



Building **R**adio frequency **I**Dentification solutions for the **G**lobal **E**nvironment

WP 9 – Reusable Transport Items [RTI]

Bruno JULIEN - GS1 France

December 19th, 2007



Reusable Transport Items



Pallet



Roll In Container



Roll cage with crates



RPC



Dolly

Tray



Beverage crate



Objectives

Improve the management of the reusable transport items [RTI] by supplying with the visibility through the Supply Chain by using Radio Frequency Identification (RFID)





Work package 9

- Objective: define solutions to use RFID and EPC network for the management of Reusable Transport Items (RTIs).
- Reusable Transport Items are Assets used to transport and handle goods. They are reusable, i.e. Not discarded, not recycled.
- These RTIs are rented from pool operators, owned by the user companies and/or exchanged between trading partners
- For example, crates, pallets, box cages, beer kegs.



Work Members

- GS1 France – WP Leader
- GS1 Germany (Focus on results and recommendations reports)
- Carrefour (a retailer)
- Bénédicta (a manufacturer SME)

External parties involved in the WP

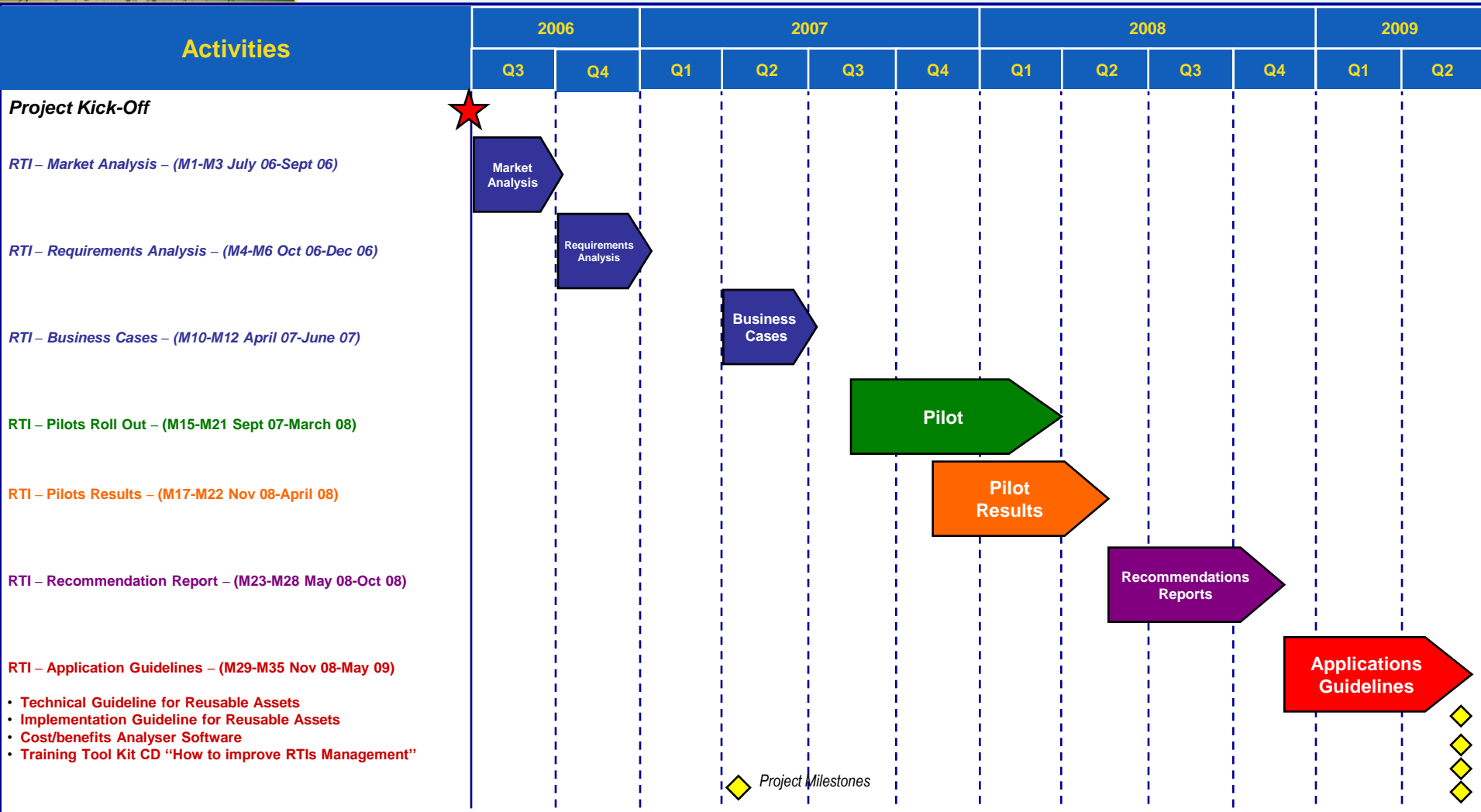
- Bénédicta's RTI Pool Provider
- Carrefour's RTI Pool Providers
- Third Party Logistics Providers [3PL] :
 - FM Logistic (Bénédicta's 3PL)
 - Kuehne & Nagel (Carrefour's 3PL)



