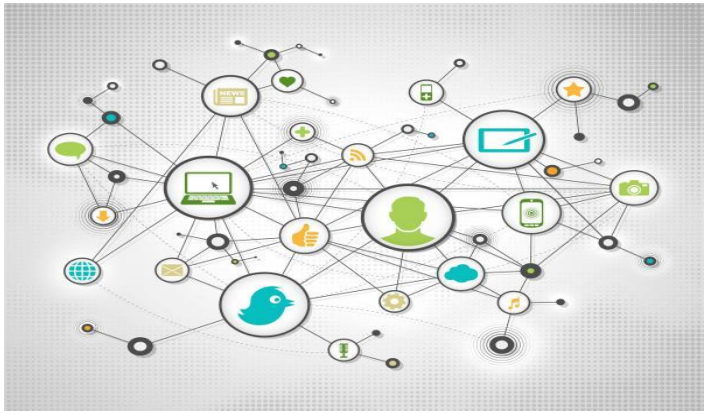

Internet de las Cosas aplicadas a Smart Agriculture

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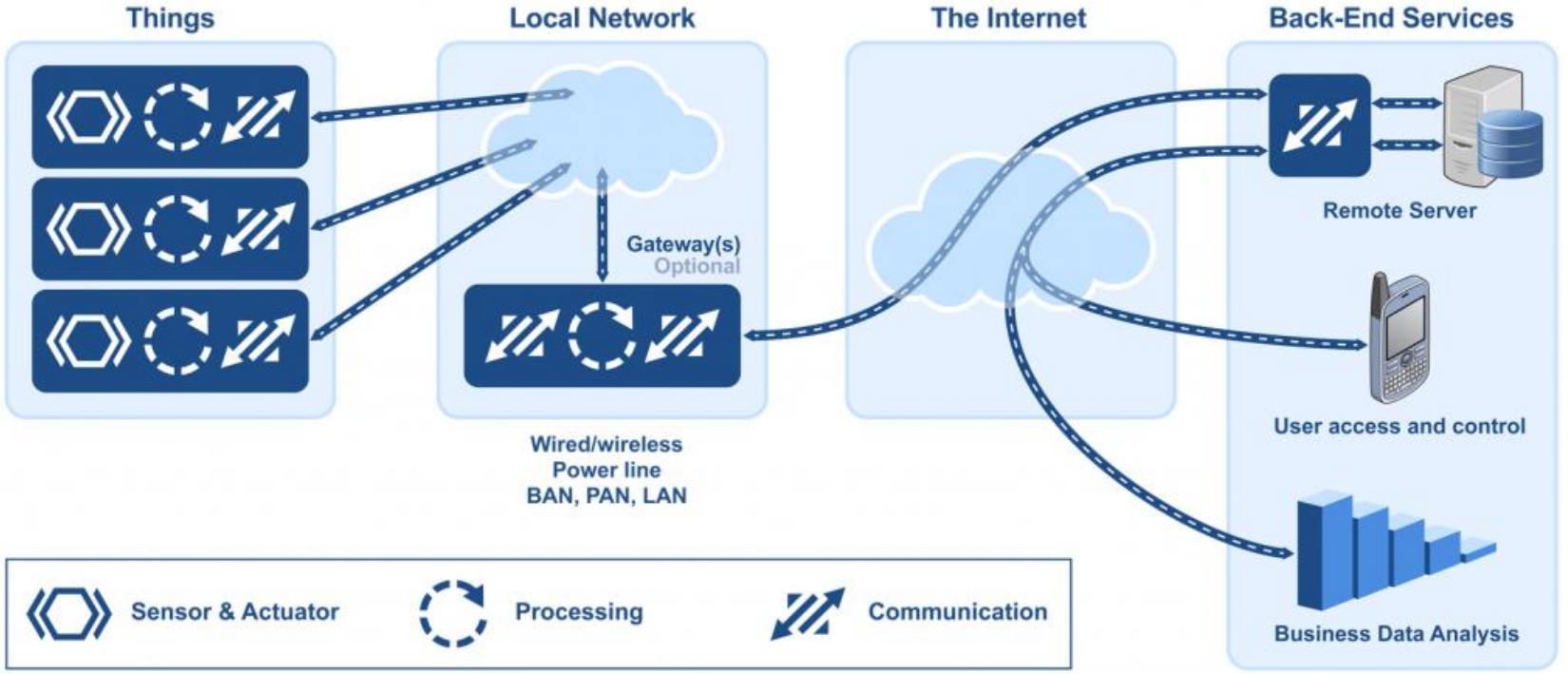
SPAIN

Introduction

- *“The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data”*



‘Smart’ solutions are instrumented, interconnected and intelligent

Instrumented + **Interconnected** + **Intelligent**

Event capture and filtering for timely response

Any to any linkage of people, process, and systems

Deep discovery, analysis and forecasting

= 

Now, what's up?

