Handling internal and external flow of EPC data
A roadmap for implementing EPCIS
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Agenda

- EPC basics
- Information basics
- EPC Global framework
- EPC Flow – Physical flow
  - Internal flow
  - External flow
- Roadmap (tips and tricks)
  - Examples
- Areas of use
What is EPC

• A numbering scheme that uniquely identifies all objects

• EPC is the “WHAT” for the rest of this presentation.
EPC Basics

- **Header**
  - identifies the length, type, structure, version, and generation of the EPC

- **EPC Manager Number**
  - entity responsible for maintaining the subsequent partitions

- **Object Class**
  - identifies a class of objects

- **Serial Number**
  - identifies the instance

Assigned by EPCglobal

Assigned by EPC Manager Owner
EPC numbered/tagged assets - examples

- RTI’s
- Products
- Machines
- Pallets
- Vehicles
- Locations
- Humans
- Animals
- ...

Note: The list is not exhaustive.
Information

- Information is the result of processing, manipulating and organizing data in a way that adds to the knowledge of the receiver. In other words, it is the context in which data is taken.

Wikipedia
What information?

• Information about the item itself
  – Status
  – Content
  – Age
  – Weight
  – Origin
  – ++

• Information about the flow / reads
  – When
  – Where
  – Why

• Aggregated information
  – How much
  – How long
EPC Global framework

- Made for intra-enterprise communication as well as external communication
- Consists of interfaces and logical functions to support the use of EPC’s
- Driven through EPCglobal which is GS1 owned.
Physical flow – EPC Flow
Physical flow – EPC Flow
Data

- Time::When
- EPC::What
- Location::Where
- Process::Why

Physical

EPC tagged item

- EPC reader

- EPC reader

- EPC reader

- EPC reader

- Time2::When
- EPC::What
- Location2::Where
- Process2::Why
**Physical**
- EPC tagged item
- EPC reader
  - EPC reader

**Data**
- Time::When
- EPC::What
- Location::Where
- Process::Why

**Information**
- Status1
- Who?
- Status2
- Who?

**Lead time::time2-time**
**Cycle time::time2(2)-time2**
**Performance measurements**
Data

- Physical
  - EPC tagged item

Aggregated Information

- Amount of status1

Information

- Time::When
- EPC::What
- Location::Where
- Process::Why
- Status1
  - Who?
- Status2
  - Who?
- Lead time::time2-time
- Cycle time::time2(2)-time2

Data

- Time::When
- EPC::What
- Location::Where
- Process::Why

Physical

- EPC tagged item

EPC reader

- Throughput
- Amount in storage/transit

- Amount in transport between loc. 1 & 2
- Amount of status2

Performance measurements

- Throughput
- Amount in storage/transit

- Lead time::time2-time
- Cycle time::time2(2)-time2

Aggregated Information

- Amount of status1
**Internal flow**

- Item is kept within organizations' possession

- Predictable supply chain
  - Information sharing
    - What
    - Why
    - Can often be done within system
  - Information exchange
    - How
    - Can often be done with existing mechanisms
Data Physical

EPC reader

• Time::When
• EPC::What
• Location::Where
• Process::Why

Filtering & collection
“RFID middleware”

Physical

EPC tagged item

EPC reader

EPC reader

• Time2::When
• EPC::What
• Location2::Where
• Process2::Why

Nortura
Data

- **Time::When**
- **EPC::What**
- **Location::Where**
- **Process::Why**

EPCIS repository

Physical

- EPC tagged item
- EPC reader
- Filtering & collection “RFID middleware”

- EPC reader
- EPC reader

• Time2::When
• EPC::What
• Location2::Where
• Process2::Why
Aggregated Information
- Amount of status1

Information
- Status1
- Who?
- Status2
- Who?
- Lead time: time2-time
- Cycle time: time2(2) - time2
- Performance measurements

Data
- Throughput
- Amount in transport between loc. 1 & 2
- Amount in storage/transit

Physical
- Filtering & collection “RFID middleware”

EPCIS repository
External product flow

- EPC tagged items in open loop systems
- EPC tagged items in one way systems
- Unpredictable supply chains

Challenges
- Information sharing
  - What
  - Why
- Information exchange
  - How
Information

• Status
• Who?

• Lead time::time2-time
• Cycle time::time2(2)-time2
• Performance measurements

Aggregated Information

• Amount of status1

• Amount in transport between loc. 1 & 2

• Amount of status2

Information

• Status1
• Who?

• Time::When
• EPC::What
• Location::Where
• Process::Why

• Status2
• Who?

• Time2::When
• EPC::What
• Location2::Where
• Process2::Why

Data

EPCIS repository

EPC reader

Filtering & collection “RFID middleware”

Physical

EPCIS repository

EPC reader

Company a

Company b

Filtering & collection “RFID middleware”
Information is stored

EPCIS Repository

EPCIS Query Interfaces

EPCIS Capture Interface

EPCIS Query Interfaces

EPCIS Capture Interface

EPCIS Capturing Application

Filtering and Collection Interface (ALE)

OPC Client

OPC Server

Filtering & Collection
RFID Middleware

Reader Protocol

Tag Protocol

RFID Reader

Data Acquisition Protocol

Sensor Protocol

Sensor

PLC, IO board ++

Data origins

Information origins

EPCIS Query Interfaces (Control and Callback)

Nortura B/D ata Warehouse

Nortura Application

EPCIS Capture Server

Business process data
Master data
EPC IS roadmap

- Start by collecting everything possible to a reasonable cost

- Analyse and extract what is the essence and how to present it
  - Vision
  - Needs
Examples...

- Based on open source implementation of EPC IS, Accada (www.accada.org) and BIRT (business intelligence and reporting tool) (www.eclipse.org/birt/)
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What can be done with the information

- Reporting and analysis
  - Asset management
  - Time to market
  - Lead times
  - Cycle time
- Automating processes
  - Shipping and receiving
- Traceability
  - Documentation of events (combining and splitting)
- Linking different systems (f.ex. ERP)
  - Information standardised and follows the physical flow
  - Downloadable and available on standardised interface