A GRID of sensors

Instruments on the GRID

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What is the Problem?

- Grid enables the virtualization of resources... computational and storing

- Instruments provide the raw data to develop and verify scientific theories.

- Point where data is collected and where scientists use the data

Is the GRID ready?

- Not completely

- Instruments are not a simple resource to implement

- Some efforts in the last years

The Instrument problem

- Integrate a network of sensors/instruments

  - broadly applicable architecture for MW in a variety of settings

  - many control SW and systems (embedded)

 - different rates of data production

The Instrument problem

- Aggregation (e.g. seismic array)

- RT fusion of heterogeneous info: one instrument reading

- Specialized instrument resources: unique constructions

A grid of sensors or sensors in the Grid

- Easy to create a Grid of homogeneous objects however....

- Support for storing and computing:

  - pipelined or workflow oriented data reduction and analysis

- We need/want integrated environment

What does exists?

NESSgrid
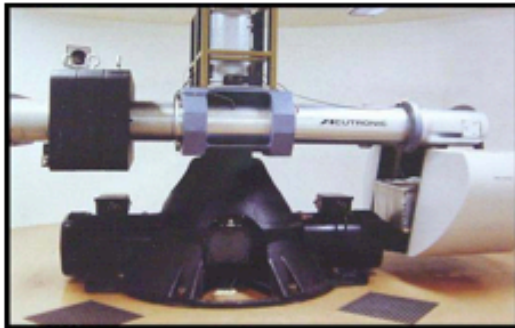
Common Instrument MW Architecture

- create middleware set for instrument and sensors

- based on WSDL, SOAP, XML etc.

- GOAL: MW that abstracts and layers functionalities

Ecological sensors

- With Long-Term Ecological Research (LTER) Lake Metabolism and coral reef monitoring groups
- Objectives:
  - Installable code for signal processing and data validation (QC)
  - Leveraging instrument description to build database tables, acquisition scripts, and user interfaces
  - Integration with Antelope ring buffer (CIMA Field Interface Module)
  - Reliability: Interface for diagnostics and maintenance.
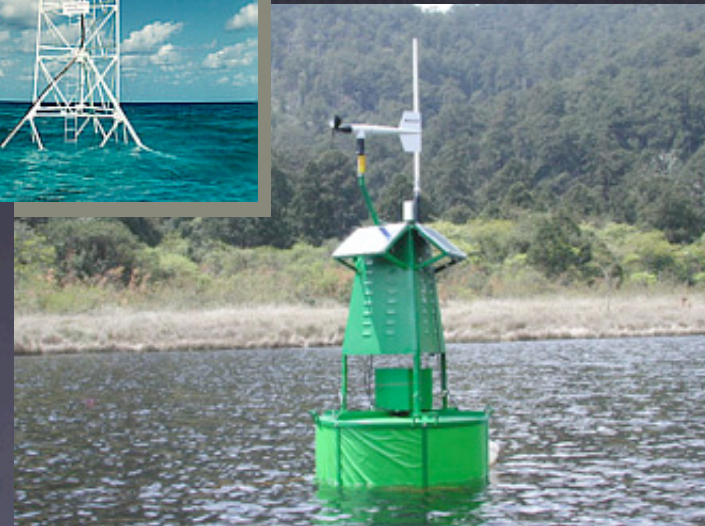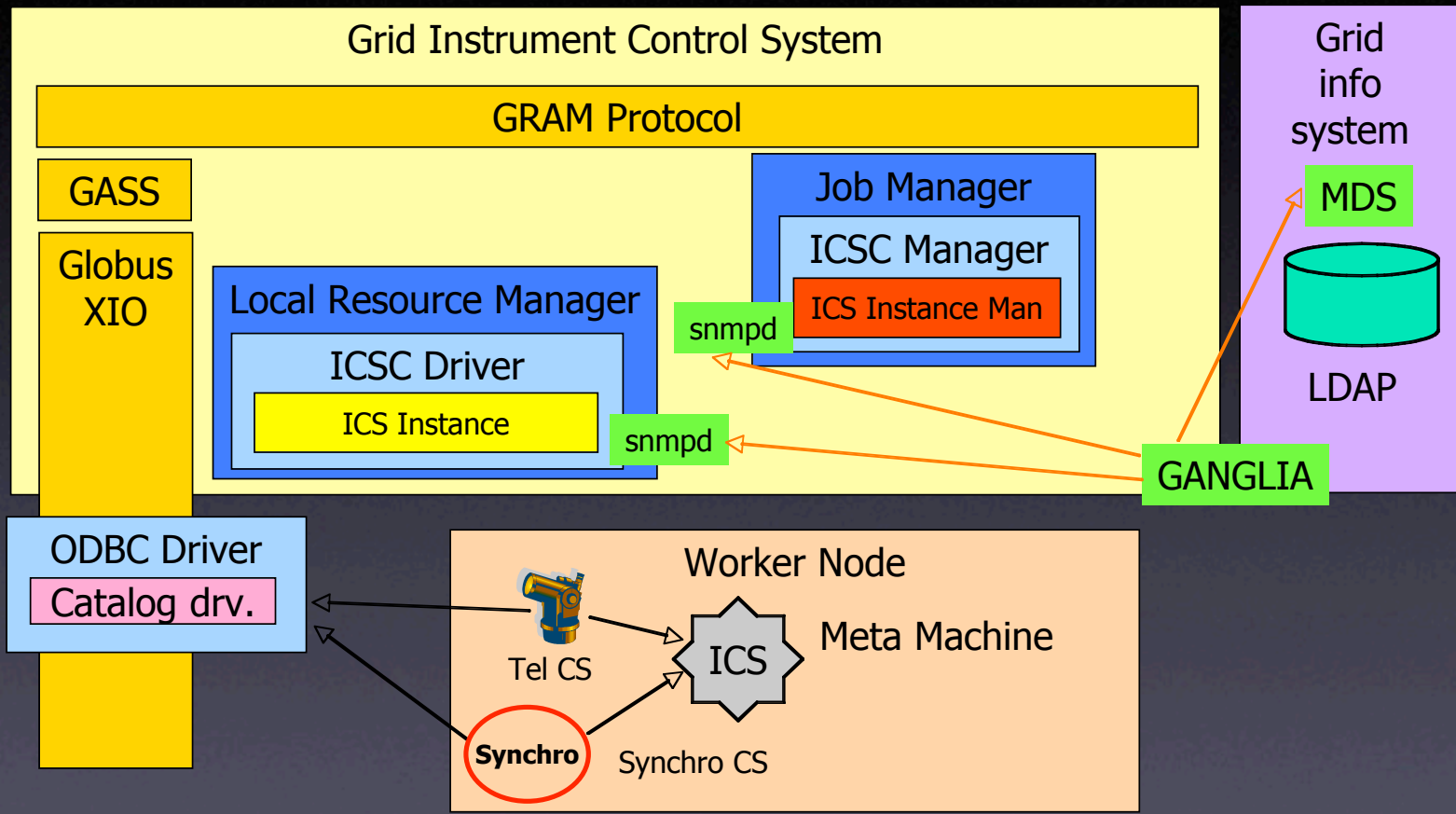
GRIDCC