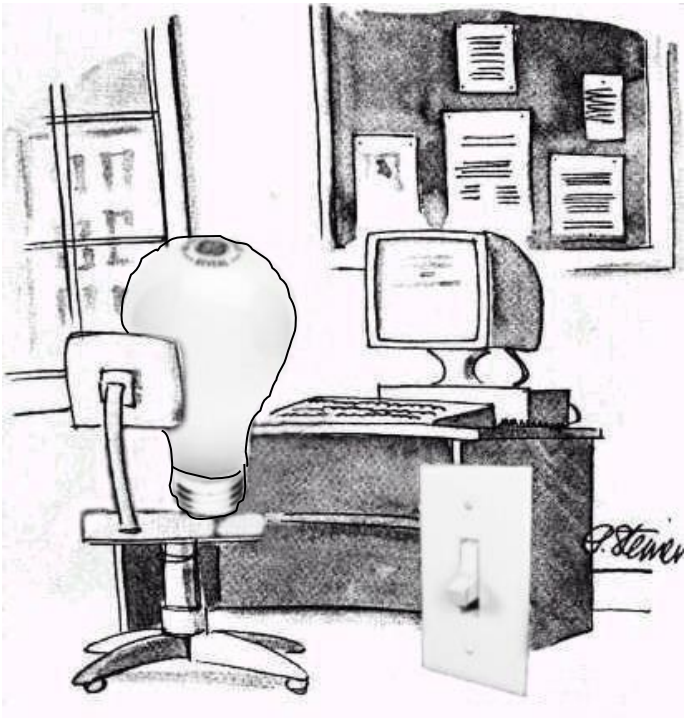
Internet-1

Internet-2

Internet-~~3~~

0

Internet-0: the Internet of Things



Borrowed from N. Gershenfeld

ON THE INTERNET NOBODY KNOWS YOU'RE A LIGHT BULB!

Changing Farm Environment

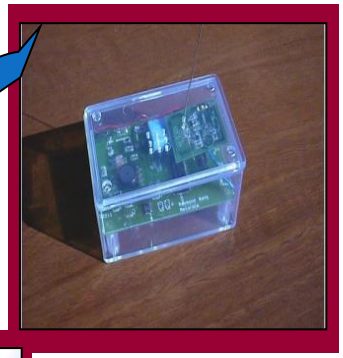
- Merging and Consolidatiion
  - Run by corporations instead of families
  - Larger areas per farm
- Increasing Global Competition
  - Proifits from crop quality as well as quantity
  - Costs and productivity improvement
    - More sophysticated machinery and equipment per farmer
  - Sustainable growth
- Increasing Environmental Concerns
  - Land and environment conservation
  - Polution reduction
  - Natural disaster damage control

Evolving Farming Technology

Today	Tomorrow
Electrical and mechanical	Information
Hardware oriented	Software oriented
Manual and on-site control	Automatic and remote control
Independent dumb machines	Networked smart machines
User and environment demanding	User and environment friendly
Unpredictable quality and quantity	Predictable in quality and quantity

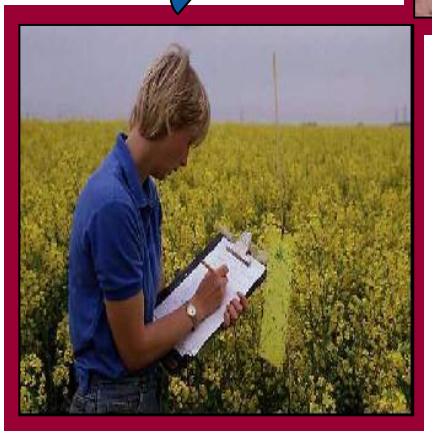
Precision Agriculture is an environment friendly system solution that optimizes product quality and quantity while minimising cost, human intervention and the variation caused by unpredictable nature.

Precision Agriculture Solutions



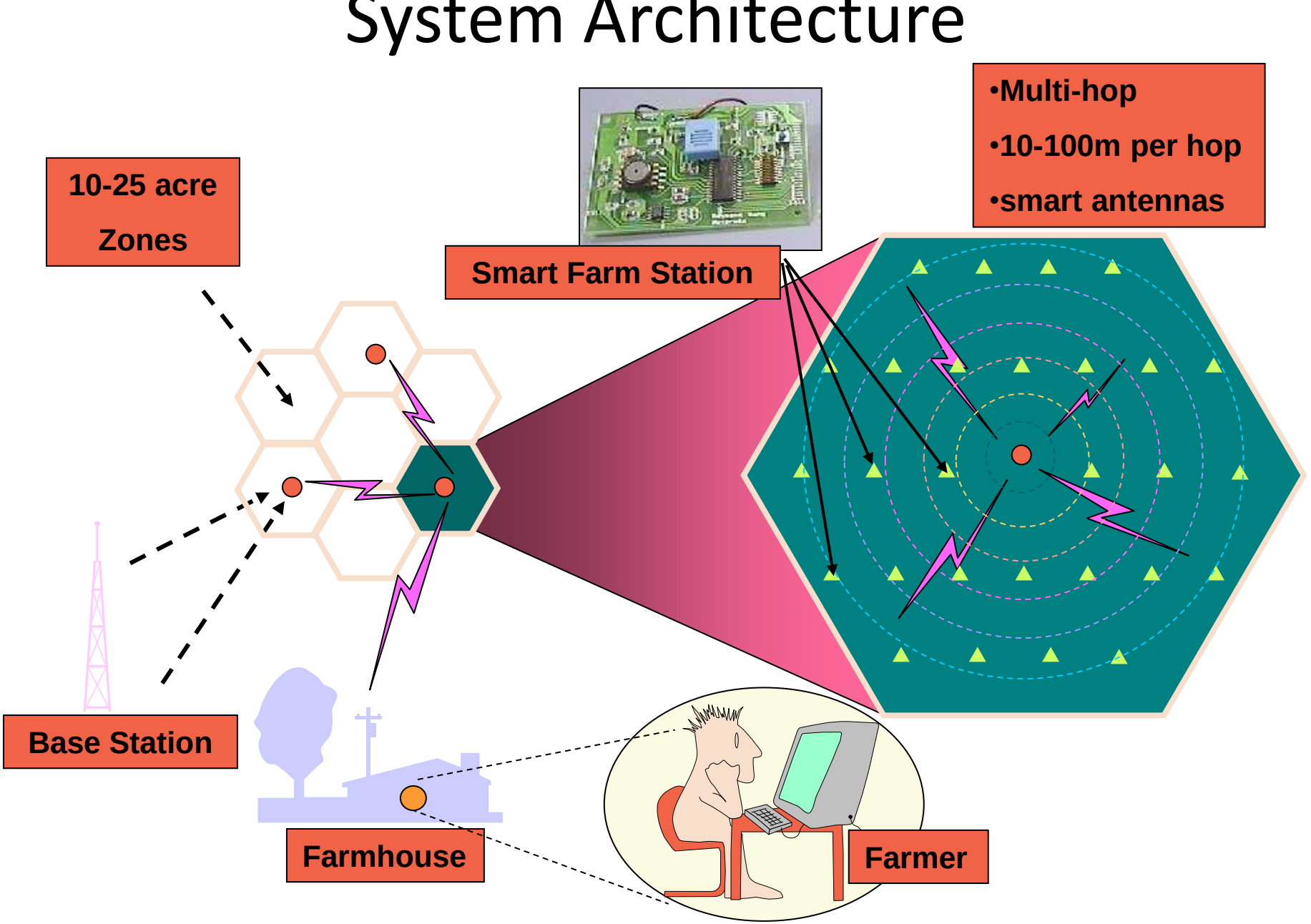
- Wireless integrated
- Zero configuration
- Location awareness

