CERP#6 meeting
Sophia Antipolis 9 – 10 June 2008

EURIDICE Project

Paolo Paganelli, Insiel spa

9 June 2008

Content

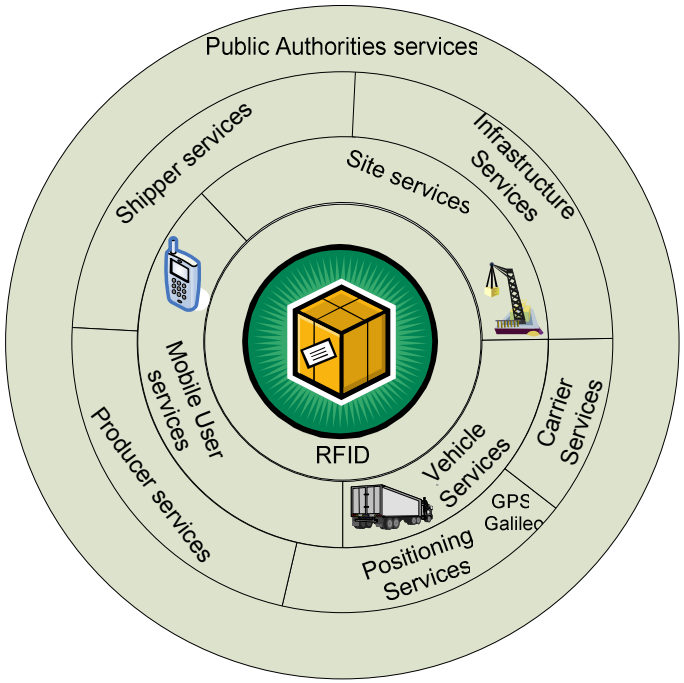
- Introduction to EURIDICE
- The Intelligent Cargo vision
- RFID in the EURIDICE approach
- Conclusions and current objectives

European **I**nter-**D**isciplinary Research on **I**ntelligent **C**argo for **E**fficient, Safe and Environment-friendly Logistics

Overall Budget - Funding	14.1 - 8.25 M€
Start - End Date	1/2/2008 – 31/1/2011
Coordinator	Insiel, Italy
Partners	

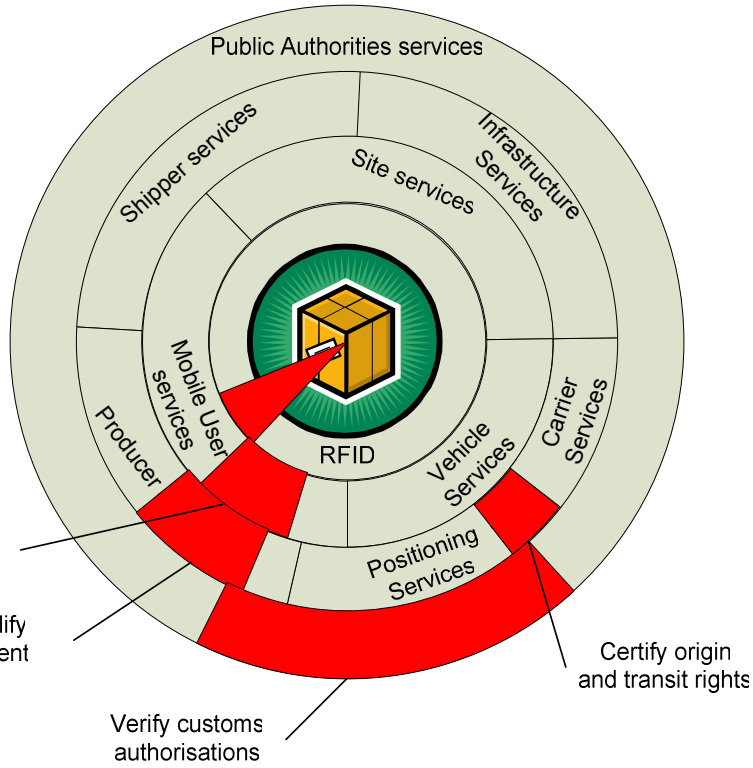
The Intelligent Cargo vision

"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."



