



***La visione di Oracle sul Pervasive Computing:  
Rfid e Architettura Orientata ai Servizi (SOA): una  
accoppiata vincente!***

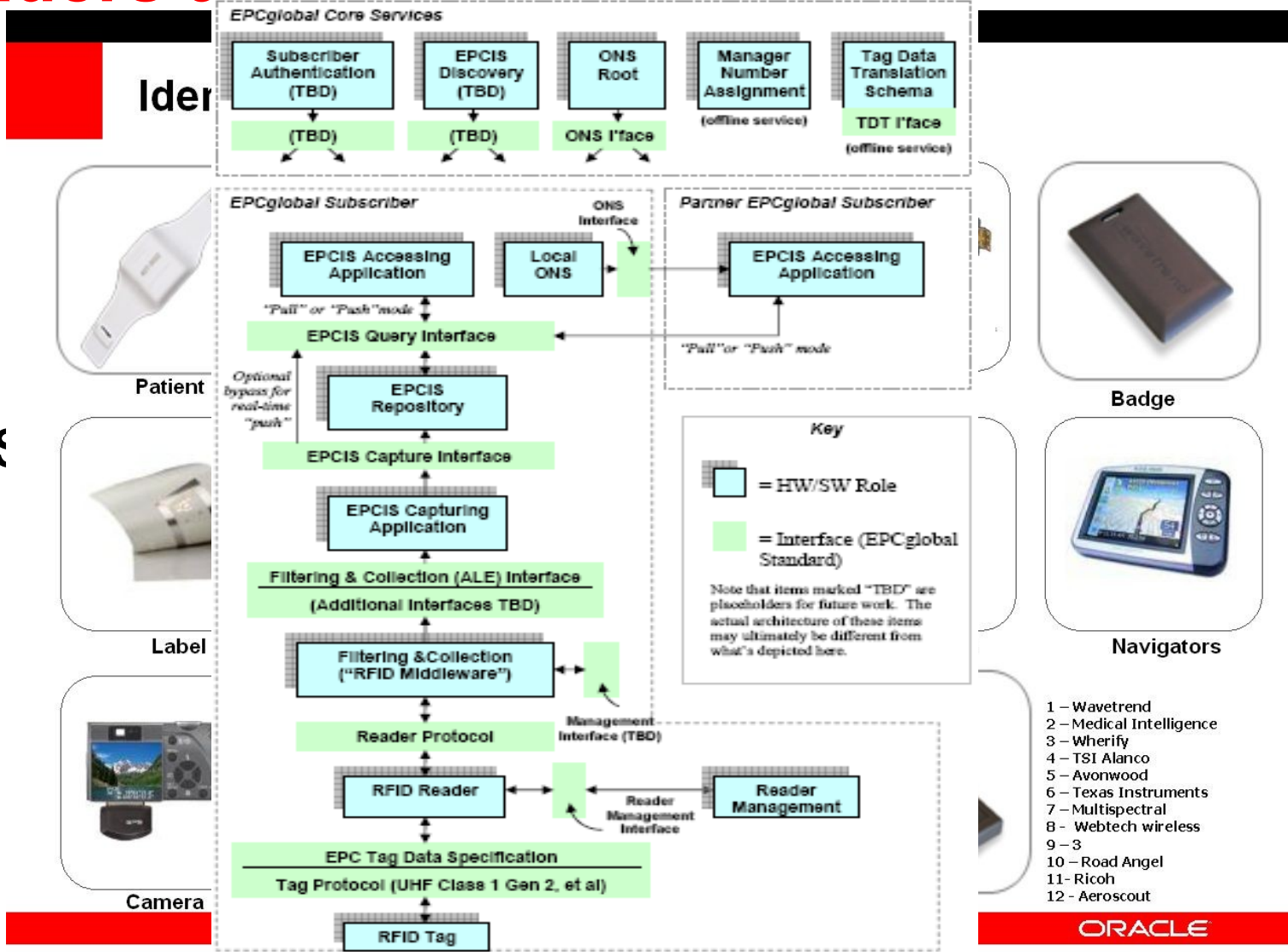
**Cesare Borretti  
Business Developer  
Pervasive Computing**

# Agenda

- Identificazione Automatica e SOA: perchè?
- Esempio
- 3 casi italiani

# Readers and Tags (Sensors)

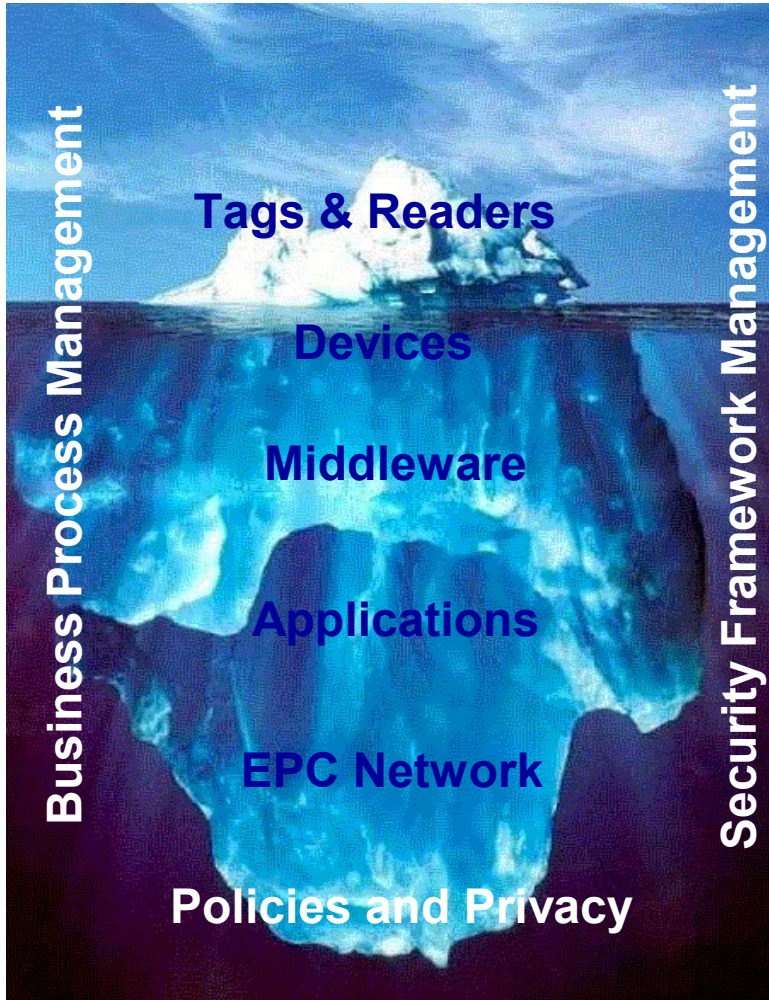
Più  
Più  
Gli s



- 1 - Wavetrend
- 2 - Medical Intelligence
- 3 - Wherify
- 4 - TSI Alanco
- 5 - Avonwood
- 6 - Texas Instruments
- 7 - Multispectral
- 8 - Webtech wireless
- 9 - 3
- 10 - Road Angel
- 11 - Ricoh
- 12 - Aeroscout

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# AIDC (Soprattutto Rfid)