The 5 phases of WP9

- Problem analysis
- Business requirements
- Business cases
- Multi sector pilot : Bénédicte side & Carrefour side (closed loop)
- Feedback from the multi sector pilot (results reports and ROI) and dissemination (recommendations, implementation and technical guide, CD tools kit).

Schedule





WP Deliverable : Problem analysis



A French survey sent to RTI suppliers about reusable assets to gain knowledge of the market, the business processes and volumes
Business Process analysis to describe the processes
Analysis of weaknesses and strengths of the processes

Deliverable number	Title	Lead	Delivery Date
D.9.1	Problem Analysis	GS1 France	10/2006

Key conclusions:

- ↪ Few RTI's management software systems (often accountability by fax, mail, excel, ..)
- ↪ RTI's stock balance are made often at end of year between RTIs pool provider and customers on declarative mode
- ↪ No real time visibility on assets park, no accuracy on accountability, ...



WP Deliverable : Requirements analysis



List and define the requirements that need to be fulfilled for the implementation of EPC for RTI management.

3 parts :

- Functional requirements
- Technical requirements
- Change management requirements

Deliverable number	Title	Lead	Delivery Date
D.9.2	Requirements Analysis	GS1 France	10/2006

Key conclusions:

- ↪ 2 process models : pooling model and exchange model
- ↪ No model better than the other



WP Deliverables : Business Cases



- Define the business scope and technical scenarios
- Track and trace both reusable transport items [RTIs] and products / unit load
- Have the engagement and the willingness of RTI pool providers
- Provide co-ordination efforts on different focus

Deliverable number	Title	Lead	Delivery Date
D.9.3	Business Cases	GS1 France	08/2007

Key conclusions:

- ↪ 1 process model : pooling model for the trials, exchange model not applicable in this context
- ↪ 2 RTIs model : wood pallet and plastic pallet
- ↪ 2 RTIs pool providers
- ↪ All actors of the supply chain (manufacturer, 3PL, retailer)
- ↪ 3 RFID solutions providers involved in the project



Business case

- Objective: provide and evaluate solutions that meet the business requirements
- This phase has started at the beginning of April
- Many actors in the project (fourteen members involved directly or indirectly in the project)
- Restricted conference call with work members and large physical meetings with all the actors to have a global view and a good understanding of the project's stakes



Goals and Stakes

Reusable Transport Items Project

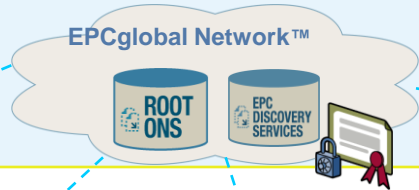
- Reduce costs of rented reusable assets
- Ensure better visibility, accuracy and traceability of reusable transport items [GRAI] through the Supply Chain and the linked unit load [SSCC]
- Improve information exchange between partners
- Decrease the time of inventory
- Reduction of RTI's stocks
- ...And everything that the feedback of pilots will teach us



Two sub-projects in the Project

- **Benedicta business case** scope and its relationships with its trade partners (RTI provider, Logistic service provider, Retailer (i.e. Carrefour))
- **Carrefour business case** scope and its trade partners (RTI provider, Logistic service provider, store(s))

Architecture Design Overview of RTIs management system in pooling model



LPR Depot Repair Area

Read GRAI
Rewrite SSCC at 'blank' value

Electronic notification :
GRAI
SSCC
DATE / TIME
LOCATION [SSLT]
BUSINESS STEP
...

