

COIN Workshop “COIN fundamentals, results and vision”

5th May 2009
Budapest



EURIDICE Integrated Project

Paolo Paganelli, Insiel spa, Italy
EURIDICE Project Coordinator

Content

- EURIDICE: the project
- Vision and message
- Intelligent Cargo
- Pilot applications and validation
- Opportunities for cooperation





The Project

EURIDICE: European Inter-Disciplinary Research on Intelligent Cargo for Efficient, Safe and Environment-friendly Logistics

FP7 ICT, Integrated Project, budget > 14 M€, duration 3 years since Feb. 2008

- Objective: to make cargo “intelligent”, i.e.: self-aware, context-aware and connected to support a wide range of information services.

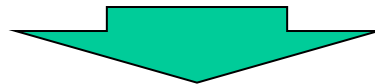
This will allow to:

- Monitor, trace and safely handle moving goods at the required level of detail, from full shipments to individual packages or items.
- Increase efficiency of transportation networks, by improving synchronization between logistic users, operators and control authorities.
- Improve sustainability of logistic systems, by reducing their impact on local communities in terms of traffic congestion and pollution.
- Results (so far):
 - High level architecture specifications.
 - Services library, Context Model and cargo-related information sources identification.
 - Pilot user requirements from different stakeholders (industry, logistics, authorities and infrastructures).
- Events
 - Intelligent Cargo Forum launched, open to logistic users, technology providers and researchers.
 - Annual “ICT in Transport Logistics” conference (first held in Lucerne, November 2008).
 - More info at www.euridice-project.eu



ICT services for goods mobility: EU scenario and challenges

	Direct employment	Share in total freight transport	Share in total passenger transport	Growth between 1995 and 2004	Expected increase until 2010 (for a transport demand 40% higher than 1998)
Road transport	4.3 million (2.6 million in freight transport 1.7 million in passenger transport)	44 %	85%	+ 35 % in freight transport 19 % for passenger cars and + 5 % for buses and coaches	38%
Rail Transport	1.2 million.	10 %	7 % (6 % for interurban trains, 1 % for urban rail (tram and metro).	+ 6 % in freight transport (+ 13% in the EU-15, - 9 % in the EU-10). + 9 % in passenger transport	Same level



Source: EC, DG Enterprise

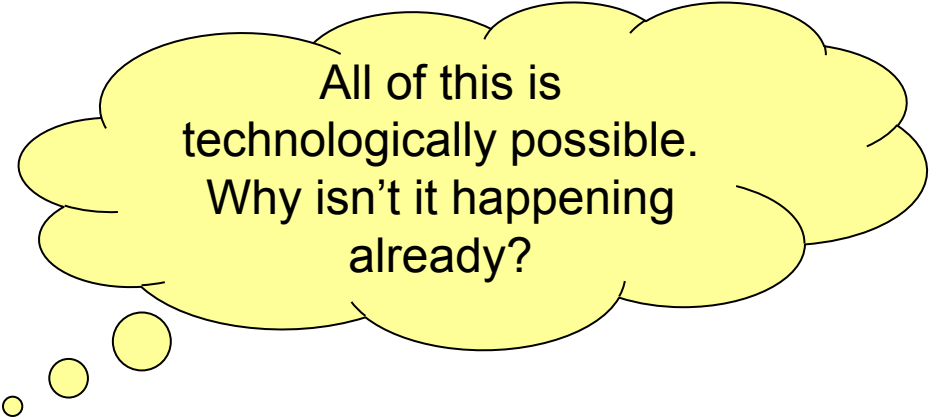
Combining all modes of transport	Logistics planning should enable a more balanced use of transport solutions whether unimodal or multimodal.
Revitalising the railways	Rail transport as key to modal shift for goods transports, needs more flexibility and reliability to attract transport buyers.
Centralised vs. decentralised logistics	Centralization of stocks in regional hubs, decentralized distribution, quick response, outsourcing to local carriers.
Efficient and effective Urban Transport	Freight transport to/from and in city areas is an essential element of the quality of life of the 80% of Europe's population.



Meeting the Challenges: EC ICT for Mobility Strategic Research Agenda

Mobility Services for Goods

- Creating a seamless efficient (goods) mobility service system using ICT as an enabler.
- Exploiting RFID and ICT platforms as critical component and architecture.
- Urban logistics supported by network management.
- High level of liable security and of adequate tracking and tracing.

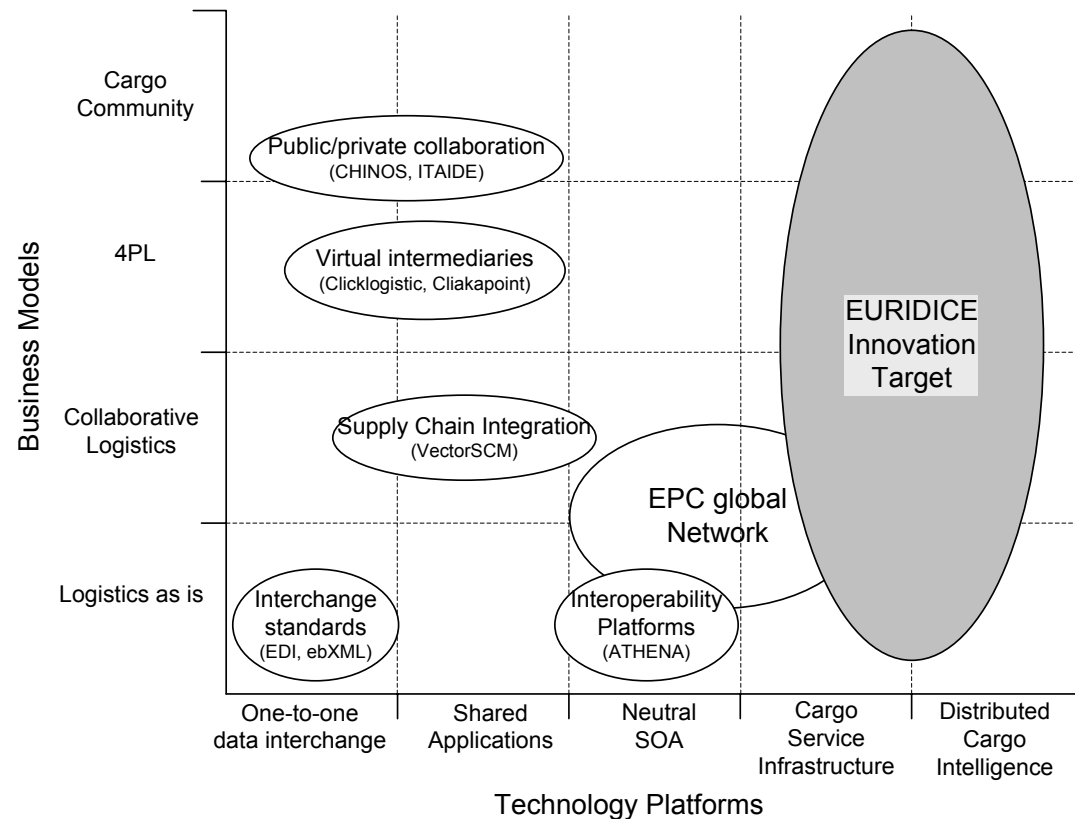


All of this is
technologically possible.
Why isn't it happening
already?

EURIDICE approach vs. state-of-the-art

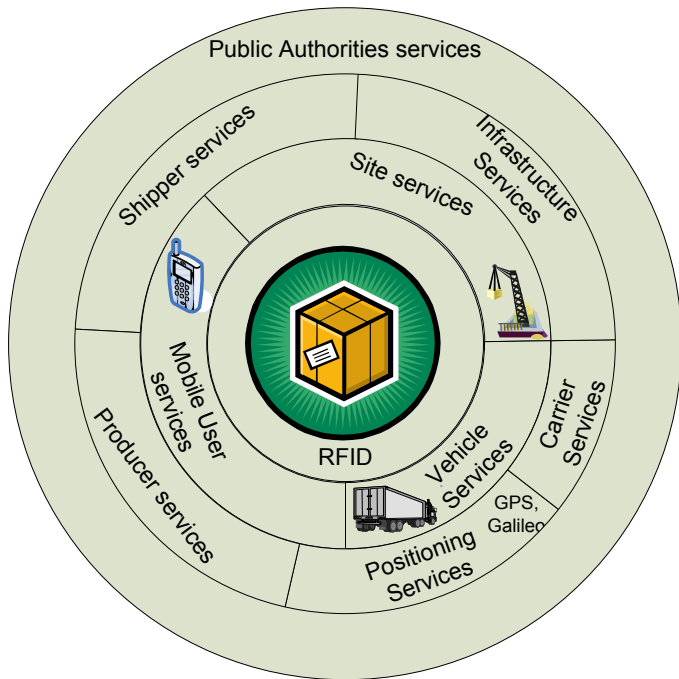
EURIDICE intends to fill the **existing gap** between technical feasibility and adoption of ICT services platforms for goods mobility, by coordinating S/T research in two directions:

- Structured approach to technology innovation, harmonizing and filling gaps between existing technologies and aiming at the **intelligent cargo** as unifying concept.
- Holistic perspective on the **business models**, that considers both traditional and innovative logistic models, while looking explicitly at the cargo communities operating at the local and global levels.

