



Creating Ubiquitous Intelligent Sensing Environments (CRUISE)

Capturing Context and Context Aware Systems and Platforms

Joint e-SENSE, MAGNET Beyond, DAIDALOS and CRUISE
workshop,

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CRUISE

Creating Ubiquitous Intelligent Sensing Environments

FP6 Network of Excellence on the Application and Communication Aspects of Wireless Sensor Networking

Fact sheet:

- ◆ Start of the project: 1st of January 2006
- ◆ Duration: 24 months
- ◆ Consortium: 32 partners
- ◆ Project Coordinator: Dr. Neeli R. Prasad from CTIF, Aalborg University, Denmark, np@kom.aau.dk
- ◆ Project website: <http://www.telecom.ece.ntua.gr/cruise/>

Why is CRUISE NoE necessary?

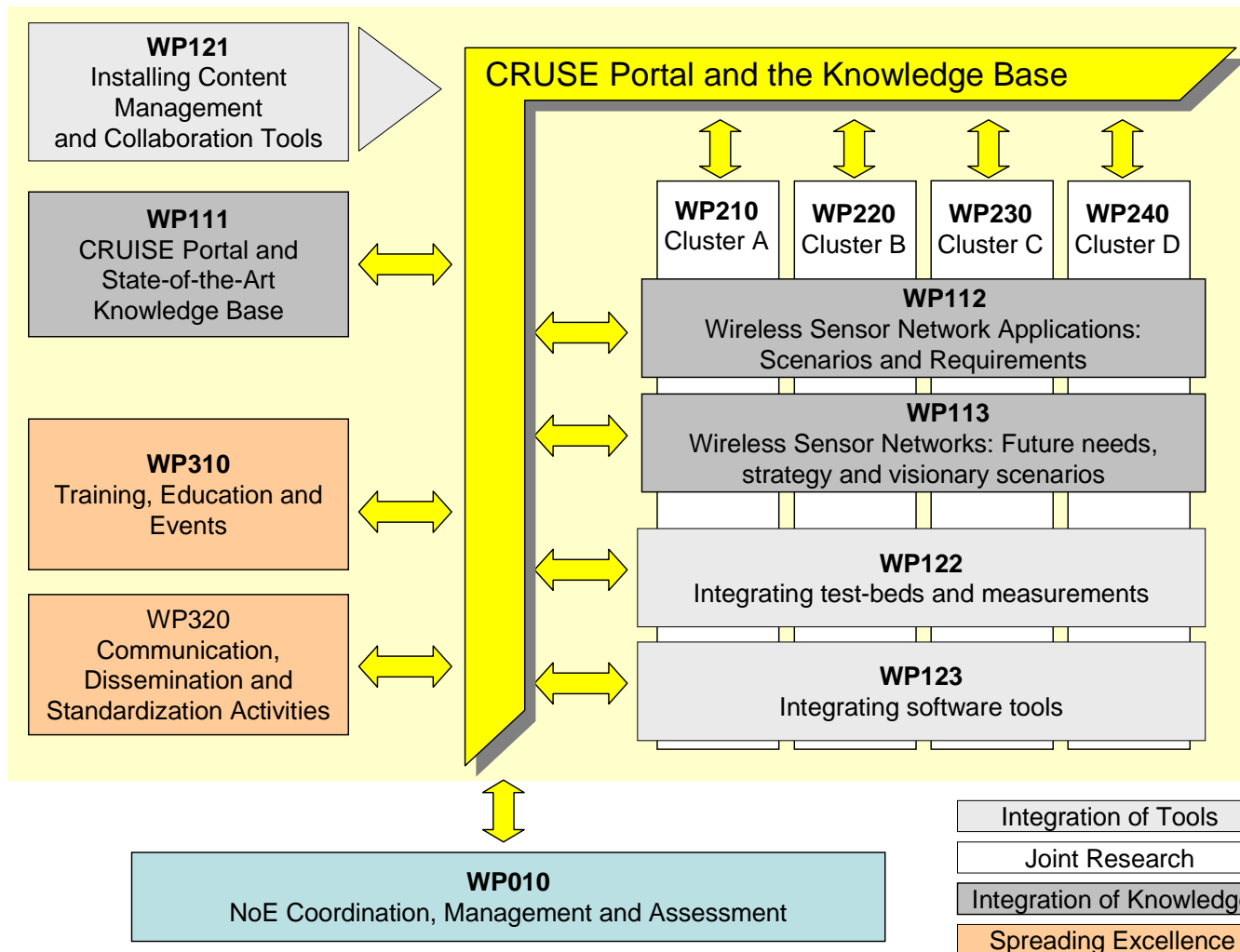
- ◆ To address current weakness and fragmentation in this field in Europe
- ◆ To bring and outline the benefits of sensor networks closer to the European society
 - Awareness of the immense benefits of wireless sensor networks is still low in Europe.