~~Tags~~

~~Readers~~

Installation & Tuning

Middleware

IT-IS Integration

Physical security

Logical security

EPC Network

EPC Discovery Services

Monitoring & Supervision

Confidentiality & Data Protection

Internal & external communication

Change management

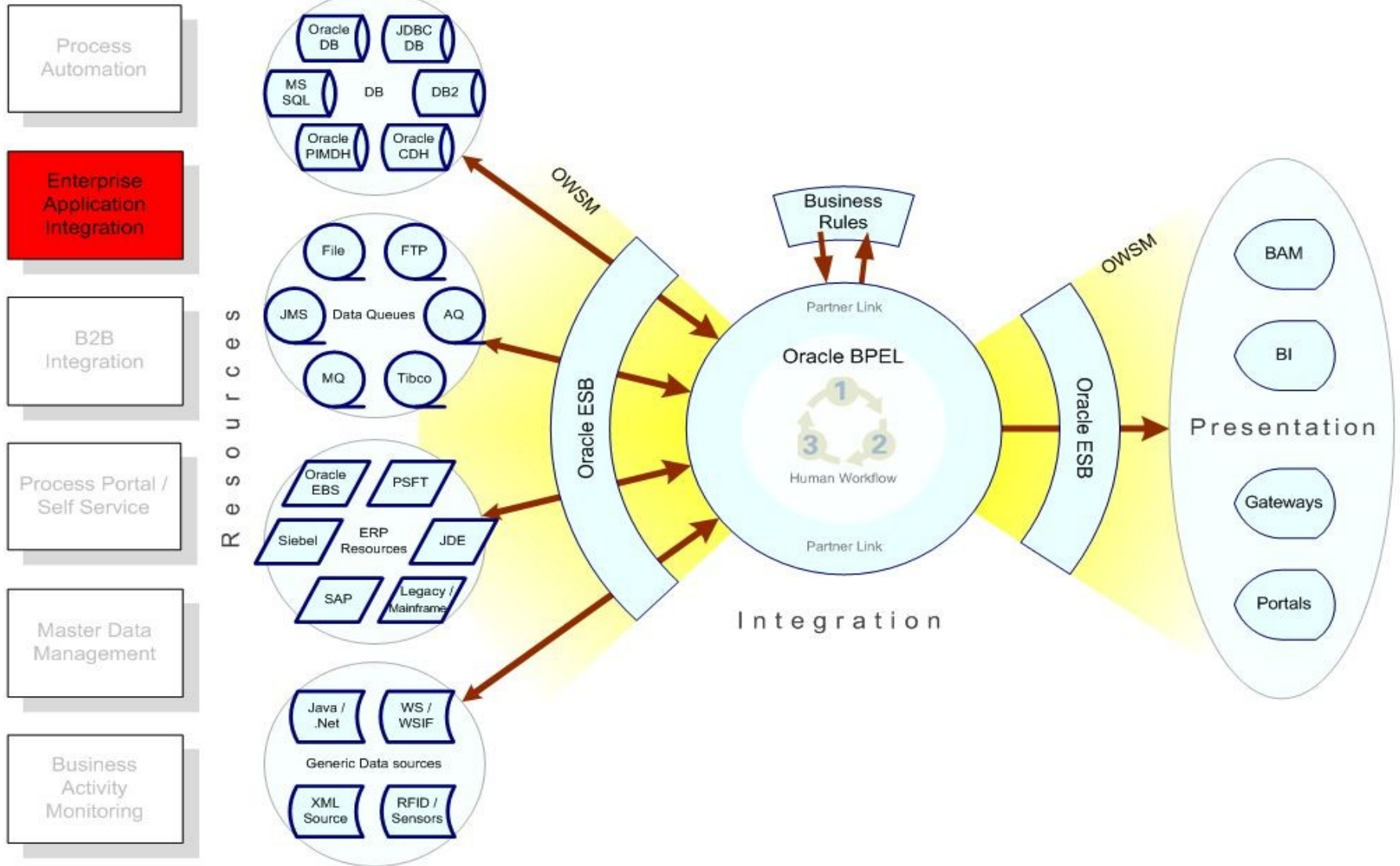
Return On Investment

Regulation & Policies

**Business Processes changes**

Gently granted by Henry Barthel, GS1

# Service Oriented Architecture



Vediamolo con un esempio

# Business Scenario

## Shipment Handling

**Advance Shipment Notice (ASN)**  
From Supplier via Oracle B2B



Shipment Notice Received from Trading Partner



# Business Scenario Shipment Handling

**Advance Shipment Notice (ASN)**  
From Supplier via Oracle B2B



**BPEL Process 1 –  
Shipment Receipt**



BPEL Process initiated to  
record the ASN into the  
back-end ERP System



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# Business Scenario Shipment Handling

**Advance Shipment Notice (ASN)**  
From Supplier via Oracle B2B



**Complex  
Event Processor**



**BPEL Process 1 –  
Shipment Receipt**



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# Business Scenario Shipment Handling

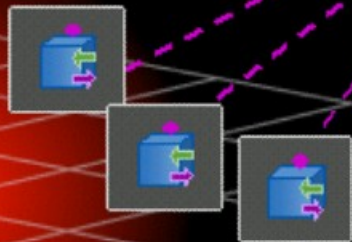
Advance Shipment Notice (ASN)  
From Supplier via Oracle B2B



Complex  
Event Processor



Shipments  
(RFID Tags)



BPEL Process 1 –  
Shipment Receipt



# Business Scenario Shipment Handling

**Advance Shipment Notice (ASN)**  
From Supplier via Oracle B2B

**BPEL Process 1 –  
Shipment Receipt**



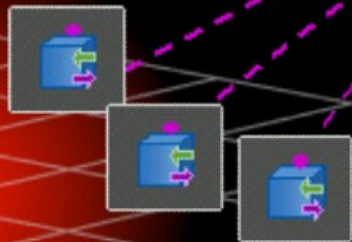
**Complex  
Event Processor**



Incomplete  
Shipment  
Event  
(timeout)

**BPEL Process 2 –  
Shipment  
Reconciliation**

Shipments  
(RFID Tags)

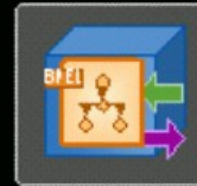


Complete Match

Accepted

**BPEL Process 3 –  
Shipment Acceptance**

Complete Shipment  
Event

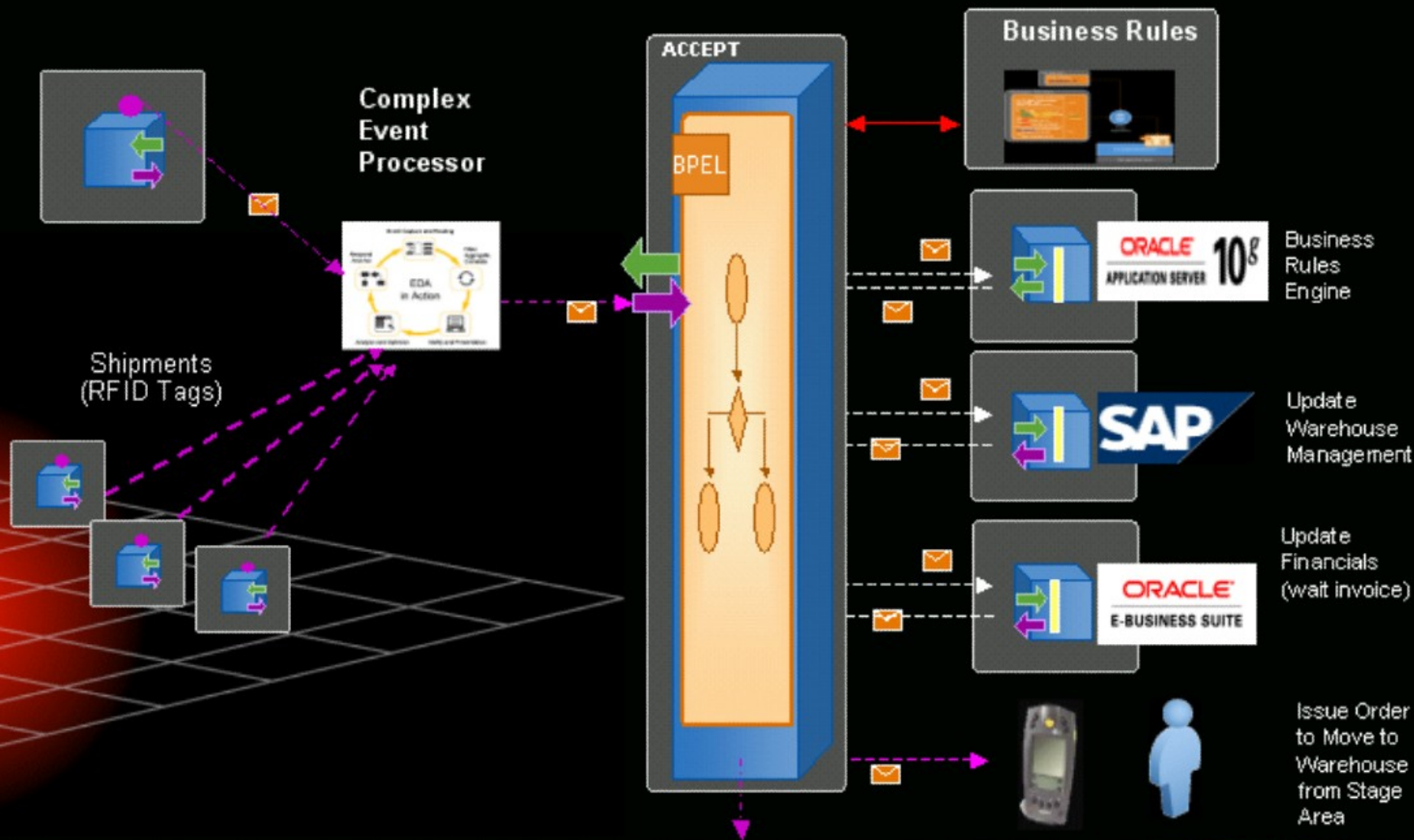


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# BPEL Process 3 - Shipment Acceptance

