



# LOGICAL

transnational logistics improvement through cloud computing  
and innovative cooperative business models



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# **Mobile Tracking and Monitoring of Supply Chain**

Dr Laurent Gomez, SAP Research

# SAP and Cloud Computing



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- Acquisition of SuccessFactor, February'12
  - Focus on Human Capital Management
- Acquisition of Ariba, October'12
  - cloud-based procurement system
  - focus on Supply Chain System
  - \$4.3 billion purchase
  - Biggest acquisition since 2007 with Business Object

**SAP's acquisition of Ariba extends Supply Chain Management cloud ...**



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... but roadmap not yet clear<sup>1</sup>



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How and Will Ariba be integrated with SAP ECC?

How and Will Ariba be integrated with SAP HANA?

**SAP's acquisition of Ariba extends SCM cloud, but roadmap not yet clear<sup>1</sup>**

1, <http://searchsap.techtarget.com/opinion/SAPs-acquisition-of-Ariba-extends-SCM-cloud-but-roadmap-not-yet-clear>



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# RESCUEIT

secuREd ServiCe enabled sUPply chain connEctivity from the real world up to the world of IT



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- **1<sup>st</sup> ever German-French** research project in **Public Security**
- **Leverage German French research funding**
- **German-French** Research Project, funded by **BMBF / ANR** in the context of the "Securing the Supply Chains / "Concepts Systems and Tools for Global Security" call.
- **Involves major actors of the supply chain**



KUEHNE+NAGEL



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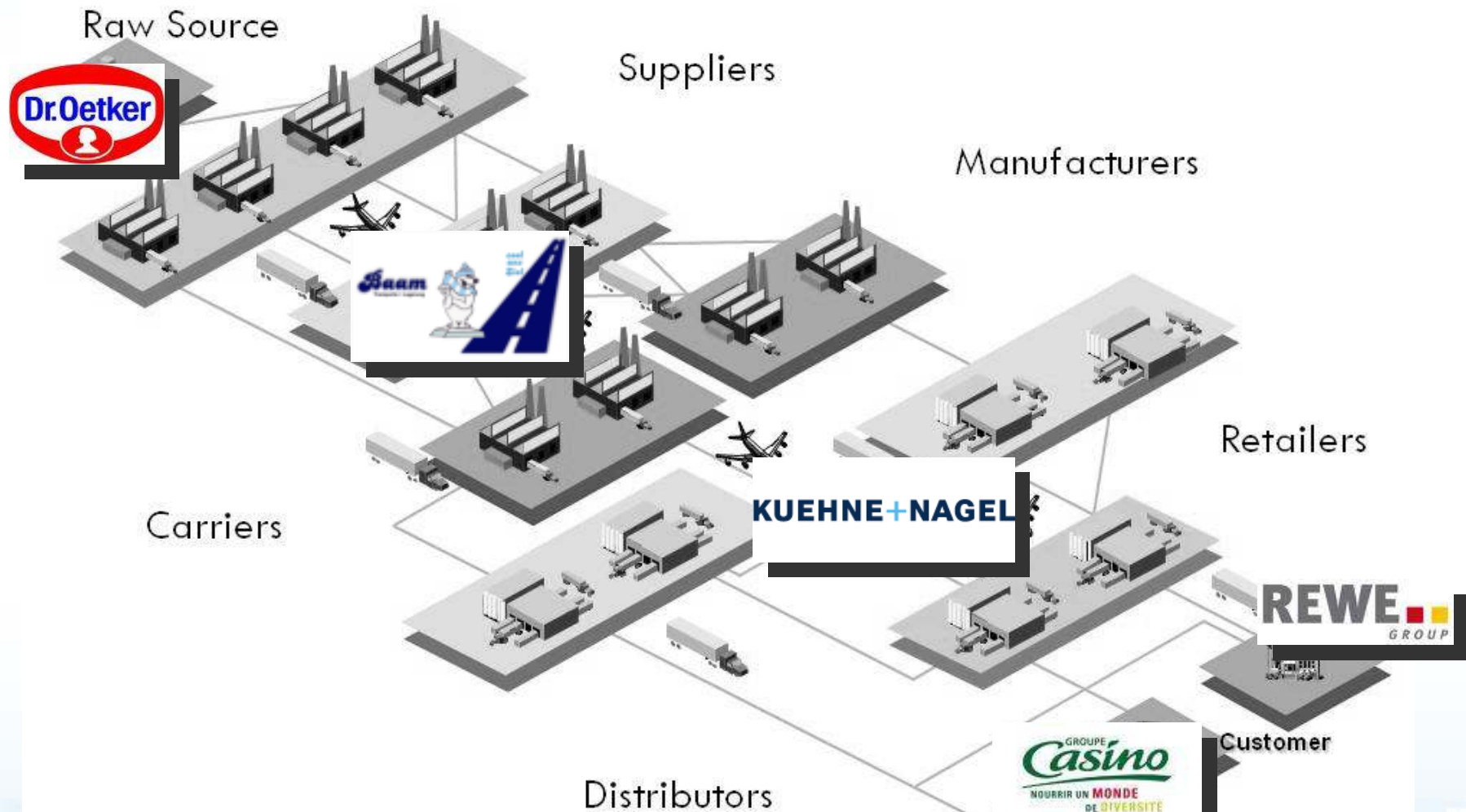


# RESCUEIT in a Nutshell



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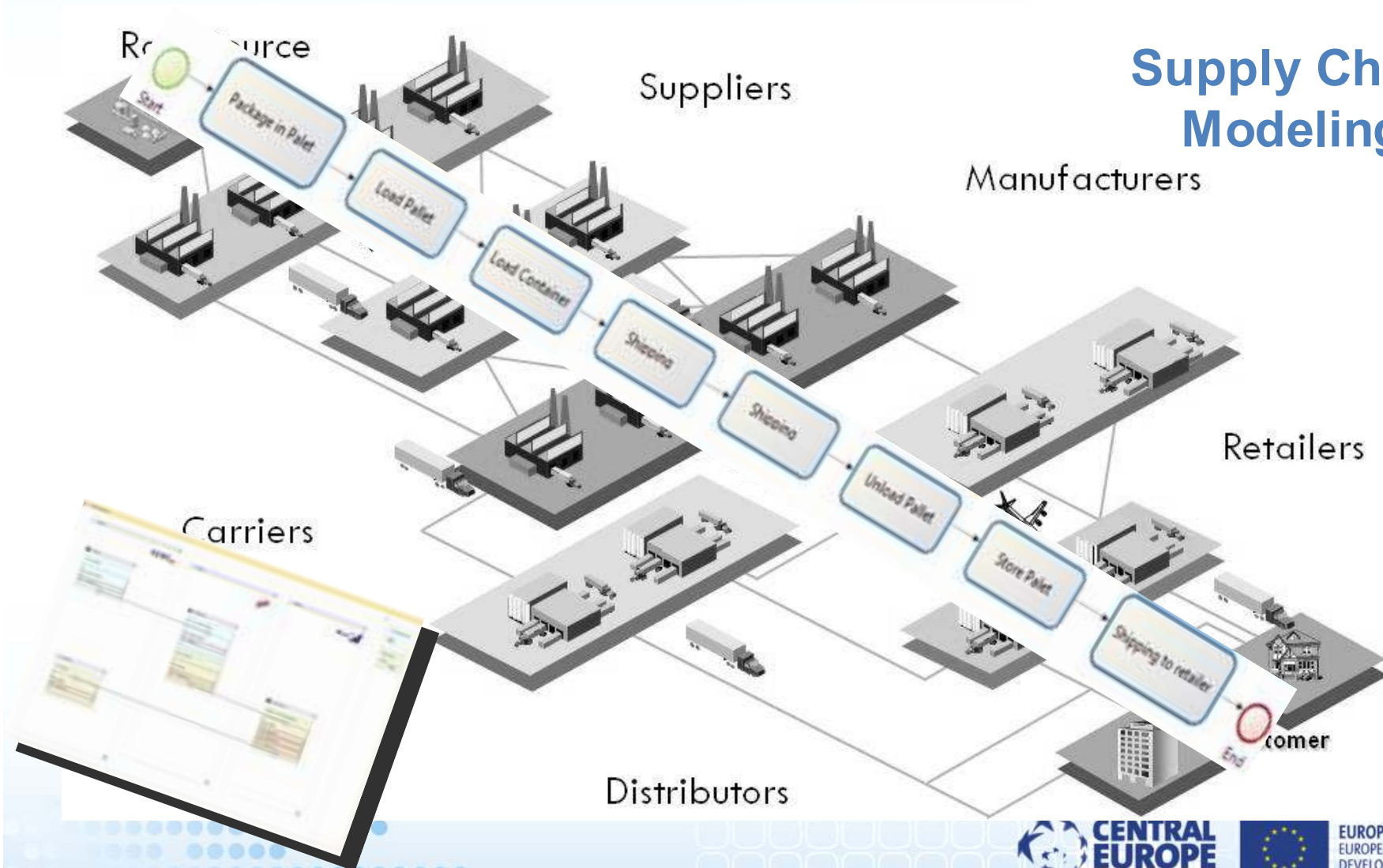
# RESCUEIT in a Nutshell