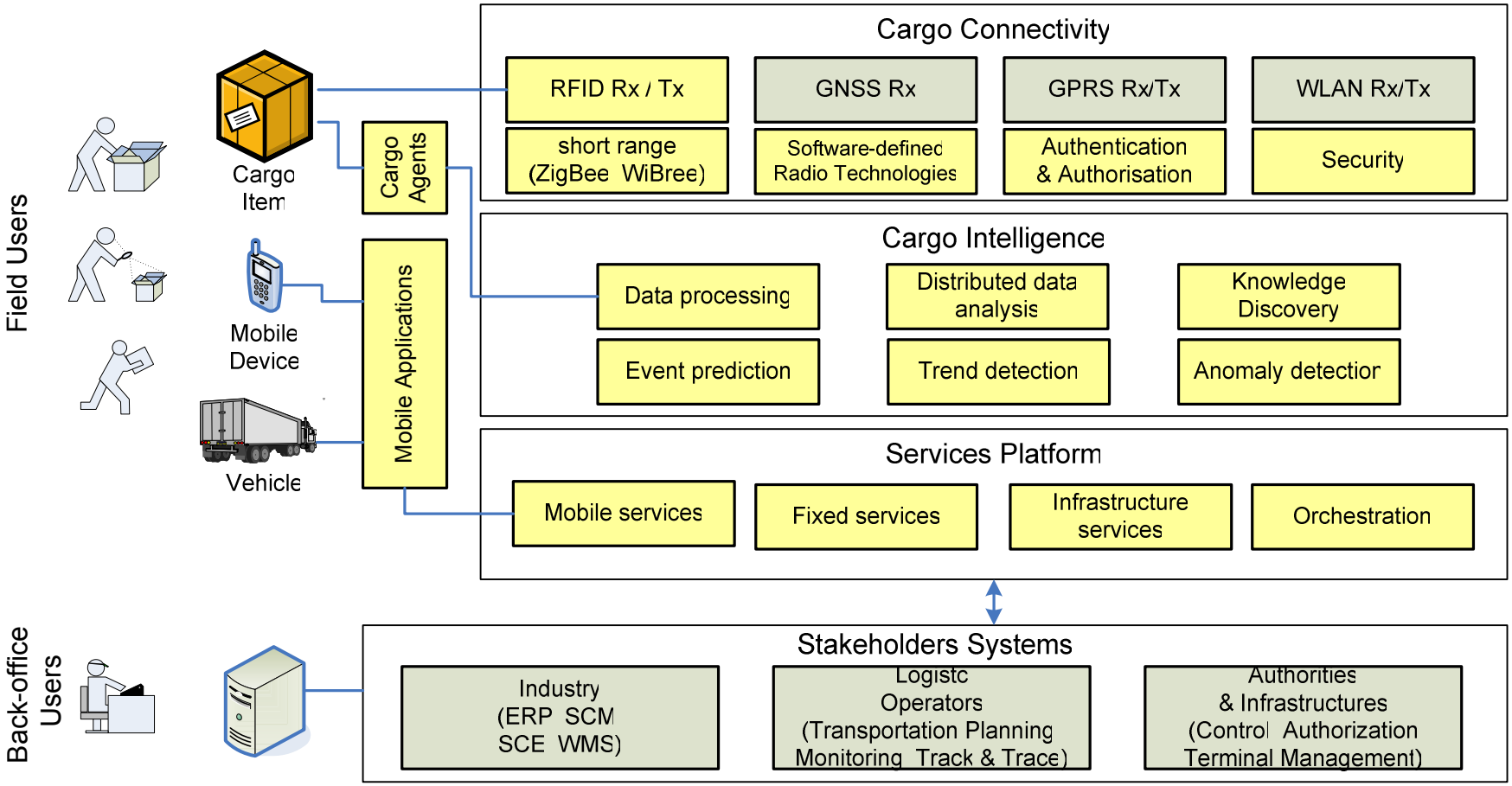
Cargo-centric Information Services Infrastructure

Services Combination on the fly



User and context specific interaction

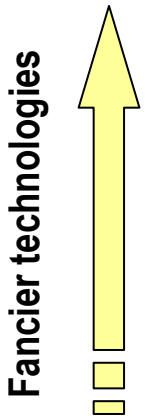
How it is done – Technological Architecture View



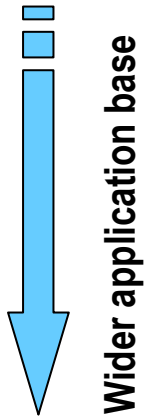
What does “Intelligent Cargo” mean?

- 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**:



- Cargo capable of autonomous decisions (intelligent agent),
- Cargo capable to start processes (independent behavior),
- Cargo capable to monitor and register its status,
- Cargo capable to grant access to services (authorization, ETA estimation, data read/write, ..),
- Cargo capable to detect its context (location, user, infrastructure, ..),
- Cargo capable to identify itself.



Intelligent vs. “dumb” cargo, basic capabilities

Capability	Dumb Cargo (state of the art)	Intelligent Cargo
Self-identification	• 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.	• 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	• No self-standing context detection capability. • Context is extrapolated by back-office systems accessing other information sources (e.g., local ID repository).	• Context determination provided by public domain services. • Common infrastructure, providing context data (identification details, location, time) to authorized users.
Access to services	• No direct access to services from the cargo itself. • Services managed by proprietary systems of each actor or by generic (not cargo related) platforms.	• Common infrastructure, providing access to services to authorized users or systems interacting with the cargo.

