ALMA Development Workshop

Gothenburg, 26-28 May 2016

Integrated Alarm System for the ALMA Observatory

EU funded *small internal* ALMA development study

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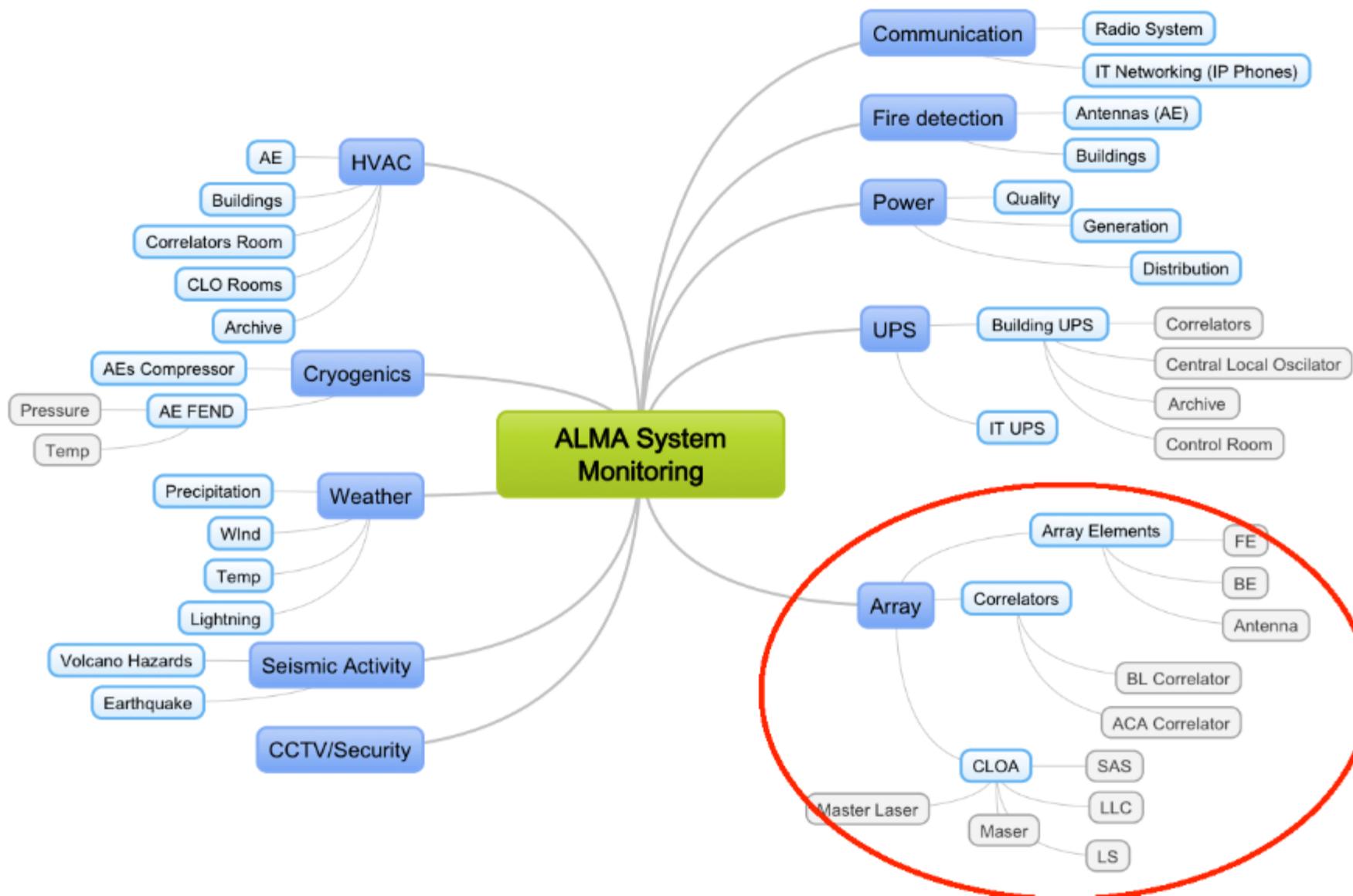ESO ALMA Support Centre - ALMA Computing

Overview

■ Motivation – why do we need this?