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## Supply Chain Modeling



# Scenario

## Importation of dangerous products to Europe

Dangerous products are imported from China;  
Products are shipped by boat to Le Havre harbor;  
After customs check, products are shipped to a K+N warehouse;  
Products are shipped by truck to the retailer storage units





A **retailer** runs out of detergent  
in his stock



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Somewhere in a retailer place

I am running out of  
stock of detergent !!!!



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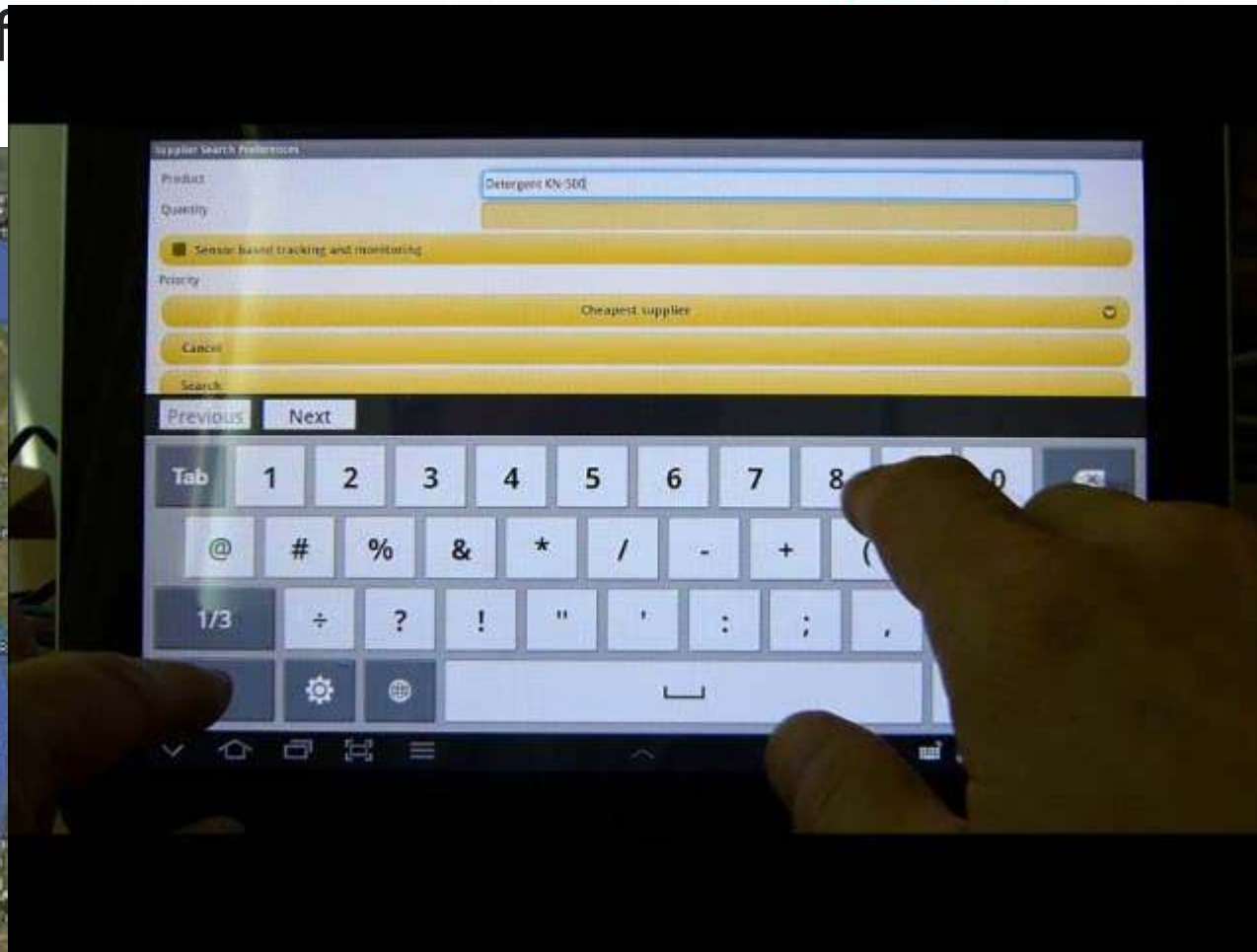
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Using his **mobile device**, the retailer looks for the fastest supplier for



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A, find  
test  
!

He calls the selected **supplier**.



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No worries!  
We send it  
right now.

Supplier



Retailer

Please send me  
detergent !



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Using his **mobile device**, the supplier creates a purchase order for detergent in a **SAP ECC** system



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Let's create a purchase order !

Material: Detergent

Quantity: 1

Purchase order: 40000000

Partner: GC 100

Purchase date: 2012-05-14

Required date: 2012-05-16



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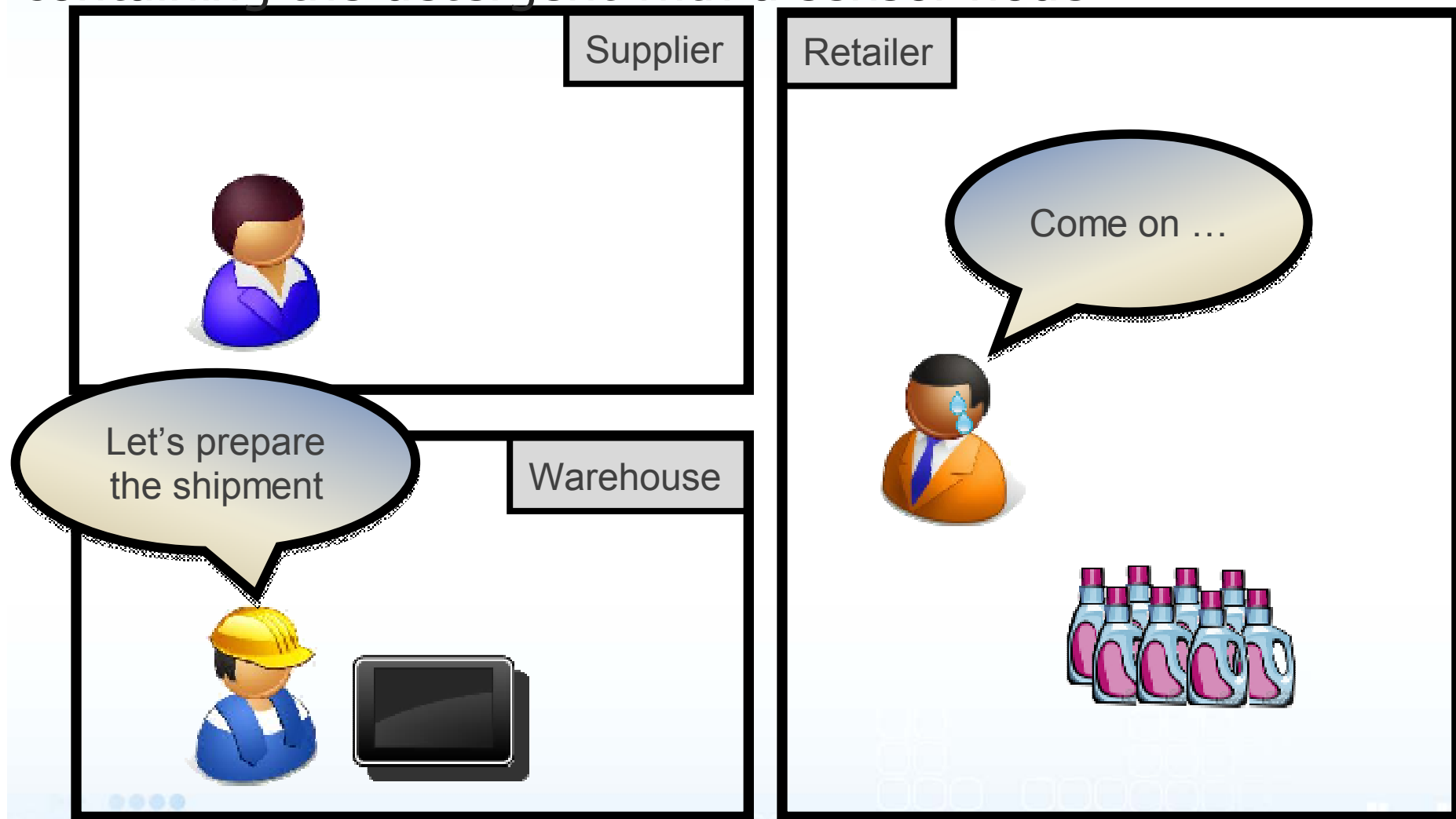