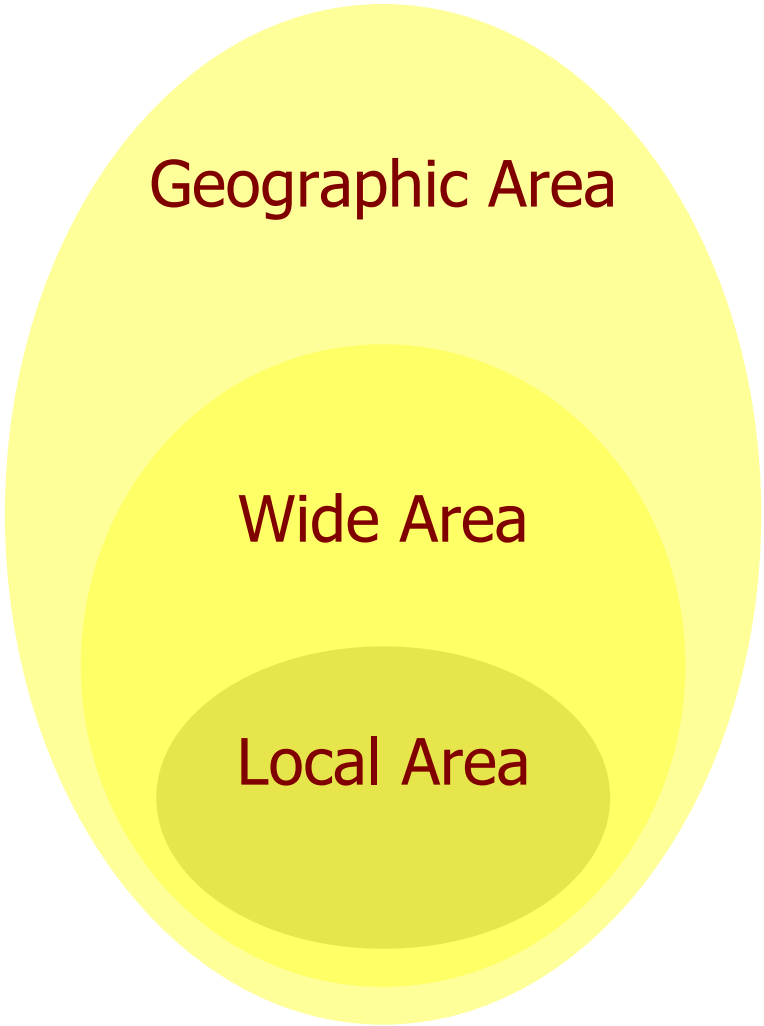
Intelligent vs. “dumb” cargo, specialized capabilities

Capability	Dumb Cargo (state of the art)	Intelligent Cargo
Status monitoring and registering	• Sensing and data storing at a specific cargo level (e.g. container). • To go beyond raw data, ad hoc back-office elaboration is needed.	• 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	• No such capability.	• Cargo is able to invoke services and start processes autonomously in response to predefined events.
Autonomous decisions (Intelligent agent)	• No such capability.	• Cargo has decisions making capabilities and is able to choose services to invoke according to circumstances.

Architectural innovation approach

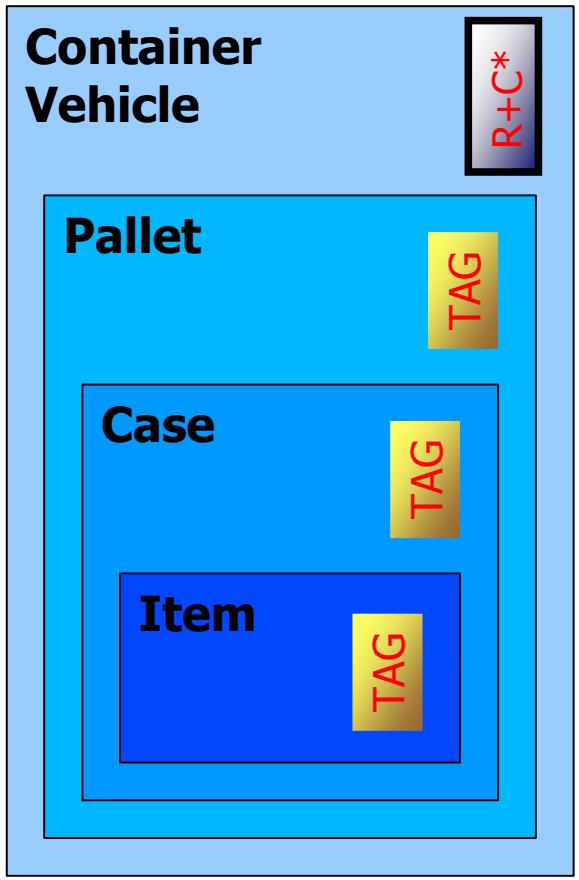
- Bring about a paradigm shift by promoting the Intelligent Cargo approach across the widest audience of users.
- There is not an “intelligent cargo” product.
- Different intelligent cargo capabilities require different implementation models:
  - Basic capabilities should be available as public domain 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 physical architecture layers