Store Record Shipment on EPCIS Server

LPRGRP LOCAL ONS

EPC IS

LPR
Benedicta's and Carrefour's RTI Pool Provider, Depot @ Sète (34)

SFP Depot Wash Area

Read GRAI
Rewrite SSCC at 'blank' value

Electronic notification :
GRAI
SSCC
DATE / TIME
LOCATION [SSLT]
BUSINESS STEP
...

Store Record Shipment on EPCIS Server

SMARTFLOWPOOLING LOCAL ONS

EPC IS

SMART FLOW POOLING

Carrefour's RTI Pool Provider Depot @ Vitrolles (13)

RFID Middleware

RFID Middleware

BENEDICTA LOCAL ONS

EPC IS

RFID Middleware



FM Logistic Picking & Shipping Area

Read GRAI
Generate & write SSCC

Electronic notification :
GRAI
SSCC
DATE / TIME
LOCATION [SSLT]
BUSINESS STEP
...

Store Record Shipment on EPCIS Server

Kuehne + Nagel Receipt Area

Read GRAI
Read SSCC

Electronic notification :
GRAI
SSCC
DATE / TIME
LOCATION [SSLT]
BUSINESS STEP
...

Store Record Receipt on EPCIS Server

CARREFOUR LOCAL ONS

EPC IS

RFID Middleware

Kuehne + Nagel Shipping Area

Read GRAI
Read SSCC

Electronic notification :
GRAI
SSCC
DATE / TIME
LOCATION [SSLT]
BUSINESS STEP
...

Store Record Shipment on EPCIS Server

Carrefour Store Receipt Area

Read GRAI
Read SSCC

Electronic notification :
GRAI
SSCC
DATE / TIME
LOCATION [SSLT]
BUSINESS STEP
...

Store Record Receipt on EPCIS Server

RFID Middleware



FM LOGISTIC
made in satisfaction

Logistic Service Provider [3PL] @ Longueil Sainte-Marie (60)

KUEHNE+NAGEL

Warehouse Center @ Brignoles (83)

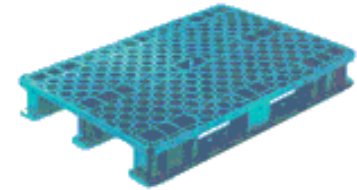
Carrefour's Store @ Aix-Les-Milles (13)

---* in dotted line are just indication of what could be done in the future




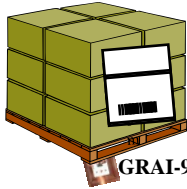
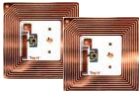
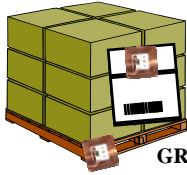

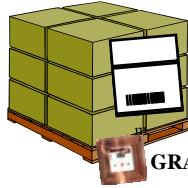

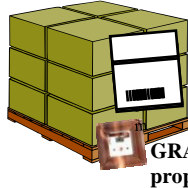
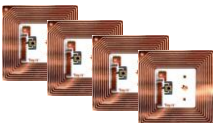
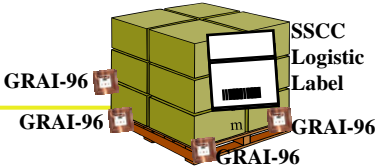
RTI Tags Scenarios - UHF Gen2 - 1 tag, 2 tags, 3 tags, 4 tags...what's the best solution

- How many tags embedded on pallets
- What type of tag (Read only, Read/Write)
- GRAI and SSCC on the same tag
- GRAI on one tag and SSCC on another tag
- Tags must be read through the supply chain with any type of readers (doorway portal, on forklift, handheld, ...) from the manufacturer until point of store and in any conditions
- The tag solution must be UHF Gen2 compliant
- The cost of embedded tags on RTI must be not too dissuasive for RTI pool provider's economic model