In its warehouse, an operator receives a shipping order. He equips the pallet containing the detergent with a sensor node.



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Risk of explosion  
OR  
Risk of theft

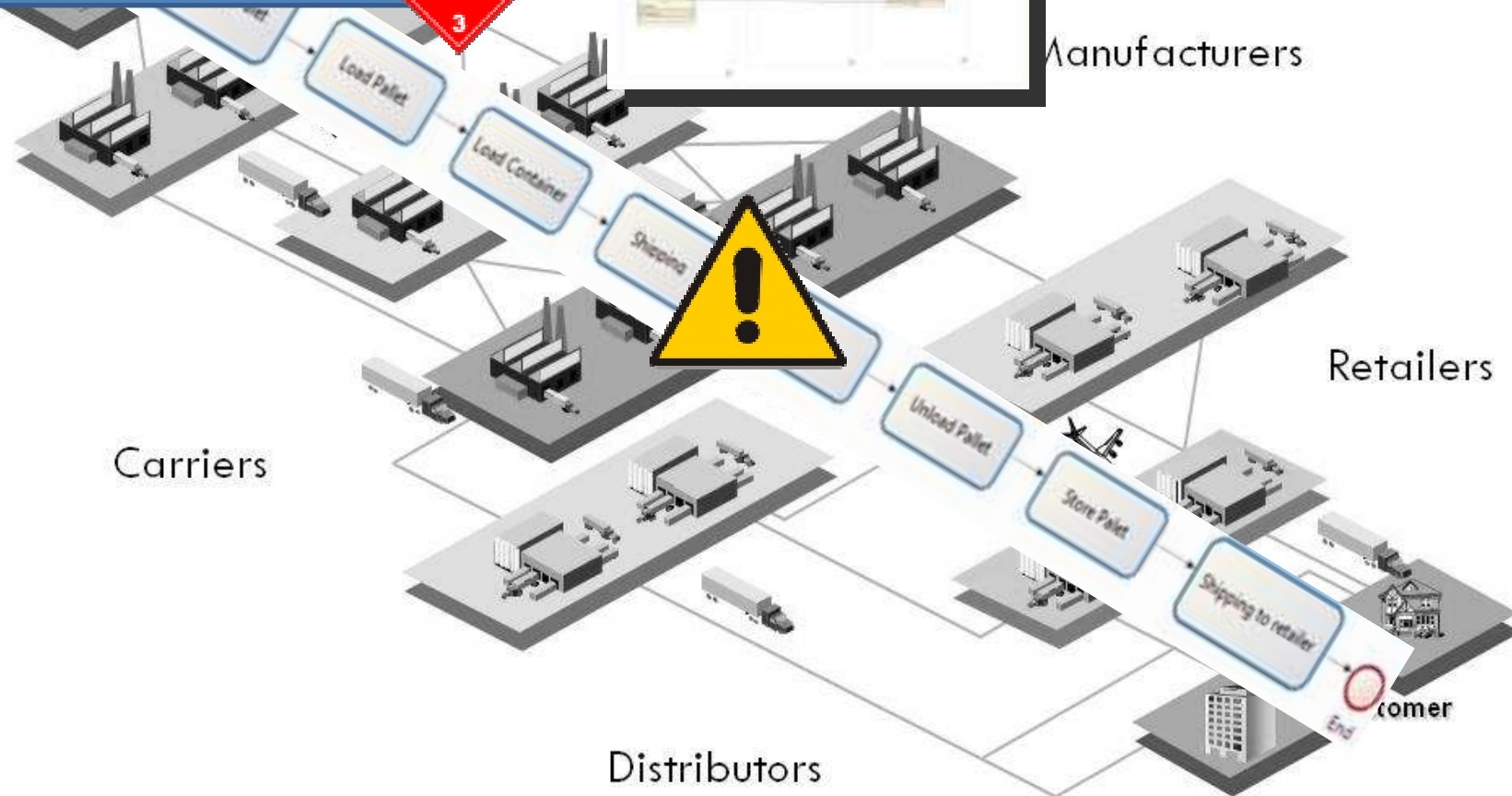


Manufacturers

Carriers

Retailers

Distributors



# Products identified as dangerous products

stored in K+N warehouse classified SEVESO II

## **Detergent - ICPE 1412**

Harmful and polluting liquids

Flash point 66 celsius degrees

Must not be mixed with acid, bases or oxidizing

Risk of fire, if exposed to high temperature

## **Aerosol – ICPE 1432**

Restricted quantity in a single location

Flash point 13 celsius degrees

Muts not be in contact with metal and acids

Risk of fire, if exposed to high temperature

# Impact on the population and environment

## **Fire**

Merchandises and packaging highly inflammable

## **Toxic gas emission**

Lethal consequence on individuals

Under the effect of heat, emission of hydro-cyanic acid or oxides of sulphur.

## **Dispersion of extinction waters**

Containing water plus chemical, foam, powder

May pollute surface or underground waters.

## **Food contamination**

# Compliance with dangerous products regulation

- Regulation compliance along the supply chain
  - Manipulation, shipping, storage of dangerous products
    - “In order to ensure compliance with the safety regulations, shipped goods have to be identified together with their classification (e.g. flammable, explosive).”
- European Chemicals Regulation
  - REACH (Regulatory framework for the management of chemicals)
- At the French level
  - ICPE (« Installation Classes pour la Protection de l’Environnement »).  
Units classified as SEVESO I/II for the storage of dangerous goods.



# Problem

**All the supply chain actors are not subject to the same regulations**

**Because they are not at the same location**

Chinese regulation vs European regulations vs boat shipment regulations

**Because they are subject to the same classification**

K+N warehouse has to be classified SEVESO II in order to store chemical

Retailer warehouse has no specific storage constraints

Risk of food contamination with leakage of liquid detergent

**There is no overall risk assessment at the execution of the supply chain**

**How to evaluate risk at the execution of the supply chain process without any disruption?**



# Delegation of risk assessment to Sensor

Approach



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- RFID are used for identification of goods plus additional information such as goods classification