- **Geographic Area:**
  - Vehicles (and their cargo) in movement
- **Wide Area:**
  - Parcels, pallet, vehicles in a site
- **Local Area:**
  - Single asset in a shelf or in a warehouse
  - Package
  - Pallet on trucks, in container or depot

Identification layering



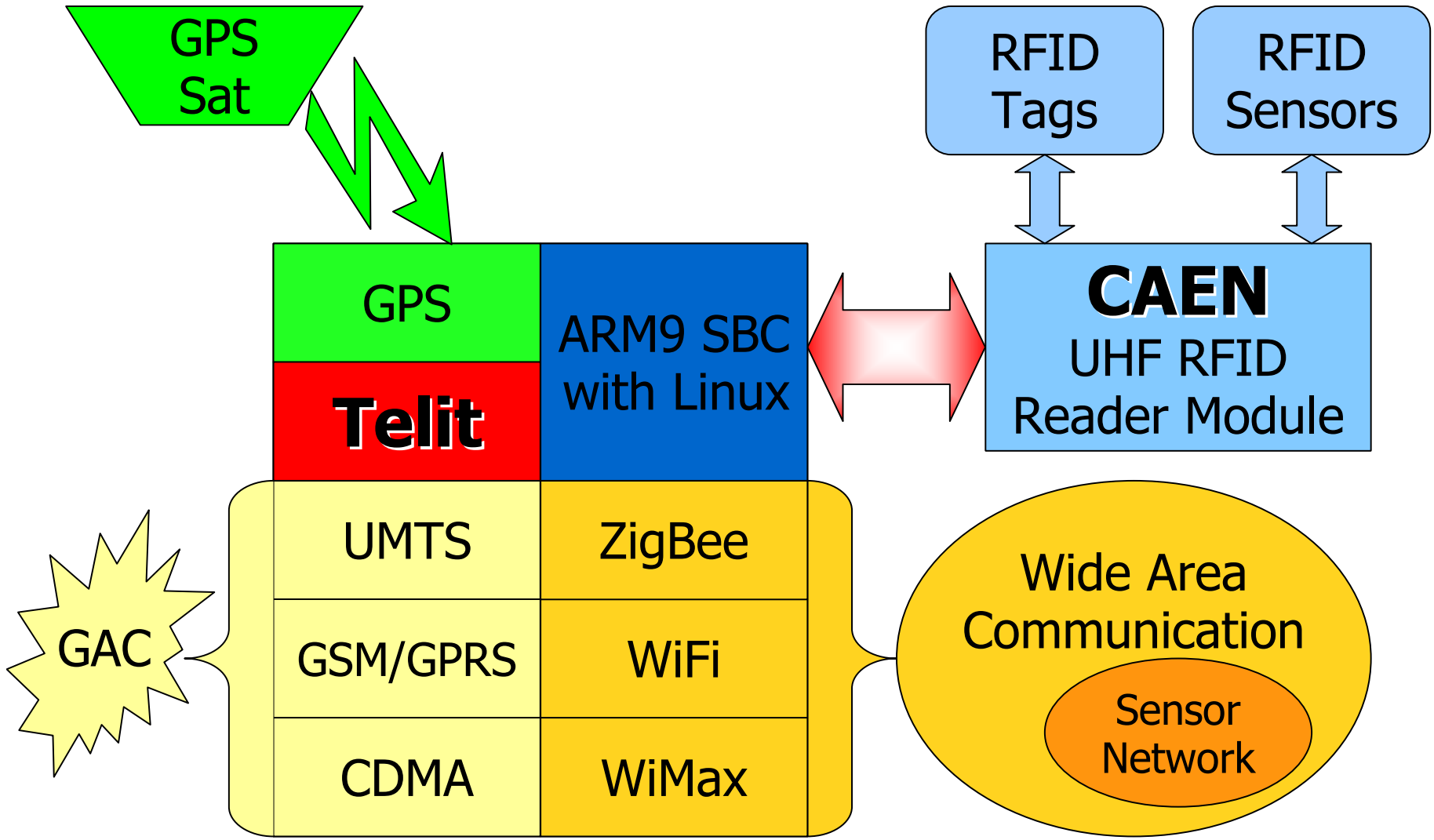
- Common reading technology: **EPC Class 1 Gen 2 UHF RFID**
- EPC Filtering
- Tag Data Translation standard
- Tag's differentiation (passive tags, semi-passive tags, loggers, sensors)

