Advanced ICT Technologies for Costs Optimization and Innovation of Winter Maintenance Processes in the Perspective of Smart-City

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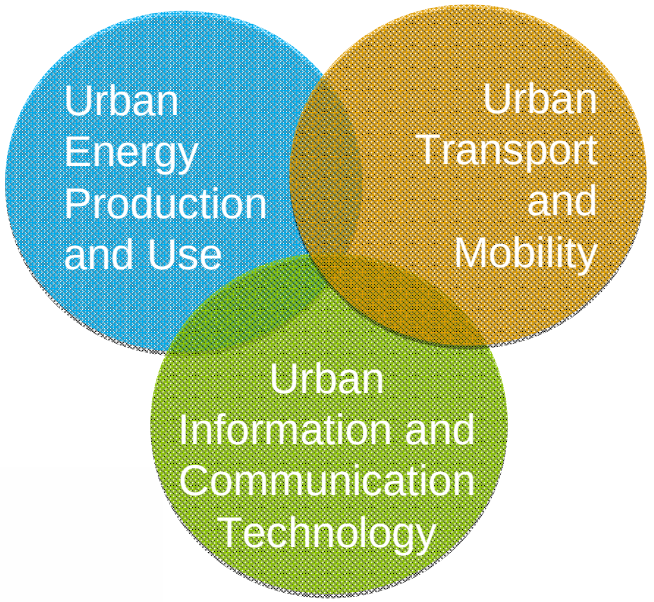
0. CONTENT

1. SMART CITY: A DEFINITION

Cities are the place of the world where the bulk of the **consumption of energy and non-renewable resources is concentrated**.

This implies that the innovations which must guide us towards a new model of **sustainable development** should be experimented first of all within cities, where they may cause more benefits.

A Smart City is a city where research and innovation aim toward the target of triple sustainability: **social**, **economic** and **environmental**.



1. SALT SPREADING IN A SMART CITY

The **GOLDEN-ICE** and **GOLDEN-INFRA** projects aim at helping to reach all the three sides of the sustainability triangle.

Safer roads and a better level of service

Social Sustainability

Optimized service, less materials, less costs

Economic Sustainability

Less damage caused by salt to soil, water and wildlife

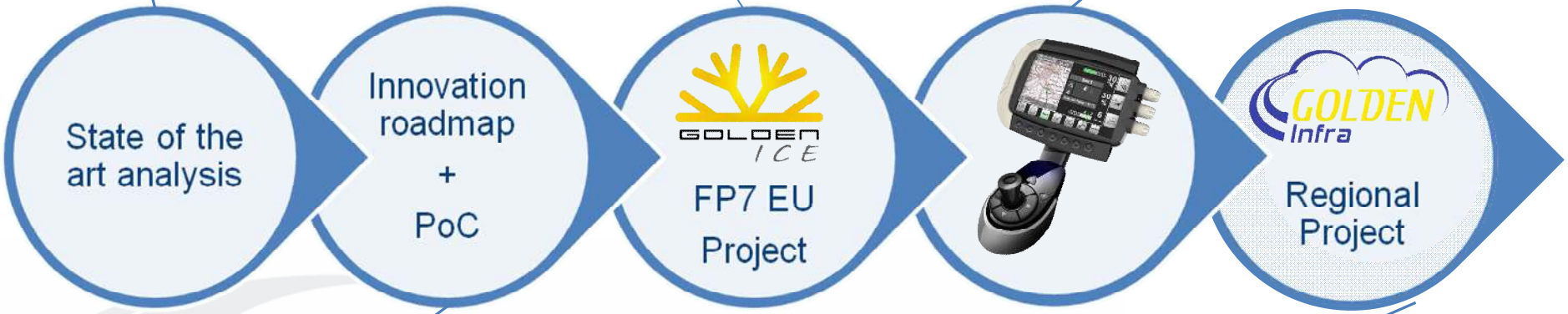
Environmental Sustainability

2. THE INNOVATION ROADMAP

State of the art analysis, process evaluation, technology assessment

Ecosat10: the new embedded product available and ready for the next innovation step