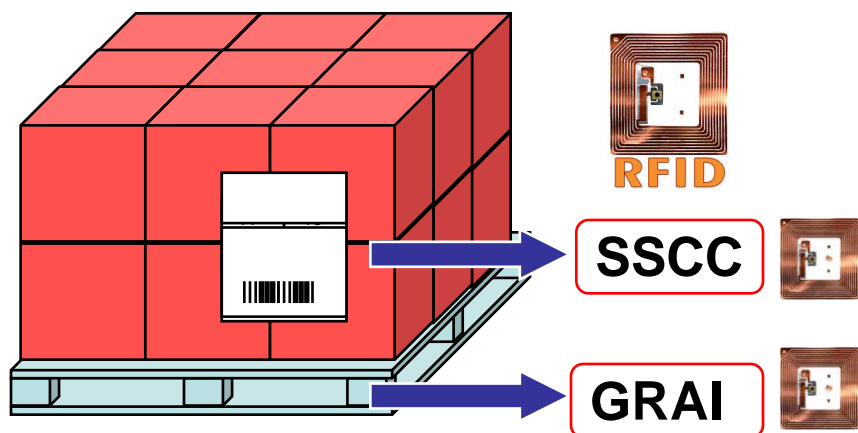
RTI Tags Scenarios - UHF Gen2 - 1 tag, 2 tags, 3 tags, 4 tags...what's the best solution

Scenario	Data Formats	Options	Tag implementation	Standards Y/N
<p><u>1 x 96-bit Tag</u></p> 	GRAI-96	<p>WORM RFID tag record the GRAI permanently attached to RTI and lock it</p>	 <p>SSCC Logistic Label GRAI-96</p>	Yes
<p><u>2 x 96-bit Tag</u></p> 	GRAI-96 + SSCC-96	<p>WORM RFID tag record the GRAI permanently attached to RTI and lock it + Read / Write RFID Tag Store the SSCC</p>	 <p>SSCC-96 + Logistic Label GRAI-96</p>	Yes
<p><u>1 x 256-bit Tag</u></p> 	GRAI-96 + SSCC-96	<p>Read / Write RFID tag record the GRAI permanently attached to RTI and lock it + Rewritable the SSCC in the user memory</p>	 <p>SSCC Logistic Label GRAI-96 / SSCC-96</p>	No but possible
<p><u>1 x 256-bit Tag</u></p> 	GRAI-96 + proprietary datas	<p>Read / Write RFID tag record the GRAI permanently attached to RTI and lock it + rewritable unspecified data in the user memory (i.e. proprietary delivery number associated to products contained within)</p>	 <p>SSCC Logistic Label GRAI-96 + proprietary datas</p>	Yes
<p><u>4 x 96-bit Tag</u></p> 	GRAI-96	<p>WORM RFID tag record the GRAI permanently attached to RTI and lock them</p>	 <p>SSCC Logistic Label GRAI-96 GRAI-96 GRAI-96 GRAI-96</p>	No but possible