- GTIN and SSCC
- Batch n#
- Limite Date
- UN code

- Sensors are used for monitoring the supply chain, and risk identification



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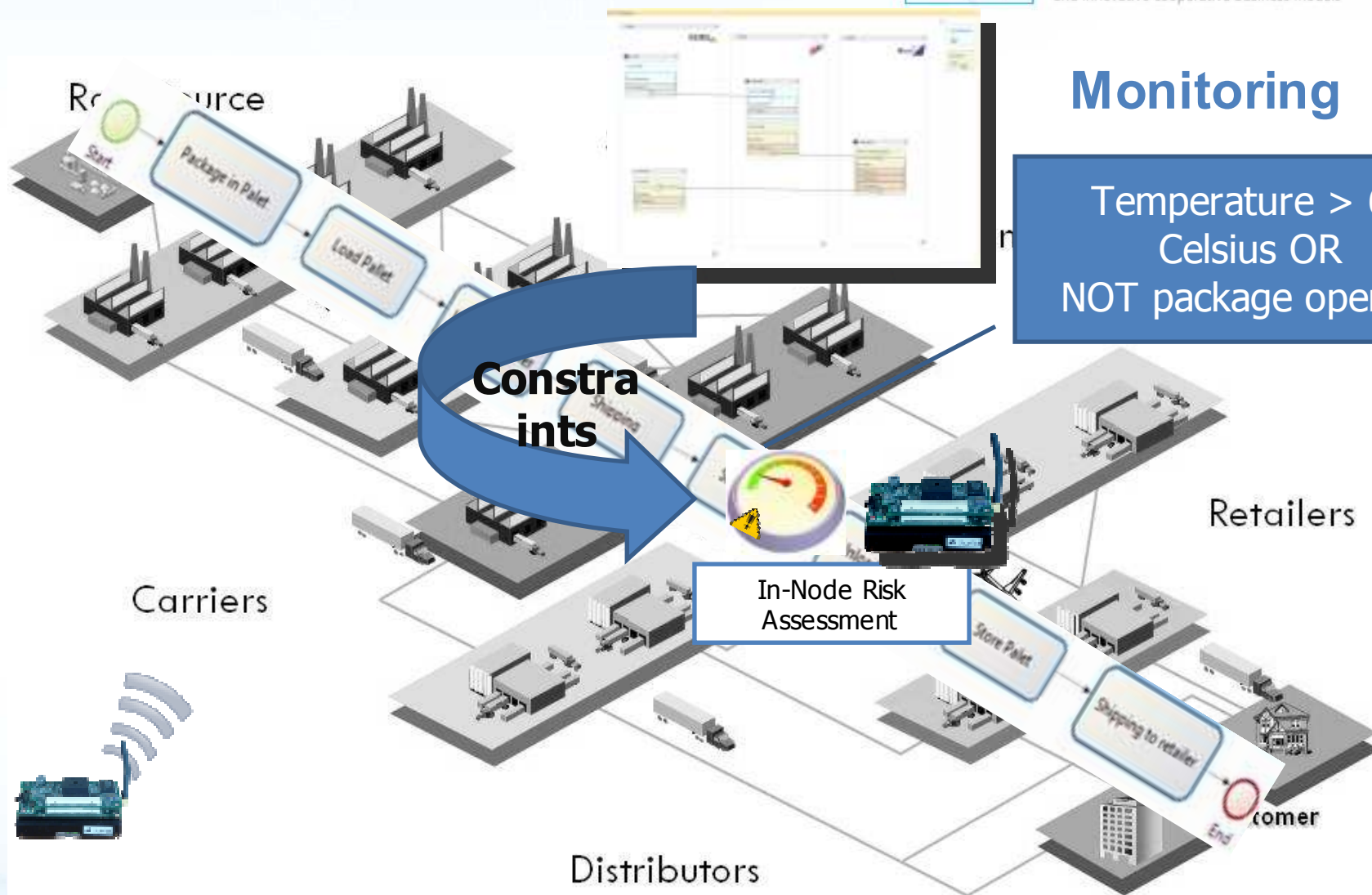
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Approach



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## Monitoring

Temperature > 66  
Celsius OR  
NOT package opening



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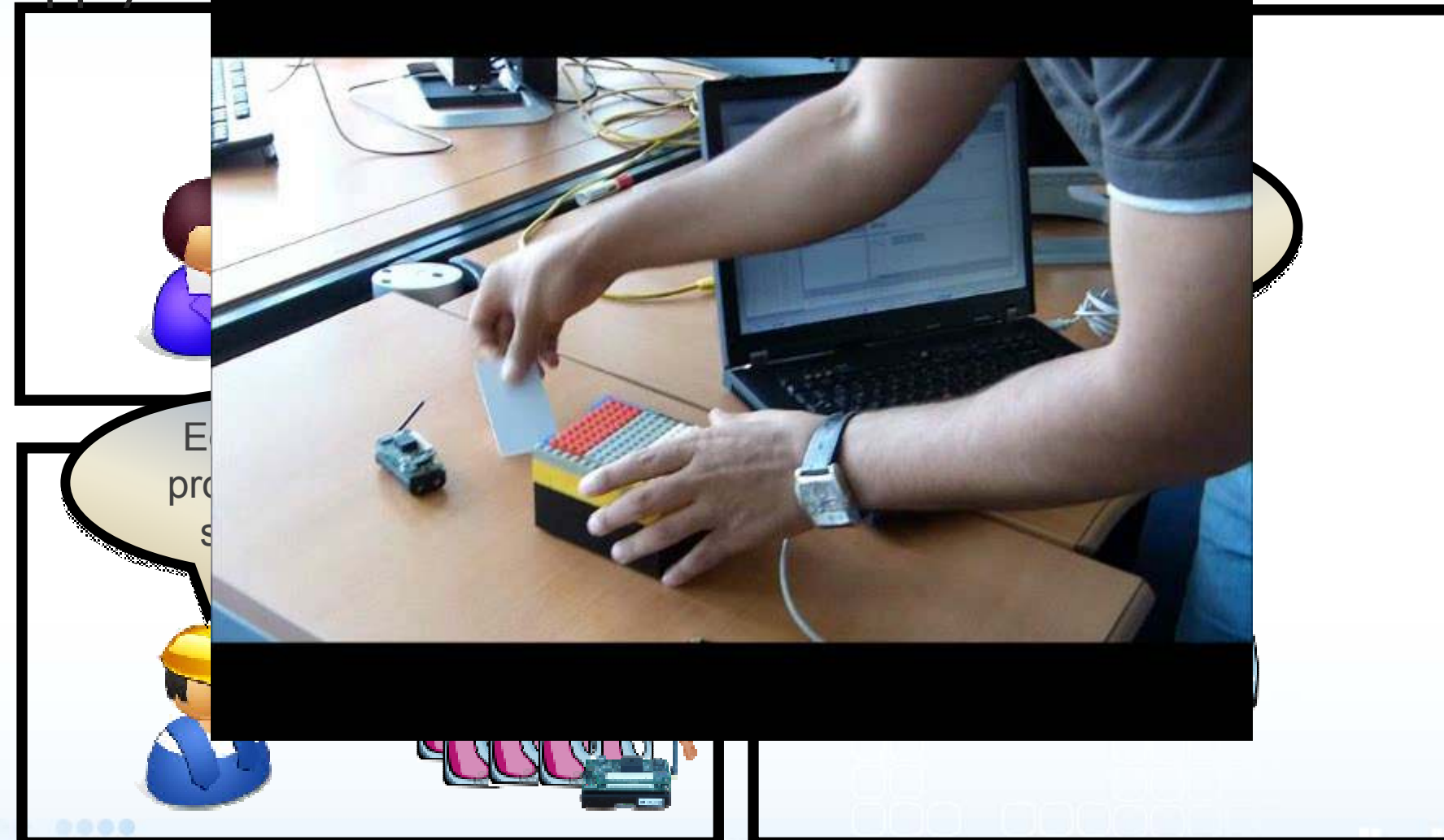
## Identified constraints

- Identification of constraints per good classification
  - ICPE 1172 - squashing, overturn, container opening, liquid leakage
  - ICPE 1412 – overheating (13°C), squashing, overturn, container opening
  - ICPE 1432 - overheating (66°C), squashing, overturn, container opening
- Container opening
  - Light monitoring
  - Secure lock
- Squashing/overturn
  - Acceleration pattern
- Liquid leakage
  - Detection of packaging opening, or shock on the products



