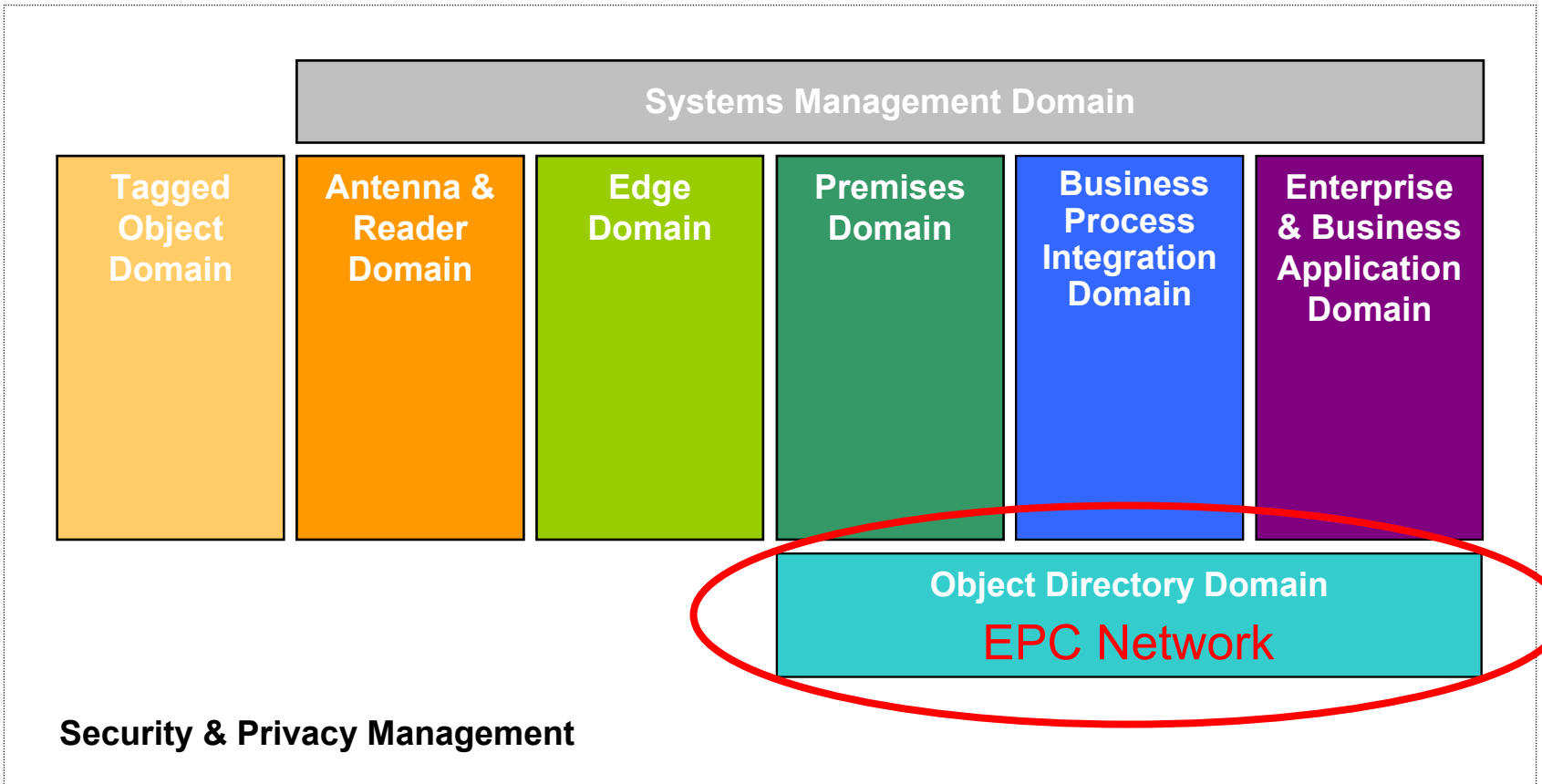
Physics

How can I reliably keep my Warehouse Management System up-to-date on the movement of my products?