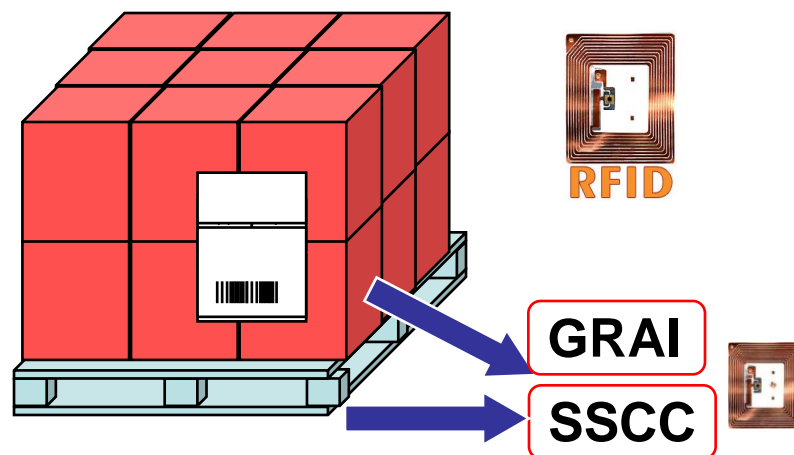


Pallets identification - Dual identity tags -

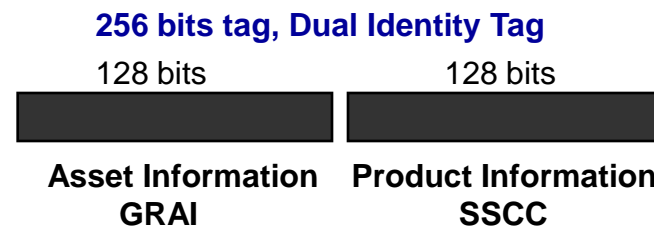
scenario 1



scenario 2



- Research on technology ability to handle in one tag more than only GRAI code
- Evaluate writable tag memory to include :
 - GRAI as a read only identifier
 - SSCC as memory re-writable extension





RFID Pallet tagging - Pilot scenarios -



1 x tag

1 x 256-bit Tag (Read/Write) for the GRAI and SSCC in the central plot of pallet

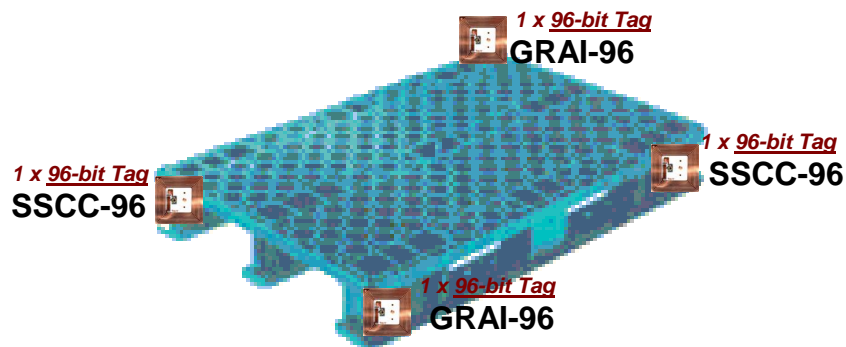


2 x tags

1 x 96-bit Tag (WORM) for the GRAI
1 x 96-bit Tag (Read/Write) for the SSCC



4 x tags



2 x 96-bit Tag (WORM) for the GRAI
2 x 96-bit Tag (Read/Write) for the SSCC
in opposite corners of the pallet



Pallets identification – GS1 128 - as a backup solution



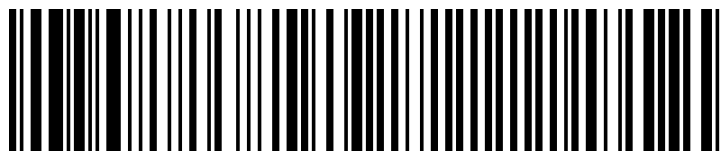
(8003) 0358946 000001 2 0000012345

No



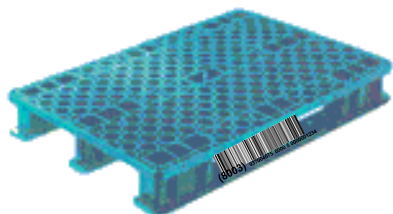
(8003)
0358946
000001
2
0000012345

= GRAI (Global Returnable Asset Identifier)
= **Logistic Packaging Return [LPR]** (Company Prefix)
= type of pallet (**wood** pallet 80x120)
= check digit
= serial number (pallet no. within this type)



(8003) 037004575 0000 5 0000001234

Yes



(8003)
037004575
0000
5
0000001234

= GRAI (Global Returnable Asset Identifier)
= **SmartFlow Pooling [SFP]** (Company Prefix)
= type of pallet (**plastic** pallet 80x120)
= check digit
= serial number (pallet no. within this type)