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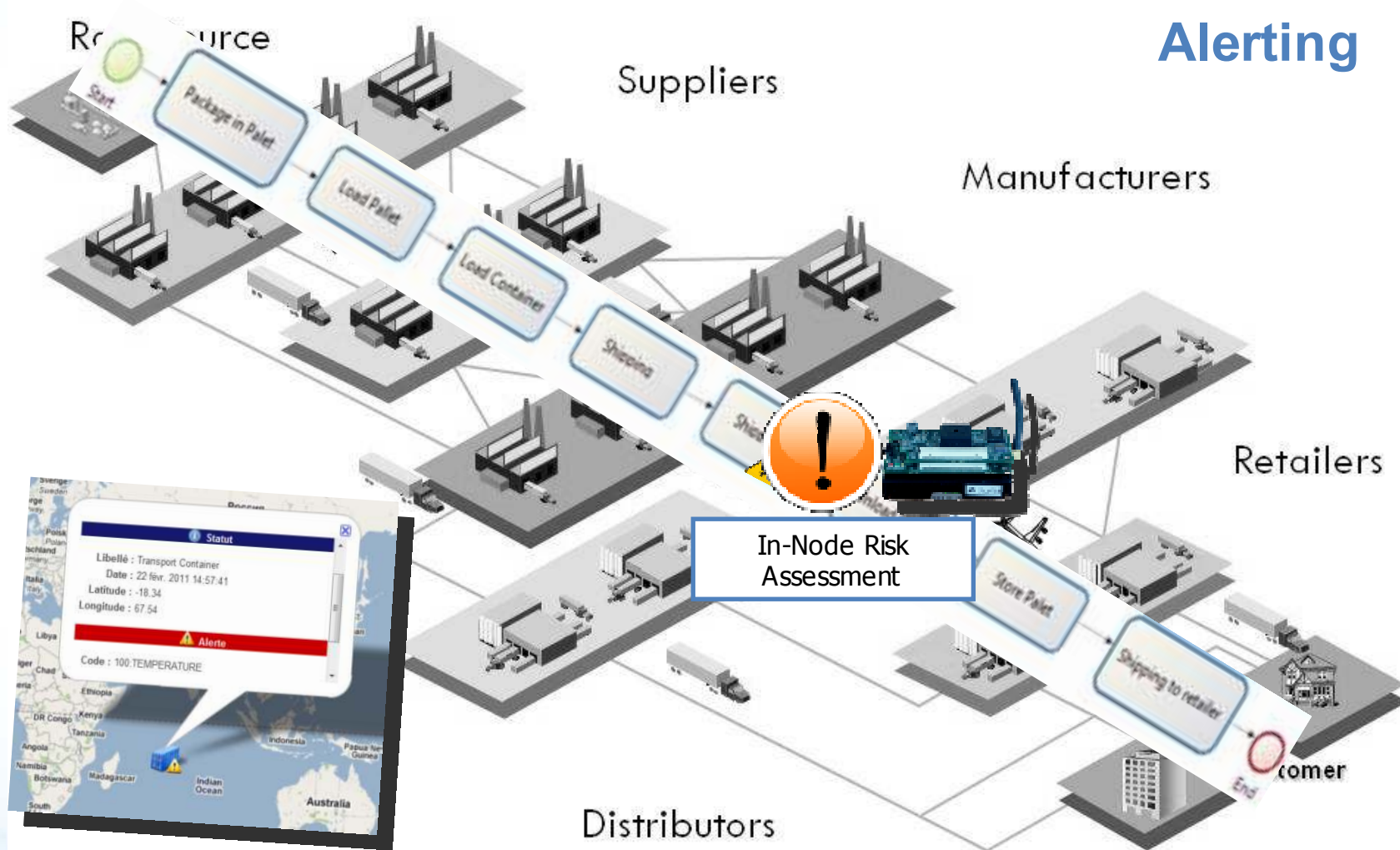
Approach



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## Alerting



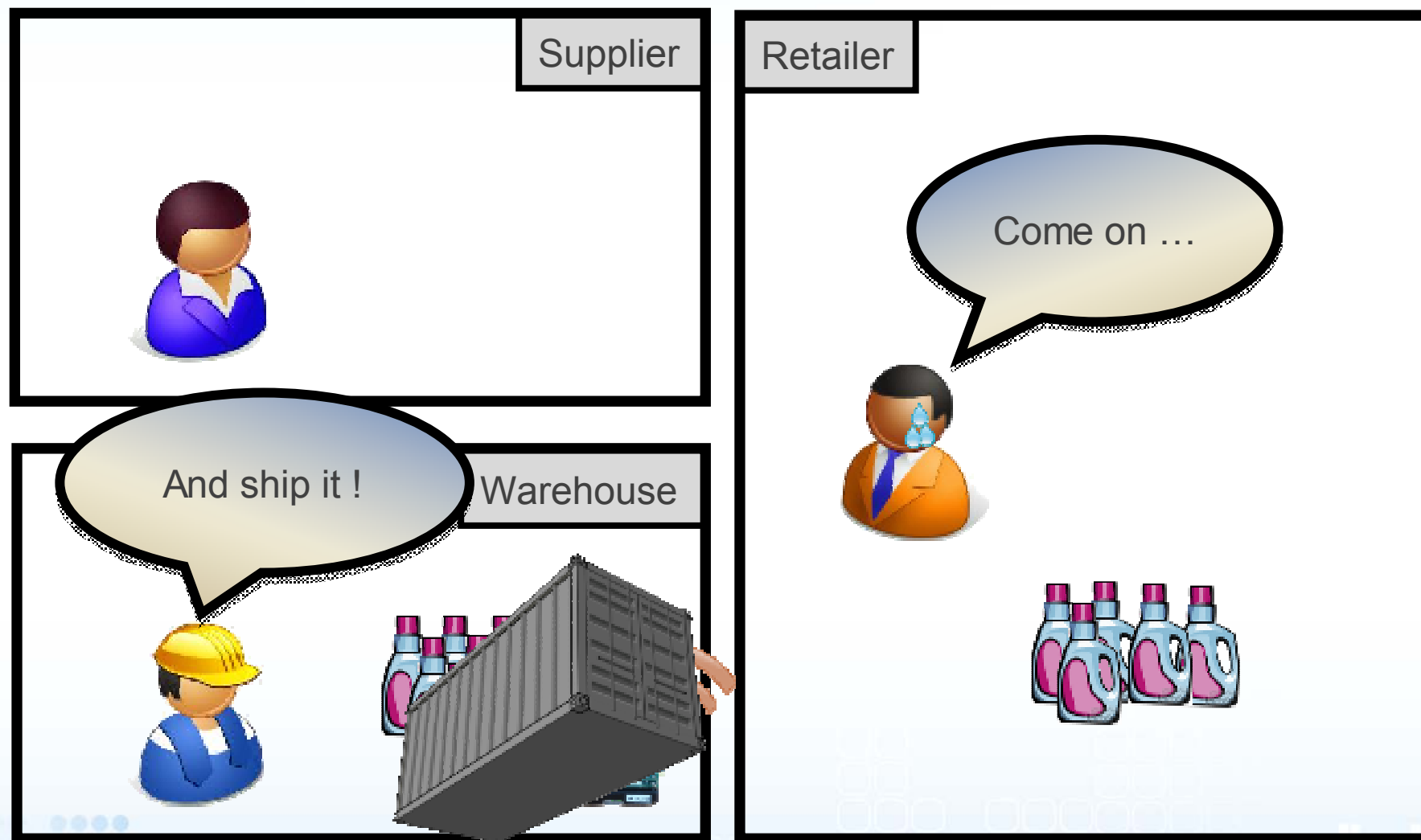


The detergents are shipped by truck to the retailer.