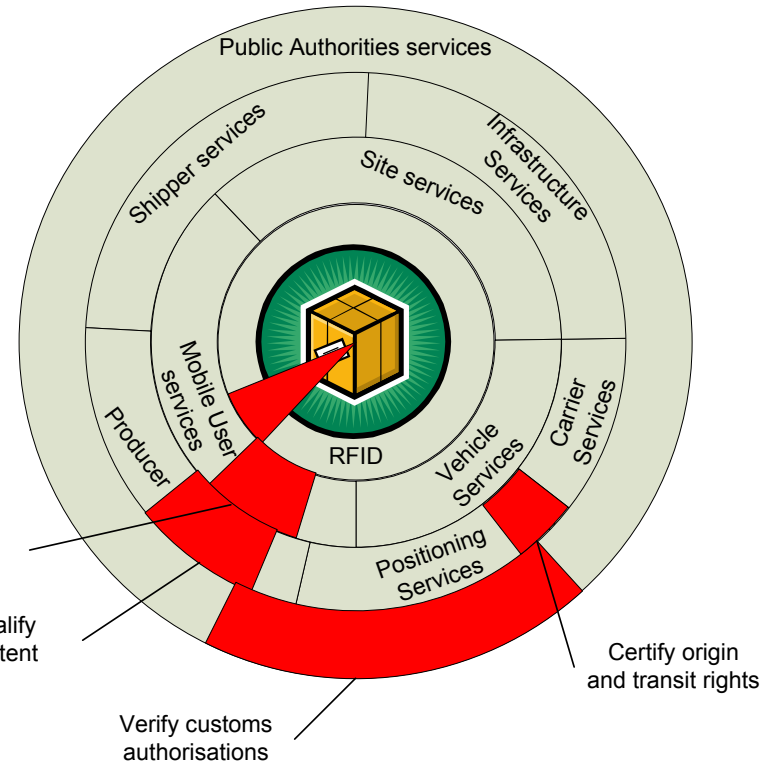
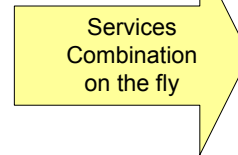
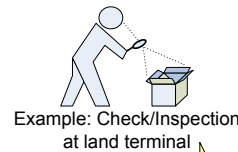


The Intelligent Cargo vision

“In five years time, most of the goods flowing through European freight corridors will be ‘intelligent’, i.e.: **self-aware**, **context-aware** and **connected** through a global telecommunication network to support a wide range of information services for logistic operators, industrial users and public authorities.”



Cargo-centric Information Services Infrastructure



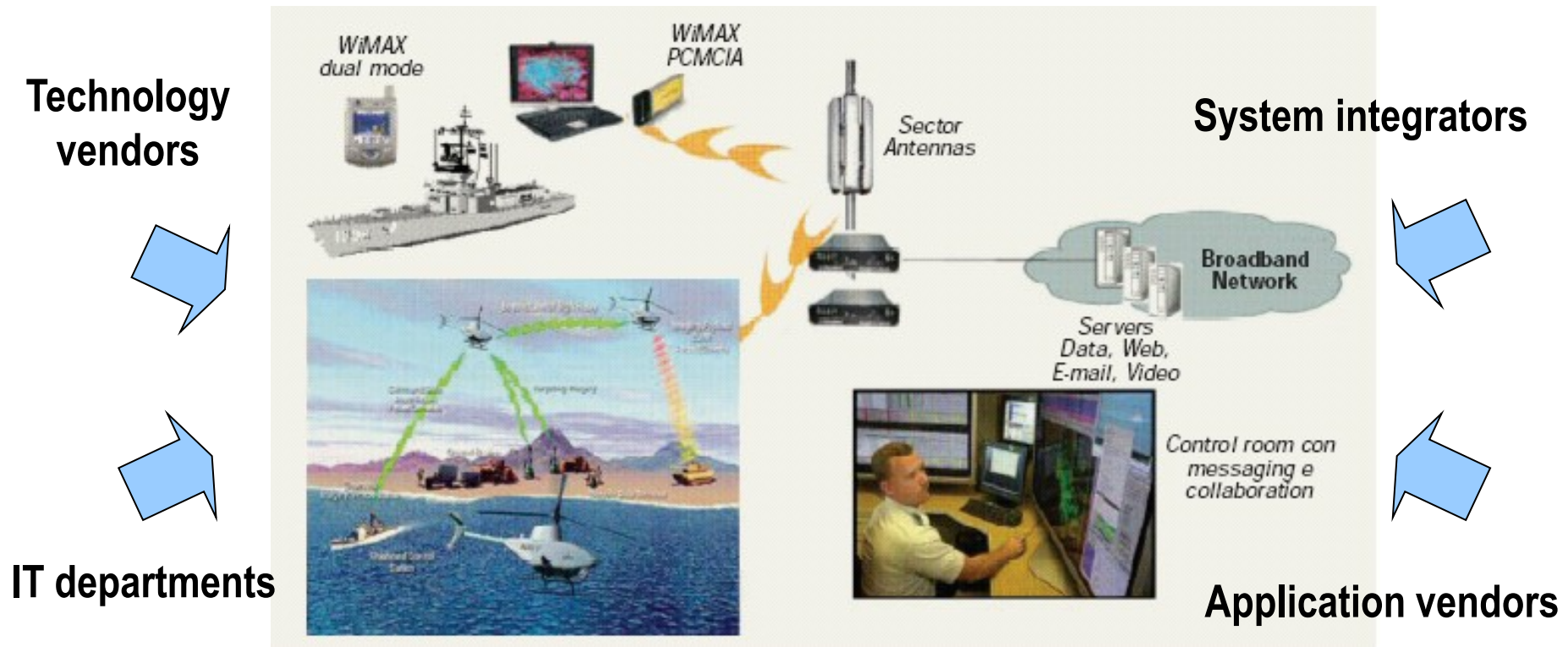
User and context specific interaction





The Vision and Message

ICT for goods mobility today: Cutting-edge technologies for top demanding customers



**Target : high value goods, with special requirements
(precious, dangerous, perishable, needed just-in-time, ...)**

What about goods that are neither precious nor special?
What services are needed by the majority of logistic users and operators?

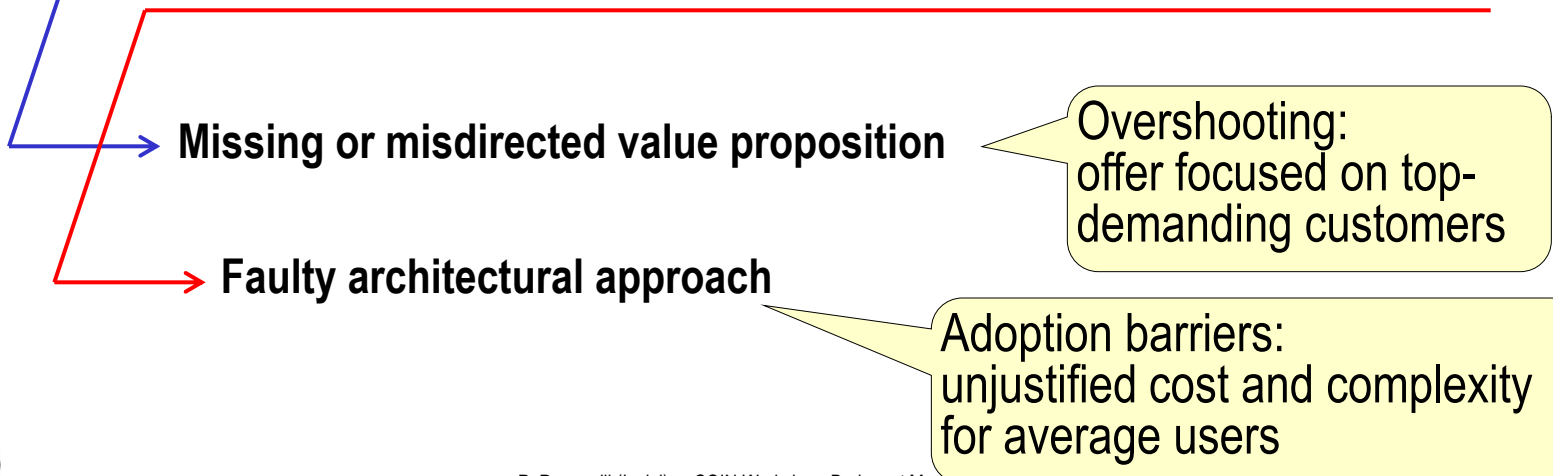


What services are needed by the majority of logistic users and operators?

- A qualified answer: “nothing, thank you!”
- “Governments should stop wasting money in goods traceability projects: no one cares about that”

President of Assologistica (Italian Association of Logistic companies)
23/4/08, speech at Politecnico of Milano convention on Logistics in Port

- Why:
 - “Because operators already have all the data they really need.”
 - “Traceability across operators would force us to link our information system into a ‘system of systems’.. costly and hardly achievable.”



Finding our own “elevator speech”

- “Pleased to meet you ...”

- 🗣️ “In five years time, most of the goods flowing through European freight corridors will be ‘intelligent’, i.e.: self-aware, context-aware and connected through a global telecommunication network to support a wide range of information services for logistic operators, industrial users and public authorities.”

- 🧐 “(we are building) a cargo centric information chain that offers automated end-to-end information about the logistic supply chain based on existing technologies and standards combined with intermediating trusted third parties.”