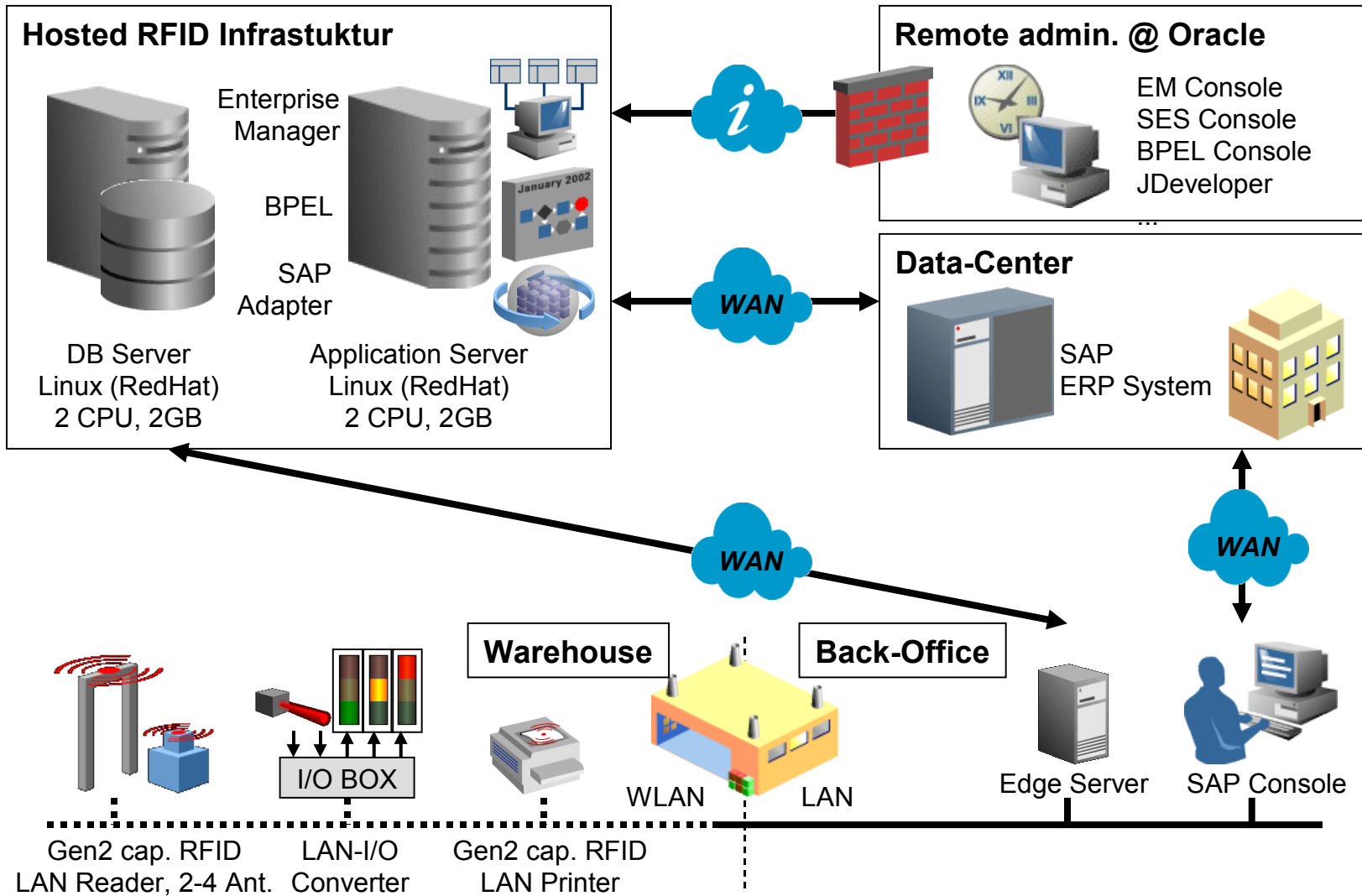
Advance Shipment Notice

BPEL 3 – Shipment Reconciliation Process



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# RFID-Infrastructure per Schenker AG



# Progetto SEC (Safe and Efficient Cargo)

# Progetto SEC: TRACCIATURA MEZZI PESANTI

## Autostrada del mare TRIESTE - TURCHIA



### **ANNO 2007**

13 PARTENZE PER SETTIMANA CON 12 NAVI IN LINEA  
19 COPPIE DI TRENI PER SETTIMANA DA E PER L'EUROPA

### **PREVISIONI 2008**

(14 - FINE 2008)  
(25 - FINE 2008)

230.000 MEZZI MOVIMENTATI

(250.000)

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# Progetto SEC: scenario

3 terminal marittimi,  
ognuno dedicato ad un porto di  
imbarco in Turchia

Retroporto, distante circa 15 km.



## **Terminal principale:**

Ospita almeno una nave al giorno con una  
movimentazione media giornaliera di 500 mezzi.

Sullo stesso terminal vengono gestiti tre treni giornalieri (Ro.La.) per Salisburgo, per un  
totale di 120 mezzi / giorno.



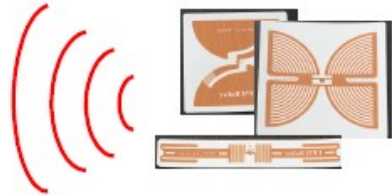
# Esigenza principale: Individuare il mezzo in modo assolutamente preciso

- Tale punto e' imprescindibile:
  - Una precisione del 99,9% e' insufficiente, corrisponde, nel nostro caso, ad un errore di circa 200 mezzi pesanti all'anno.
  - I rilevatori di targhe via telecamera (precisi al 100% per rilevare le autovetture), non garantiscono pari livello di esattezza anche nella rilevazione dei mezzi pesanti.
  - Infatti, mentre le autovetture hanno due targhe (la frontale e la retro) riportanti lo stesso numero, consentendo l'uso contemporaneo di due telecamere (una puntata sul davanti e una sul retro) per confrontare i due numeri e portare l'errore a zero, per i mezzi pesanti ciò non risulta possibile. Le due targhe si riferiscono, infatti, a due mezzi diversi: la motrice ed il rimorchio.

→ RFID è l'unica soluzione possibile

# Tecnologia scelta: tag RFID passivi UHF

## Il TAG o TRANSPONDER



I tag passivi sono meno costosi e non richiedono l'uso di una batteria.

La tecnologia UHF consente letture a distanza, per i tag utilizzati in SEC:

- fino a 7 m di distanza,
- velocità intorno a 40 km/h.

In prima battuta sono stati applicati i tag solo sui semirimorchi

(complessivamente 16.000 mezzi)

In seguito (inizio 2009) verranno marcate anche le motrici.

(Complessivamente 11.000 mezzi)

Un tag RFID viene applicato sulle motrici e sui rimorchi di cui si vuole tracciare il transito. Il tag RFID è un microchip nel quale sono memorizzati dei dati, in particolare contiene un codice, che gli è stato associato in modo univoco.