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The supplier and retailer can **track** and **monitor** real time on their **mobile**

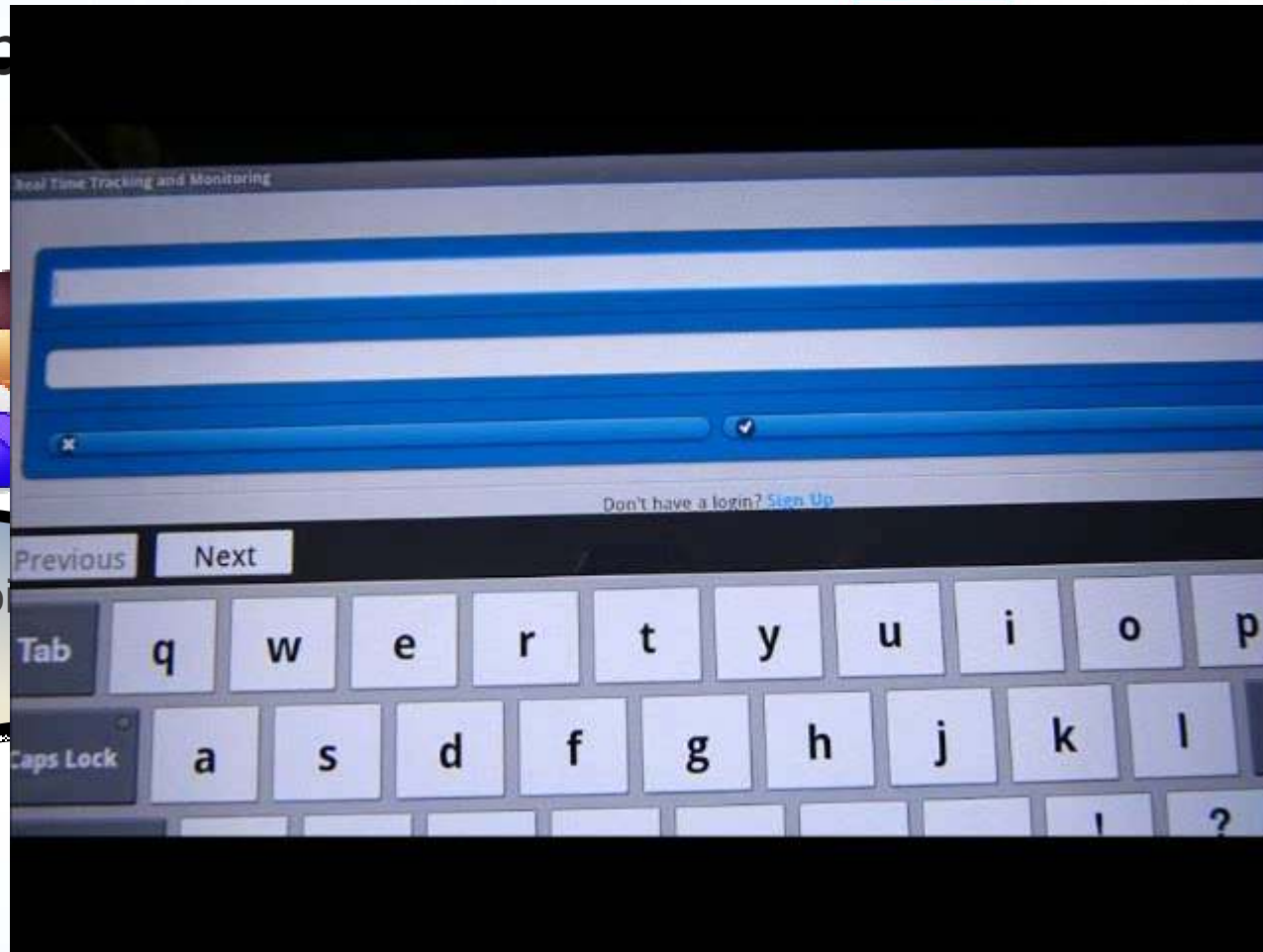


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the shipp

What's going on?



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A temperature increase on the product is detected and an alert is sent to



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What's going on



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Finally, the retailer receives the detergent



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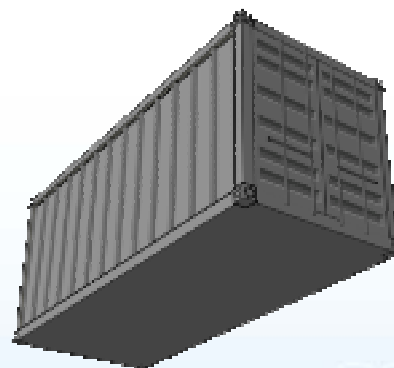
You're welcome :)

Supplier



Retailer

Thank you  
**RESCUE IT**  
!!!



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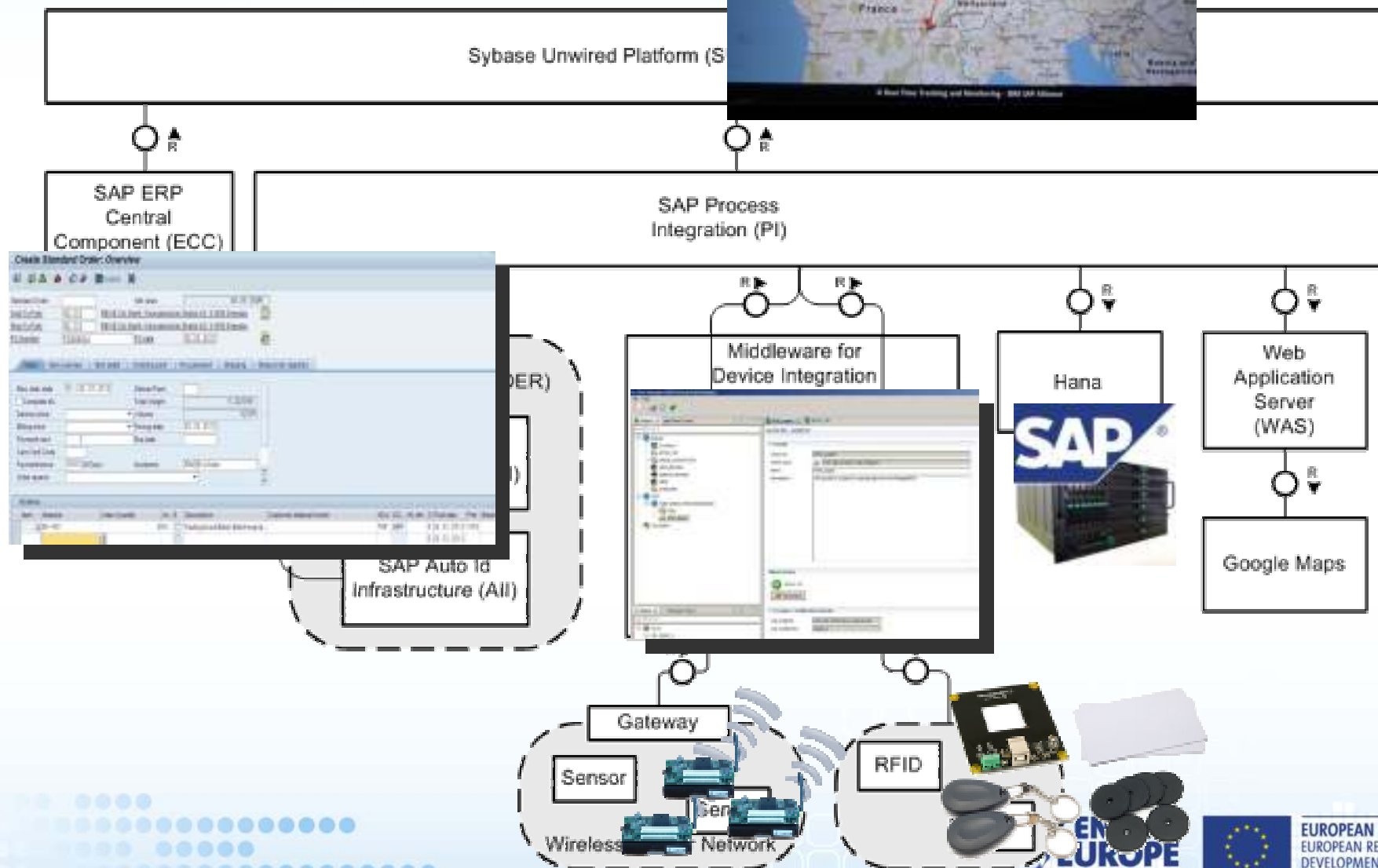


# Global Architecture



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Improvement through cloud computing  
New business models