Why NOW?

- ◆ Research activities on wireless sensor networks at the national and European level are gaining momentum
 - Coordination is necessary
 - Europe should gain leadership

- ◆ **Make a significant contribution to **coordination** and **effectiveness of research****
 - Evaluate, update and communicate the State-of-the-Art in wireless sensor networking to the technical community.
 - Distil a path from current technological status to a long term vision by defining the intermediate steps in a vision-based roadmap.
- ◆ **Stimulate **exchange of researchers** and keep them informed of the needs of both industry and research**
- ◆ **Foster **integration and sharing of test beds** and research tools in more effective ways**
- ◆ **Organize and participate in events which promote research on sensor networking and the integration of different European research initiatives**

- **Integration of Knowledge**
- **Integration of Tools**
- **Joint Research**
- **Spreading of Excellence**



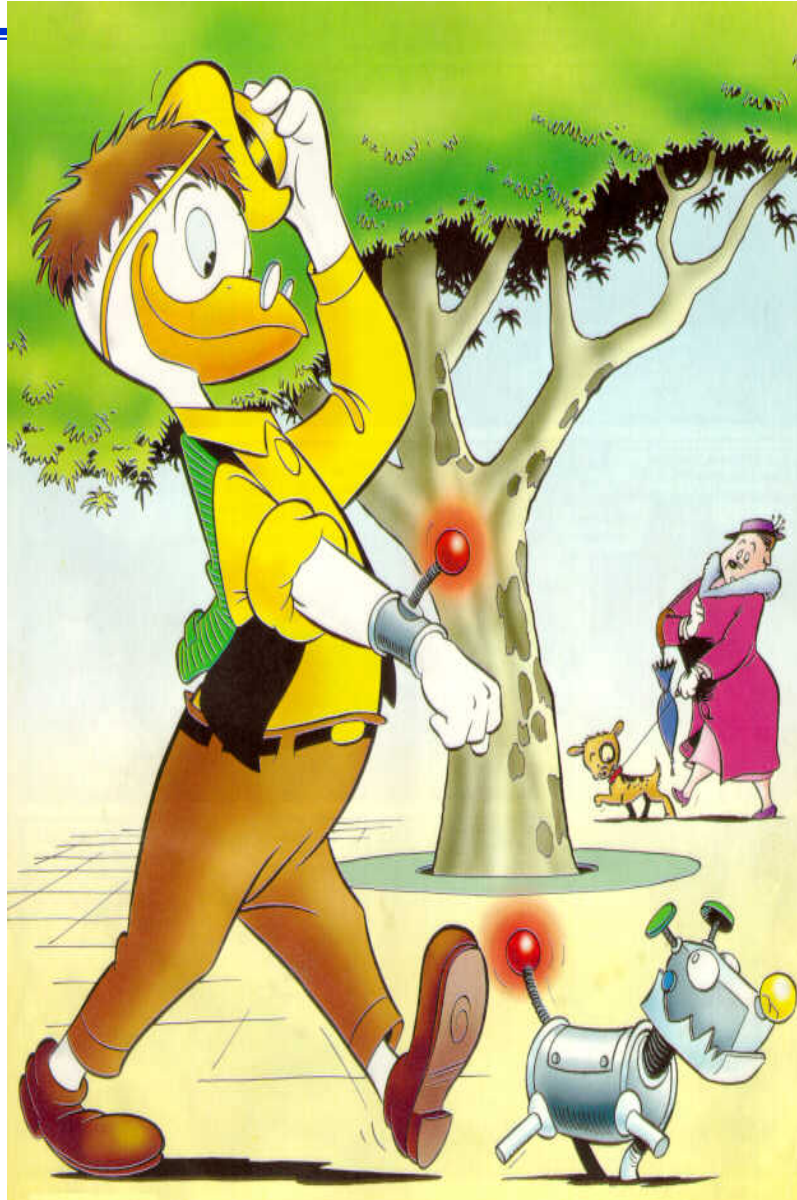
**Cluster A –
Architecture and
Topology**