...

- 😊 “We provide this ^①product for these ^②customers to achieve these benefits.”

③

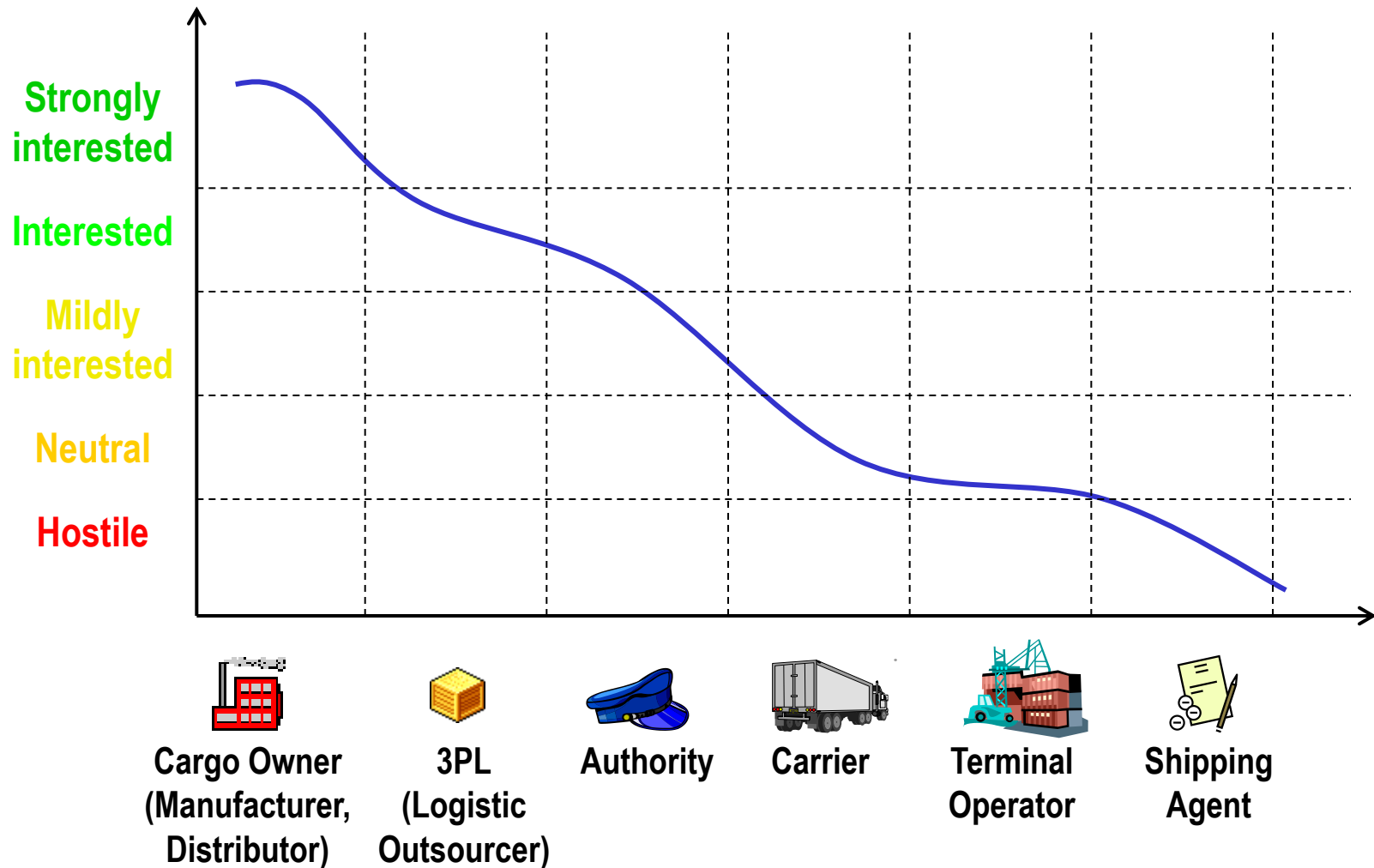
1. The product

- We provide:
 - Information infrastructure / platform? (too vague)
 - Hardware / software tools / systems? (too limited)
 - (yet another) process / data integration platform? (not true)

“We provide cargo information services ..”



The customers: Who cares about the cargo being intelligent? → Who is target of our value proposition?



Value proposition pitfalls

- Some apparently good targets are hostile or neutral at best
 - Shipping agencies, terminal operators, carriers.
 - Misdirected value propositions can be found behind some past failures.
- Aiming at individual targets is not enough
 - The intelligent cargo concept, like other similar approaches, builds on **cooperation** between different actors.
 - Among the necessary actors some will find no **value** in the interchange, at least at the beginning (e.g., small carriers).
 - Other motivations/levers can be attempted to convince them, but a good **business architecture** should work by itself (frictionless).
- Importance of finding the right architectural approach
 - Maximize the value for those who care.
 - Minimize the burden for those who don't care.

2. The customers

- Our customers:
 - Logistic companies
 - Cargo owners / shippers
 - Authorities / infrastructures ? (not customers, more providers / users)

“We provide cargo information services for logistic and industrial companies ..”

3. The benefits

- What is our value proposition?
 - Cargo-centric
 - Open (not proprietary), based on existing technologies and standards combined with intermediating trusted third parties
 - End-to-end information train
 - Option to use the EURIDICE architecture gradually, depending on the needs and available resources
 - ...
- Need to translate this into user value
 - Blue Ocean “Value Innovation” approach



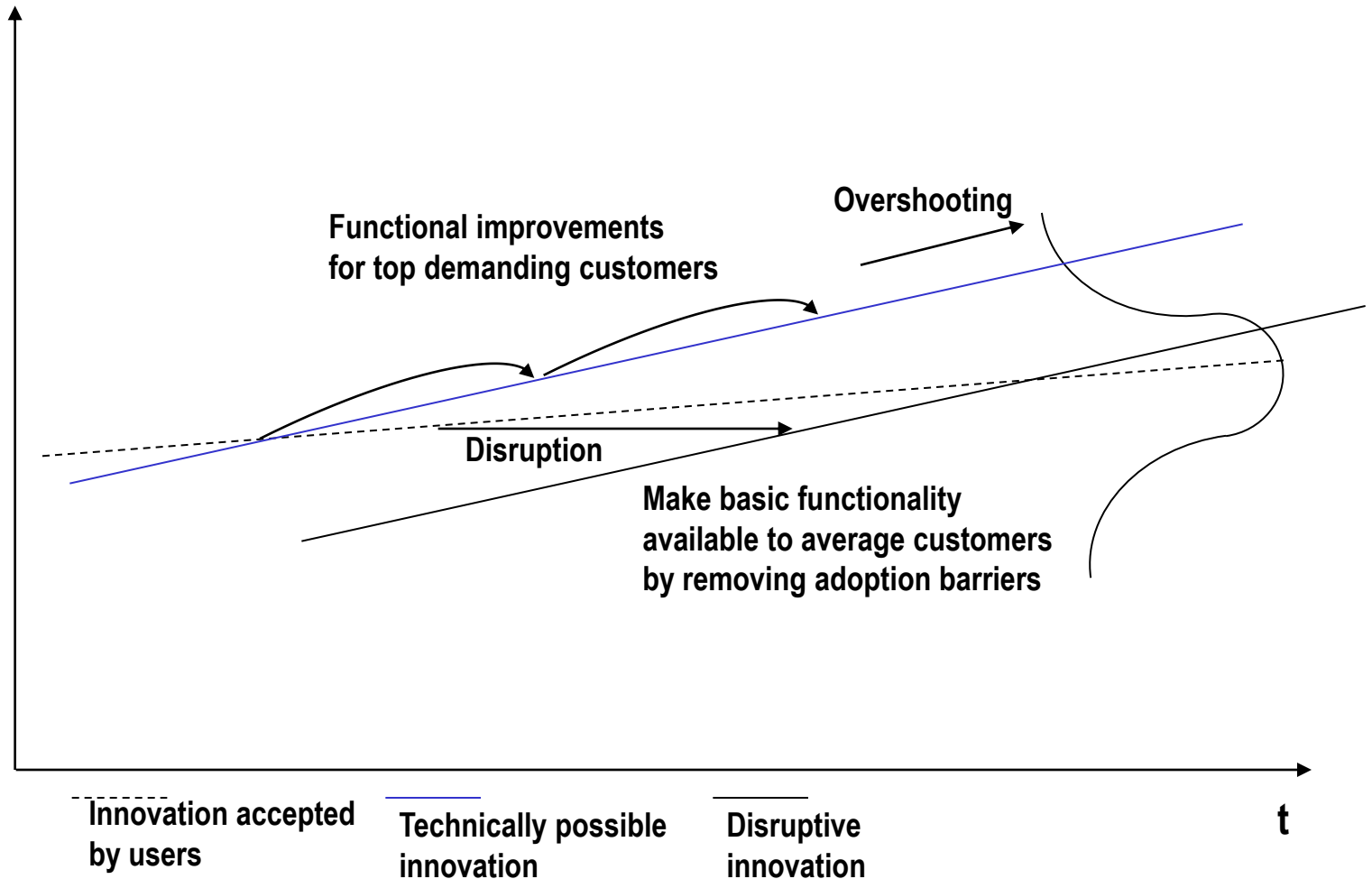
Application ideas

- Ubiquitous track & trace functionality, based on events communicated bottom-up by moving freight items.
- Cargo-initiated, completely automated transit verification and authorization procedures.
- Supply chain event management based on thing-to-thing interaction and embedded intelligence, where cargo itself has the primary responsibility to detect and handle unexpected events and to escalate to a human operator if needed.
- ...
- ... and many more applications that Euridice S/T research will make possible.