- Wired, Bulky
- User demanding



- Manual
- Unreliable

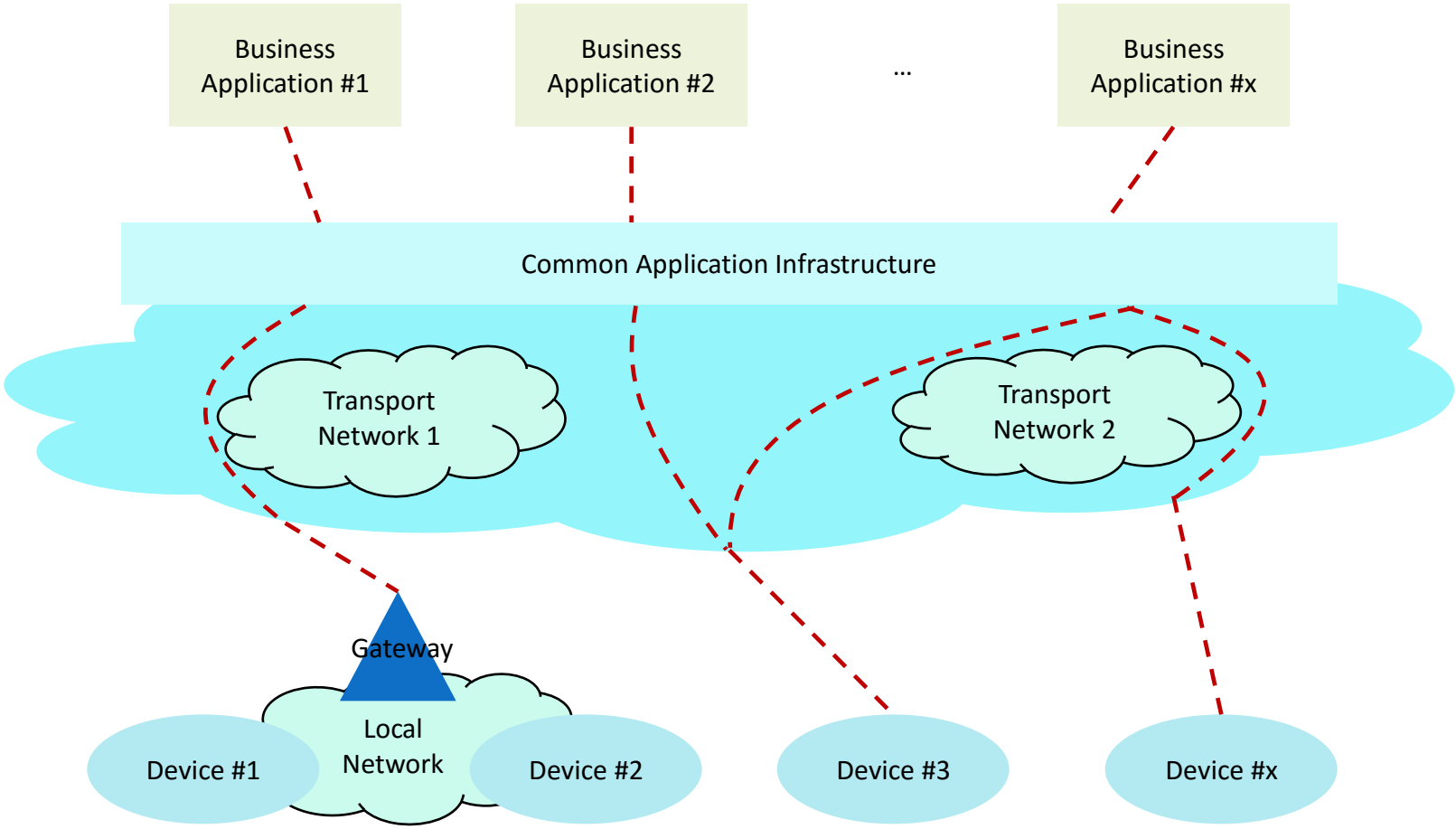
System Architecture

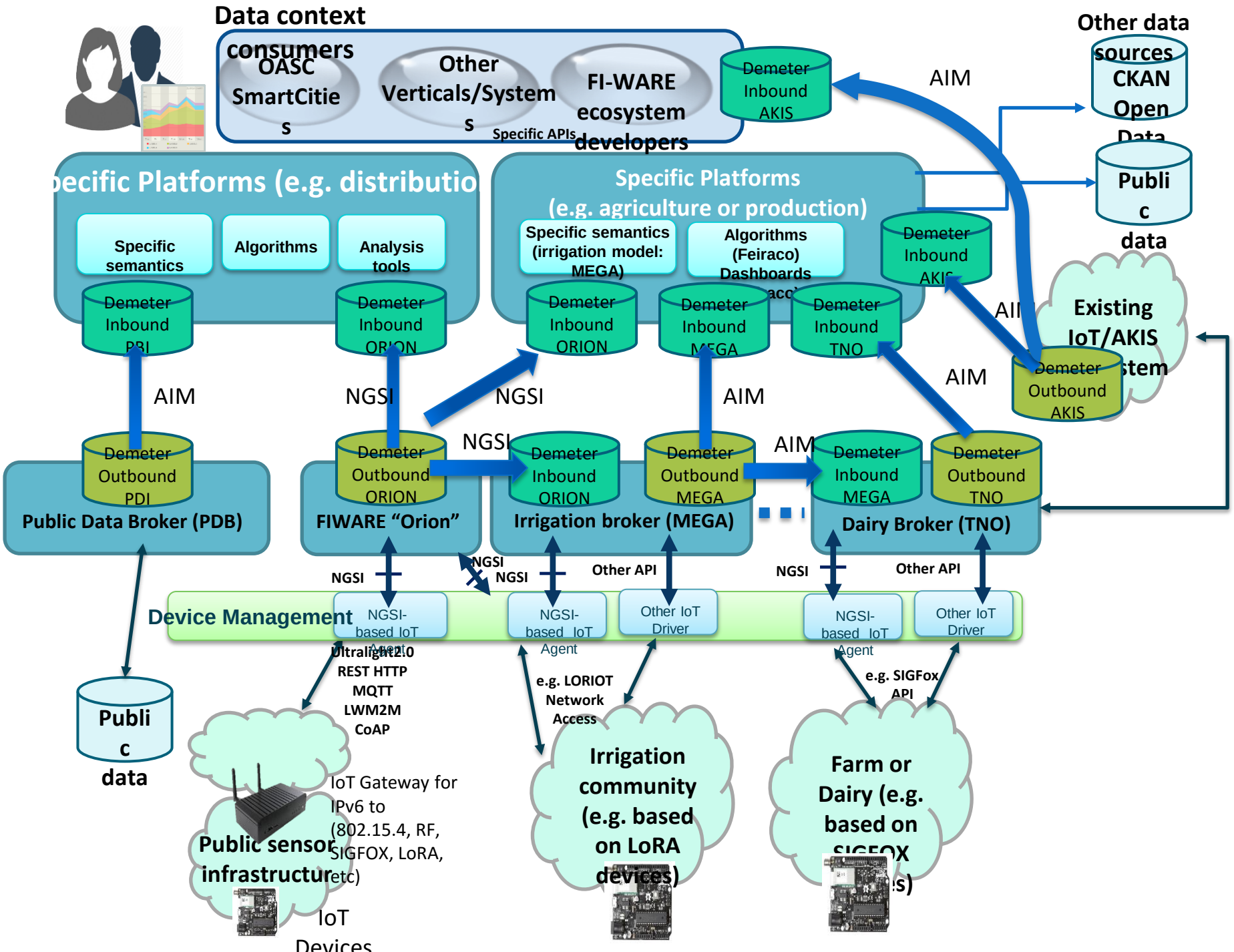


System Requirements

- Low-cost, low-power, small size networking devices
  - unliscenced band
  - short distance per hop
  - low date rate
    - Sensor information data < 50 bps/zone
  - low mobility
- Long Battery life (> 8 months)
- Robust to environment variation
  - temperature, humidity, rain, wind, growing plants
- User friendly
  - Minimal network set-up and configuration
  - Minimal network management