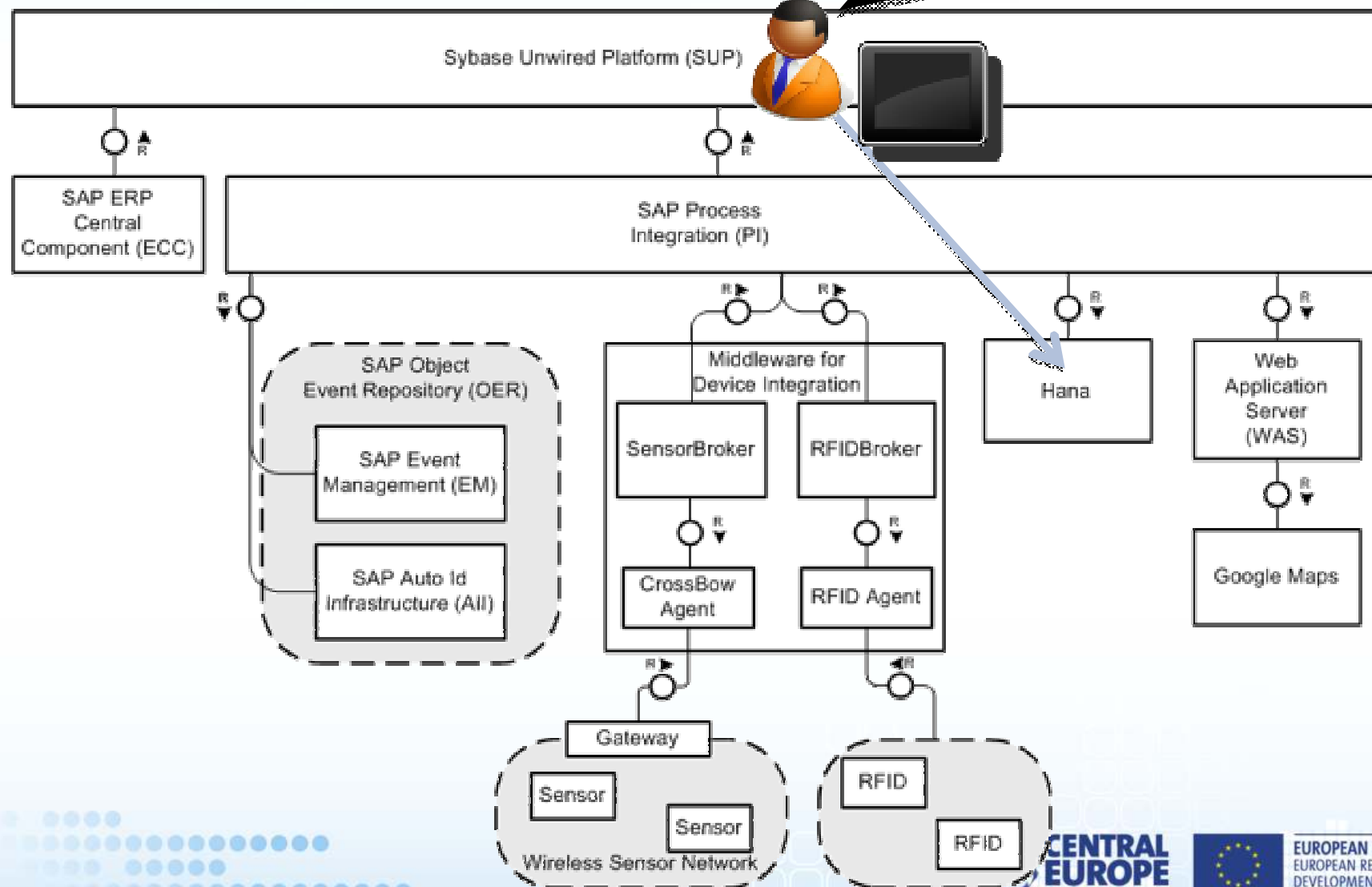
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# Global Architecture

## Selection of the fastest supplier

Please HANA, find me the fastest supplier !



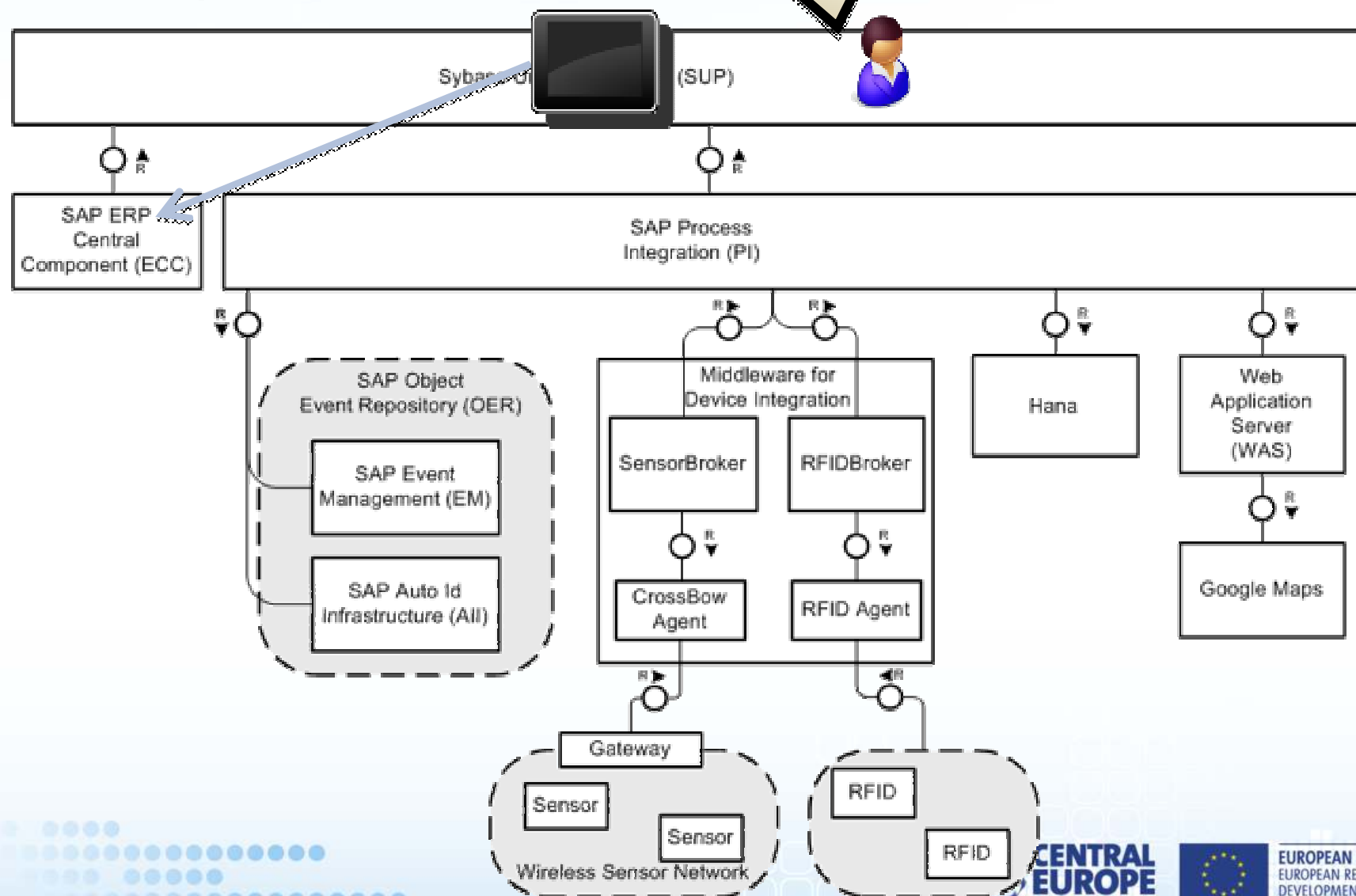
# Global Architecture

## Create a purchase order

Let's create a purchase order !

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# Global Architecture Program sensor nodes with physical constraints



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Equip and  
program the  
sensor !