**Cluster B –
Protocols and
data aggregation**

**Cluster C –
Security and
Mobility**

**Cluster D -
Transmission**

Thank You



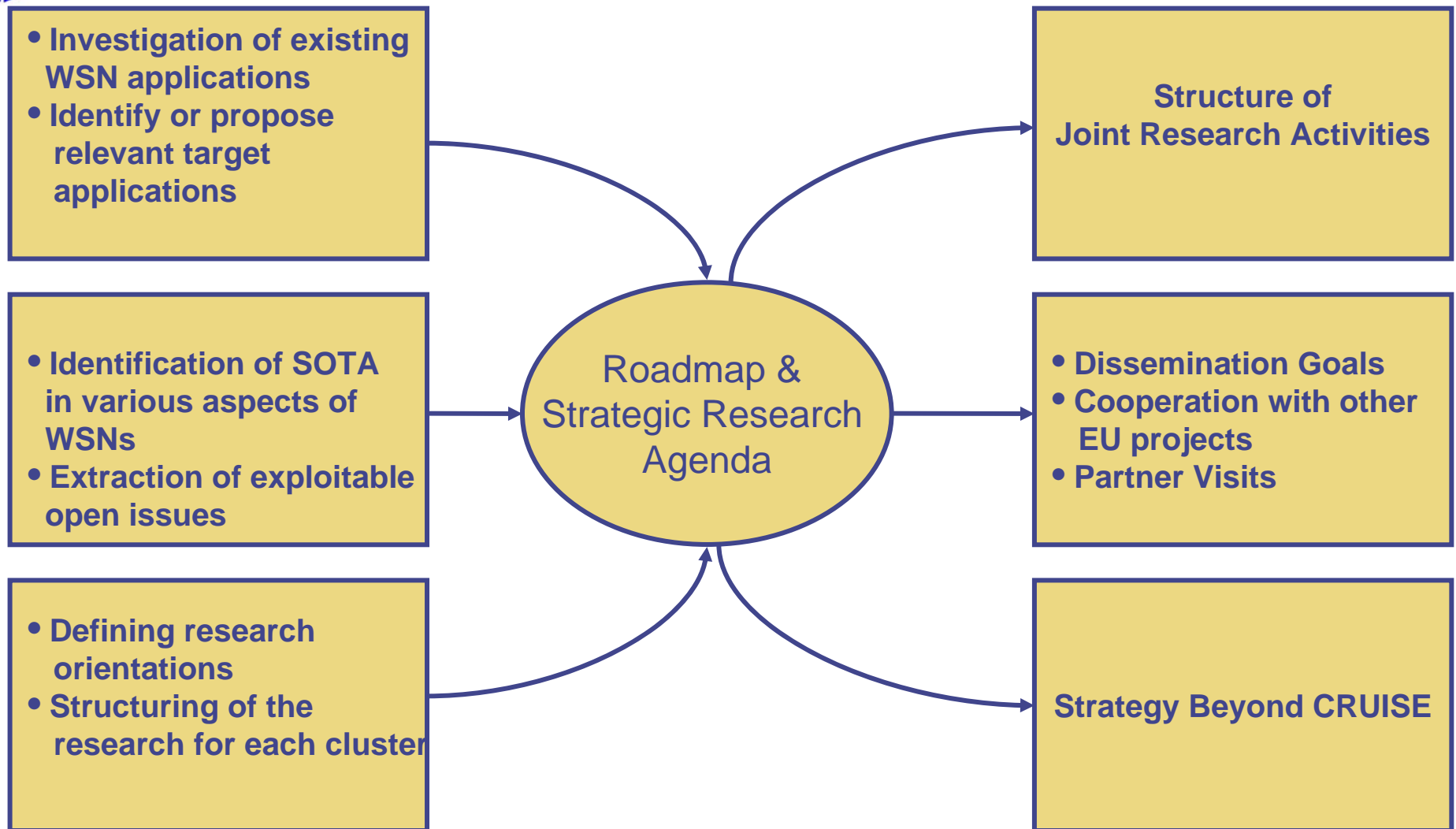
Integration of Knowledge

- Forest Fire Detection
- Flood Detection
- Monitoring Biodiversity
- Habitat Monitoring
- Smart Homes
- Target Tracking
- Environmental Protection
- Warehouse Tracking
- Structural Integrity Monitoring