# Progetto SEC: posizionamento lettori e tag



Terminal: area di sbarco

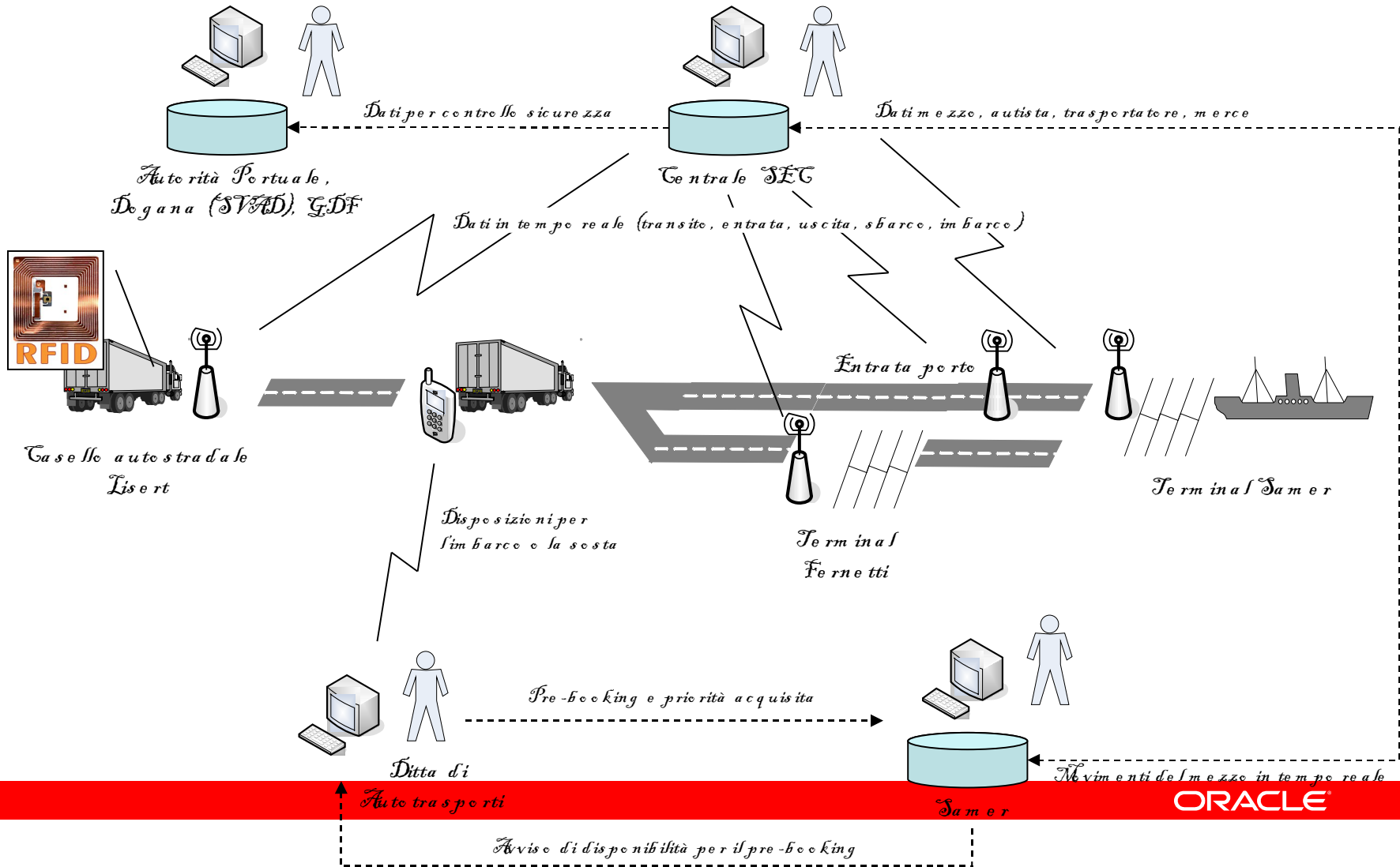


Terminal: varco d'ingresso

Tag:  
posizione  
errata



# Where is SOA in SEC project?



# EPCIS Logistics Project dall'Universita' di Parma

# Il Progetto

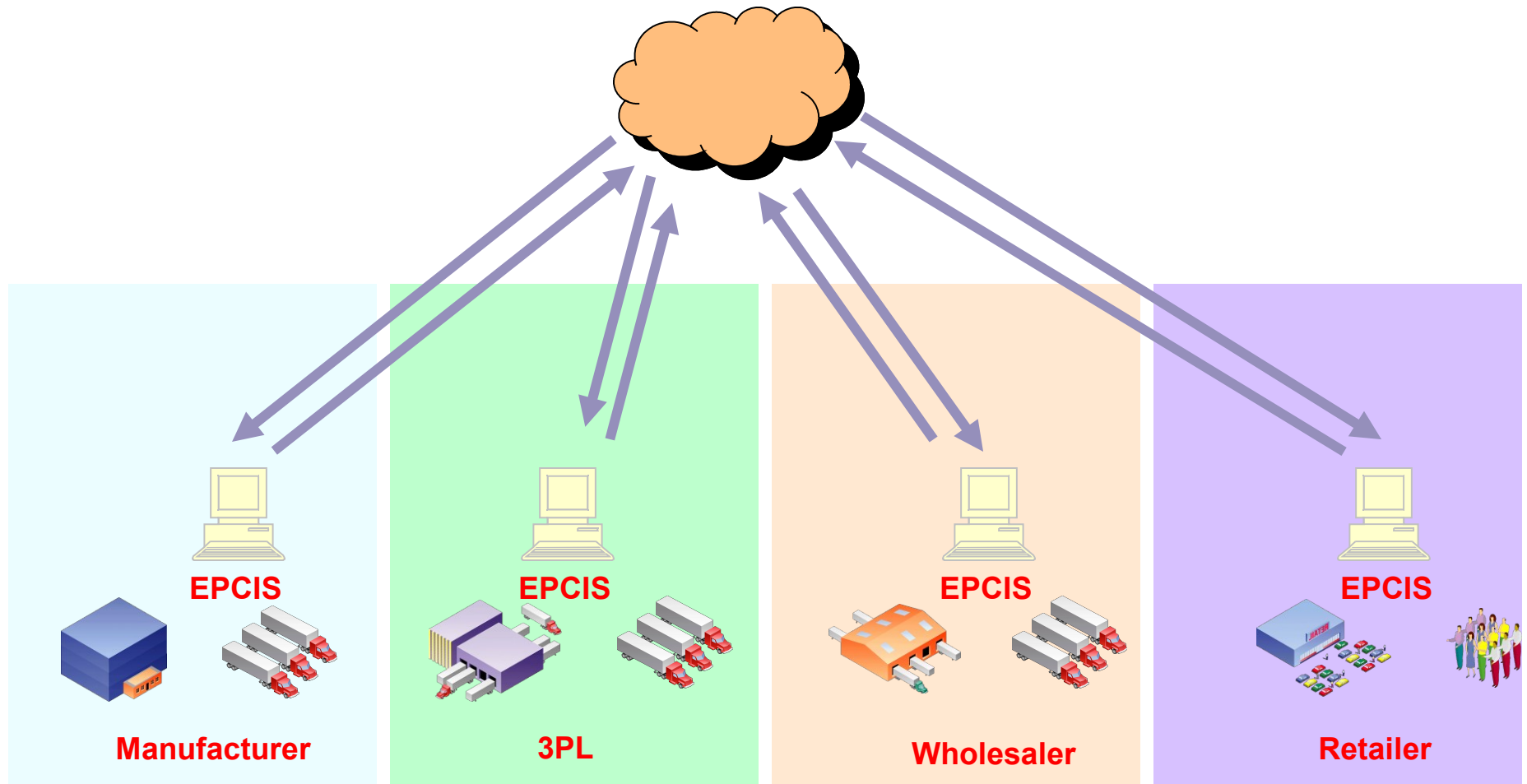
## Aziende Clienti



**Id-Solutions**, società di spin-off accademico dell'Università degli studi di Parma

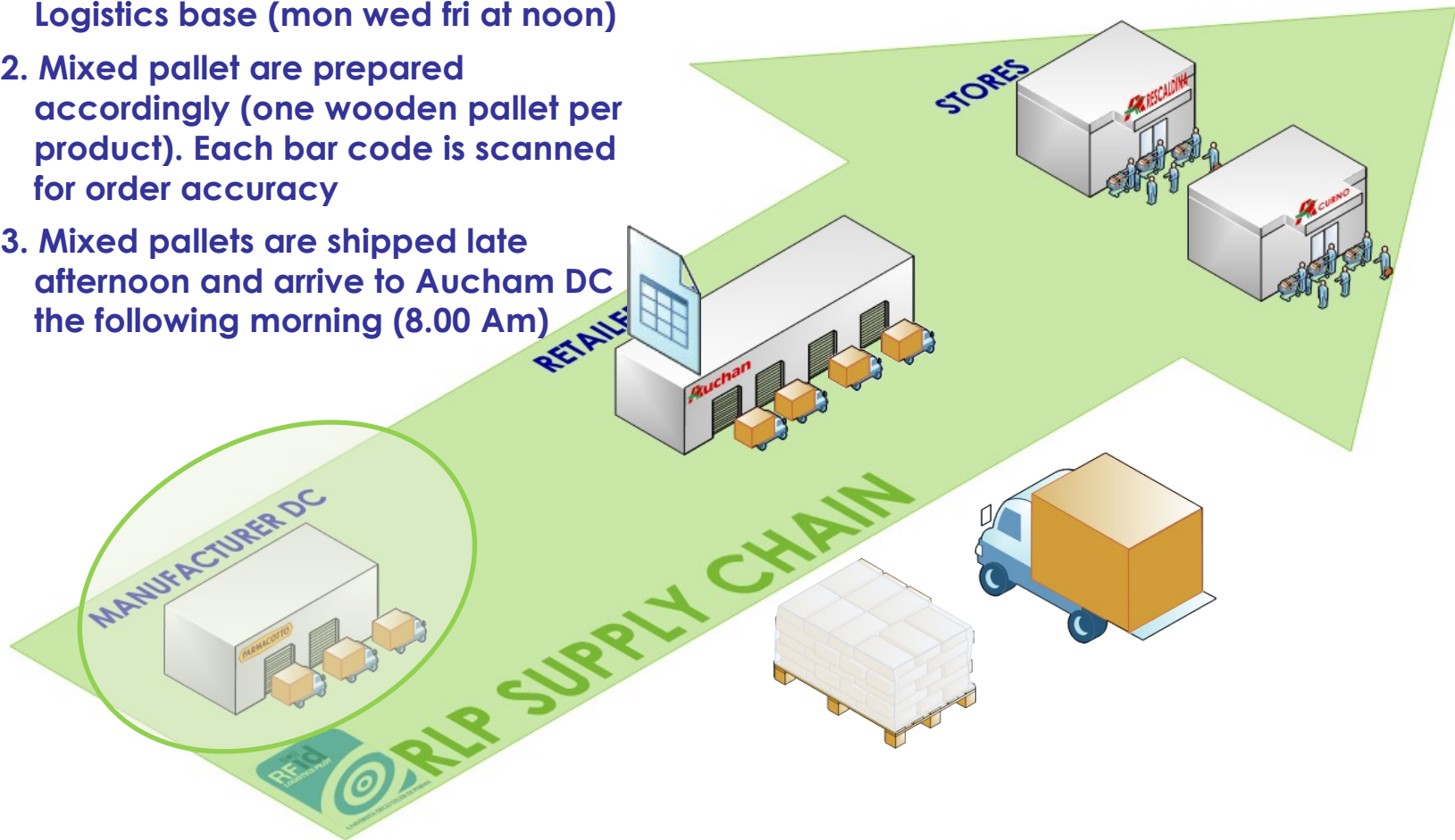


# Il flusso completo



# “As Is” supply chain

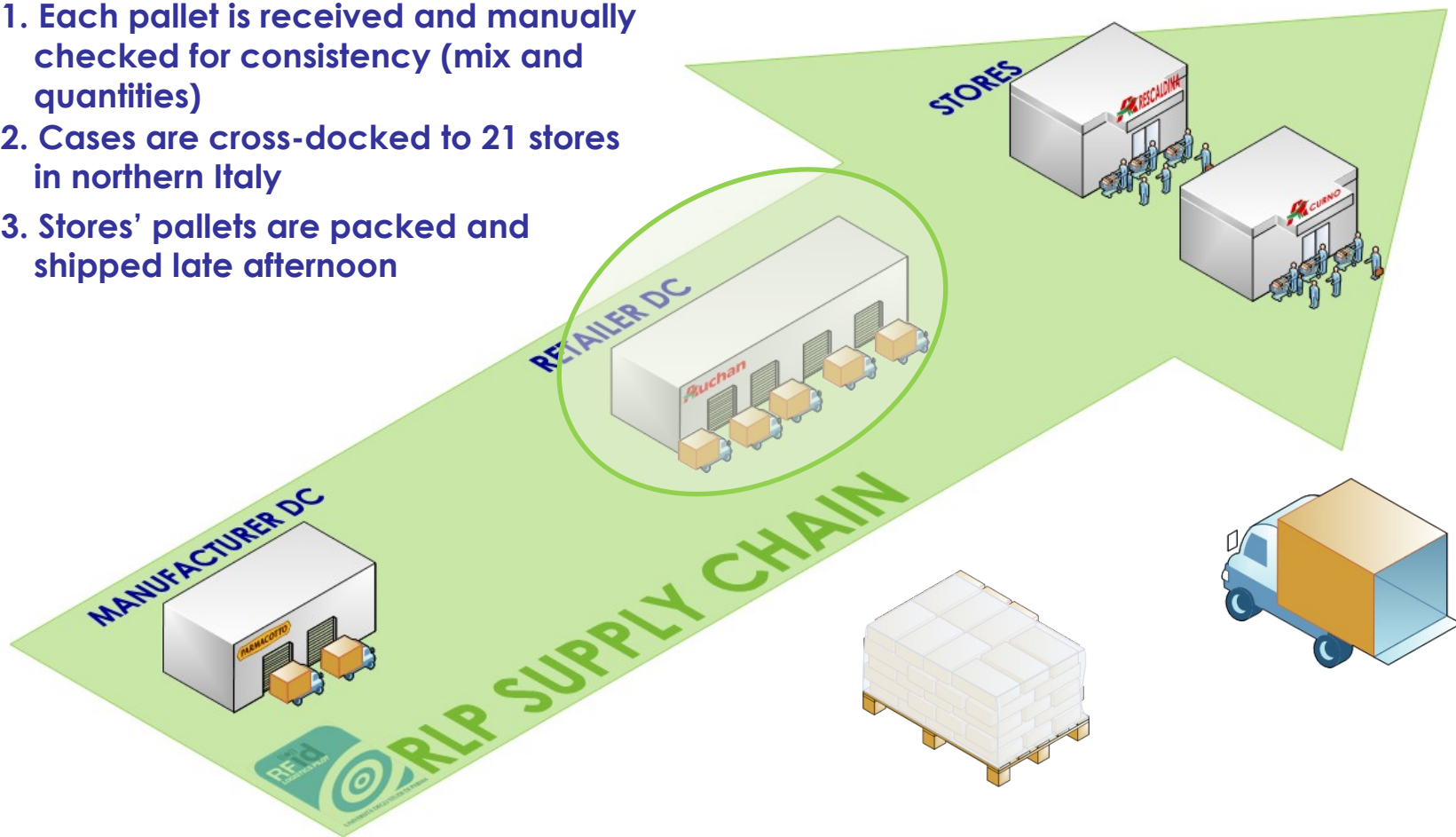