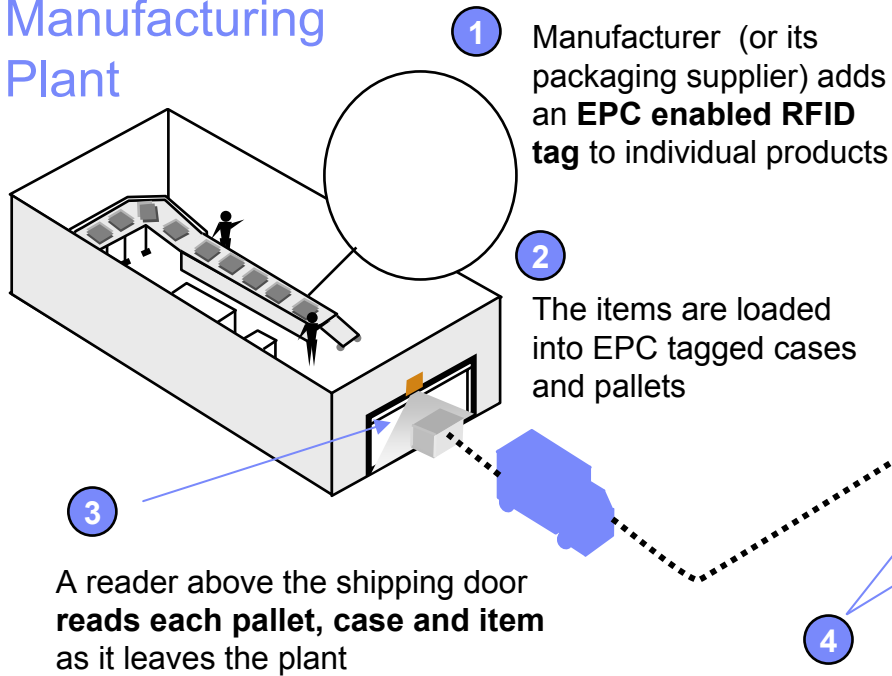
Simple for small plots but increasingly difficult in global rollouts for big manufacturers and retailers.

The IBM RFID Domain Model breaks the problems of doing EPC deployments at scale into manageable sub-components



EPC data is captured by both the Manufacturer and Retailer

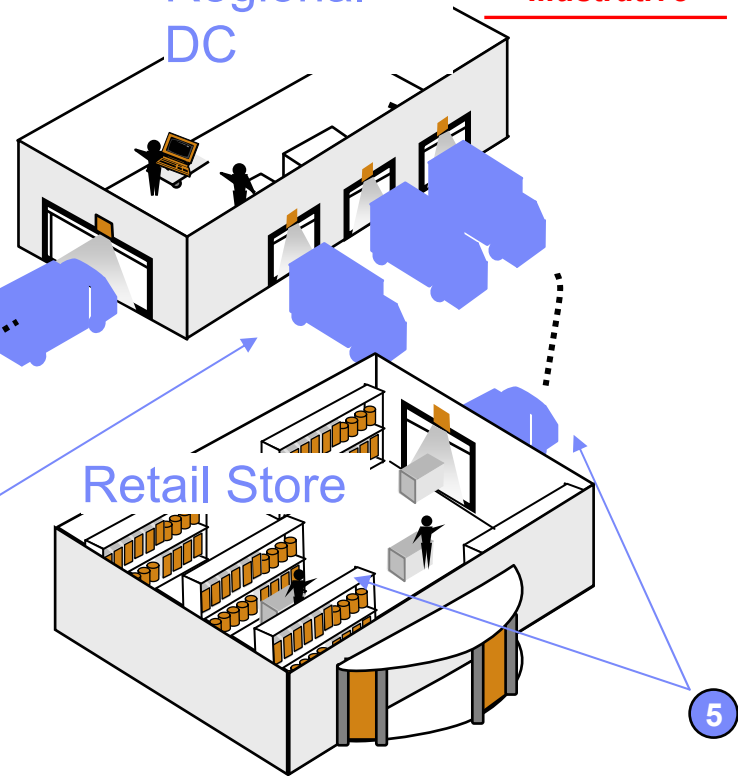
Manufacturing Plant



The pallets of Manufacturer product arrive at a DC and the items are **automatically received and uploaded to the WMS**. The product is picked and shipped with increased accuracy and throughput, and reduced labor expense.

Regional DC

Illustrative



The delivery arrives at the retail store and is **automatically received and inventory is updated**. A network of readers in the back room and the storefront ensure that **product movement is tracked to improve shelf availability, promotion management, reduce theft, etc.**

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

We wrote a
whitepaper with the
Global Commerce
Initiative...

Purpose: Link
existing investment
in Global Data Synch
to **emerging**
investments in EPC.

Similarities,
Differences,
Practical Advise

An Integrated View of the Global Data
Synchronisation Network and the
Electronic Product Code Network