Disruptive innovation strategy: Aim at the largest pool of users → remove barriers

Performance
/ Functionality



The EURIDICE message

“We provide cargo information services for logistic and industrial companies that can be activated at low cost and work with any logistic partner along any transport route. ”



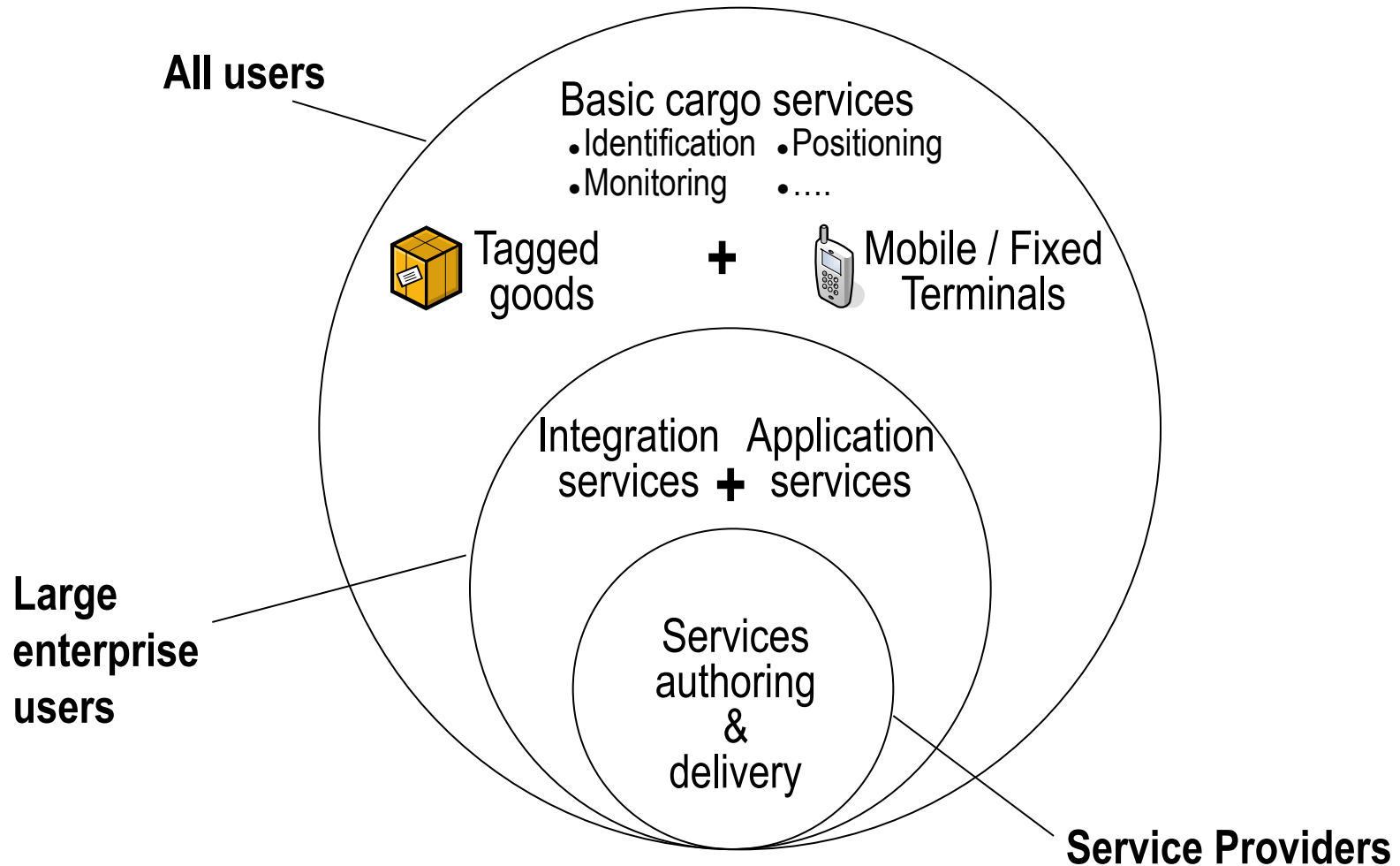
Our mission:

“Providing cargo information services for all”

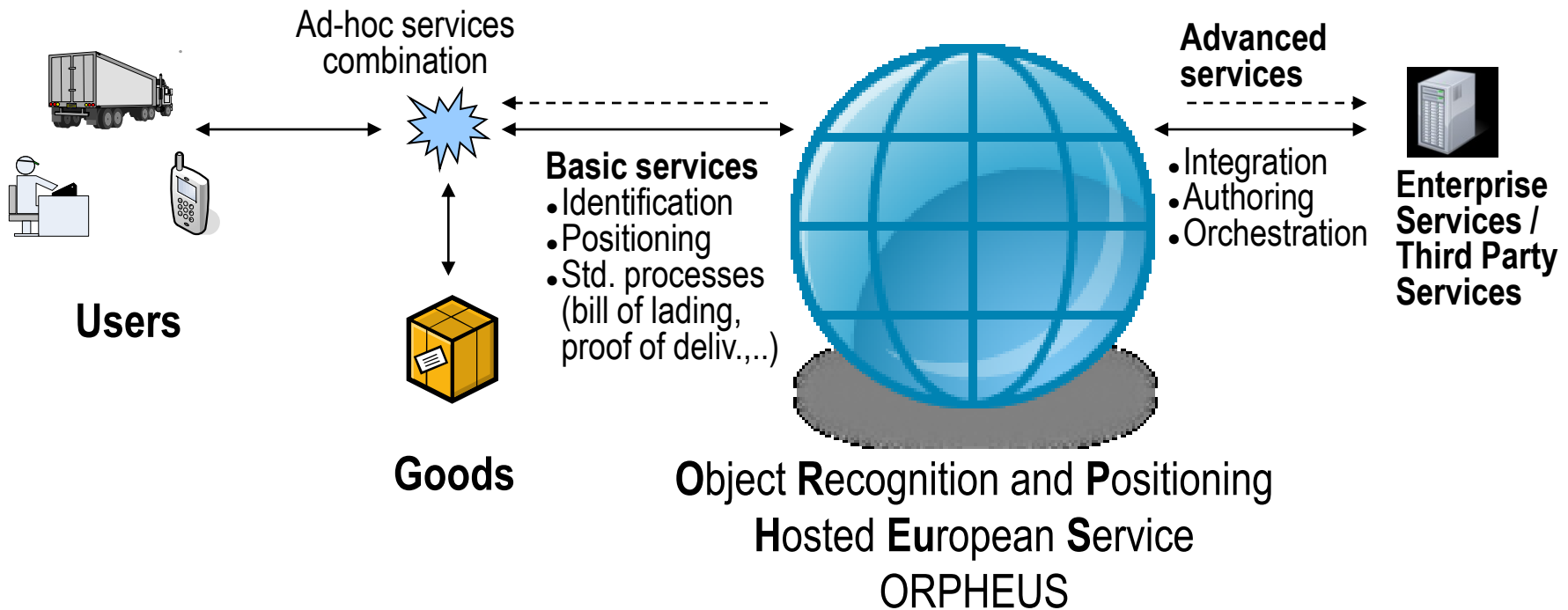


Our market

(go for the biggest catchment!)



ICT for goods mobility tomorrow



Intelligent cargo = self-identifying, easy to interact and communicate with



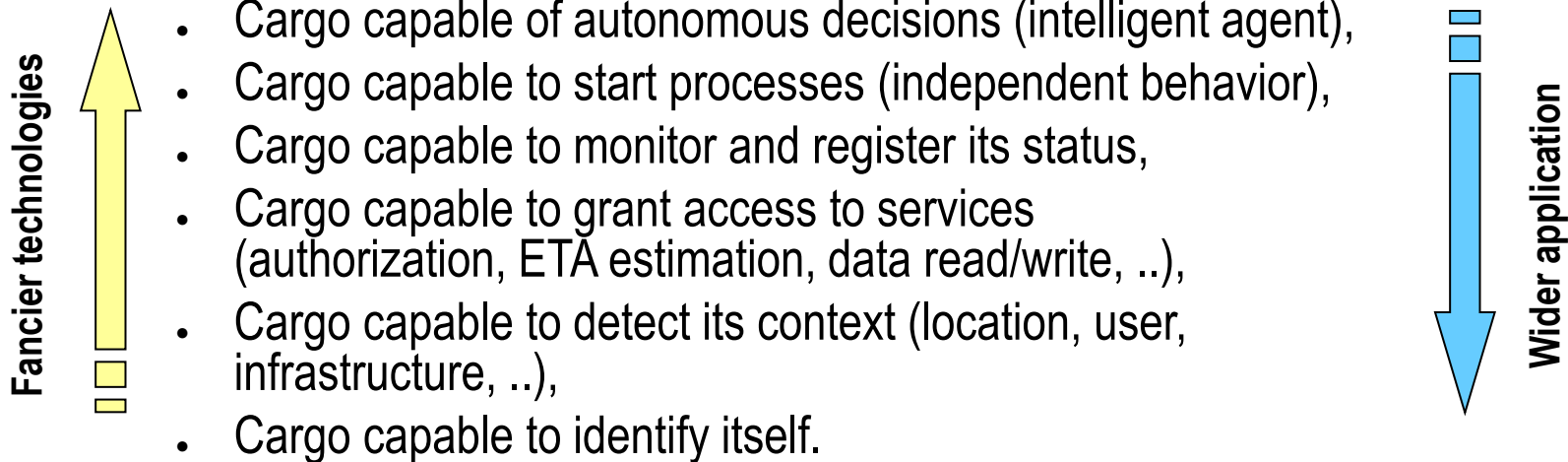
What is Intelligent Cargo

What does “Intelligent Cargo” mean?