*R+C = RFID reader + intelligent communication device

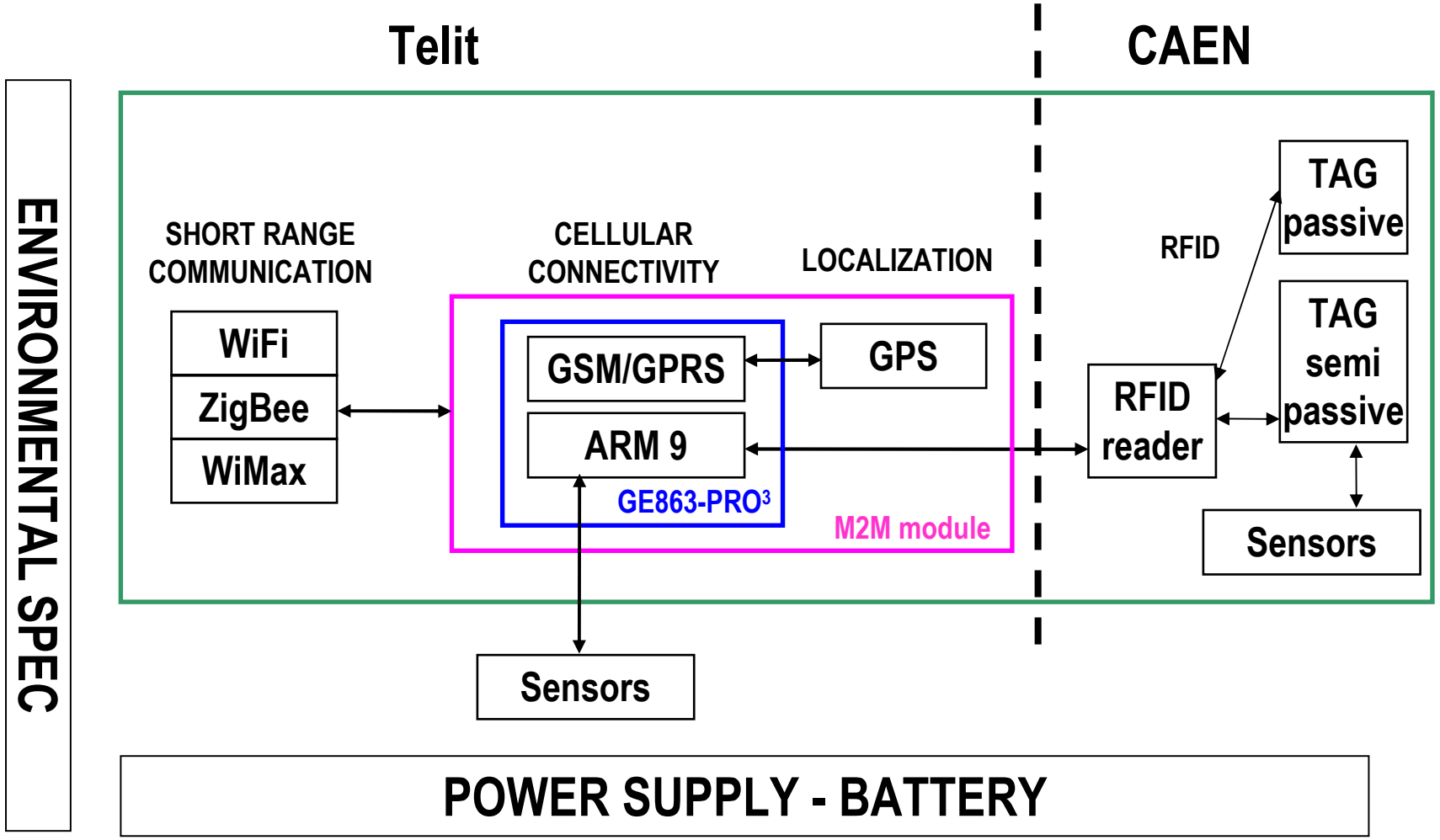
Available technology mix

- **GPS** (global localization)
- **RFID** (identification, local area communication)
- **Sensors** (environment monitoring)
- **WiFi/ZigBee/WiMax** (wide area communication)
- **GSM/GPRS/UMTS/CDMA** (geographic area communication)
- **ARM + Memory** (local computational power)