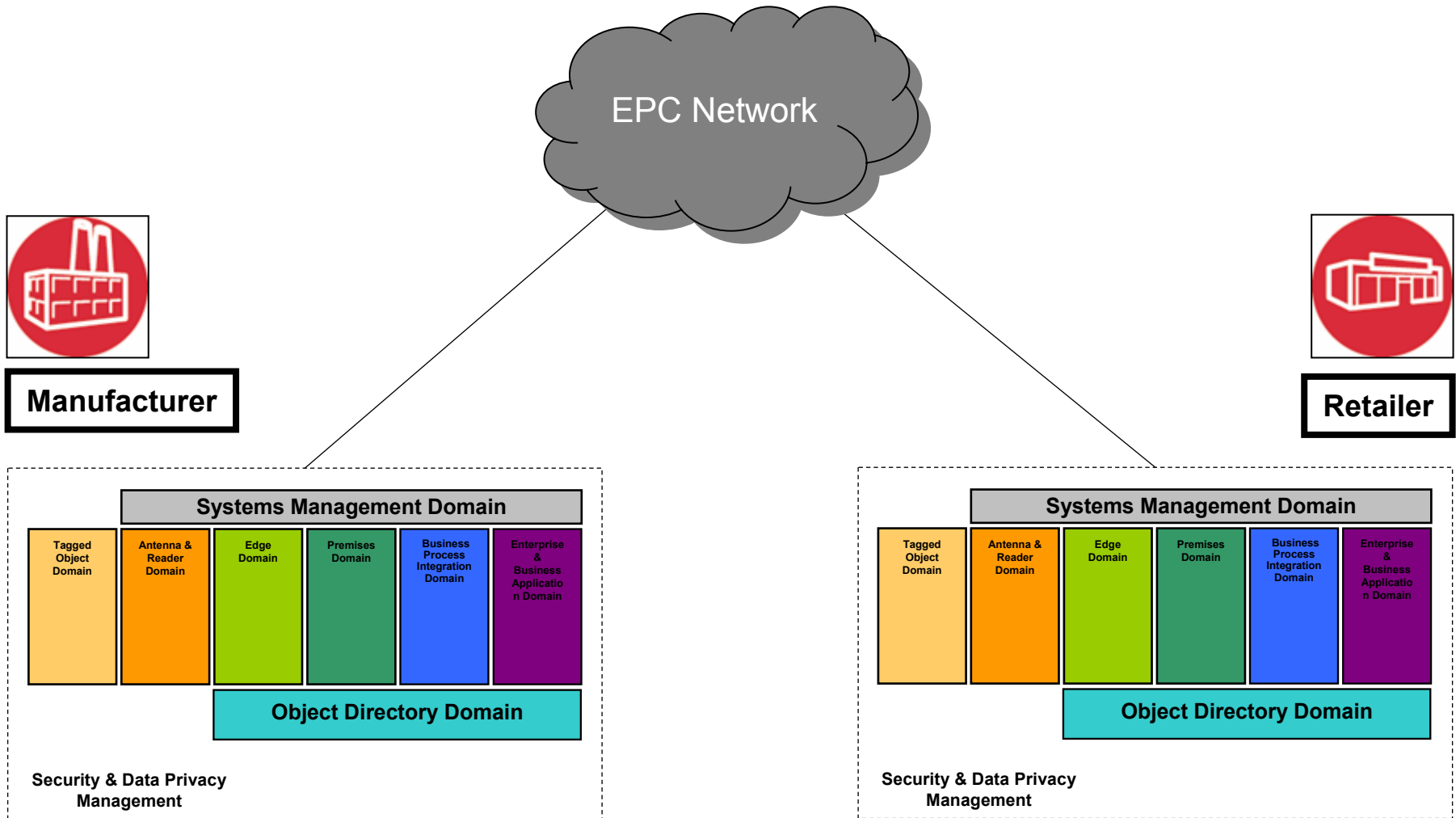


Retail / Consumer Products – Business Case Findings

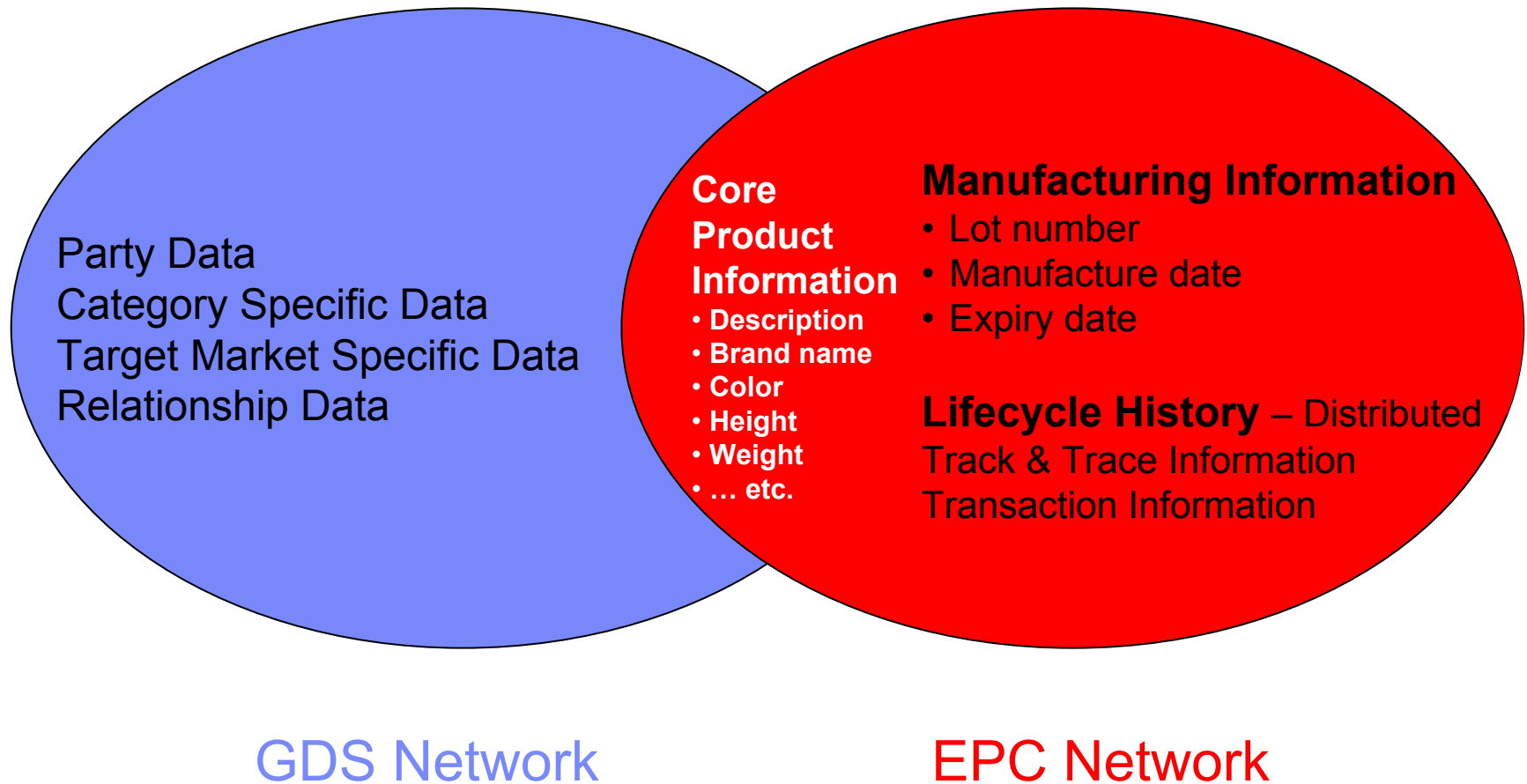
- **Retail: “It is relatively easy to find ROI if you don’t have to pay for tags”**
 - Largest benefits tied to improved store level execution (Out of Stocks, Inventory, Productivity)
 - Largest cost drivers - process change, infrastructure and integration
- **Many Consumer Products manufacturers are still searching for ROI**
 - Largest benefits tied to improved retailer execution and/or data sharing (OOS, Proof of Delivery, Inventory Reduction, Other)
 - Awaiting the <\$0.05 or <\$0.02 tag
 - ROI will require increased retailer adoption (scale)

