Using EPCIS Data Sharing for Full Supply Chain Visibility

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About the Speaker

• Independent Consultant
• Specializing in EPC/RFID Standards adoption
  – Software architecture for enterprises and solution providers
  – Educational programs on standards tailored to clients’ needs
• Actively involved in EPCglobal standards development
  – Member, Architecture Review Committee
  – Editor, EPCIS specification
  – Co-chair, Filtering & Collection (ALE) Working Group
  – Editor, EPC Tag Data Standard
  – Contributor to five other software specifications
  – Member, Joint Strategy and Planning Committee
Agenda

• What Is EPCIS Visibility Data?
• What Does EPCIS Visibility Data Look Like?
• What Information Does it Contain?
• How Can You Benefit?
Visibility into the Physical World

- Business decisions are made here, in the company headquarters data center.
- ...but there's an awful lot of important action here, in the real world.

EPC and RFID technology can bring awareness of the physical world.

- Factory
- Distribution Center
- Retail Store
What do EPC and RFID do?

- No EPC/RFID ➔ No Visibility
- EPC uniquely identifies the asset
- RFID Tag encodes the EPC
- RFID Reader senses presence of asset (no human intervention)
- Information systems now have visibility data
- Business can take action
Visibility in the Supply Chain

DC1 - Mfr

Pack Line

R1

Ship Door

R2

Rcv Door

R3

DC2 - Retailer

Ship Door

R4

Rcv Door

R5

Back

Interior Door

Front

R6

Store1

R7

Trash Compactor

EPCIS Visibility Data
Application: Retail Promotions

- Give unique EPC to each case of promotion-packaged item, on RFID tag
- Equip facilities with RFID readers: loading dock doors, trucks, retail back-room door, dumpster
- Retailer and Manufacturer share visibility data
- Can now measure & drive promotion:
  - Timeliness: is promotional packaging reaching consumer in time?
  - Effectiveness: is promotional item selling better?
Visibility Sharing using EPCIS

- Many apps require sharing of visibility data.

- EPC Information Services (EPCIS) provides the standard way to share visibility data.

Where is my product?

Your product was last seen in Store #23, at 10am Tuesday, during receiving.
What is EPCIS Visibility Data?

- EPCIS Data consists of **events**, each of which records something that happened in the real world.
- Often, though not necessarily, triggered by reading an RFID tag.
- An event has four dimensions:
  - **What**: what physical objects were involved (EPC or other identifier)
  - **When**: when the event took place (timestamp)
  - **Where**: where the event took place (location identifier)
  - **Why**: what business process step was being carried out
EPCIS Event in XML

<Event type>

<eventTime>2007-11-06T15:00:02.449Z</eventTime>

<epcList>
  <epc>urn:epc:id:sgtin:0400001.000006.1</epc>
</epcList>

<action>OBSERVE</action>
<bizStep>urn:epcglobal:cbv:bizstep:receiving</bizStep>

<readPoint><id>urn:epc:id:sgln:0400001.00300.0</id></readPoint>
<bizLocation><id>urn:epc:id:sgln:0400001.00300.0</id></bizLocation>

</ObjectEvent>
# EPCIS Events in Tabular Form

<table>
<thead>
<tr>
<th>EPC</th>
<th>Time</th>
<th>Biz Loc</th>
<th>Store</th>
<th>Sub loc</th>
<th>Biz Step</th>
<th>Disposition</th>
</tr>
</thead>
</table>

... ... ... ... ... ... ...

**What** | **When** | **Where** | **Why**
The **What** Dimension: the EPC

- Looks like this:
  
  `urn:epc:id:sgtin:0801234.099999.1732050807`

- Tells you:
  - What product (GTIN / UPC)
  - What specific instance (serial number)
The **What** Dimension: the EPC

- Having a unique EPC for each product instance gives you **new information**
- The **specific** instance (serial number) of a product lets you:
  - Measure transit time from your factory to the store sales floor
  - Know when a specific lot has reached the store
  - Know if exactly the same things you shipped were received
  - Learn how retailers cycle inventory of your product
  - Trace history of a product as it moves through supply chain
The **Where** Dimension