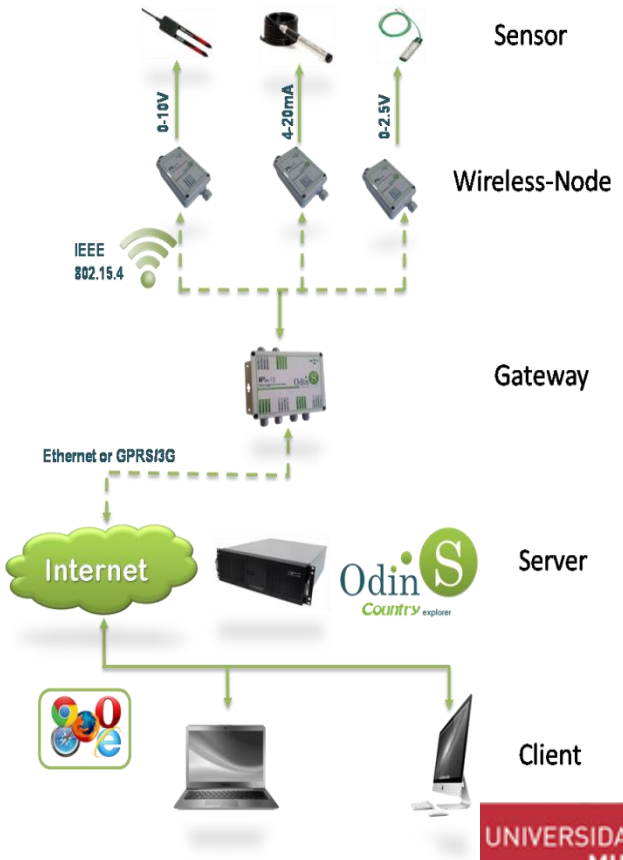
IoT architecture

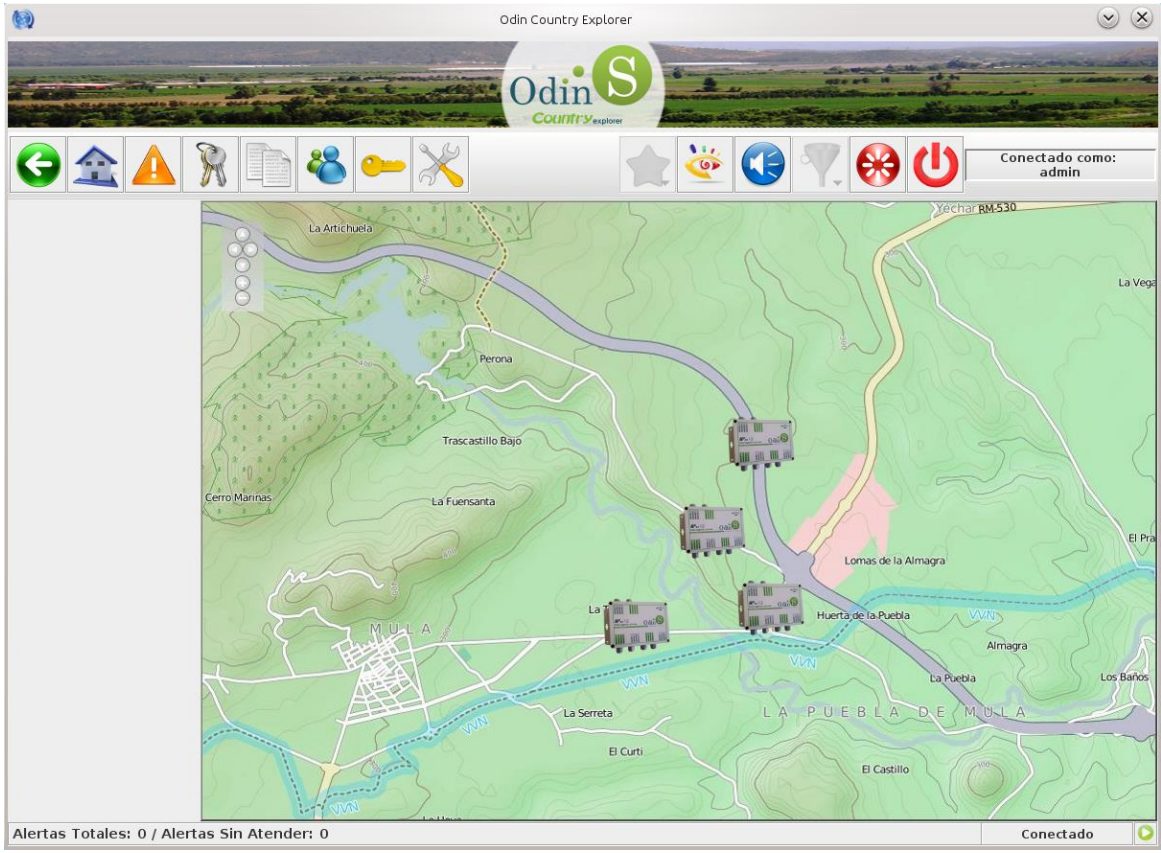



Data context consumers
OASC SmartCities
Other Verticals/Systems
FI-WARE ecosystem developers
Specific APIs
Demeter Inbound AKIS
AIM
Other data sources
CKAN Open Data
Public data
Specific Platforms (e.g. distributio
Specific Platforms (e.g. agriculture or production)
Specific semantics
Algorithms
Analysis tools
Specific semantics (irrigation model: MEGA)
Algorithms (Feiraco) Dashboards
Demeter Inbound PBI
Demeter Inbound ORION
Demeter Inbound ORION
Demeter Inbound MEGA
Demeter Inbound TNO
Demeter Inbound AKIS
Existing IoT/AKIS stem
Demeter Outbound AKIS
AIM
NGSI
NGSI
NGSI
AIM
AIM
Demeter Outbound PDI
Demeter Outbound ORION
Demeter Inbound ORION
Demeter Outbound MEGA
Demeter Inbound MEGA
Demeter Outbound TNO
Public Data Broker (PDB)
FIWARE "Orion"
Irrigation broker (MEGA)
Dairy Broker (TNO)
NGSI
NGSI
NGSI
Other API
NGSI
Other API
Device Management
NGSI-based IoT Agent
NGSI-based IoT Agent
Other IoT Driver
NGSI-based IoT Agent
Other IoT Driver
Ultralight2.0
REST HTTP
MQTT
LWM2M
CoAP
e.g. LORIOT Network Access
e.g. SIGFox API
Public data
IoT Gateway for IPv6 to (802.15.4, RF, SIGFOX, LoRA, etc)
Public sensor infrastructur
Irrigation community (e.g. based on LoRA devices)
Farm or Dairy (e.g. based on SIGFOX
IoT Devices