**Overall Value Chain Business Case Is Often Positive !
... But CP reluctance is problem #1 for EPC adoption**

Both the manufacturer and the retailer have their own separate RFID infrastructure and talk via EPC Network



Current Linkage Between GDS & EPC Networks



How Does the EPCglobal Network keep the product info linked?

- **Object Naming Service (ONS)**

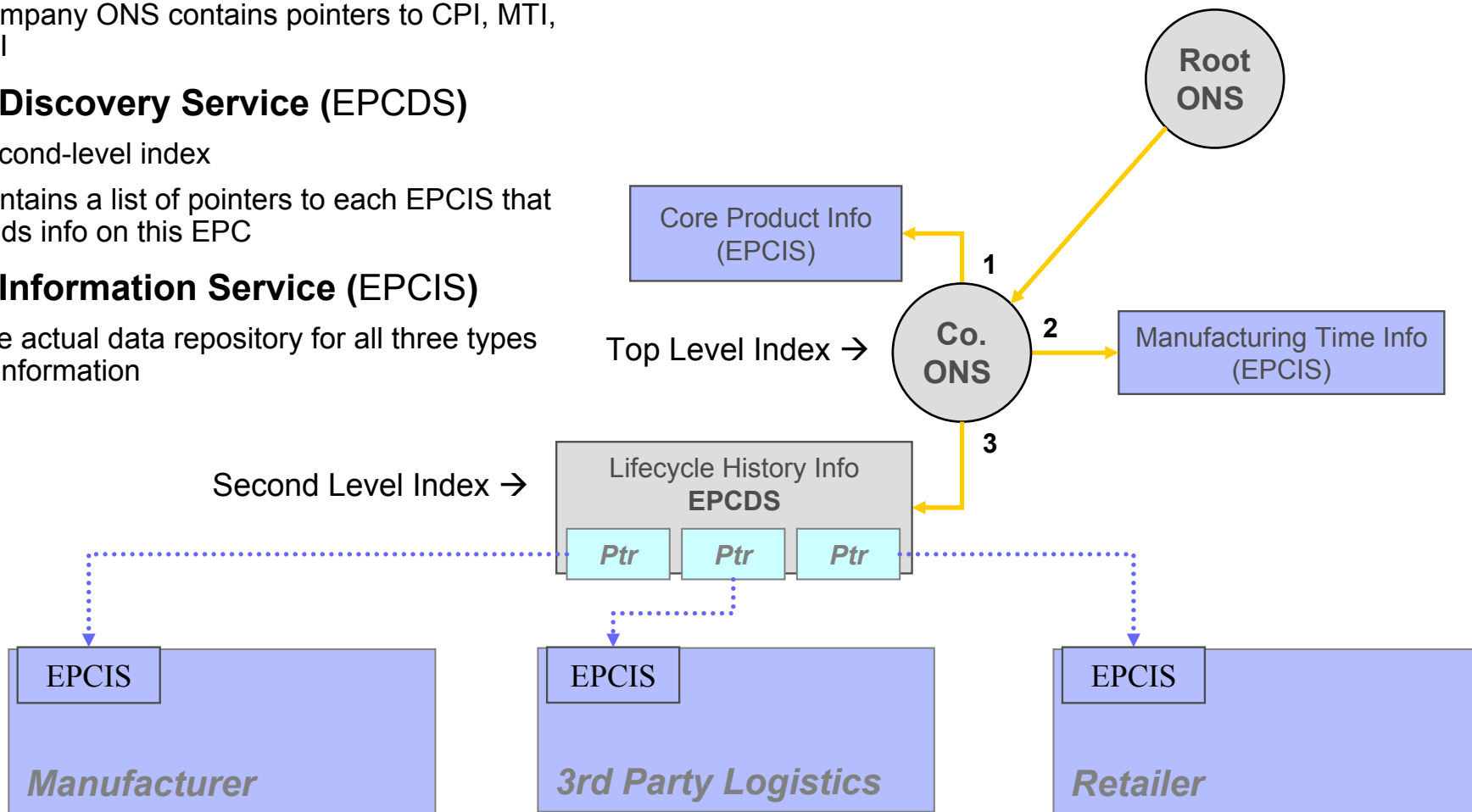
- Root ONS contains pointer to Company ONS (i.e. Manufacturer)
- Company ONS contains pointers to CPI, MTI, LHI