1. Order issued by Auchan DC to Parmacotto Logistics base (mon wed fri at noon)
2. Mixed pallet are prepared accordingly (one wooden pallet per product). Each bar code is scanned for order accuracy
3. Mixed pallets are shipped late afternoon and arrive to Auchan DC the following morning (8.00 Am)





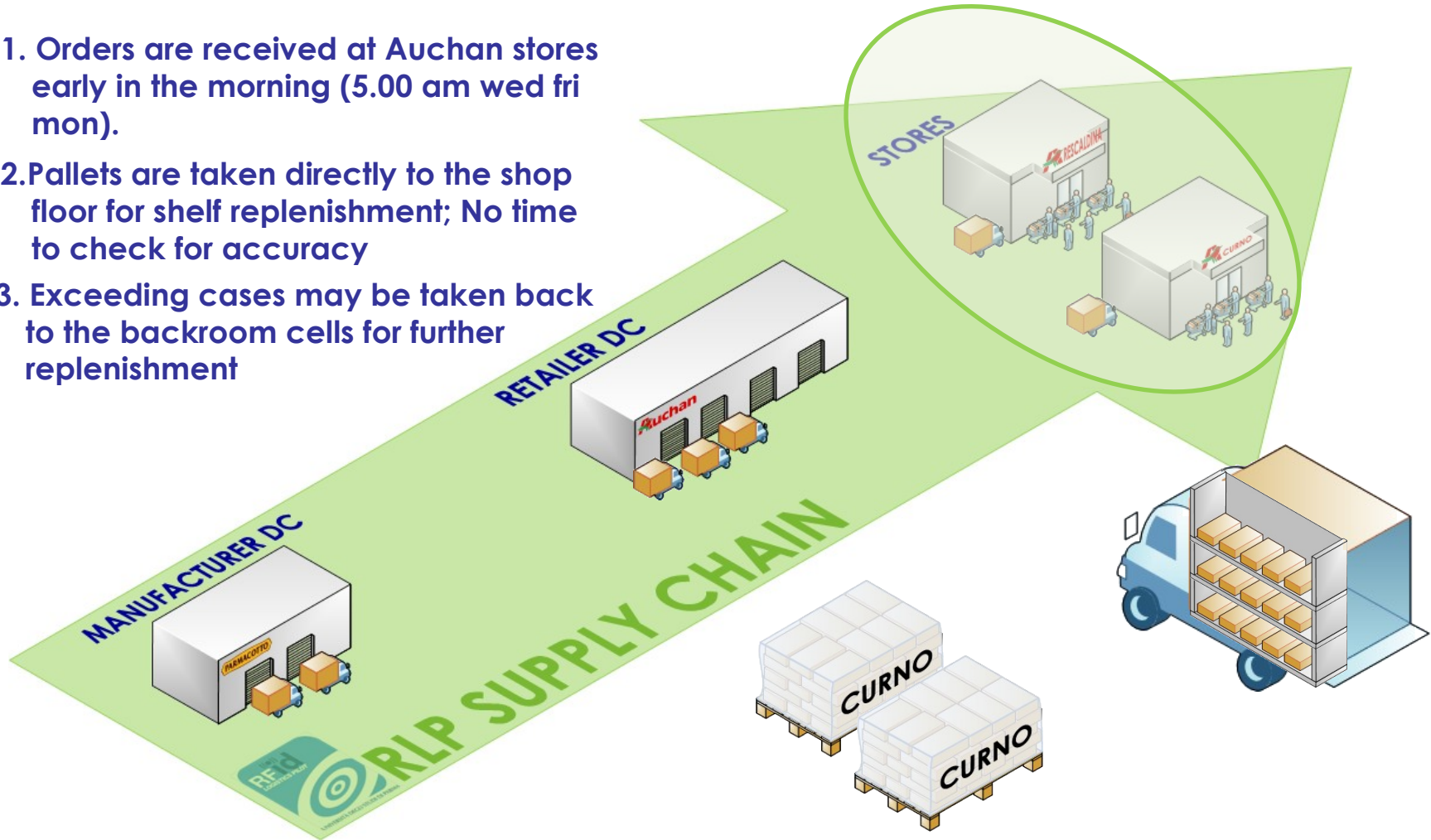
# “As Is” supply chain

1. Each pallet is received and manually checked for consistency (mix and quantities)
2. Cases are cross-docked to 21 stores in northern Italy
3. Stores' pallets are packed and shipped late afternoon