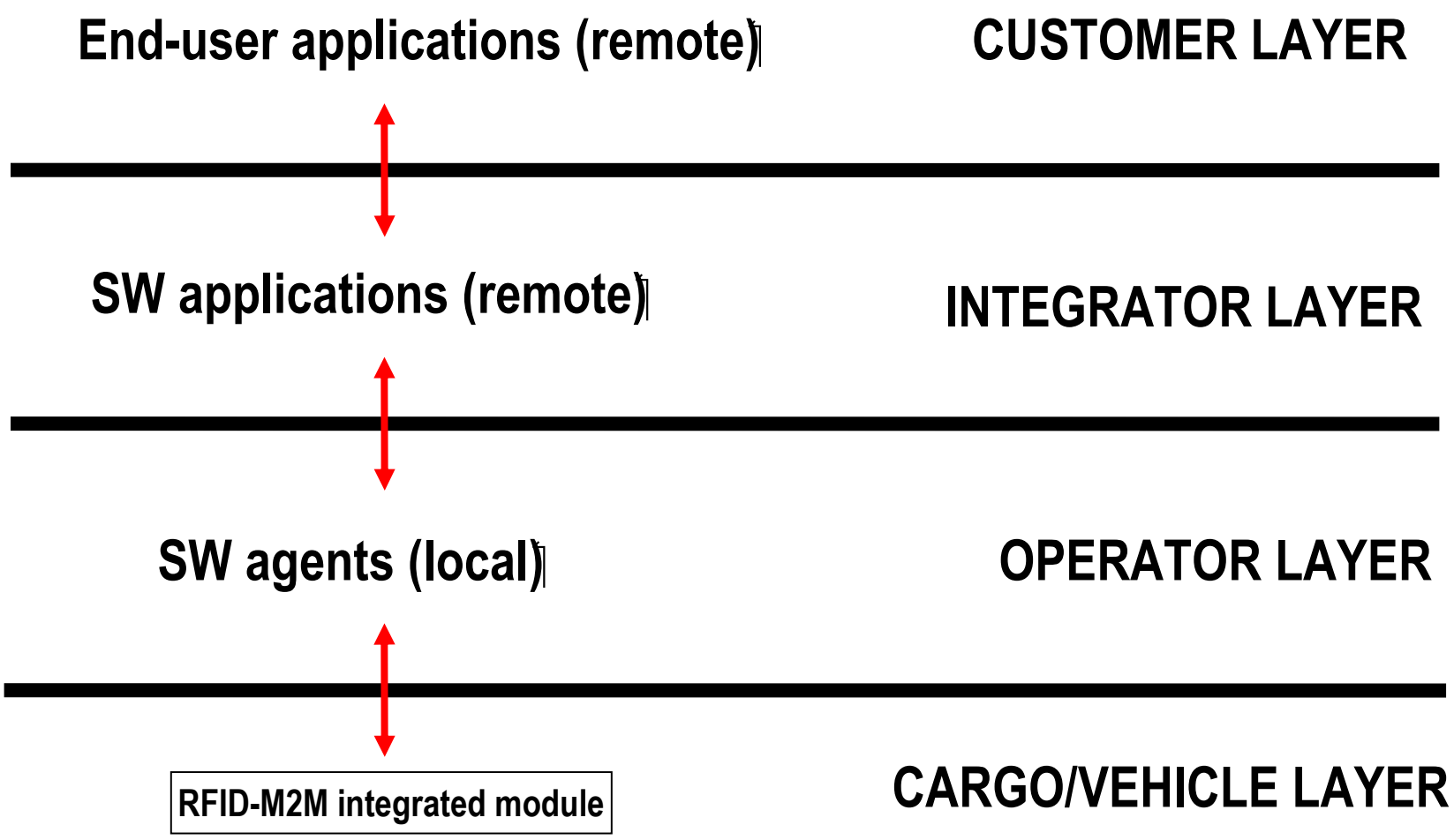
Technology integration



RFID-M2M integrated module

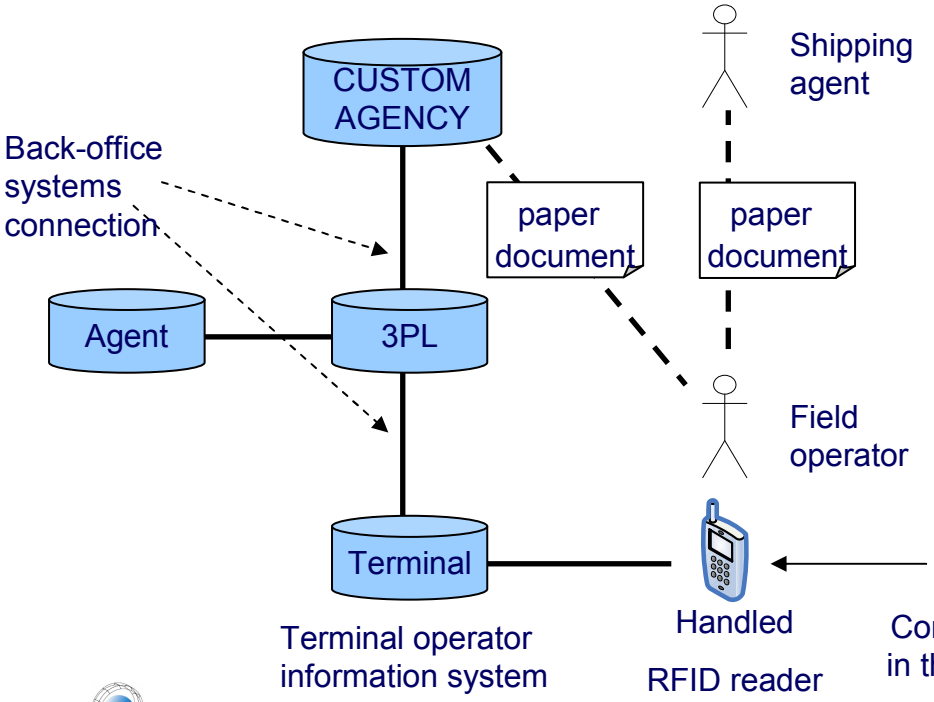