■ Approach – doing things the right way

■ Status update – what has happened so far?

■ Next steps – how do we bring this into production?

Motivation

■ ALMA is much more than 66 antennas, a correlator and a database

■ Every component is important and must be monitored centrally 24/7

■ Consistent representation of alarms to avoid misjudgements

■ Increase system stability and hence operational efficiency

Things to be monitored (not complete)

ALMA System Monitoring

- HVAC
  - AE
  - Buildings
  - Correlators Room
  - CLO Rooms
  - Archive
- Cryogenics
  - AEs Compressor
  - AE FEND
    - Pressure
    - Temp
- Weather
  - Precipitation
  - Wind
  - Temp
  - Lightning
- Seismic Activity
  - Volcano Hazards
  - Earthquake
- CCTV/Security

- Communication
  - Radio System
  - IT Networking (IP Phones)
- Fire detection
  - Antennas (AE)
  - Buildings
- Power
  - Quality
  - Generation
  - Distribution
- UPS
  - Building UPS
    - Correlators
    - Central Local Oscilator
    - Archive
    - Control Room
  - IT UPS
- Array
  - Array Elements
    - FE
    - BE
    - Antenna
  - Correlators
    - BL Correlator
    - ACA Correlator
  - CLOA
    - SAS
    - LLC
    - LS
    - Master Laser
    - Maser

L6

What we have today

- The ACS alarm panel (red circle) is the only official source of alarm notifications to the array operators
  - Only tabular representation, no situational awareness
  - Can by design never cover everything
  - Only available when the online software is running
- Many prototype tools to cover the gaps – no consistency
- Many "blind spots"
- A good (bad) chance to miss out on important alarms or react too late

ACS Alarm Panel

OMC

Critical Antenna Devices by AOG

Device Map by OMC+HCI

AOG Alarm Panel

Email Alarm Notification

Approach

■ Small internal study to determine requirements

  ➢ Funds from ESO to cover travel and contracts

  ➢ Collaboration of all ALMA partners

  ➢ Started in October 2015, to be completed in June 2016

Status update

1. Identify all the relevant hardware and software systems. ✔

2. Document the existing alarm systems and available interfaces to access relevant data. ✔

3. Engage an external alarm system expert (ESA) ✔

4. Engage a human-computer interface expert (INRIA) ✔

5. Compile a report to stipulate the requirements for an integrated alarm system. ⌛

6. Write a proposal for the upcoming call for ALMA development projects to design, implement and deploy an integrated alarm system. ✖