Country explorer

- ✓ Monitoring of crops
- ✓ Irrigation





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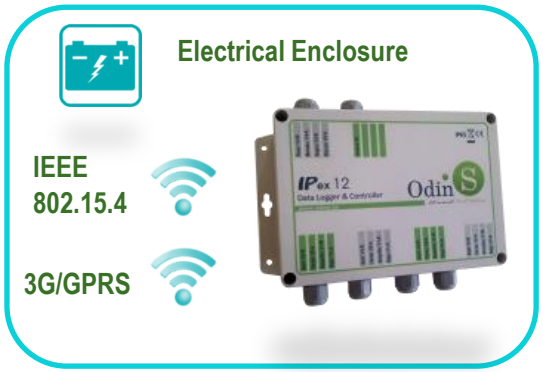
Country explorer

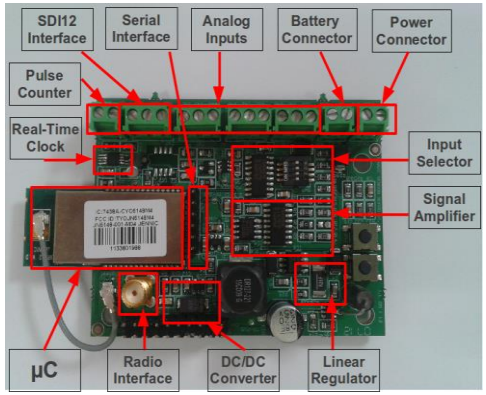


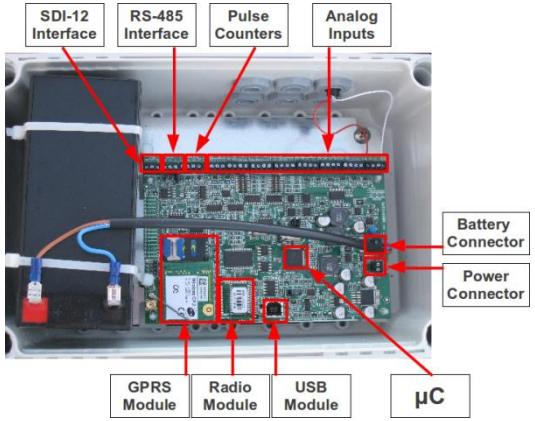
measuring air/soil/water temperatures

dielectric constant of the soil

Soil parameters

Water tension





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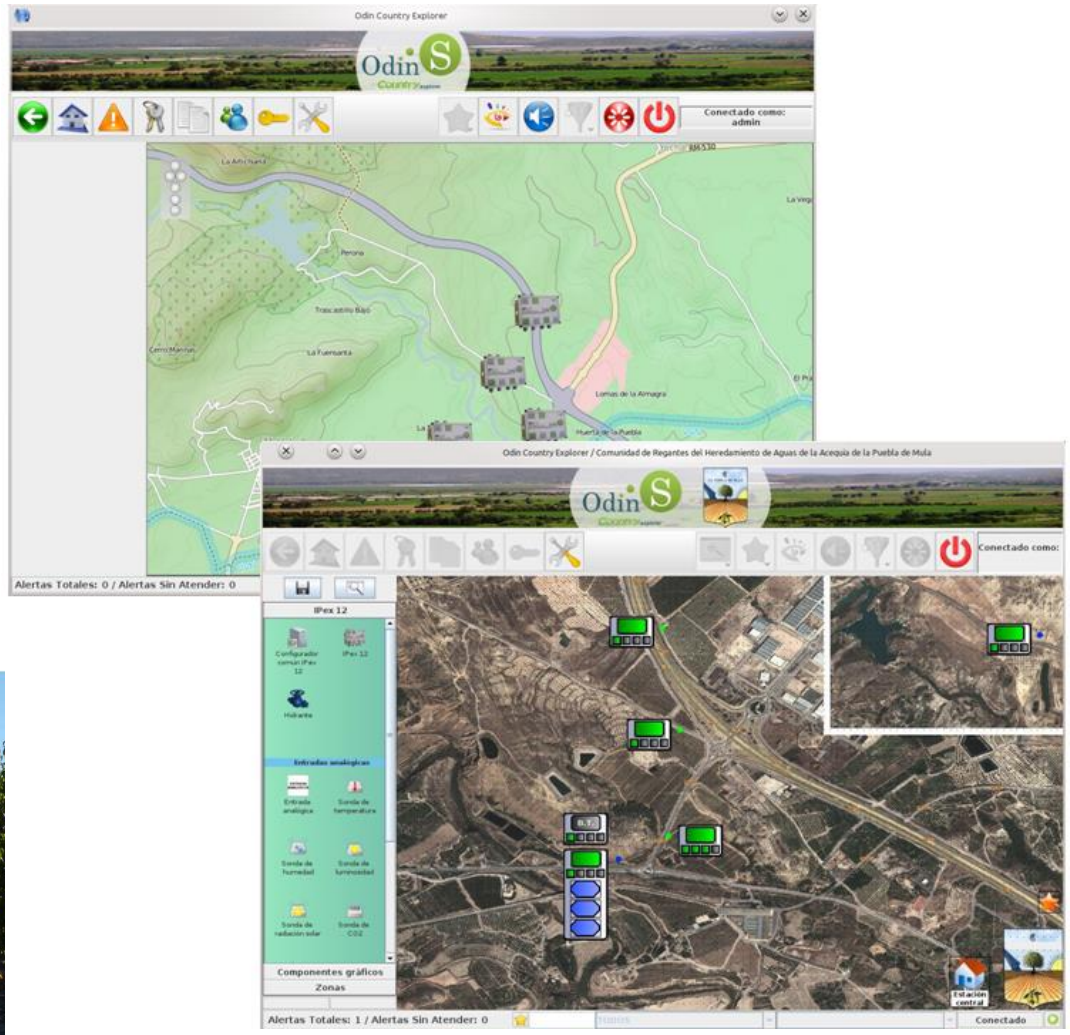
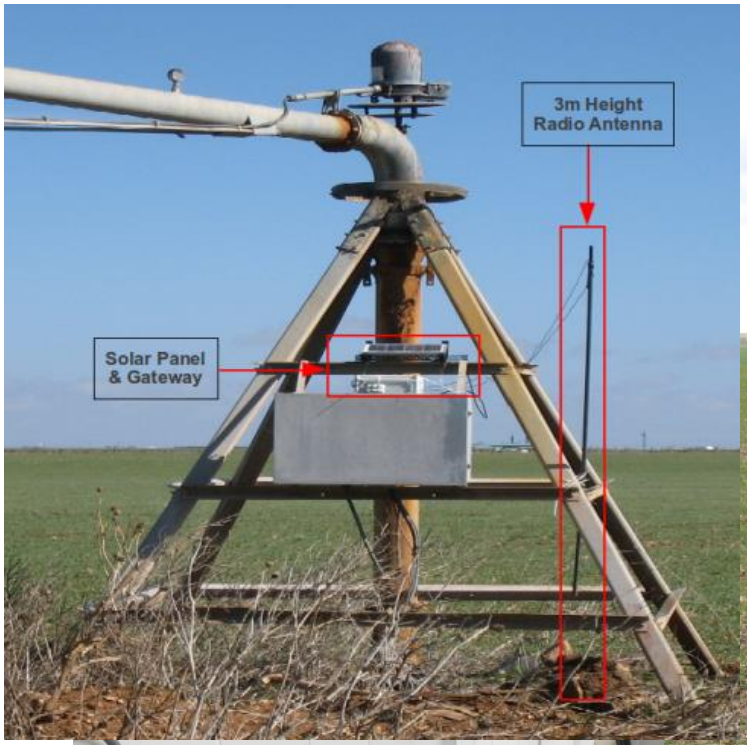
Irrigation Management and remote Monitoring