- Each **R3** is a place where an event can occur
The **Where** Dimension

- The data contains a **location identifier**:
  urn:epc:id:sgln:0614141.12345.4153

- You can look this up in Master Data to get:
  - The **type** of site (DC, store)
  - **Which** store or DC
  - **Area** within facility (e.g. for a store: front room, back room, etc)
  - Sometimes even more precise information:
    - End cap vs shelf
    - Upper “steel” storage vs lower stock area (warehouse-style store)
    - Which department (grocery, sporting goods, etc)
    - Warehouse bin number
The **Where** Dimension

- Having precise location gives you new information
  - When does product enter the sales area?
  - Was it stocked in the right part of the store?
  - How many products were discarded?
  - Did the products show up at the right store?
  - Did they show up at all?
  - Where do I go to quickly find the missing asset?
The **Why** Dimension

- **Business Step**: what was happening to the product when the tag was read?
  - Shipping
  - Receiving
  - Accepting
  - Stocking
  - + 27 others

- **Disposition**: what is true about the product afterwards?
  - In Transit
  - Sellable, not accessible (e.g., in back room)
  - Sellable, accessible
  - Non-sellable, expired
  - Sold
  - + 14 others
The Why Dimension

- Business Step and Disposition make it easy to process the data
  - Can easily correlate to business processes (shipping, receiving, …)
  - No need to understand how the retailer collected the data
  - Search and analysis simplified
EPCIS Data Across the Supply Chain

Manufacturer

Dist Ctr

EPCIS Events

EPC Capture Apps

Retailer

Dist Ctr

Store

Tagging Station

Palletizer

Portal

Portal

Shelving

Portal

Portal

Doorway

Commission

Aggregate

Ship

Receive

Store

Ship

Receive

Disaggregate

EPCIS Events
EPCIS Data Across the Supply Chain

Manufacturer

Retailer

Dist Ctr

Dist Ctr

Store

Commission  Aggregate  Ship  Receive  Store  Ship  Receive  Disaggregate

Mfr EPCIS + Retailer EPCIS

Case #123 of Cherry Hydro

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/5</td>
<td>1:23pm</td>
<td>Mfr DC #2</td>
<td>Shipping</td>
</tr>
<tr>
<td>2/7</td>
<td>4:28am</td>
<td>Retail Store #5 back room</td>
<td>Receiving</td>
</tr>
<tr>
<td>2/8</td>
<td>5:23pm</td>
<td>Retail Store #5 front room</td>
<td>Observe</td>
</tr>
</tbody>
</table>
EPCIS Data Sharing

• How do you get data from across the supply chain?

1. Capture your own EPCIS data
2. Find other parties who also have data
3. Exchange data point-to-point using EPCIS

• EPCIS is not a single giant database: Each party keeps its own data, and shares it only with whom it chooses
Finding EPCIS Data

• How do you find other parties who have data of interest? Three options:

• Pre-arrangement
  – with your known trading partners

• Object Name Service (ONS)
  – finds the party that commissioned a given EPC

• Discovery Services
  – finds all data in the supply chain
  – still under development
Data Sharing with Known Trading Partners

1. EPC data collected during tagging and shipping

2. EPC observations collected as product moves

3. Retailer data shared with supplier via retailer’s network

4. Combined data used to gain business benefits
Uses for Visibility Data

• Many business questions need visibility:
  – Has my product reached the consumer?
  – Was my shipment delivered?
  – Is my product authentic?
  – Where are the missing products?
  – Where are the trouble spots in the supply chain?
  – How can I reduce inventory?
  – Am I making best use of my fleet?
Top CPG Use Cases Today

• **Sales Promotions / New Product Introduction**
  – Are products getting to the right place at the right time?

• **Recall execution**
  – Where are the products that need recall?
  – Have they been removed?

• **Delivery Execution**
  – Did products actually arrive?
  – Were they checked in quickly?