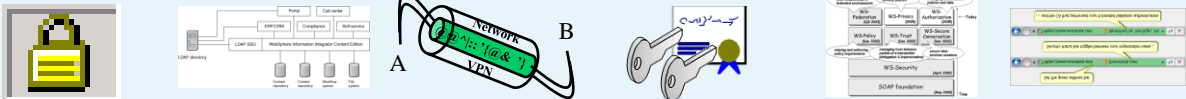


Key Challenges

- **Establishing the business case for RTI tracking linked to product tracking**
 - Association and reporting of SSCC, GTIN & GRAI movements
 - **RTI tagging standards**
 - Availability of write SSCC on user memory
 - Number and location of GRAI tags
 - **Reader/antenna configurations and tag type**
 - **The willingness and engagement of RTIs pool operators**
 - **Business Process Management -> How to manage RFID-enabled pallets from non RFID RTIs in the business process workflow ?**
 - **Find a target windows for the trials (Benedicta and Carrefour) --> depend on Carrefour steering committee and Kuehne & Nagel management.**
 - **Build an EPC Network test platform for the 'Track and Trace' of RTIs**
 - **Appropriate access of data relating reusable assets for key stakeholders**
 - **Finding the right ROI for all trading partners (manufacturer, LSPs, retailer, RTI pool provider)**
-



Sharing data between trading partners using EPC-IS (authenticated queries by partners or pull mode by information owner)



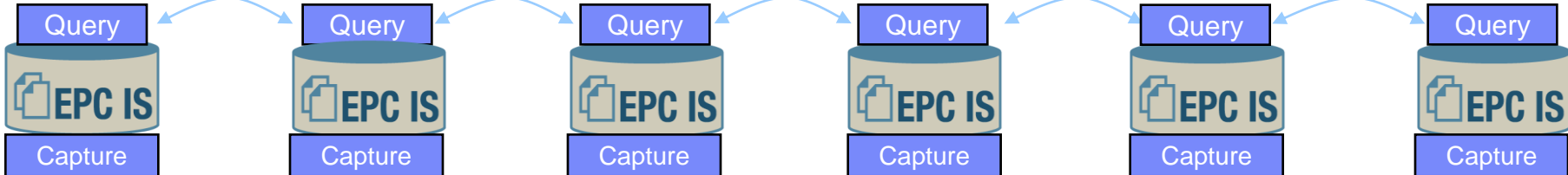
i.e. Real time XML queries of RTIs mvts on database (dashboard) from EPC-IS server

‘Push’ mode

SSL	SSO LDAP	VPN IPSec	PKI Cert. X509	SAML XACML	EV SSL IEv7 Cert.
<ul style="list-style-type: none"> . Authentication . Data Flow Integrity 	<ul style="list-style-type: none"> . Authentication . Authorization . Credential Integrity 	<ul style="list-style-type: none"> . Authentication . Data Flow Integrity 	<ul style="list-style-type: none"> . Authentication . Confidentiality . Integrity . Non repudiation 	<ul style="list-style-type: none"> . Authentication . Authorization . Integrity . Non repudiation 	<ul style="list-style-type: none"> . Authentication . Integrity . Non repudiation
<ul style="list-style-type: none"> . Bind Server . Encrypted data flow 	<ul style="list-style-type: none"> . Organisation . Update Users . Access Control 	<ul style="list-style-type: none"> . Switch appliance . Update ACLs 	<ul style="list-style-type: none"> . Trust 3rd Party . OCSP - CRL 	<ul style="list-style-type: none"> . SOAP Message . XML Gateway 	<ul style="list-style-type: none"> . CA Cert. Cost . Upgrade Client

‘Pull’ mode

i.e. Daily dispatch of RTIs mvts based on database trigger from EPC-IS server



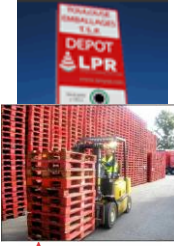
Manufacturer



3PL



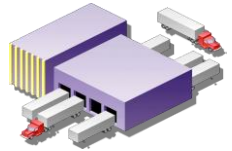
RTI Pool Provider



RTI Pool Provider



Warehouse



Store





Findings

- Based on the findings of the problem analysis phase:
 - Focus on plastic and wood pallets
 - Work on one model
 - Pooling model
 - Exchange model not applicable in this context
 - Need for a traceability system to locate the assets.
 - Partners will then be able to increase the speed of circulation of RTIs and decrease the inventory of RTIs.