Sensor Networks Roadmap & Strategic Research Agenda

- ◆ **Provide** a comprehensive strategic agenda for research orientations within the scope of CRUISE
- ◆ **Clearly identify** the SOTA and research trends in existing sensor networks research
- ◆ **Incorporate** the identified open issues in joint/integrated research activities among the partners
- ◆ **Promote** *research collaboration* within Europe and layout an effective roadmap for enabling sensor networks beyond CRUISE



Integration of Tools

Knowledge Management Tools

- ◆ To define the requirements and implement a knowledge management tool (so called VirtualOffice) where all the network activities, meetings, documents and roadmap will be published
- ◆ Integrate eLearning capability

Platforms, test beds measurements

- **Compare** the platforms used within the consortium
- **Integrate** and open existing test beds within the NoE in order to stage joint experiments.
- **Perform** measurement scenarios of common interest according to the plan



Software tools for modeling, design and simulation

- To identify existing software tools for modeling, design and simulation of sensor networks
- To provide guidelines for programming procedures and documentation in order to facilitate integration of modules within partners
- To develop and integrate research and teaching software modules to be shared among NoE partners

Joint Research

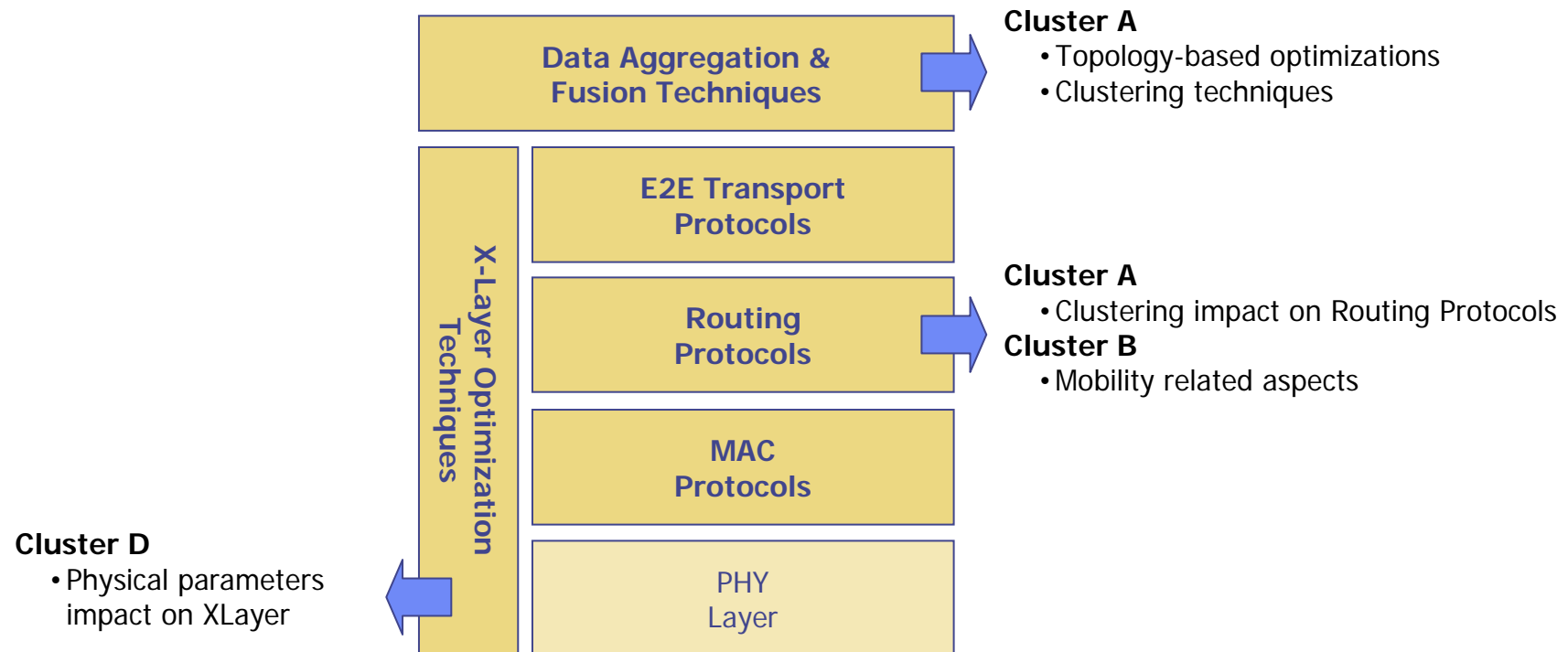
◆ Sensor Network Architecture

- Wireless Hybrid Networks
- Performance Analysis of Convergent Hierarchical Wireless Networks from WLANs to Sensor Networks
- Sensor Node Architecture with Middleware and Service Layers
- Fundamental issues and tradeoffs in wireless sensor networks