- **EPC Discovery Service (EPCDS)**

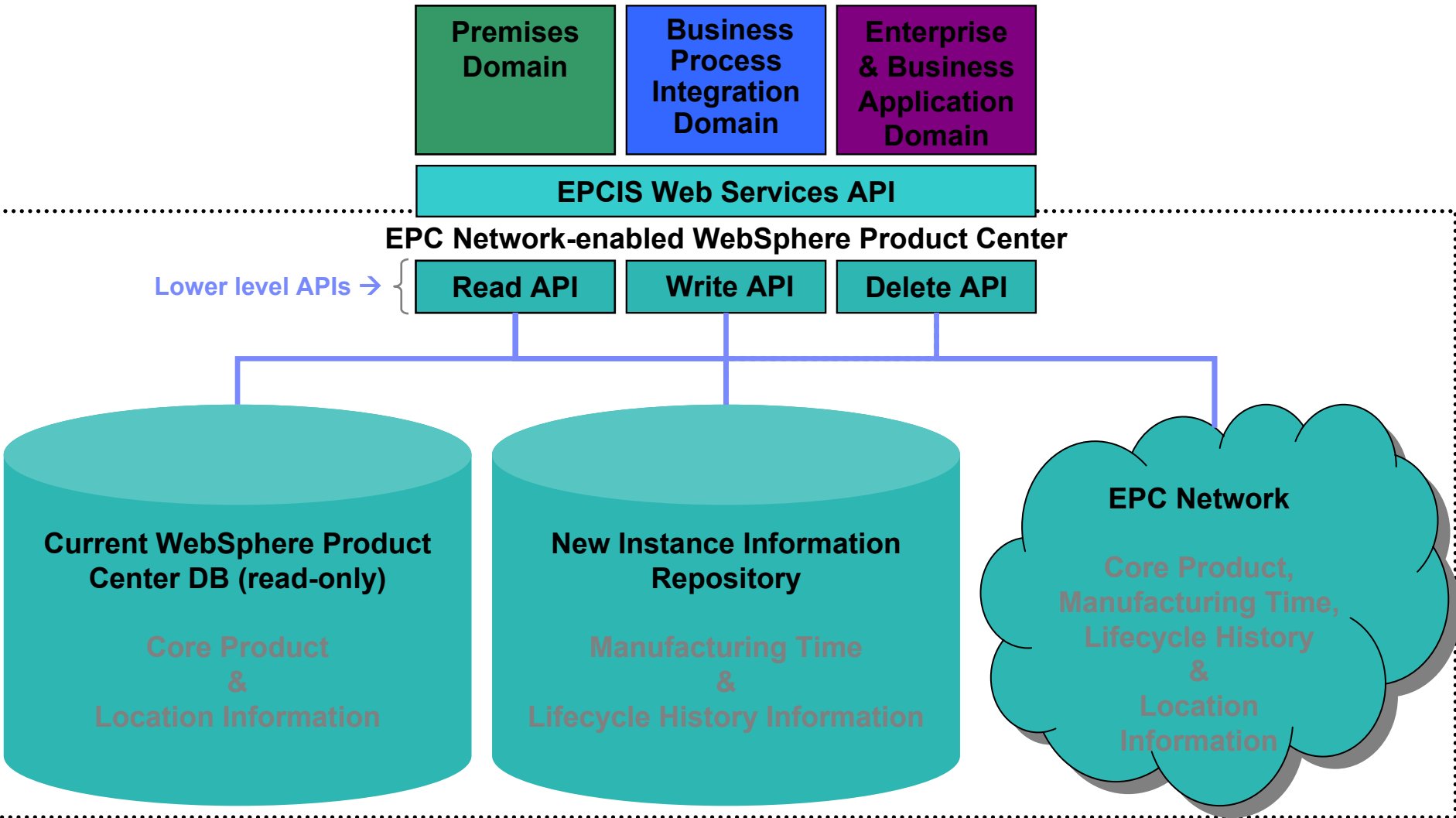
- Second-level index
- Contains a list of pointers to each EPCIS that holds info on this EPC