• **Sales Floor Visibility**
Promotion Execution Errors

Set-up OK

Left in Back

Worked into Riser

Worked into Side Shelf
Promotional Execution

<table>
<thead>
<tr>
<th>Widget PDQ Lift Comparison</th>
<th># of Stores</th>
<th>Average Weekly POS ($/Store) Before</th>
<th>During</th>
<th>Lift</th>
<th>After</th>
<th>Lift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displays Set-up</td>
<td>68</td>
<td>45%</td>
<td>$11.6</td>
<td>$14.1</td>
<td>22%</td>
<td>$12.3</td>
</tr>
<tr>
<td>Displays Set-up Early</td>
<td>14</td>
<td>9%</td>
<td>$12.4</td>
<td>$14.1</td>
<td>14%</td>
<td>$13.1</td>
</tr>
<tr>
<td>Displays Set-up On-Time</td>
<td>43</td>
<td>29%</td>
<td>$10.7</td>
<td>$13.9</td>
<td>30%</td>
<td>$11.6</td>
</tr>
<tr>
<td>Displays Set-up Late</td>
<td>11</td>
<td>7%</td>
<td>$14.1</td>
<td>$14.9</td>
<td>6%</td>
<td>$13.8</td>
</tr>
<tr>
<td>Worked In / No Display</td>
<td>55</td>
<td>37%</td>
<td>$13.2</td>
<td>$13.7</td>
<td>4%</td>
<td>$13.3</td>
</tr>
<tr>
<td>Left in Backroom</td>
<td>15</td>
<td>10%</td>
<td>$12.7</td>
<td>$12.5</td>
<td>-2%</td>
<td>$12.4</td>
</tr>
<tr>
<td>No Display Reads at the Store</td>
<td>12</td>
<td>8%</td>
<td>$12.1</td>
<td>$13.2</td>
<td>9%</td>
<td>$12.5</td>
</tr>
<tr>
<td>RFID Enabled Stores</td>
<td>150</td>
<td>25%</td>
<td>$12.3</td>
<td>$13.7</td>
<td>11%</td>
<td>$12.7</td>
</tr>
<tr>
<td>Non-RFID Enabled Stores</td>
<td>450</td>
<td>75%</td>
<td>$12.5</td>
<td>$13.6</td>
<td>9%</td>
<td>$12.7</td>
</tr>
<tr>
<td>Summary for All Stores</td>
<td>600</td>
<td>100%</td>
<td>$12.5</td>
<td>$13.6</td>
<td>9%</td>
<td>$12.7</td>
</tr>
</tbody>
</table>

- During and after promotions, visibility data can help identify:
  - What was the lost revenue opportunity due to poor execution by the stores?
  - Which stores repeatedly discard displays and simply work-in the product?
  - What best characterizes the highest lift stores? And the worst?
  - What type of stores (format, revenue) were most likely to set-up the displays on-time?
  - What type of stores were most likely to work-in product?
  - What role did beginning on-hand inventory play in store execution?
Top Pharma Use Cases

• Forward Logistics
  – Detailed trace of product whereabouts
  – Full case → tote → each
  – Drop ship, repackaging, kitting
• Reverse Logistics
  – Returns, recalls, withdrawals
• Product Authenticity
  – Did product take an authorized path through the supply chain?
    • (if not, possible counterfeit)
  – Any unexplained gaps in custody during which product may have been tampered?
Food Safety

• Food-borne illness a major problem worldwide:
  – In US alone, $152 billion / year in losses
  – 76 million cases of illness, 5000 deaths

• Requirements:
  – Trace path of food in supply chain
  – When contamination discovered, track and remove the bad lots
  – Record critical information:
    • Farm of origin, date of harvest, temperature during shipping, etc
Food Safety – Case Study

• March 26, 2010: Thailand gov’t announces program to trace agricultural products from farms to store shelves
• Unique serialization using bar code and RFID
• Data shared with trading partners using EPCIS
Other Industries

• Transportation and Logistics
  – Full visibility through complex trans-oceanic logistics process

• Defense
  – Tracking repairable parts between active supply chain and repair depots

• Airlines
  – Tracking baggage Unit Load Devices across airlines

• Automotive
  – Tracking tires through supply chain, retreading
  – Tracking of material handling conveyances
The Value of Visibility

• Supply Chains can be like a dark tunnel...

• Visibility information helps you see inside!
Thank you