- The **technological innovation** dimension is not sufficient to define Intelligent Cargo.

Smart tags, sensor networks, distributed intelligent agents, ...

- Defining Intelligent Cargo requires a second dimension of **architectural innovation**, to highlight changes from the users perspective.
- EURIDICE initial list of **intelligent cargo capabilities:**



Intelligent vs. “dumb” cargo, basic capabilities

Capability	Dumb Cargo (state of the art)	Intelligent Cargo
Self-identification	<ul style="list-style-type: none"> • Local identification based on proprietary systems of each actor. • Shared IDs through ad-hoc connection between back-office systems. • Pre-fixed level of detail throughout the supply chain. 	<ul style="list-style-type: none"> • Global identification provided by public domain services. • Cargo is able to self-identify through a common infrastructure, accessible to field users, vehicles and back-office. • Dynamically selected level of detail (package, pallet, container, ..).
Context detection	<ul style="list-style-type: none"> • No self-standing context detection capability. • Context is extrapolated by back-office systems accessing other information sources (e.g., local ID repository). 	<ul style="list-style-type: none"> • Context determination provided by public domain services. • Common infrastructure, providing context data (identification details, location, time) to authorized users.
Access to services	<ul style="list-style-type: none"> • No direct access to services from the cargo itself. • Services managed by proprietary systems of each actor or by generic (not cargo related) platforms. 	<ul style="list-style-type: none"> • Common infrastructure, providing access to services to authorized users or systems interacting with the cargo.

Intelligent vs. “dumb” cargo, specialized capabilities

Capability	Dumb Cargo (state of the art)	Intelligent Cargo
Status monitoring and registering	<ul style="list-style-type: none"> • Sensing and data storing at a specific cargo level (e.g. container). • To go beyond raw data, ad hoc back-office elaboration is needed. 	<ul style="list-style-type: none"> • Status data are available in real time through the service infrastructure. • Status data are contextualized and integrated with the other cargo information services.
Independent behavior	<ul style="list-style-type: none"> • No such capability. 	<ul style="list-style-type: none"> • Cargo is able to invoke services and start processes autonomously in response to predefined events.
Autonomous decisions (Intelligent agent)	<ul style="list-style-type: none"> • No such capability. 	<ul style="list-style-type: none"> • Cargo has decisions making capabilities and is able to choose services to invoke according to circumstances.

Architectural innovation approach

- Bring about a paradigm shift by promoting the Intelligent Cargo approach across the widest audience of users.
- There is not an “intelligent cargo” product.
- Different intelligent cargo capabilities require different implementation models:
 - Basic capabilities should be available as public domain services for all the intelligent cargo users.
 - Specialized capabilities should be developed for specific purposes by individual users or groups of users to fulfill specific application requirements.
- There is not a single “intelligent cargo” user:
 - Need to carefully analyze value produced across the transport chain (“Who cares?”).
 - Need a convincing value proposition for all the involved actors.



EURIDICE vision translated into an architecture

“In five years time, most of the goods flowing through European freight corridors will be ‘intelligent’, i.e.: **self-aware**, **context-aware** and **connected** through a global telecommunication network to support a wide range of information services for logistic operators, industrial users and public authorities.”

- What does this mean from an architectural perspective?

“Connect cargo objects with each other, to provide intelligent services for logistics stakeholders.”

- We aim to realize the “internet of cargo”



Internet of Cargo vs. Internet of Things

The internet of cargo

Connect cargo objects with each other, to provide intelligent services for logistics stakeholders

The internet of things

Connect objects with each other, to provide intelligent services for any individual user







Expected paradigm shift

	Current paradigm	Intelligent Cargo
Data origin	User or back-office generated.	Item/sensor generated.
Interaction paradigm	Organization-to-organization	Thing-to-thing.
Data processing	Centralized at organization level.	Distributed, may start at object level.
Communication support	Predefined communication channels.	Self-configuring combination of local and global communication resources.
Data interchange semantics	Mutually agreed with each partner or between trade community members.	Globally established, for any-to-any ad hoc exchanges.
Decisions support	Top-down decision making, based on periodic data revision.	Event-triggered, decentralized and (partially) automated exception resolution.



Cargo objects and logistics stakeholders

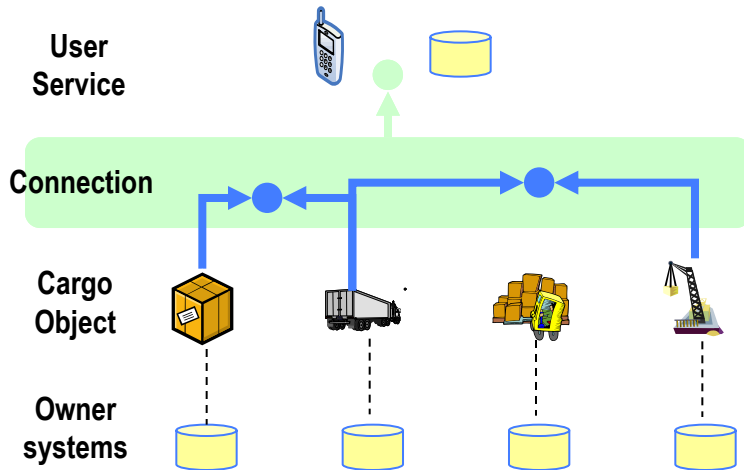
Cargo Objects

 Infrastructure	--	Needs data / provides data	Needs data / provides data	Owns
 Warehouse	Needs data	Needs data / provides data	Owns	--
 Vehicle	Needs data	Owns	Manages	Needs data / provides data
 Item	Owns	Needs data / provides data	Manages	Needs data / provides data
	Cargo owner	Carrier	Logistic service provider	Infrastructure manager

Stakeholders

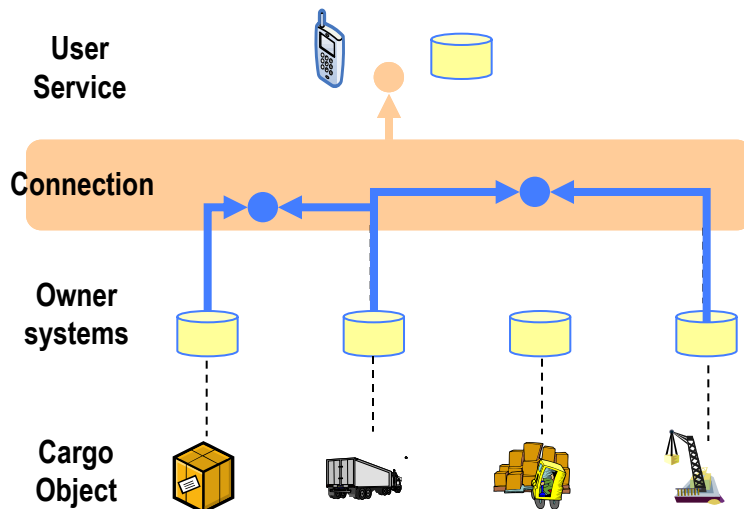


Thing-to-thing vs. organization-to-organization



Thing-to-thing

- Connect via cargo objects interaction.
- Decentralized data processing.
- Owner systems may not be involved (only to access owner services).



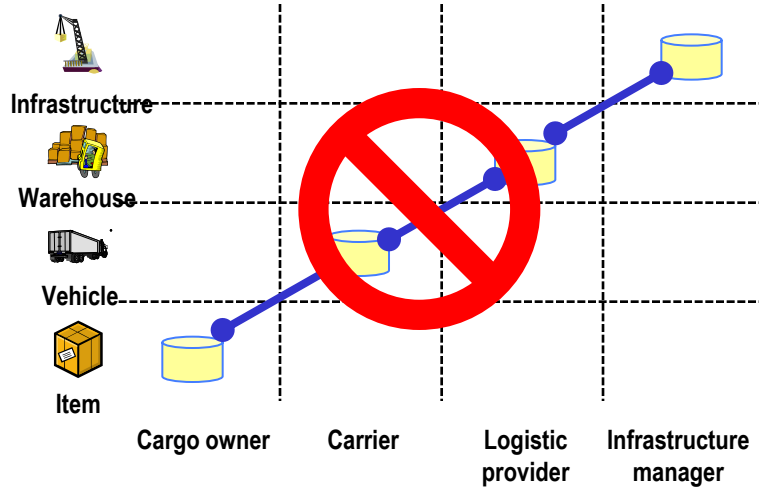
Organization-to-organization

- Connect via pre-existing links between organizations.
- Cargo objects may not be involved (disconnected physical / information flows).