SAP ERP  
Central  
Component (ES)



Sybase Unwired Platform (SUP)

SAP Process  
Integration (PI)

SAP Object  
Event Repository (OER)

SAP Event  
Management (EM)

SAP Auto Id  
Infrastructure (AII)

Middleware for  
Device Integration

SensorBroker

RFIDBroker

CrossBow  
Agent

RFID Agent

Hana

Web  
Application  
Server  
(WAS)

Google Maps

Gateway

Sensor

Sensor

Wireless Sensor Network

RFID

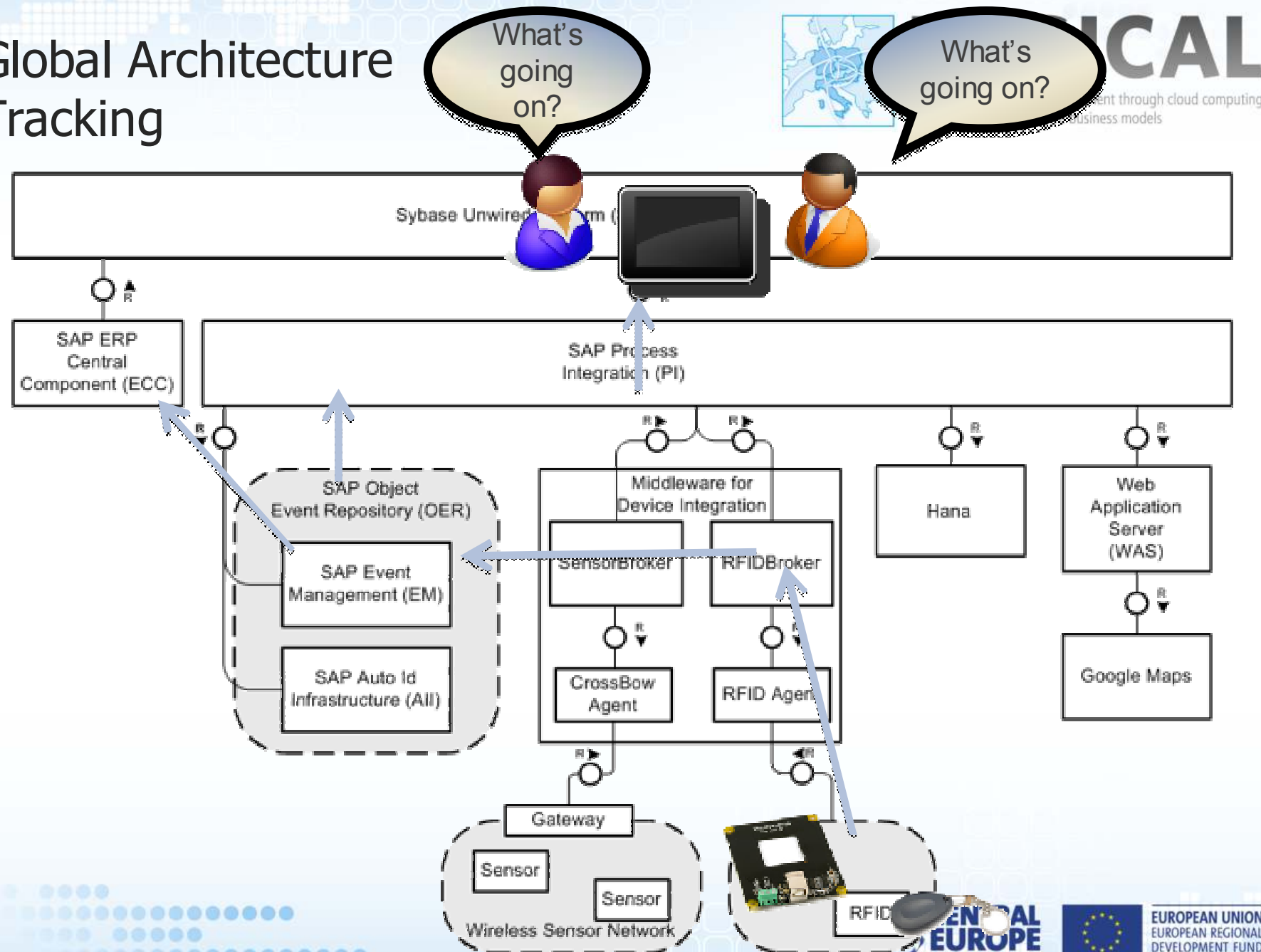
RFID

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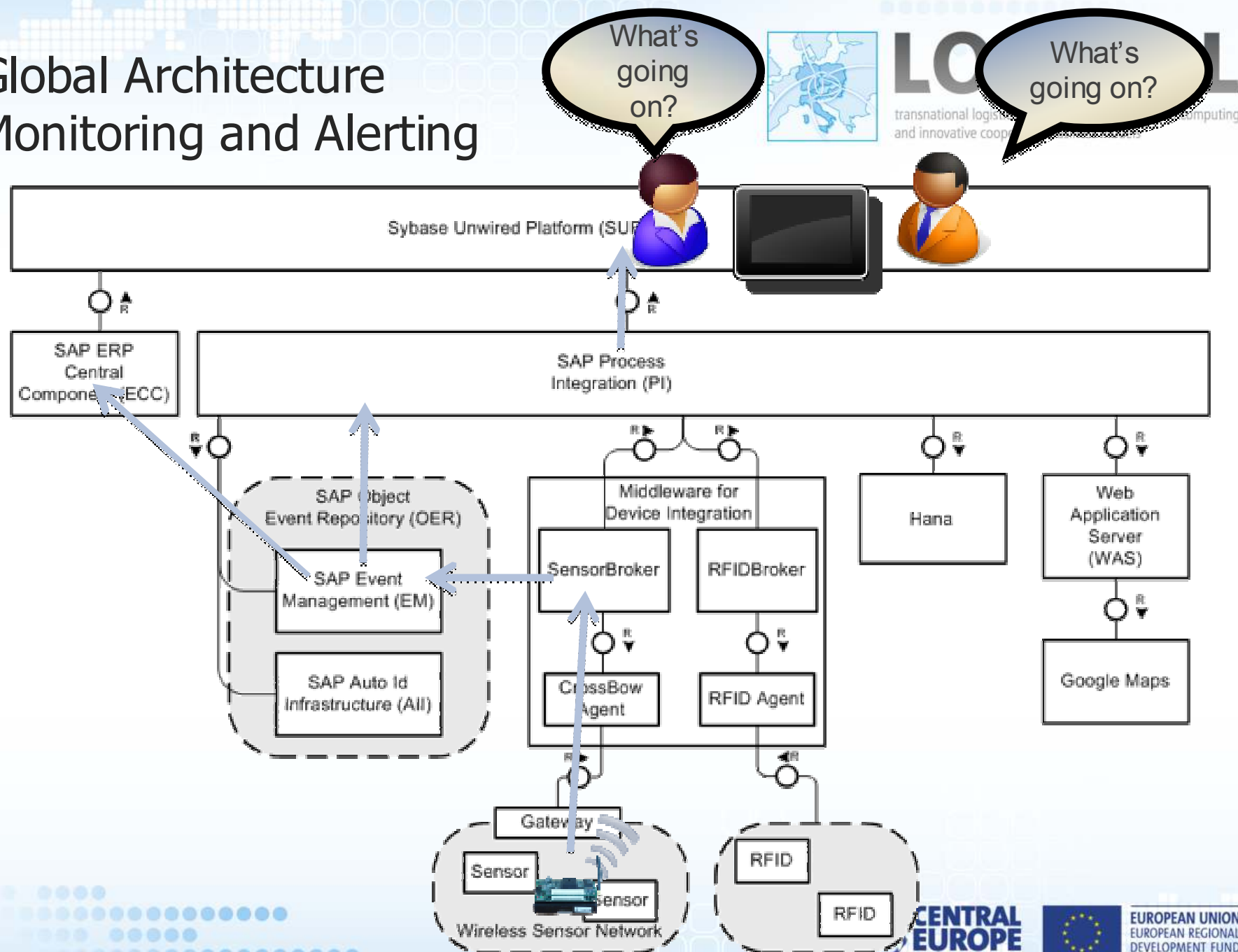


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# Global Architecture Tracking



# Global Architecture Monitoring and Alerting





# Conclusion



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- Secure and Mobile Tracking and Monitoring of Supplied Goods
  - Confidentiality of the supply chain process with a secure tracking mechanism
  - Risk assessment with an embedded mechanism on the sensor nodes
- 2<sup>nd</sup> Innovation Price of the German-French Commerce and Industry Chamber
- Integration with ARIBA solution ...



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# Thank you!

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