- ELETTRA synchrotron

- Access to the instruments will be via an interface to a Virtual Instrument Grid Service (VIGS).

- VIGS are a new concept and their design

- WS based

Instrument@INAF

- GRID.IT project: monitor and control a network of small telescopes

- develop a MW on LCG/EGEE to abstract the resource

- Representation of instrument based on well grounded ontology

The Instrument Element

- New fabric element for the GRID

- ICSP: a ICS Protocol to make IEs and ICSs able to communicate each other

- ICSL: a ICS Language used by IEs to speak with ICSs according to protocol ICSP

- ICSC: an Instrument Control System Connector, a driver able to speak ICSL and understand ICSP-compliant requests mapping them in requests to the specific ICS sitting behind it answer to these requests
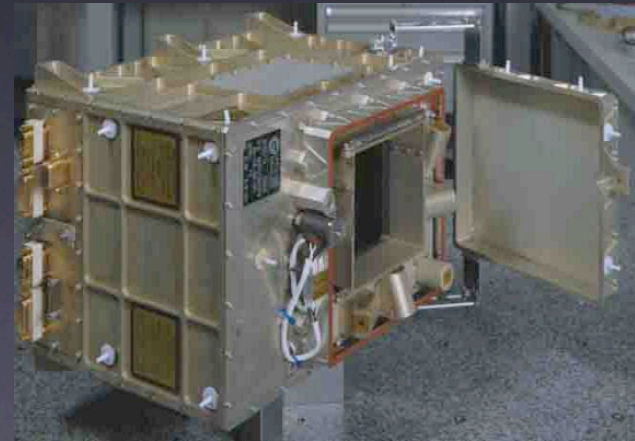
Telescopes as testbed

- Monitoring resources trough GRIS

- Integrated in the GRID

- Controlling in QRT environment

- Not based on WS (but we can)

Pollution Detection Sensors Network

- Grain impact analyzer and dust accumulator (GIADA INAF - oana)

- Spettrographer (ELETTRA)

Summing up

- New GRID features: the instrument

- Different implementations: WS oriented (GT4 GTCP)

- INAF IE on LCG/EGEE