Advanced navigation concepts and applied research for a competitive advantage



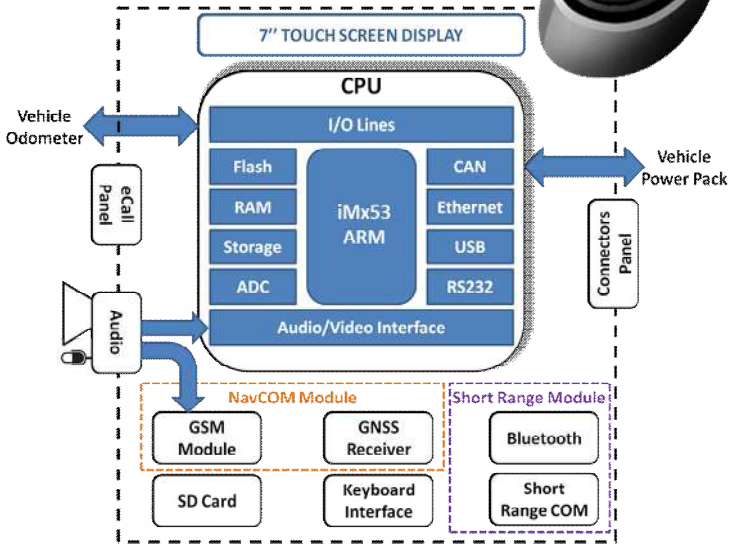
Definition of the innovation of product and process, Requirements sketch out and PoC realization

Introduction of the cloud computing concept following the intelligent system paradigm, focus on data aggregation and a smart-centralized control of the on field resources

3. THE GOLDEN-ICE PROJECT

The first step in the innovation process has been giving **intelligence to the truck** equipment:

- **Automatic control** of the salt spreading process
- Reproduction of **pre-recorded missions**
- **Advanced GNSS** capabilities
- **Communication** capabilities (GSM, GPRS)
- Integrated **eCall** functionalities