Overview of ESA model

Intuitive overview of the monitored information
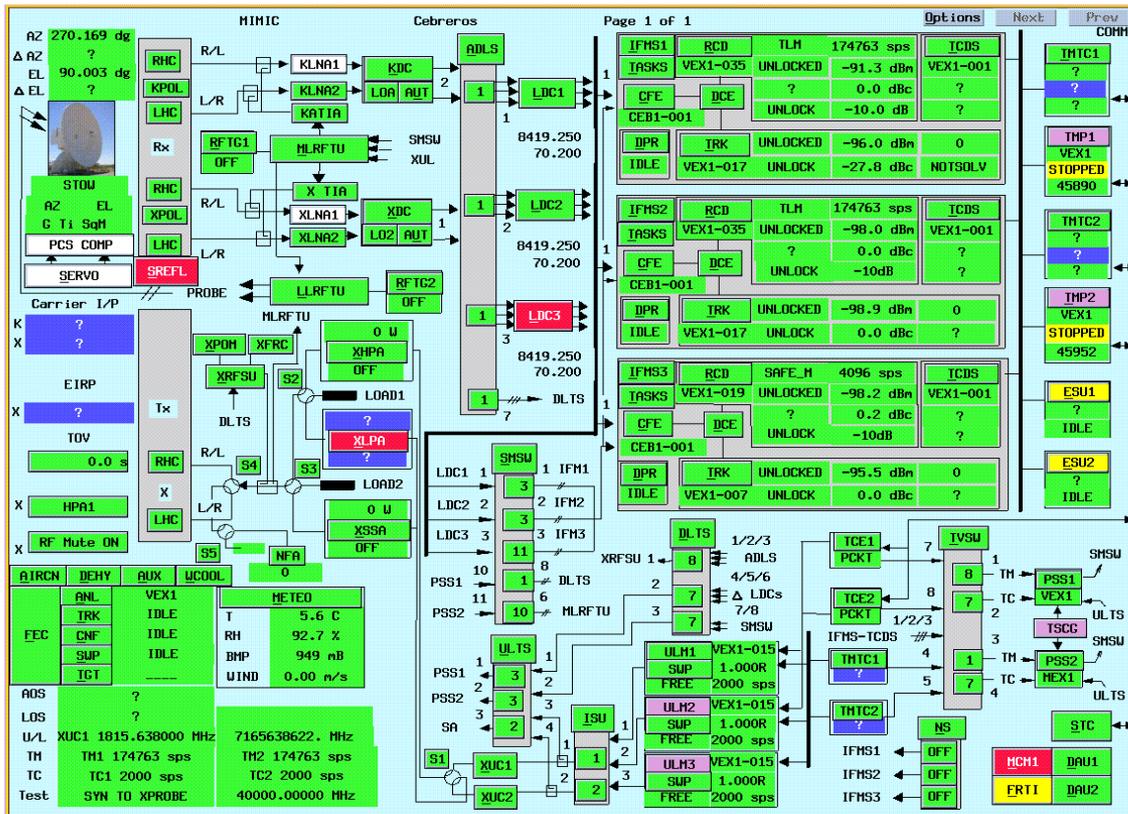
Hierarchical model with alarm propagation
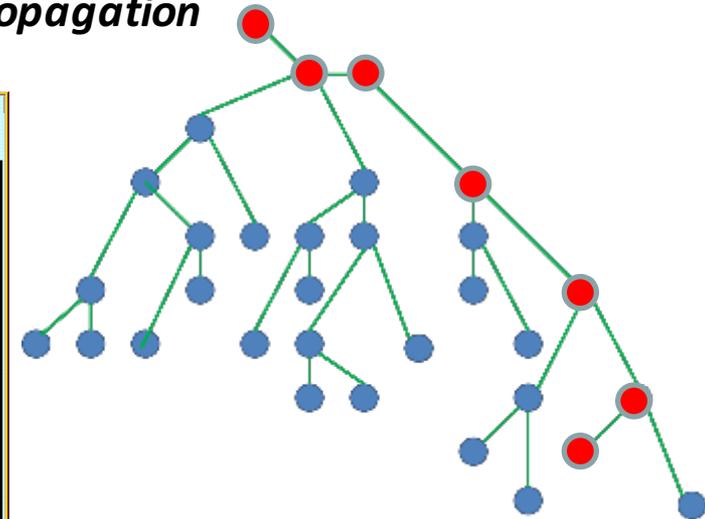
Qualified values