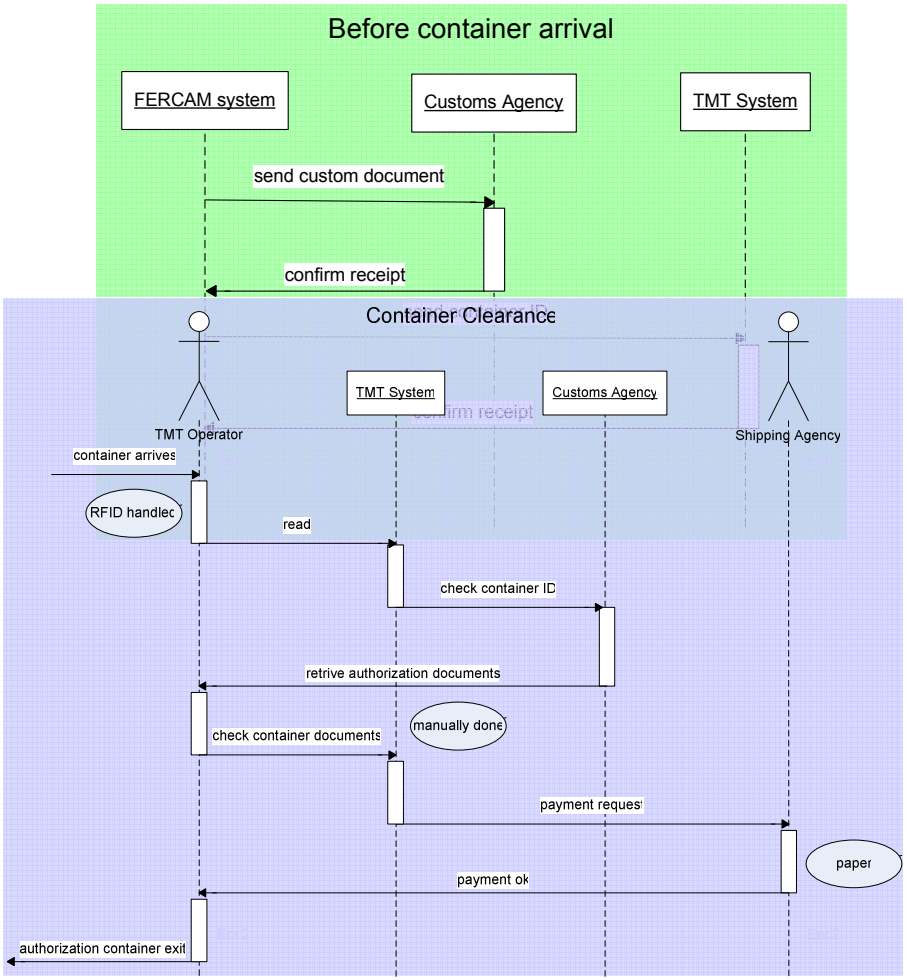
Conceptual layering



Example: EURIDICE pilot at the Port of Trieste (state of the art architecture)