- **EPC Information Service (EPCIS)**

- The actual data repository for all three types of information



S&A Premises and Business Process Integration servers plus Enterprise Apps can read & write information about EPC tagged products into WPC on demand



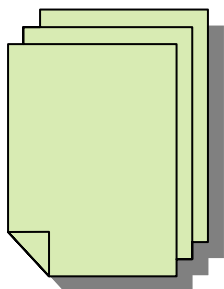
Why Is The EPC Network Required?



Brand Manager

“How is my product selling?”

Accurate
Consistent
Timely



Retail Portal
New York



Retail Portal
Paris



Retail Portal
Tokyo

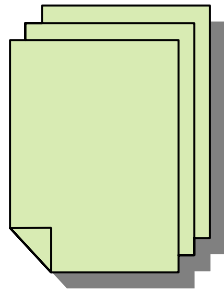


EPC Network Can Simplify Communication

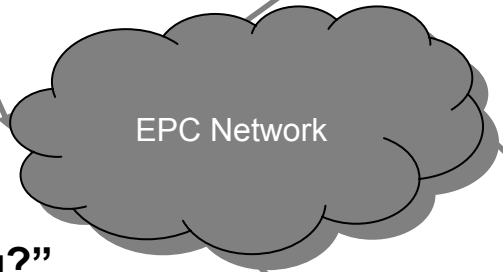


Brand Manager
“How is my product selling?”

**Accurate
Consistent
Timely**



Efficient, Consistent, and Timely Reporting



**Retail Portal
New York**
EPC Network Adaptor



**Retail Portal
Paris**
EPC Network Adaptor



**Retail Portal
Tokyo**
EPC Network Adaptor



Query Trader Moes and see where the product is out-of-stock

TARGET STRUCTURE DETAIL

Name: Pantene Shampoo and Conditioner Introduction

Last Check: Nov 03, 2004 02:02:45.658 PST

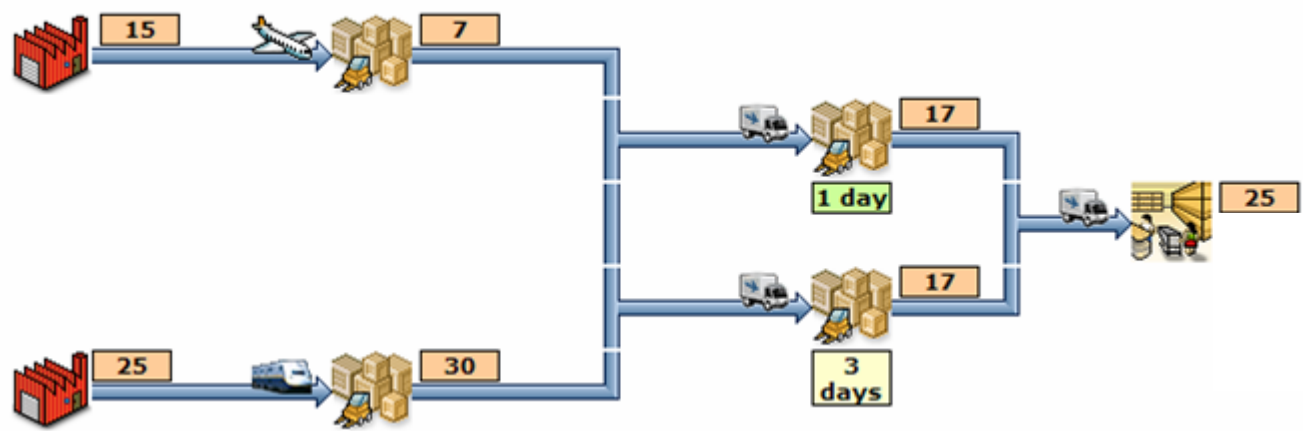
Item(s): 00808781005510 Pantene Shampoo
 00808781009430 Pantene Conditioner

INVENTORY ALERTS

Active Alerts (6)

ACTIVE ALERTS FOR 00808781005510: Pantene Shampoo

		Target	Actual
	Trader Moes Store Number 3: Supercenter, Sherman, TX - Sales Floor	60	12
	Trader Moes Store Number 4: Supercenter, Dallas (SW) (DUNCVL), TX - Sales Floor	60	12
	Trader Moes Store Number 8: Supercenter, Plano, TX - Sales Floor	60	0
	Trader Moes Store Number 8: Supercenter, Plano, TX - Back Room	180	30
	Trader Moes Store Number 16: Trader-Moes, Farmers Branch, TX - Back Room	180	30
	Trader Moes Store Number 16: Trader-Moes, Farmers Branch, TX - Sales Floor	60	0