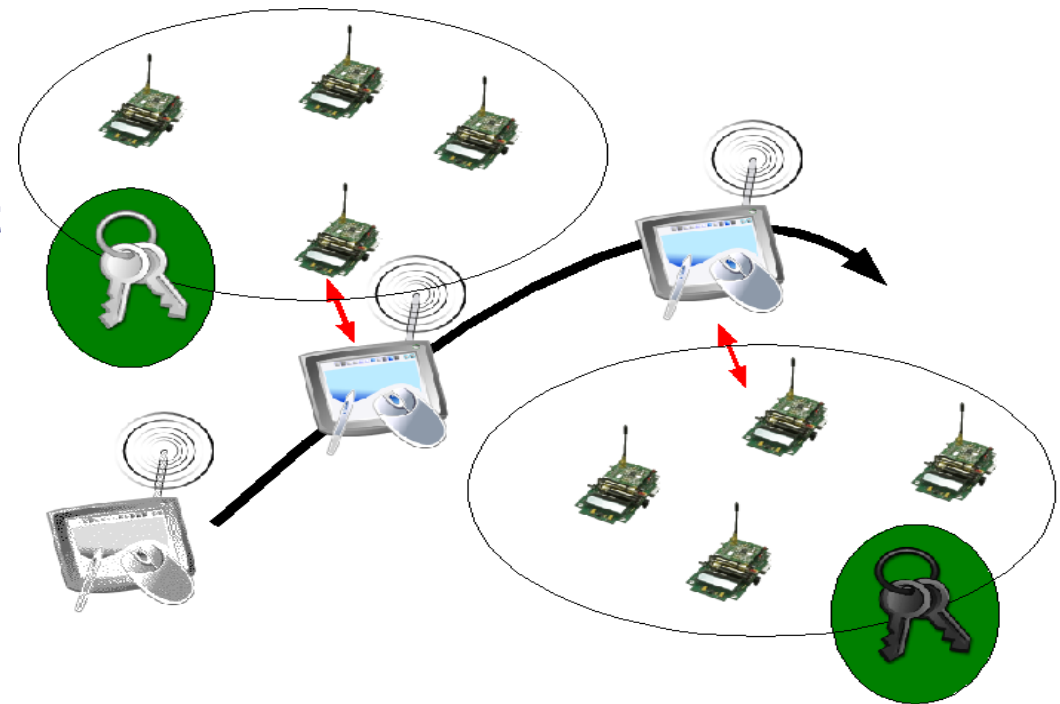
◆ Sensor Networks Topology Control

- Topology - aware routing
- Clustering creation and management

- ◆ All aspects related with the protocol stack of WSN, except the PHY Layer (which is analyzed in Cluster D)
- ◆ Data aggregation and Fusion strategies



- ◆ **Secure Mobility - Authentication and Key Management**
- ◆ **Modeling and detection of misbehavior in sensor networks**
- ◆ **Privacy protection and secure profile management**



- **Mobility models for predefined scenarios (environmental monitoring and road traffic monitoring)**
 - Explore different mobility classes
 - how this mobility models can be applied under simulation for the pre-defined scenarios
 - explore and compare path planning algorithms for improving area coverage and for data collection under the different mobility models
- **MAC and Routing optimization under the different mobility classes and models**
 - Explore new algorithms to predict the potential topology changes based on mobility models
 - Explore "clever" mobility-aware scheme in IEEE 802.15.4 for contention channel access/GTS slots assignment.
 - investigate routing protocols in hybrid sensor networks with stationary and mobile nodes
- **Mobility aspects and cross-layer design for WSNs**
 - study the effects of mobility (with different mobility models), under delay, capacity (throughput) and coverage aspects, taking into account the realistic constraints (energy, CPU and memory)

- **Enhance transmission power efficiency through cooperative diversity**
 - **Both macro-diversity and micro-diversity**
- **Enhance bandwidth efficiency through cooperative MIMO transmissions**
- ***Distributed sensing, source coding and joint source-channel coding***
- ***RF and propagation issues***

Spreading of Excellence

- Training, Education and Events
- Communication, Dissemination and Standardization Activities

Thank You