# “As Is” supply chain

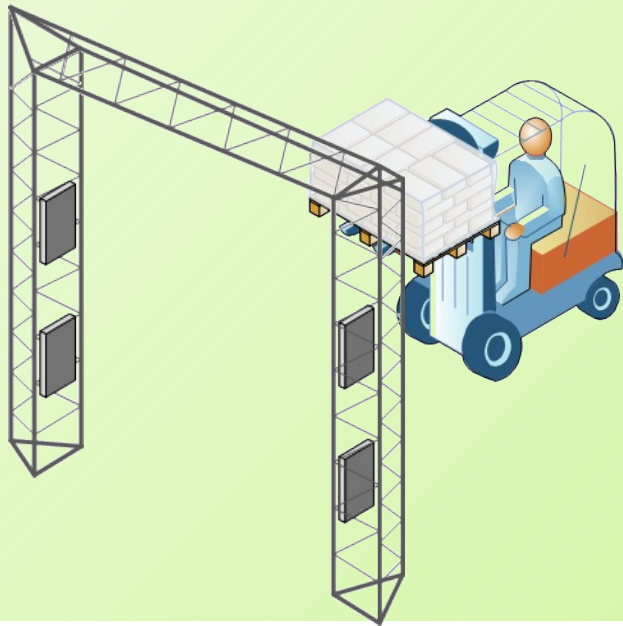
1. Orders are received at Auchan stores early in the morning (5.00 am wed fri mon).
2. Pallets are taken directly to the shop floor for shelf replenishment; No time to check for accuracy
3. Exceeding cases may be taken back to the backroom cells for further replenishment



# Engineering: Receiving

## Business Process Reengineering

1. All pallets are scanned through an RFID Portal
  - ✓ The first tag read starts the EPC Network querying process
  - ✓ A match is made between real reads (green) and expected tags (red)



### EPC reads

sgtin-96:3.8008835.200017.8  
sgtin-96:3.8008835.200017.7  
sgtin-96:3.8008835.200017.6  
sgtin-96:3.8008835.200017.5  
sgtin-96:3.8008835.200017.4  
sgtin-96:3.8008835.200017.3  
sgtin-96:3.8008835.200017.2

### EPC expected

sgtin-96:3.8008835.200017.1  
sgtin-96:3.8008835.200017.2  
sgtin-96:3.8008835.200017.3  
sgtin-96:3.8008835.200017.4  
sgtin-96:3.8008835.200017.5  
sgtin-96:3.8008835.200017.6  
sgtin-96:3.8008835.200017.7  
sgtin-96:3.8008835.200017.8

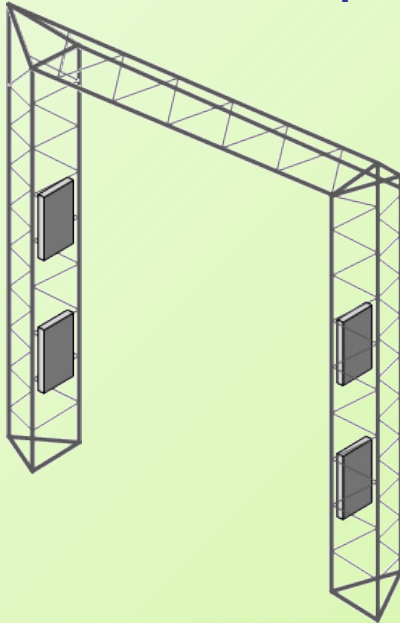
# Engineering: Receiving

## Business Process Reengineering

1. Exceptions are managed by the operator through the RF terminal:

- ✓ EPCs expected but not read
- ✓ EPCs read but not expected

the EPCIS is updated accordingly




### EPC reads



sgtin-96:3.8008835.200017.8  
sgtin-96:3.8008835.200017.7  
sgtin-96:3.8008835.200017.6  
sgtin-96:3.8008835.200017.5  
sgtin-96:3.8008835.200017.4  
sgtin-96:3.8008835.200017.3  
sgtin-96:3.8008835.200017.2  
sgtin-96:3.8008835.200017.1

### EPC expected

sgtin-96:3.8008835.200017.1



# RLP Supply Chain Dashboard <sup>BETA</sup>

Powered by  ID-SOLUTIONS with  ORACLE technology

DEMOAPEX Logout

Read point Rescaldina Receiving - Overall cases seen in the time interval

Status	Description	Cod Parmacotto	Cod Auchan	Total [case]	Rfid [%]	Man [%]	Not Read [%]
	PROSC.COTTO ALTA QUALITÀ 160G.	PM076	-	83	95.18	4.82	0.00
	PROSC.CRUDO STAGIONATO 125G.	PM075	-	74	95.95	4.05	0.00
	MORTADELLA BOLOGNA 160G.-FAMIG	PM071	-	49	97.96	0.00	2.04
	IL PARMACOTTO	005	-	50	100.00	0.00	0.00
	PROSC.CRUDO SELEZIONATO TRANCI	PM002	-	6	100.00	0.00	0.00
	ANTIPASTO EMILIANO 125G - FAM.	PM070	-	28	96.43	3.57	0.00
	FESA DI TACCHINO	PM230	-	7	100.00	0.00	0.00
	PROSCIUTTO COTTO TOAST TRANCIO	PM012	-	0	0.00	0.00	0.00
	EDAMER FORMAGGIO AFF.-FAMIGLIA	PM122	-	9	88.89	11.11	0.00
	FONTAL FORMAGGIO AFF.-FAMIGLIA	PM127	-	2	100.00	0.00	0.00
	TILSIT FORMAGGIO AFF.-FAMIGLIA	PM124	-	12	91.67	8.33	0.00

Completato

Trasferimento dati da 160.78.24.142...

Google

ostazioni

Logout

Impostazioni

Synchronize data

WELCOME, DEMOAPEX Logout

Total [case]	Rfid [%]	Manual [%]	Missed [%]
376	96.54	2.66	0.80

Total [case]

361

01

14.761s 1296x786

# Where is SOA in EPCIS Pilot?

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FUSION FACTORY

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Process Automation

Enterprise Application Integration

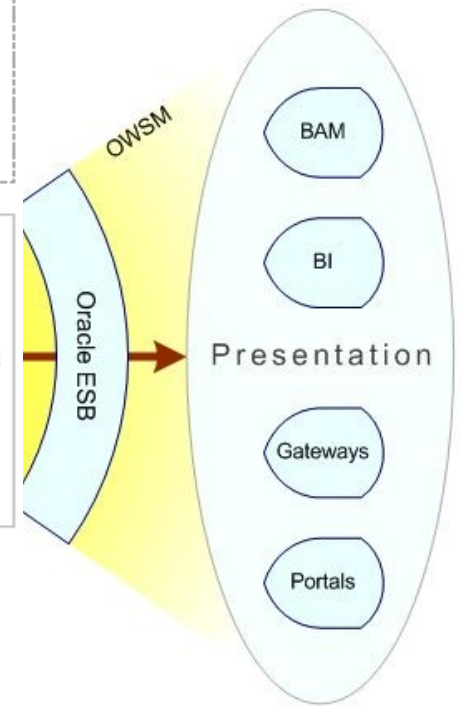
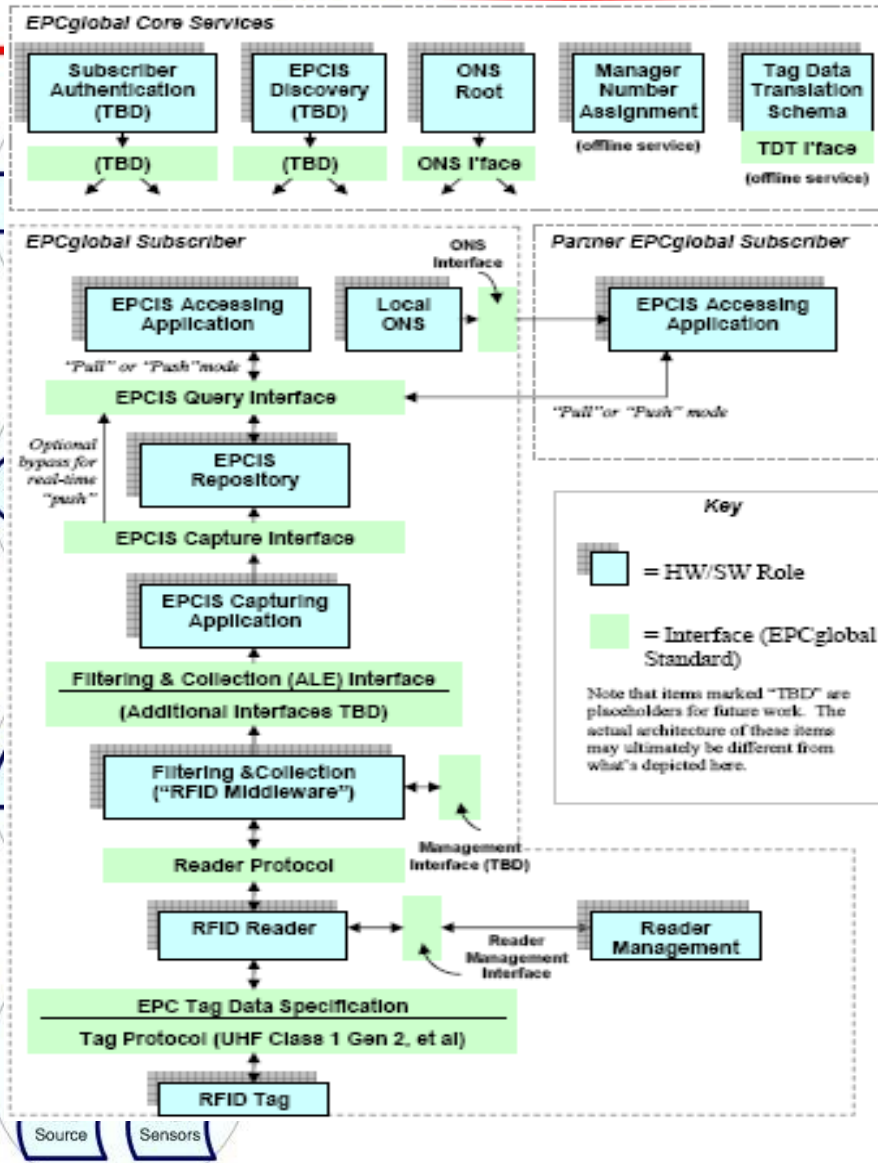
B2B Integration