EPC Track and Trace History Records

EPC Search

EPC:

EPC Scans for 485112 345678901280000000123456

Time of Scan	GLN	Company Name	Reader Location	Additional Attributes
Thu Aug 20, 2004 - 10:34:34.237 am	0000000123426	Manufacturer	Reader is located in the Manufacturer's Plant	Temperature: 43 F
Thu Aug 20, 2004 - 10:34:34.237 am	0000000123433	Manufacturer	Reader is located in the Manufacturer's Plant	Temperature: 43 F Humidity: 60%
Thu Aug 20, 2004 - 4:39:32.117 pm	0000000123440	Manufacturer	Reader is located in the Manufacturer's Warehouse at the inbound loading dock	--
Thu Aug 20, 2004 - 7:14:45.019 pm	0000000123457	Manufacturer	Reader is located in the Manufacturer's Warehouse at the outbound loading dock	--
Fri Aug 21, 2004 - 9:10:12.277 am	0041163123410	Albertsons	DC inbound loading dock at 7550 Oak Grove Road, Fort Worth, Texas 76140	--
Fri Aug 21, 2004 - 2:15:45.456 pm	0041163123427	Albertsons	DC outbound loading dock at 7550 Oak Grove Road, Fort Worth, Texas 76140	--
Fri Aug 21, 2004 - 4:34:34.237 pm	0041163123434	Albertsons	Back of Store loading dock at 7400 oakmont, fort worth tx 76132	--
Sat Aug 22, 2004 - 10:34:43.983 am	0041163123441	Albertsons	Reader is located on the door between the back storage area and the sales floor at 7400 oakmont, fort worth tx 76132	--
Sat Aug 22, 2004 - 2:06:11.721 am	0041163123458	Albertsons	Eco compactor at 7400 oakmont, fort worth tx 76132	--

EPC Path 485112 345678901280000000123456



Compute Farm Network

WebSphere XD Dynamic Operations

Virtualization

Conventional Distributed Environment

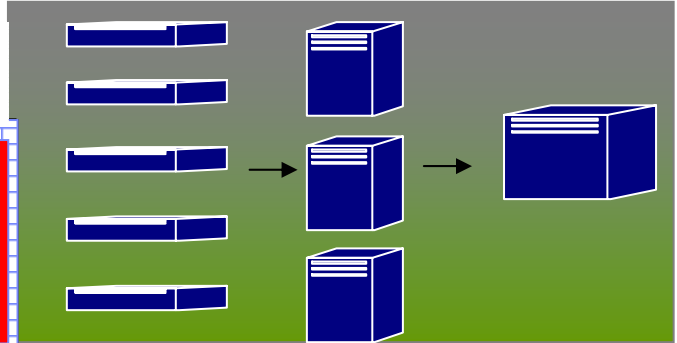
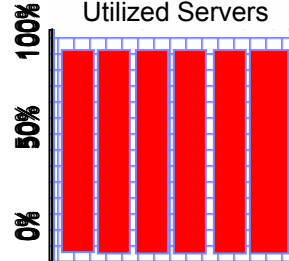
- Environment
 - 30+ applications
 - 100 application servers

- Challenges
 - Underutilized servers
 - Inability to share resources across server pools – especially during peaks
 - Inconsistent quality of service for business critical applications
 - Human Intensive Monitoring and Managing Environment

Stock Trading

100%

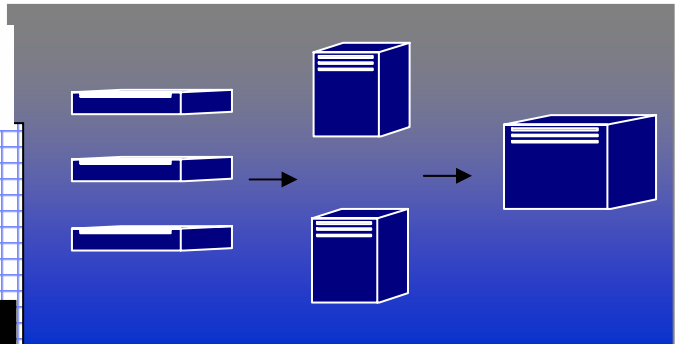
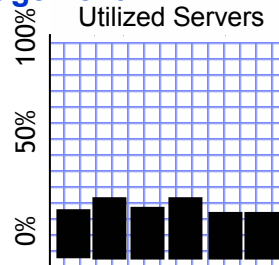
Utilized Servers



Account Management

15%

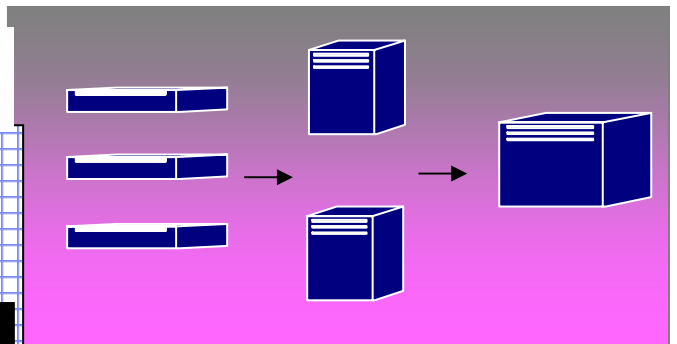
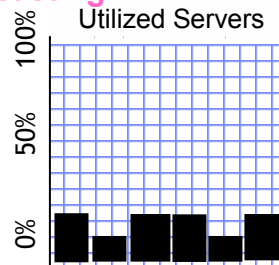
Utilized Servers