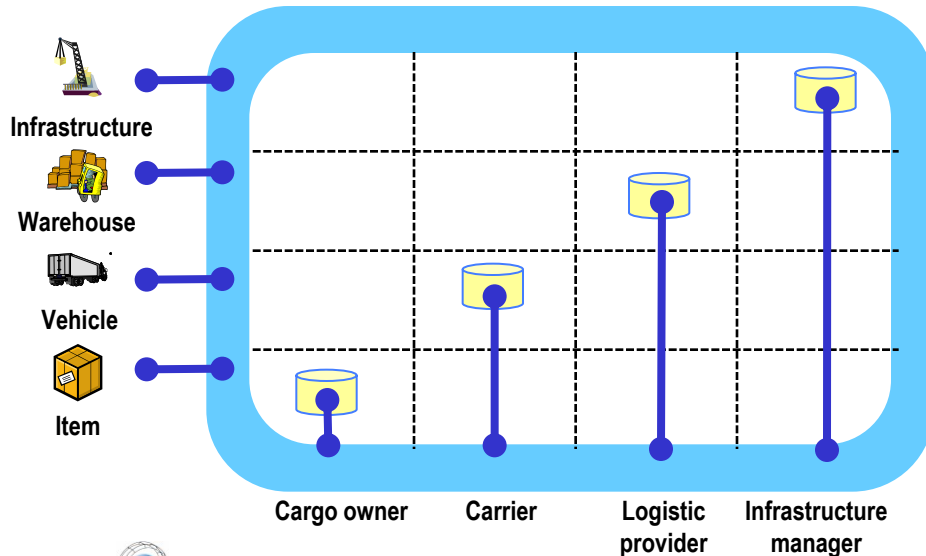
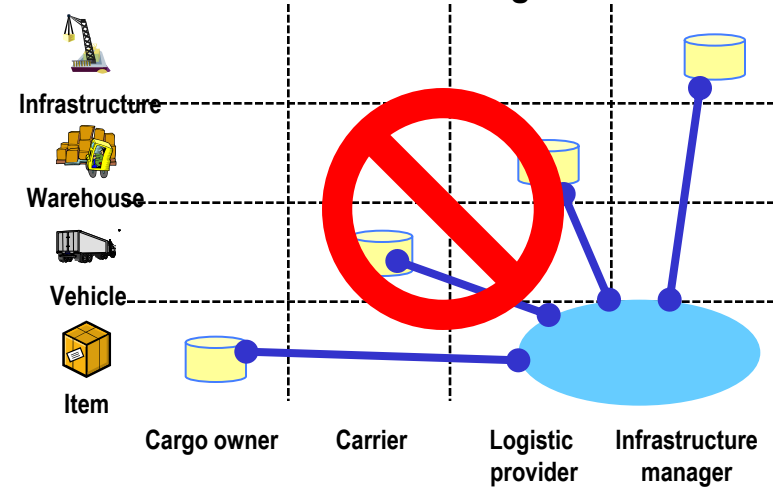


Any-to-any communication and data interchange

One-to-one links



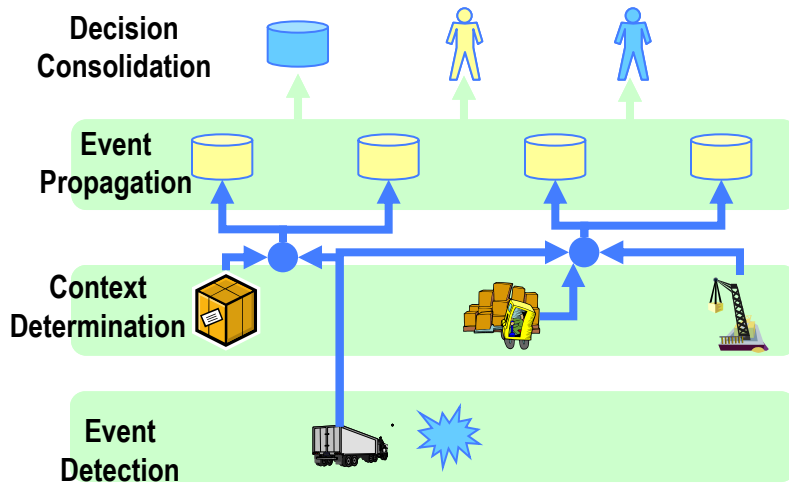
Data interchange hub



- DNS-like system for cargo objects and related services.
- Globally shared semantics.
- On demand configuration of communication resources.

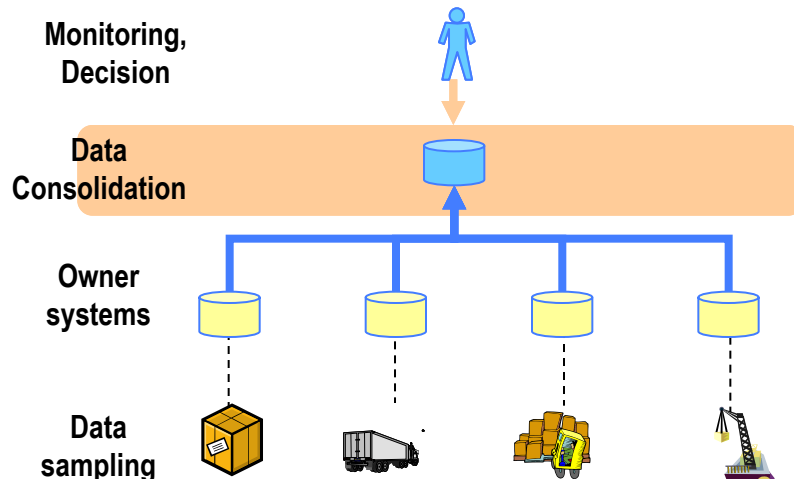


Event-triggered, decentralized decisions support



Intelligent cargo

- Automated event detection and context determination.
- Bottom-up exception resolution (escalation, consolidation of decisions).

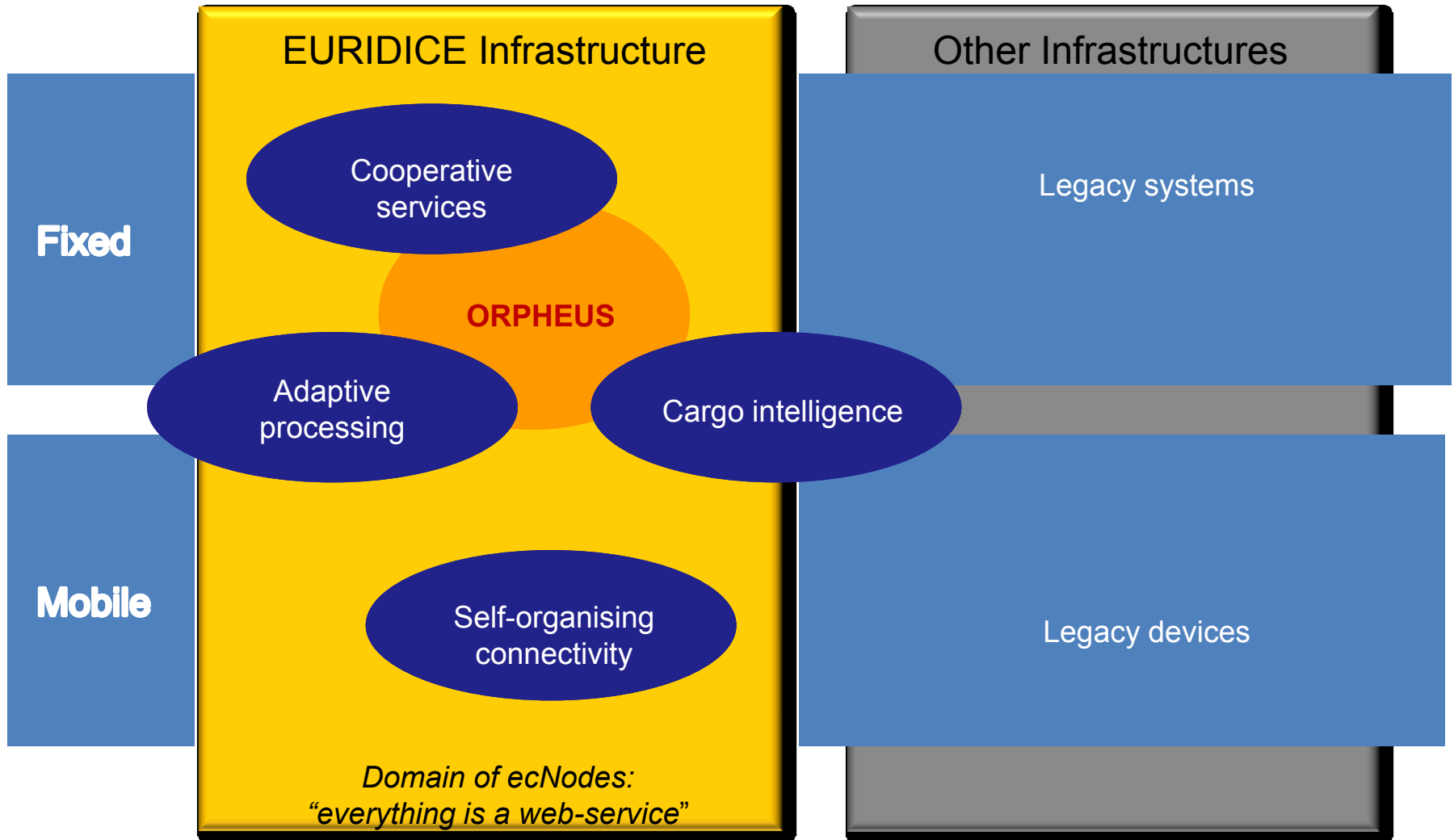


Traditional approach

- Data consolidation from back-office systems.
- Top-down centralized monitoring, revision and communication.