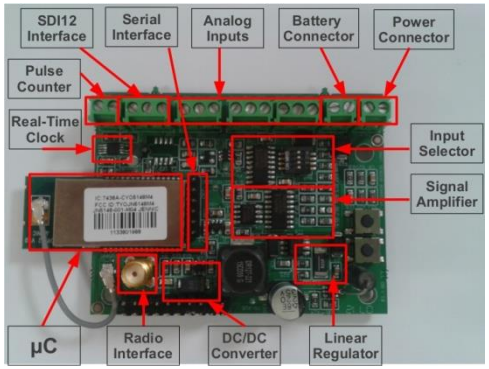
- ✓ Define periods and time of crops irrigation
- ✓ Incident Alerts
- ✓ Remote management of valves and infield devices
- ✓ Remote Water consumption counters
- ✓ Management of irrigation community

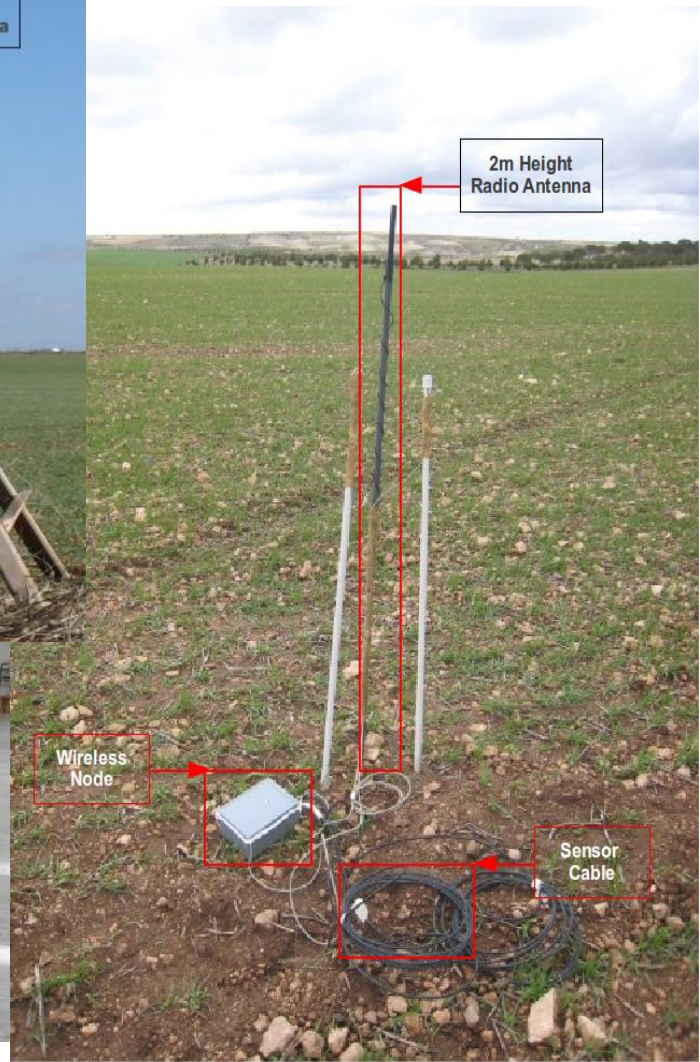


Remote control of soils for fertilization optimization and hydric fingerprint

- ✓ Salinity, humidity and conductivity measurement
- ✓ Mesh network of sensors
- ✓ Decision making tools for irrigation and fertilization