Portfolio Forecasting

10%

Utilized Servers



WebSphere XD Dynamic Operations

Virtualization

WebSphere XD Environment

- **Virtualized**
 - Pool Resources (Node Groups)
 - Virtualized Applications
- **Autonomic**
 - Operational Policies are attached to Application to reflect operational goals and importance of application
 - Autonomic Managers monitor environment for maximum utilization using business goals
- **Results**
 - Reduce total cost of ownership (doing more with less)
 - Increase stability and repeatability of Environment

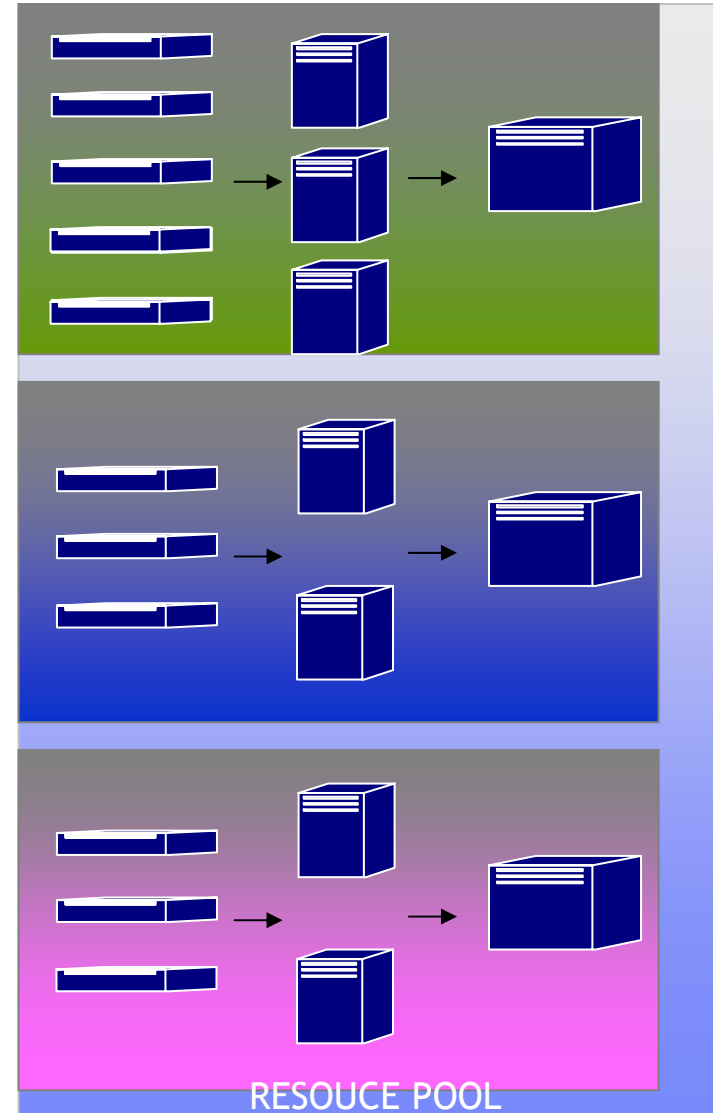
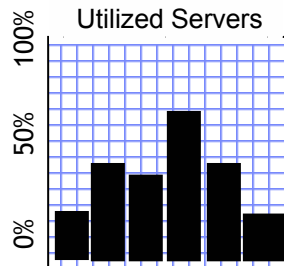
Stock Trading

Customer Support

Account Management

Risk Management

Portfolio Forecasting 55%



WebSphere XD Dynamic Operations

Goals Directed Infrastructure

Applying Business Goals to Applications

Application Solutions

Stock Trading

Account Management

Portfolio Forecasting

Customer Support

Risk Management

Service Classes

Gold	RT < 1sec for 80% req	Very High
Bronze	Avg RT < 2sec	Medium
Silver	Avg RT < 5sec	Medium
Other	Best Effort	

Goals

Priorities

Policies Drive Decisions of Autonomic Managers

Keys to building a successful Intelligent Network, continued

- **Build on existing standards – avoid Not Invented Here**
- **Move the smarts out towards the edge of the network**
- **Trust but verify – network and device outage will occur**
- **Clearly document interfaces between the big blocks**
- **Think of device management up front**
 - Monitor, Manage, Reconfigure, Device Security
- **Always be on the lookout for unintended consequences**
- **Demo early and often – Great for getting real feedback**
- **Continue to make computers and complexity disappear**

Learn by doing...

Always looking to co-innovate

Christian C. Clauss

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WebSphere Product Center

IBM Software Group

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