Process Portal / Self Service

Master Data Management

Business Activity Monitoring

RESOURCES



# Catena del freddo presso un Retailer Italiano

# La catena del freddo

## Ambito

La catena del freddo vuol dire mantenere i prodotti refrigerati ad un intervallo di temperatura controllata per conservarne la qualità. Il freddo circoscrive la propagazione di microrganismi. Qualsiasi rottura della catena del freddo provoca un'accelerazione dello sviluppo microbico e, di conseguenza, riduce il tempo di vita del prodotto rendendolo pericoloso.

I peripli logistici effettuati dai prodotti, dalla produzione al consumo, spesso sono complessi e sottoposti a parecchie sollecitazioni.

La catena del freddo è costituita da un gran numero di tappe, il che aumenta notevolmente il rischio di rottura della catena stessa.

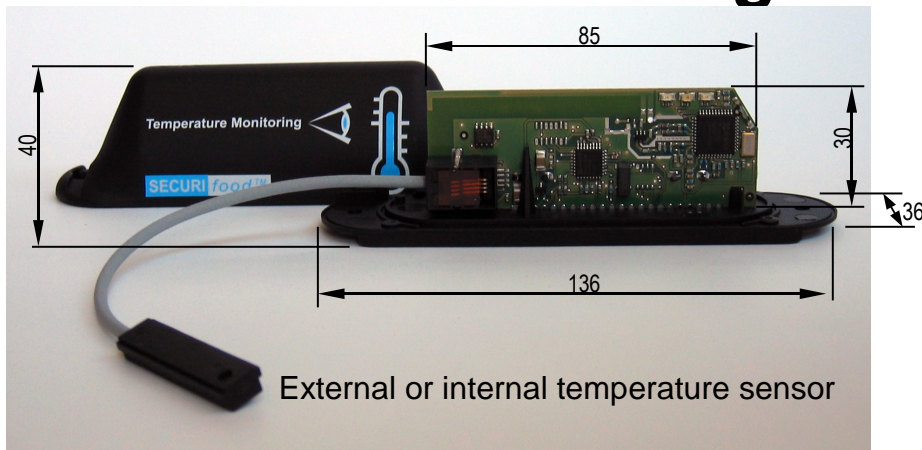


# Hardware of IP01 nodes and communication's protocol match the highest industry standards

T

A

S



## Protocol (proprietary)

- Flexible nodes communication protocol
- Self-configuring, self-healing, mesh networking
- Scalable multi-hop network
- Flooding and source routing (not dependent on network size)
- Supports both static and mobile applications
- Designed for low power implementation
- Small footprint | Low complexity (4k - 6k instructions only)
- Low memory requirements
- Structured frame organization (4 frame types only)
- Extendible functionality via additional frame types
- 32-bit addressing | 4 multicast addresses

## Node housing

IP65 (IP66-IP68 for special cases)  
Material: Grilon BK50

## Sensor

Protocol: I2C  
Temperature range: -35°C to +70°C  
Temperature accuracy: +/-0.5°C |  
+/-1°C depending on range breath  
Internal/External digital probe: IP68

## Microcontroller

Semtech 8 bit microcontroller  
2MIPS typical (<2mA)  
512 bytes of data | 8k instructions  
Multiple IOs and UART  
1.2µA timekeeping

## Power supply

AA 3.6V Lithium 2.25Ah | SAFT LS14500  
Battery temperature range -60 to +85°C

## RF Characteristics

Semtech BFSK tranceiver  
Frequency : 868MHz (free ISM band)  
Output power: 15dBm  
Sensitivity: -112dBm @ 1% BER, 4.8kb/s  
Data Rate: 4.8 to 76.8kbit/s

## Antenna

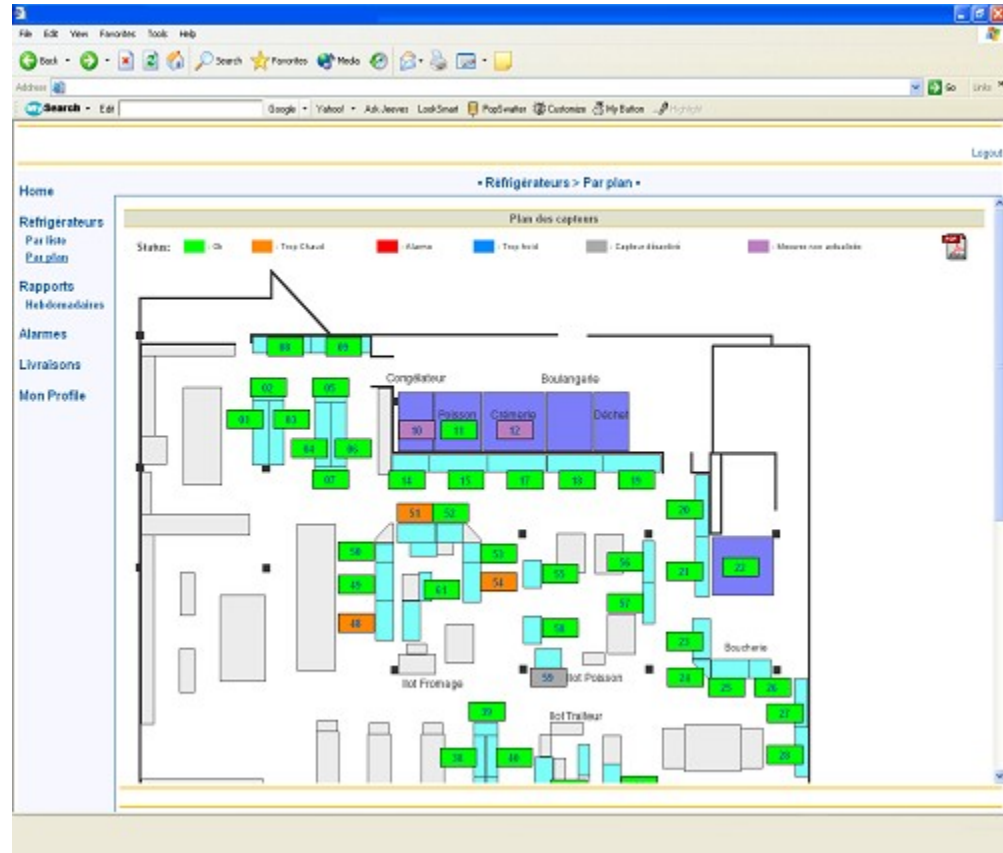
Frequency: 868MHz  
Bandwidth: 11MHz  
Gain: -6.5dBi