Intelligent cargo framework architecture

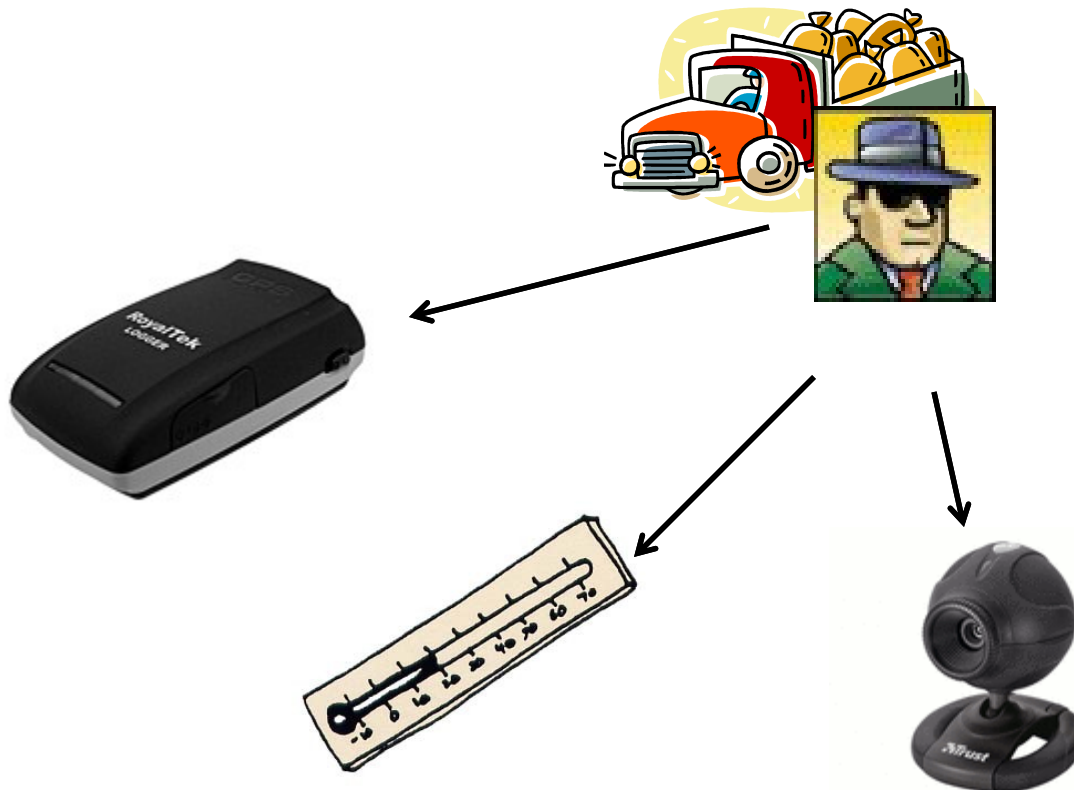


Intelligent Cargo & the Agent Paradigm

- **Agents ... [by definition]**
 - ... sense their environment

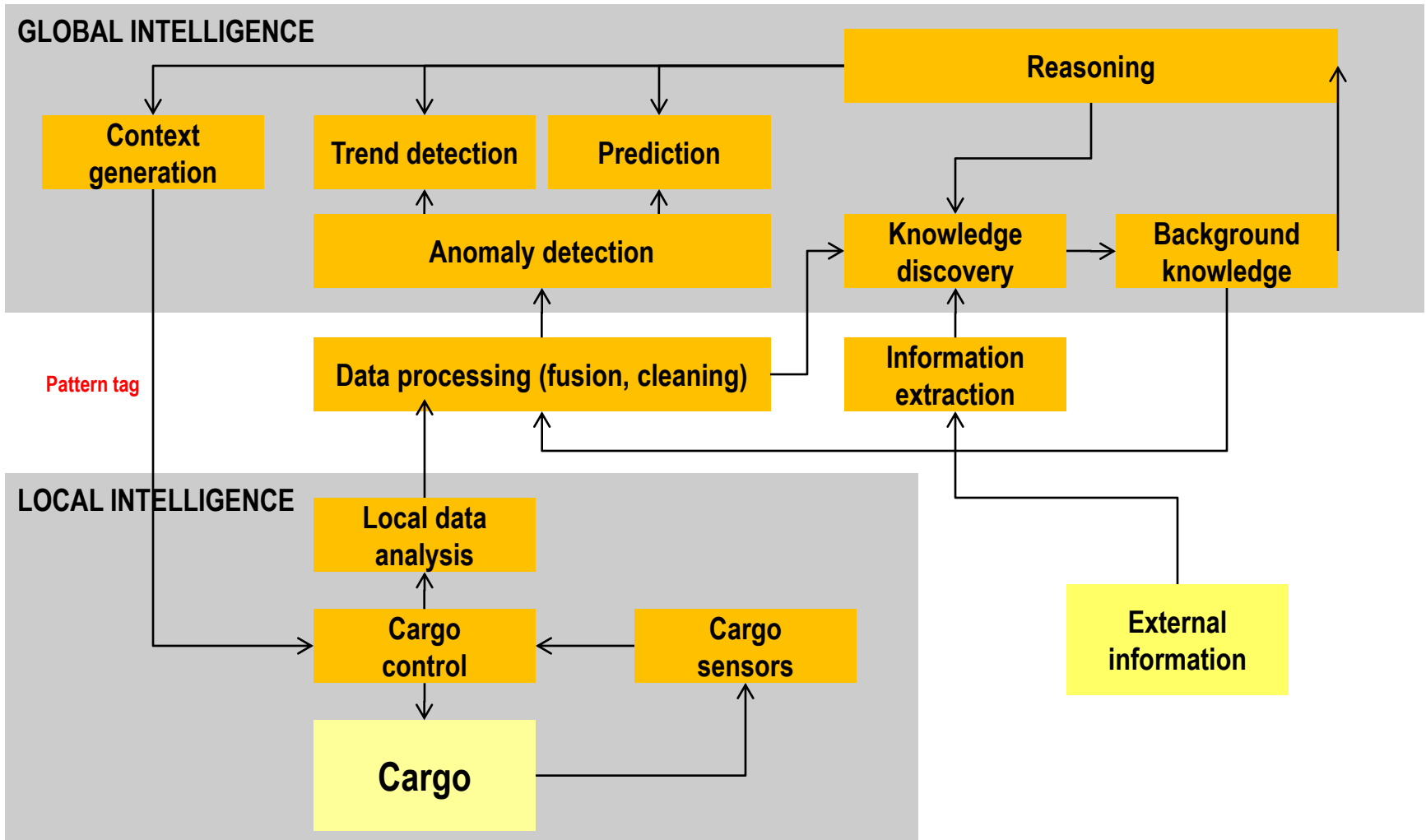
Agents use **sensors**

They **interpret** their environment and react **appropriately**



Cargo Intelligence solution

GUI applications for decision support, visualisations,...





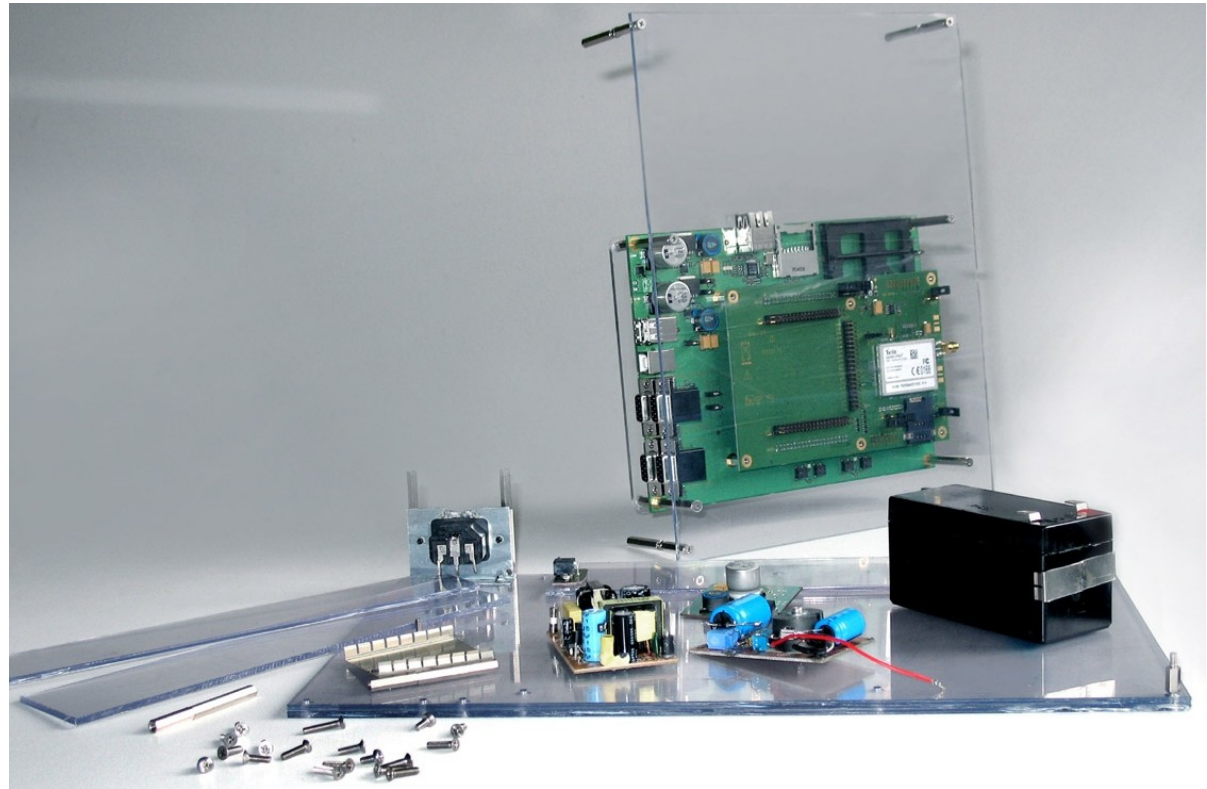
Intelligent Cargo Pilot Applications and Validation