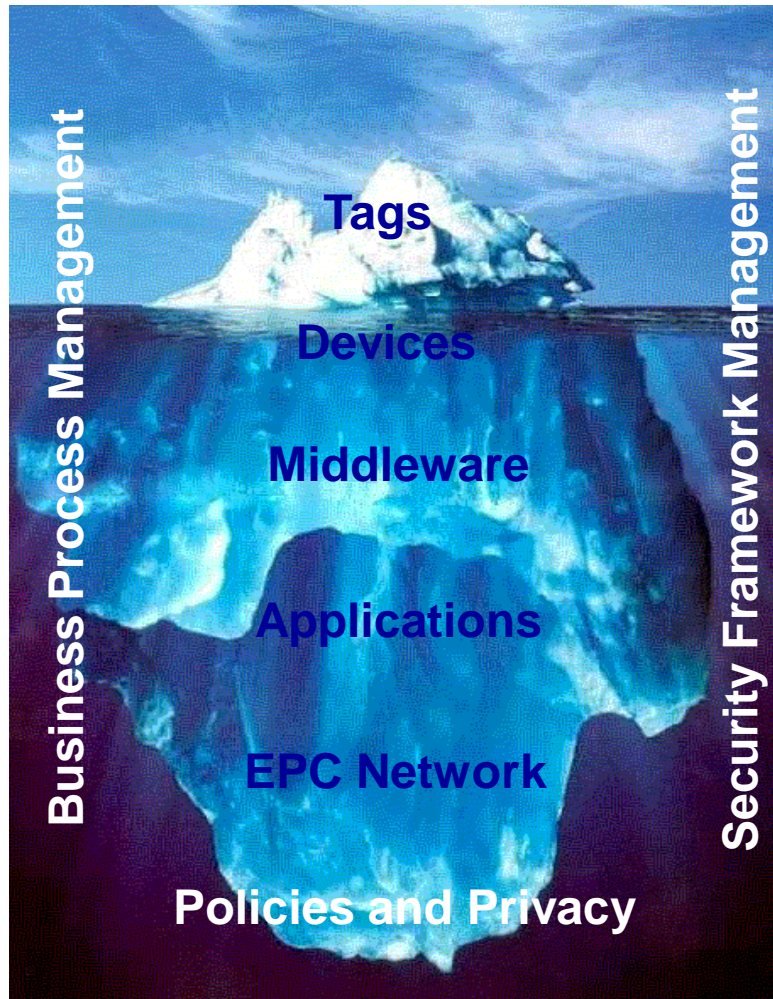


Plan for the next Months

- ***Preparation and development of pilots infrastructure (Sept 07 - Feb 08)***
- ***Pilots roll out during mid February 08 till end of May 2008***
- ***Pilots Analysis and Results Reports***
- ***Find the Return on Investment (ROI) models for use of returnable assets regards expected benefits :***
 - ***For asset management :***
 - ***Reduces losses***
 - ***Increase rotation***
 - ***...***
 - ***For product / unit load tracking :***
 - ***Track and trace products***
 - ***Automate product shipping & receipt***
 - ***...***



Tags : This is just the tip of the iceberg... The hidden aspects of the problem... ... always more important...



Tags (Frequency, Type, Memory capacity, ...)

The points of readings RFID (Fixed, mobile, ...)

Tag Acquisition Network (Switch appliance, wireless)

Installation & Tuning (Upgrade, Interoperability, ...)

Middleware (Basic vs business middleware, ...)

Mobility (M2M) (Windows CE, ...)

IT-IS Integration (Legacy systems) (WMS, ERP, ...)

Physical security (Backup systems)

Logical security (Web Services, RDBMS integrity, ...)

EPC Network (EPC-IS, Local ONS, ONS)

EPC DS (Discovery Services)

Storage of data events (NAS, SAN)

BI – Data warehouse (OLAP, ROLAP, MOLAP)

Monitoring & Supervision (SNMP, LLRP, ...)

Confidentiality & Customers Privacy (kill tag, ...)

Internal & external communication (employees, ...)

