Service-Oriented Architecture is an IT strategy that organizes the discrete functions contained in enterprise applications into interoperable, standards-based services that can be combined and reused quickly to meet business needs.”

And Why Is It So Valuable?

… because expressing functionality as services evolves how IT functionality is delivered to the enterprise, and in consequence the value that it brings.
Application Infrastructure vs. Service Infrastructure

- **Application Infrastructure**
  - Service Enablement
  - Execution Environment
  - Reliability

- **Service Infrastructure**
  - Cross-platform management
  - Governance and control
  - Service discovery and publishing
  - Service security
  - Message routing and transformation
  - Resource allocation

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Accelerating ROI for RFID Solutions

- To realize the full benefits of RFID solutions, the information arising from event-driven RFID data will need to converge with existing electronic business transactions and shared across the enterprise with trading partners.

- The bulk of the ROI will come from using RFID data to trigger business events. Data capturing, filtering, enriching, analyzing, sharing and acting on RFID data is a business intelligence and process management problem.
Technical Challenges

1. Data Explosion from RFID events
2. Interaction of Physical Objects & IT
3. Geographical Distribution
4. Making Sense of RFID Data
5. Data Exchange & Inter-Enterprise Collaborations
6. Extensibility & Innovation

Addressing the Challenges – 3 Architectural Principals
RFID Edge Computing

Making Sense of RFID Data

1. Collect / Filter
   - Terabytes
   - Feb 11, 2005 // 13:05:23
   - 192.255.10.10
   - Store45_Inventory
   - 0041163045101 (GLN)
   - Crest Toothpaste
   - 4oz (unit weight)
   - Delivery timeliness
   - Dwell times
   - Promotion timeliness
   - Inventory accuracy
   - Share Information
   - Easy to digest format

2. Enrich via EPC-IS & Internal Systems
   - Gigabytes

3. Analyze
   - Megabytes

4. Act
   - Kilobytes

Business Events
- RFID Events
- Business Process Improvement
RFID Event Collection & Filtering

**RFID Event**
Individual tags on items and/or containers trigger RFID activity at readers

**Scanner Interface**

**Filtering / Aggregation**

**Physical Event**
20 tagged items (EPC code xxx) in container no. yyy passed Reader no. zzz at time nnn

**What?**

**Where?**

**When?**

---

Enriching the RFID Events

**Physical Events**

**Service Interface**

**Shared Event Services**

**Data / Message Controls**

**Shared Data Services**

**Service / Application Controls**

**Shared Application Services**

**Application Views**
Warehouse Management System
Delivery Scheduling System
Partner / 3PL, EIR Integration

**Data Views**
Product EPC Master Data
Customer Master Data
Product Master Data
Turning RFID Events into Business Events

Shared Event Services

Shared Application Services

Business Event
Shipment No: 12345
Product Code: ABCDE
Customer Name: ABC Ltd
Delivery Date: 01/11/2004
Delivery Status: En-route

Shared Business Services Framework

Sharing the Business Events

RFID Reader Network

RFID Integration platform

Project management Application server

Plant/Vehicle maintenance Application server

Existing App EAI
HR
MM
EPCglobal Network

- Leverage RFID and global standards for unique item identification such as Electronic Product Code (EPC) to address real-world challenges by enabling automated identification, dissemination, discovery and sharing of real-time, accurate and on-demand information about individual items as they move through the supply chain for all trading partners.

- Enable track and trace beyond the 4 walls providing supply chain visibility and management that crosses physical boundaries between trading partners with a pedigree of product movement accessible to authorized partners and enabling inter-enterprise collaboration.

- Leverage existing Internet platform to create a low-cost, standards-based set of services for trading partners to collect, discover, utilize and communicate information associated with the EPC across supply chains, across industries and around the world.
Electronic Product Code (EPC)

- An identification scheme for universally identifying physical objects via RFID and other means.

- Virtual license plate for an item consisting of owner / manufacture, product class and serial number
  - GID – General Identifier
  - SSCC – Serial Shipping Container Code
  - SGTIN – Serialized Global Trade Item Number
  - SGLN – Serialized Global Location Number
  - GAIA – Global Individual Asset Identifier
  - GRAI – Global Returnable Asset Identifier

EPC Information Services (EPCIS)

- Observations – RFID read events including EPC identifier, location, time and sensor data.

- Containment – aggregation of units into a large units e.g. case-to-pallet and pallet-to-container/truck associations.

- Transaction ID – association of transaction identifier e.g. PO, ASN, etc for integration of data with existing business applications for track and trace.

- Publish / Subscribe – Push / Pull model enabling parties to subscribe to data they have access to.
Healthcare Life Sciences – Product Authentication

Setup security
Manufacturer sets up bi-directional certificates, determine query response attributes, and enable SSL on a port

Read Bottle upon Receipt
Distributor reads EPC and Chip UID on unit tag – or looks up unit tag via case read

Lookup Mfr in ONS
Distributor finds Manufacturer EPCIS matching company prefix in EPC Number

Send Query to Mfr
Distributor polls Mfr EPCIS via SSL using Simple Event Query
  - Event Type = Object
  - EQ_businessStep = "Nocommissioning"
  - MATCH_epc = EPC + Chip UID

Reply to Query
Mfr provides EPCIS web service response via SSL – transmits either Commissioning Event if authentic or Error Message if EPC + Chip UID not made by Manufacturer

**Setup**
- Authentic Chip UID EPC
  - ABCD 1234
- Counterfeit Chip UID EPC
  - EFGH 1234

Deep product capabilities offering **complete** Edge-to-Enterprise software infrastructure
Combination of RFID Infrastructure with SOA-driven Platform to Create New RFID Enabled Business Processes

Unmatched leadership within EPCglobal

- Member since 2002
- Founder of Software Action Group (SAG)
- Member of EPCglobal Architecture Review Committee (one of three solution provider slots)
- Active participation, authoring & IP contribution

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RFID Customer Deployment Expertise

CPG/Manufacturing
- The Coca-Cola Company
- HAMPTON
- vtech
- Colgate

Retail
- Albertsons

Transportation
- KUEHNE - NAGEL
- Honeywell
- BOEING
- FedEx
- UPS
- TNT

Pharma
- McKesson
- Novartis

Hosted Providers
- GS
- AT&T

Thank You

Contact:
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