EURIDICE toy demo kit

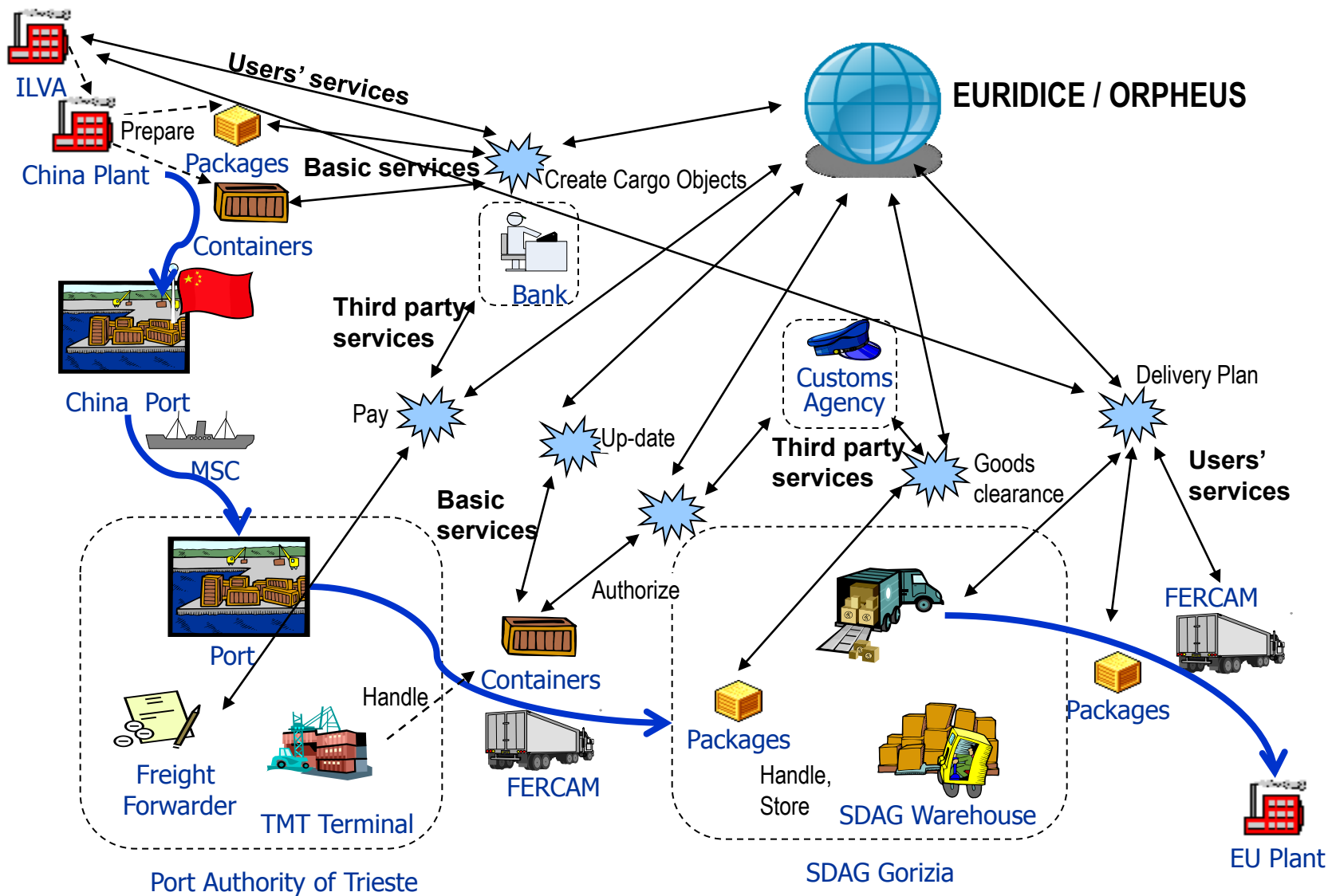
The “demo kit” is a complete prototype composed of the evaluation boards (GSM/GPRS and RFID modules), the 12V battery and three power supplies (battery charger from 220V AC, 5V switching power supply, battery charger from 12..24V DC).

All the components will be housed in a sort of sandwich of plexiglass.

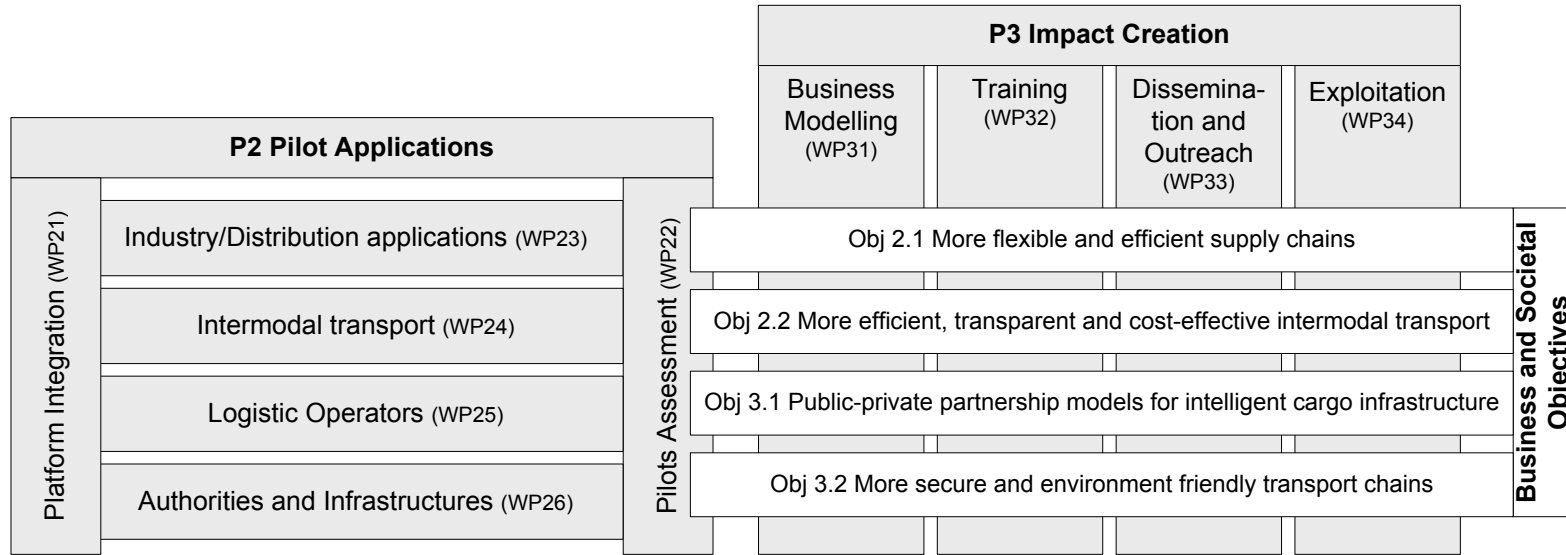
In the photo, all the components, but the RFID reader, are shown before the assembly.



Sample application: Authorities and Infrastructure Pilot in the Friuli Venezia Giulia Region



Pilot applications and validation in EURIDICE



- 12 Pilot applications
- User requirements
 - Technical and functional test

- Process-level validation
- Business process modelling
 - “As is” vs. “To be”
 - KPIs

- Business model validation
- Value chain analysis
 - Business model innovation
 - Collaboration needs
 - Business-level indicators





Cooperation opportunities

Cooperation opportunities

- Technology
 - EURIDICE is a “lighthouse project”, open to other projects willing to use, enhance, complement our results
 - Next technical workshop with DG TREN, DG INFSO projects in Munich, next week
- Business (Logistics)
 - We aim at representing the community of logistic companies and users (Intelligent Cargo Forum)
 - Next annual event in Venice, November 2009
- Links with COIN could be established on relevant issues
 - Interoperability with Enterprise Systems
 - Business Modelling
 -



Contact



Paolo Paganelli

Insiel S.p.A.

Via Cesare Battisti 27

40123 Bologna, Italy

tel. +39 040 3737001

mob. +39 3346324553

e-mail paolo.paganelli@insiel.it