Change management (training, employment change)

BPM (business processes, adaptive SC networking)

Return On Investment [ROI] (RFID business models)

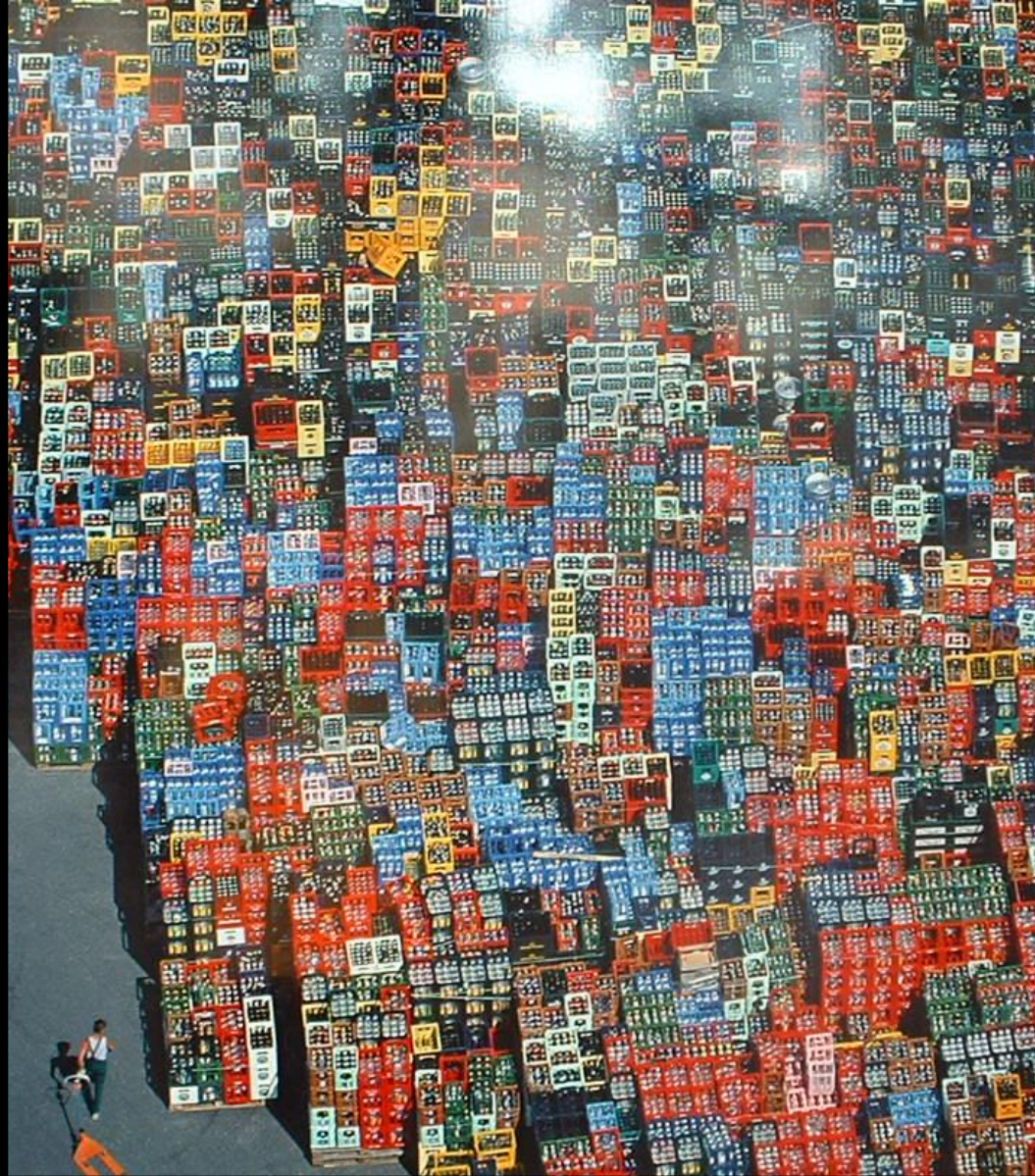
Regulation & Policies (Internat. & national organisation, EC)

Internet Governance (political, economical and social stakes)

Networked Enterprise (SC, Automotive, Aerospace, ...) © 2007

Process Management Competencies

Complex Technical Competencies



Beverage and Beer Crates in Lower Saxony (Germany)



Thank you for your attention !

Questions ?

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