## Node tech. specifications

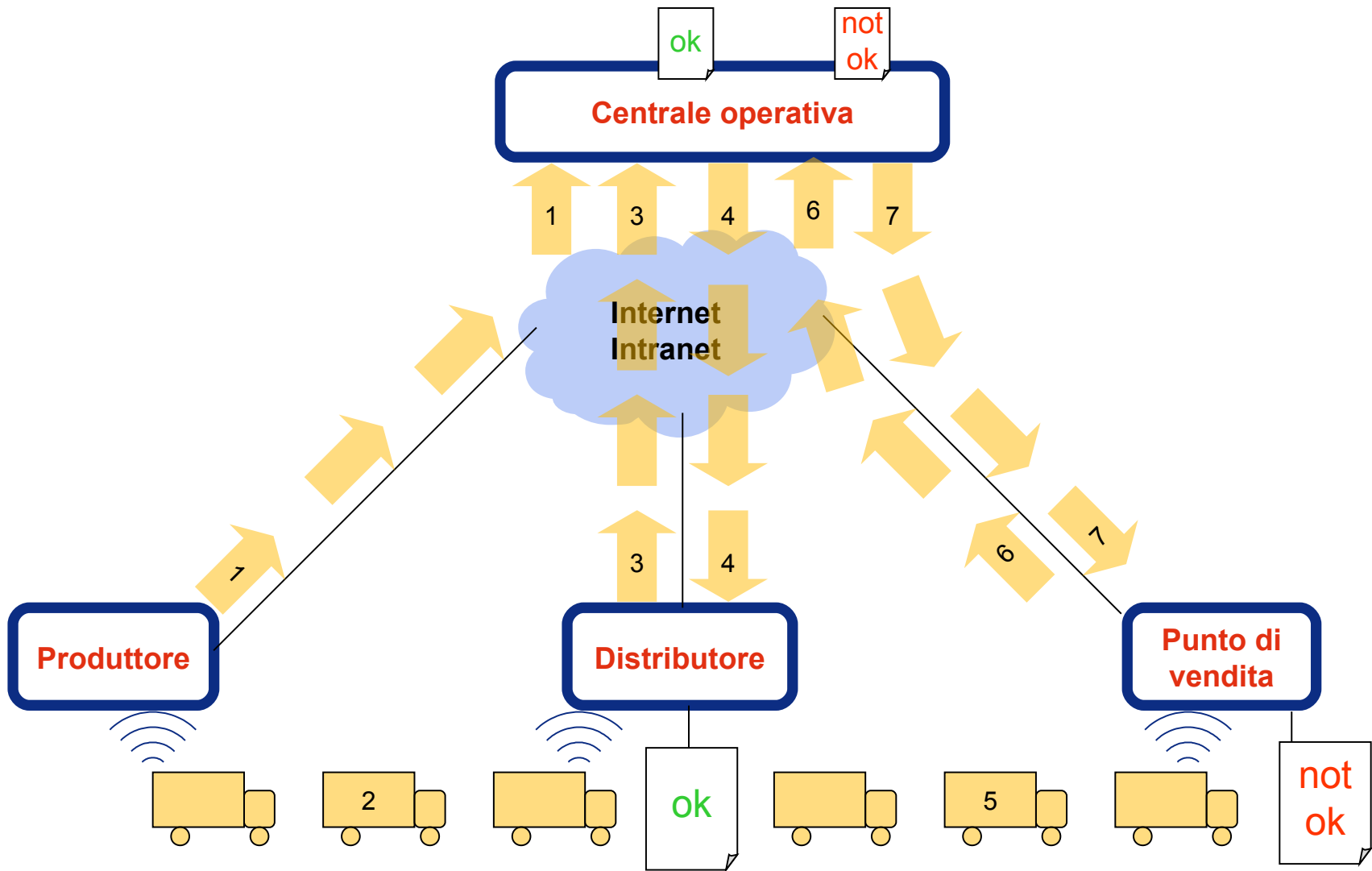
No installation required, just place & track  
Line-of-Sight range >1.5km  
Average current: 3uA  
Current peak: 62mA (TX max)  
Autonomy >> 5 years

# Vista del punto vendita

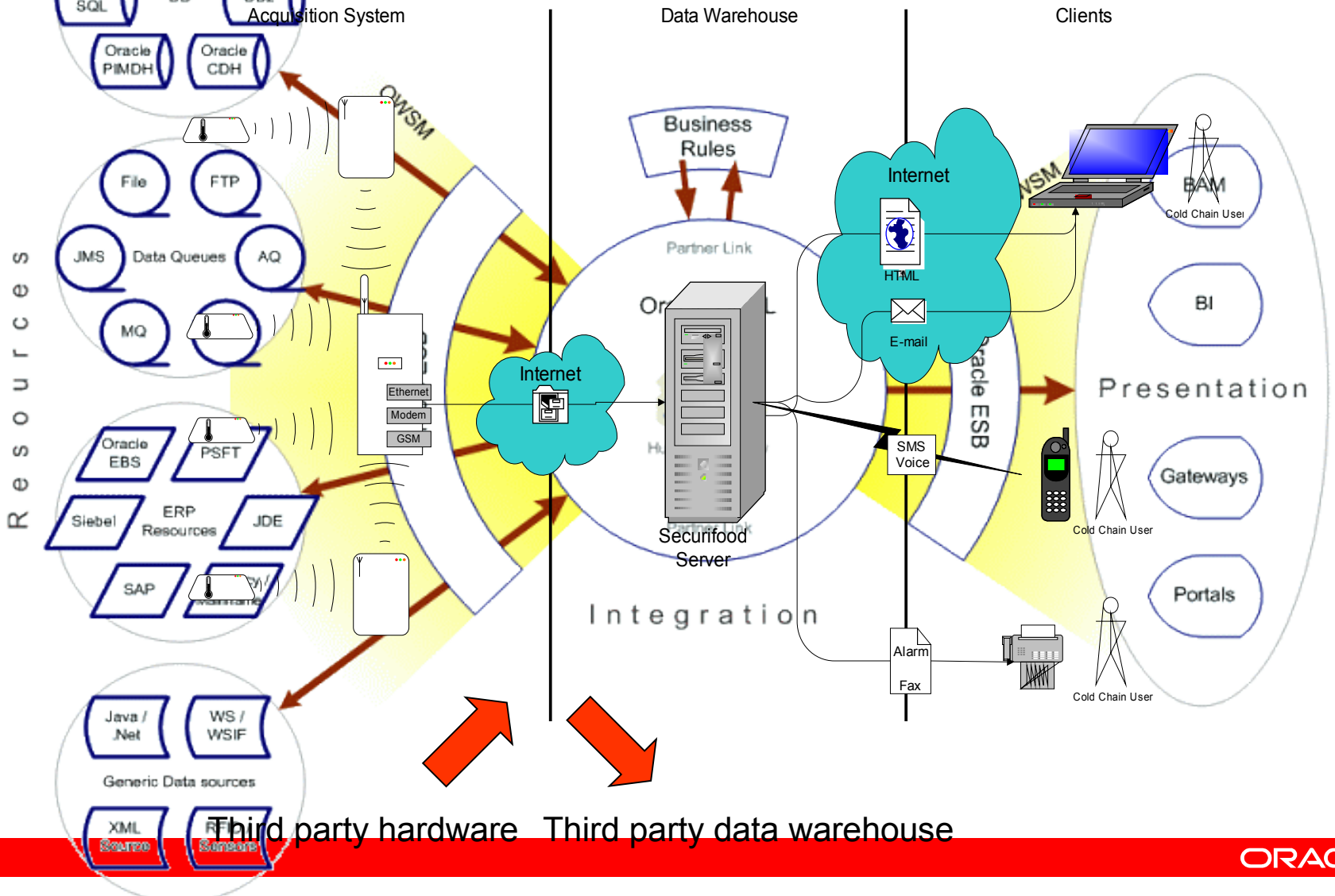
-  OK
-  Troppo caldo
-  Allarme
-  Troppo fredda
-  Sensore disattivato
-  Misuraz. non rilevata



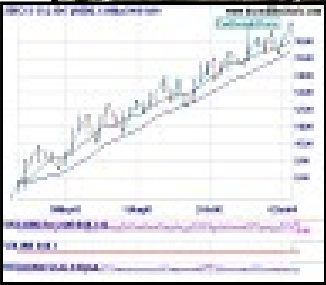
# Anche per il sistema di trasporto..



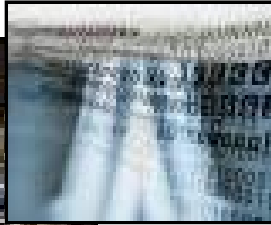
# Where's SOA in Cold Chain Management?



# Business as Events: Event Driven Architecture



Algorithmic trading



Asset management

Distributed order orchestration



Need to support one or more of:

- High volume
- Continuous streaming
- Sub-millisecond latency
- Disparate sources
- Time window processing
- Complex pattern matching

Financial Services  
 Transportation & Logistics  
 Telecommunications & IT  
 Manufacturing  
 Insurance  
 Public Sector & Military

- Intrusion detection systems
- Military asset allocation



Reponses to calamities – earthquake, flooding



Shop floor monitoring



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