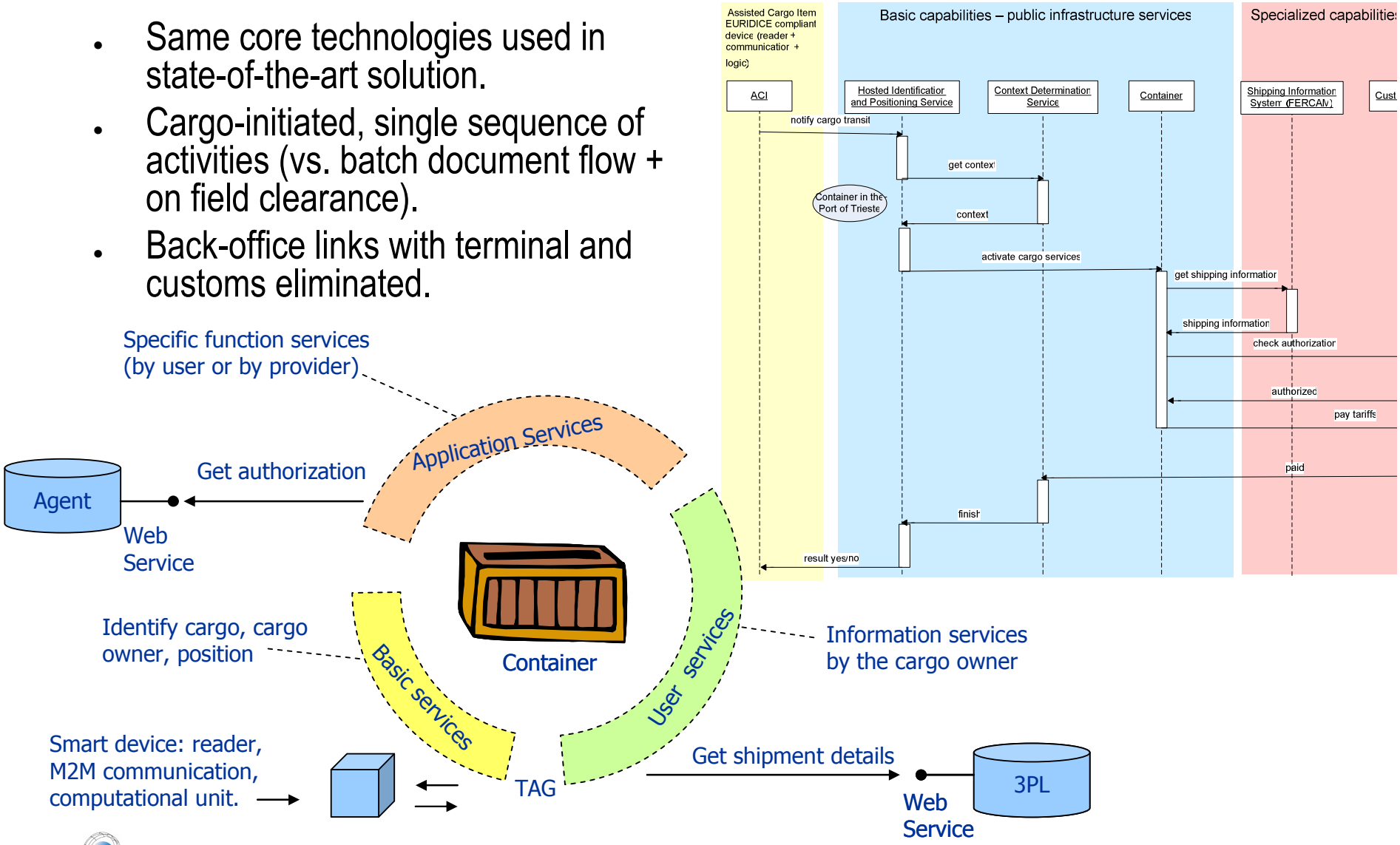
- Local SOA for back-office links.
- RFID on container, handheld reader for field operator at the terminal.
- Batch flow for customs documents.
- Carrier-Terminal systems integration for container identification.





Example: EURIDICE pilot at the Port of Trieste (Intelligent Cargo architecture)

- Same core technologies used in state-of-the-art solution.
- Cargo-initiated, single sequence of activities (vs. batch document flow + on field clearance).
- Back-office links with terminal and customs eliminated.



Conclusions

- Intelligent Cargo solutions are defined by an innovative architectural approach, not only by:
  - Deployment of new advanced technologies,
  - Fulfillment of previously unattainable functional requirements.
- Non-functional requirements make a difference, e.g.:
  - Streamline processes by reversing the paradigm (cargo-centered vs. back-office system centered).
  - Eliminate back-office links (especially those involving uninterested actors).
- Need to pursue innovation along three dimensions:
  - Technological innovation.
  - Value innovation
    - Value chain analysis (who cares, who doesn't)
    - Value proposition formulation.
  - Business model innovation
    - Ecosystem of involved product and service providers.
    - Viability and sustainability.

Open issues

To be solved within EURIDICE:

- The integrated module will be portable or fixed? (this will heavily affect power management).
- Will software agents run locally inside the integrated module? (the choice of the type of applications on user terminal (e.g. Java) must be determined based on real capabilities of hw modules).
- Shall the integrated module have a GPS module for localization? (the prototype will have it)

Need coordinated actions beyond EURIDICE:

- Security issues: to make a difference for logistic users we have to stick sensitive information and value added services to the tag (e.g., prepaid shipping tariffs) but that rises security concerns.
- Reaching an acceptable level of standardization:
  - Immediate need for basic services (identification, positioning, connectivity).
  - Medium- to long-term need for specialized services (eCustoms, collaborative logistics, ..)
- The usual tag price concerns..

EURIDICE current objectives (December 2008)

- Release first version of the Intelligent Cargo Integration framework.
- Define scope and contents of the Pilot Cases.
- Refine vision and formulate value proposition.

- Start Business Forum.
- Start promotion of an Intelligent Cargo movement in the frame of ITS.
- Establish link with related initiatives (Galileo, internet of things, ..).

Contact

Paolo Paganelli

Insiel S.p.A.
Via Cesare Battisti 27
40123 Bologna, Italy
tel. +39 040 3737001
mob. +39 3346324553
fax +39 051265182
e-mail paolo.paganelli@insiel.it