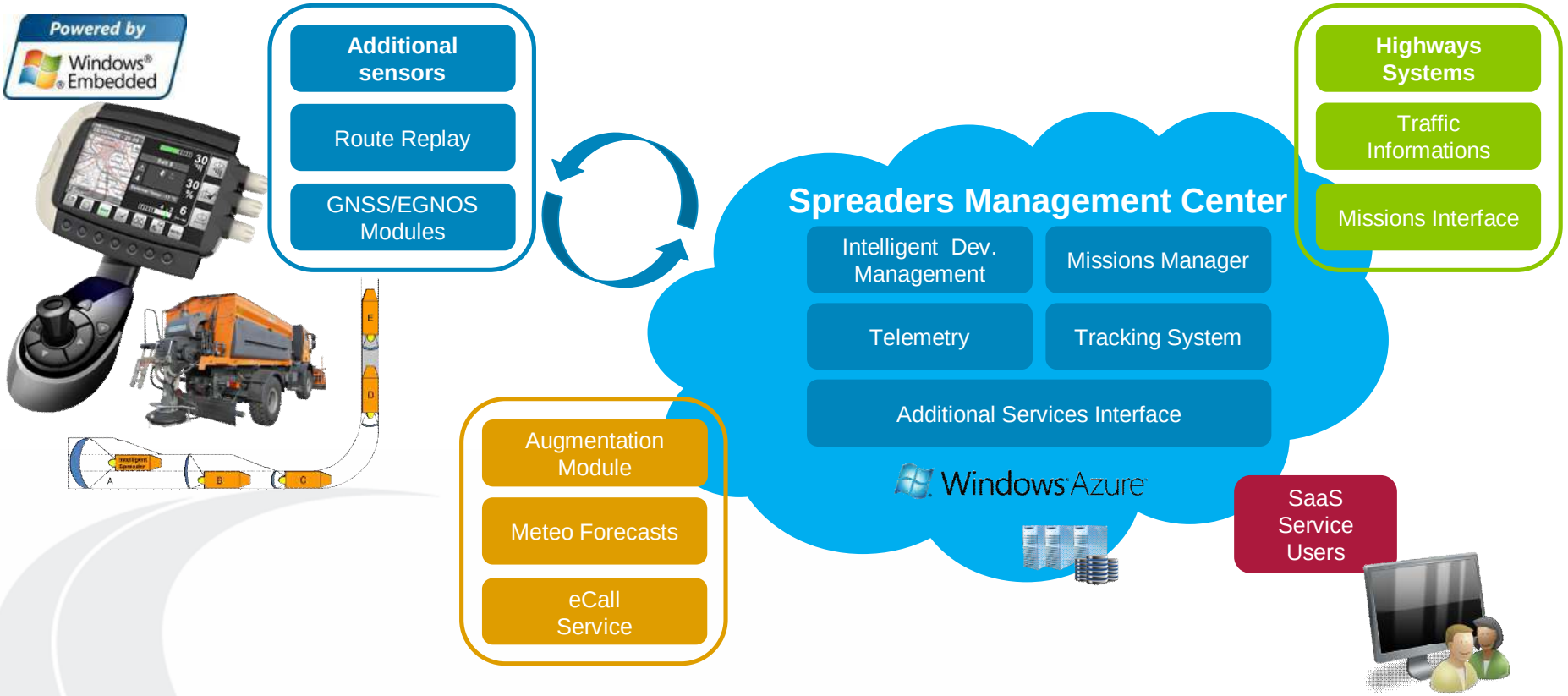


3. THE GOLDEN-INFRA PROJECT

The evolution in the innovation process focused the development of a **high level winter maintenance service** through a **cloud based Management Center**:

- Advanced **operations management**
- Centralized **device management**
- **Telemetry data** collection and aggregation
- Integration with complementary **sources of information**:
  - Weather forecasts
  - RWIS
  - On-board sensors

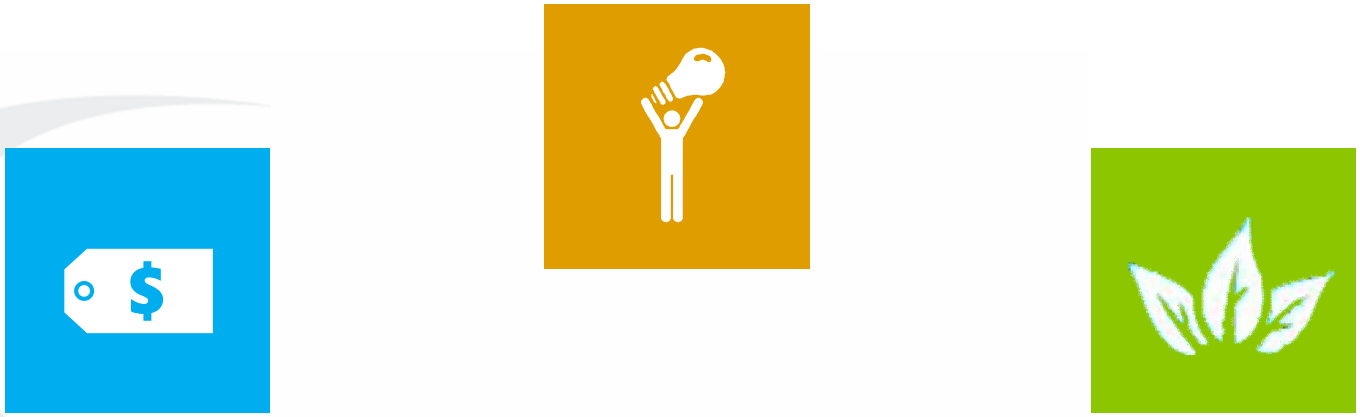
3. OVERALL SYSTEM ARCHITECTURE



4. RESULTS AND FUTURE DEVELOPMENT

The innovation roadmap so far has brought significant on-field test results:

- **Direct costs** reduction (spreading materials) up to 20%
- **Indirect costs** reduction (infrastructure, road maintenance, …)
- Enhancement in winter maintenance processes through the implementation of a centralized **Decision Support System**
- **Environmental impact reduction** subsequent to a reduced salt usage



4. RESULTS AND FUTURE DEVELOPMENT

Future development can evolve on two main directions:

- **On board**
  - Introduction of additional sensors and devices
  - Enhancement of positioning system (e.g.: multi constellation receivers, Inertial Navigation Sensors, enhanced maps)
  - Further automation of the spreading process
- **At the management center**
  - Introduction of additional data sources (e.g.: new sensors, traffic information, Earth Observations)
  - Automatic optimization of spreading missions
  - New data exploitation strategies (e.g.: Open Data, Proprietary Data)

THANK YOU

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