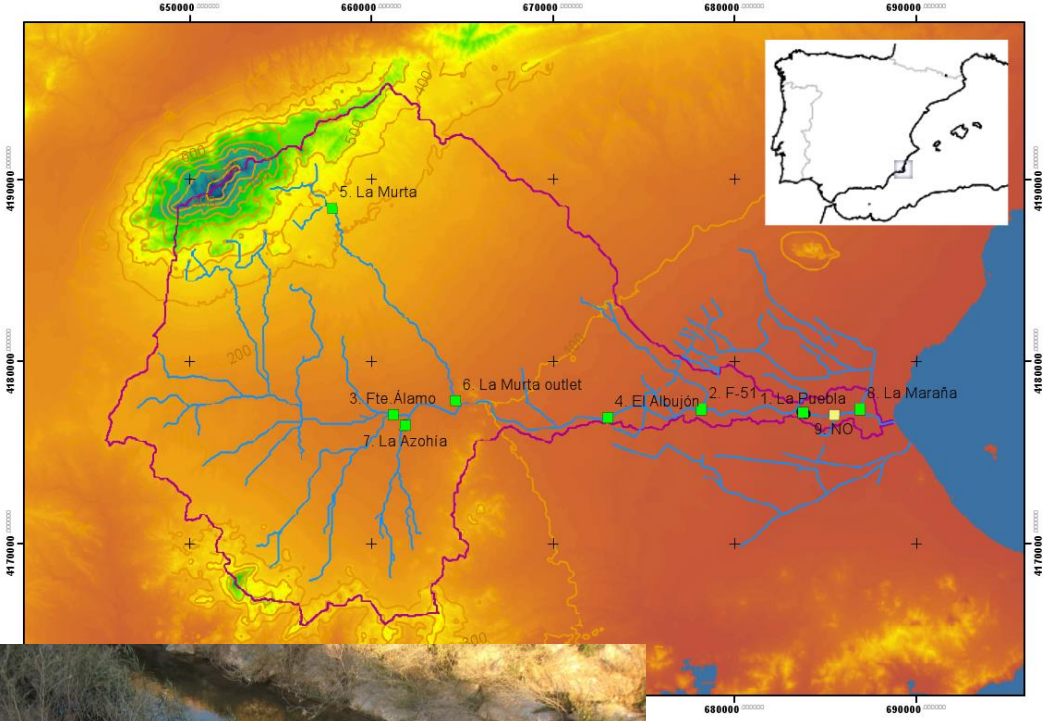




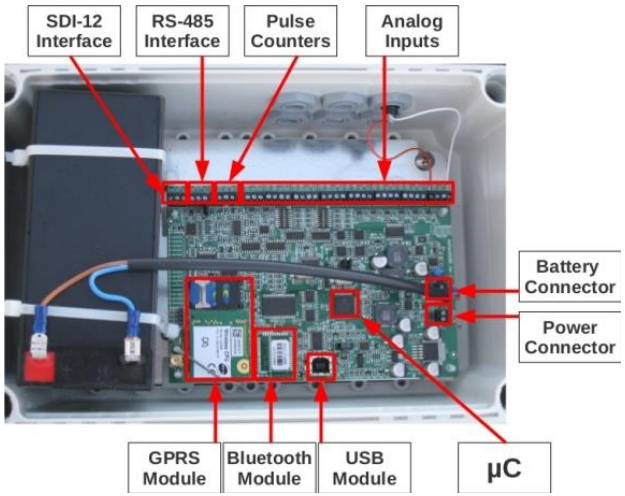


Floods monitorization and emergency alerts

- ✓ Water level monitoring in wells and basins.
- ✓ Water level and speed monitoring
- ✓ Data analytics
- ✓ Predicción de emergencias
- ✓ Civil protection alerts



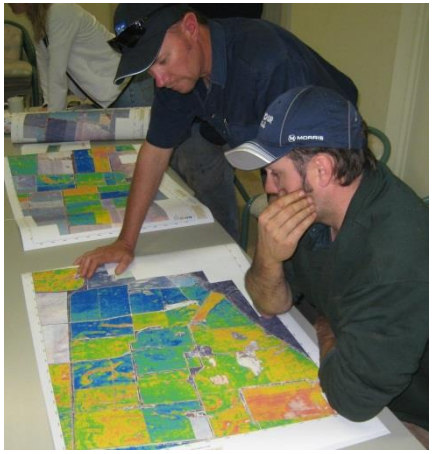
D50. Zone 30N



Agriculture control systems

- ✓ Irrigation control systems:
- ✓ Greenhouse
- ✓ Datalogger

SMART Farming



- Machine GPS guidance
- Information Rich
- Precise input placement
- Consistent spatial footprint
- Accurate field operations mapping
- Max production with less inputs
- Economic, Environmental, Social