Alarm panel mock-ups

■ Observatory Overview Panel

Alarm panel mock-ups

■ Array elements

Visualization techniques

Alarm panel mock-ups

■ Weather reporting

Alarm panel mock-ups

■ Power generation

Alarm panel mock-ups

■ Buildings

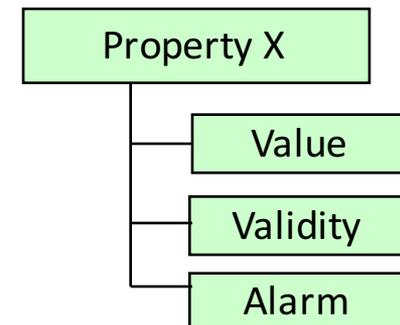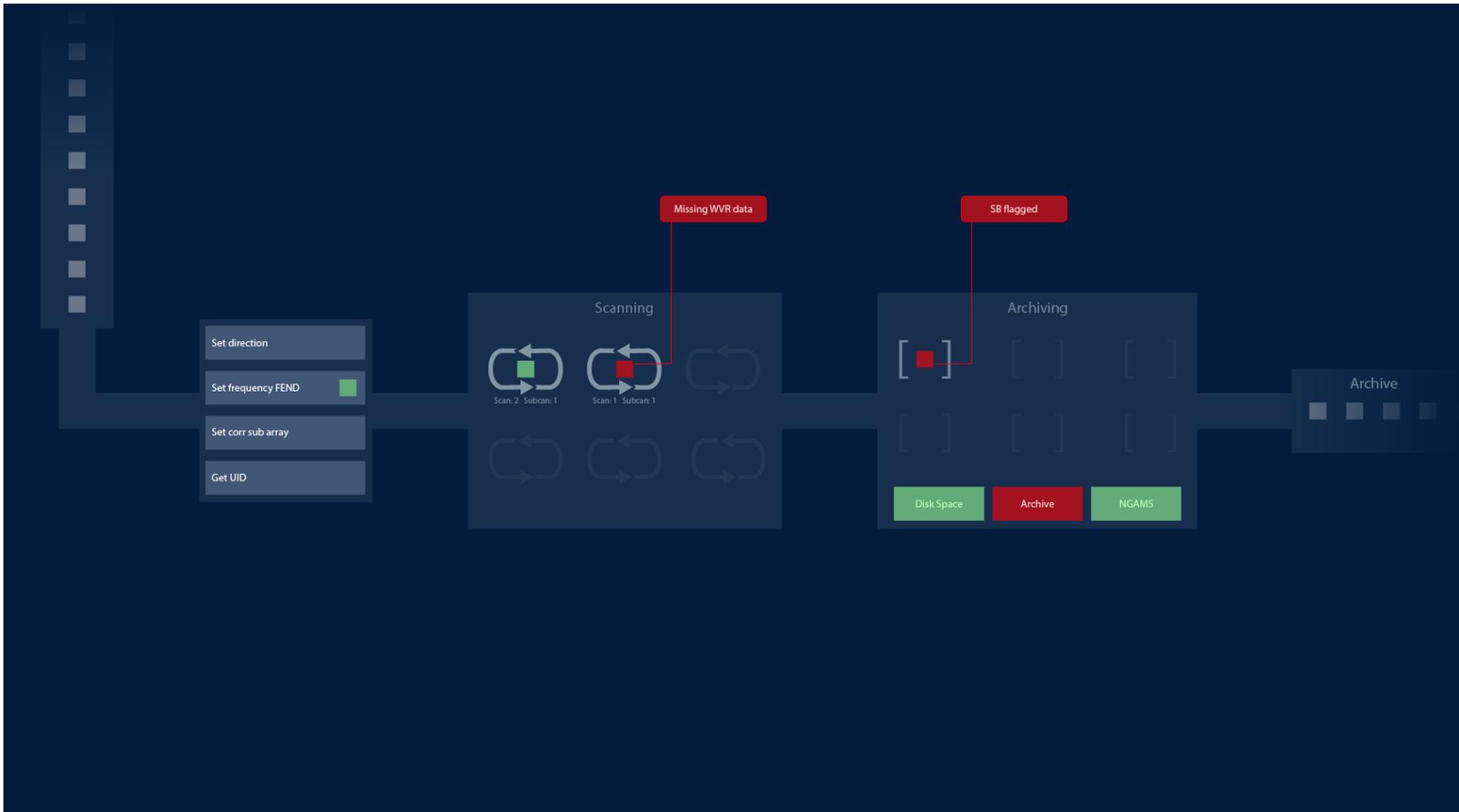# Alarm panel mock-ups

■ Observations

Next steps

- Complete study by 30 June 2016
- Write proposal for ALMA development funding
  - Need FTE estimate
  - Cost for software licensing or additional hardware
  - Where should the work be done? ESO or JAO?
  - Requires frequent collaboration with all groups at JAO
- Delivery of first version in late 2017?
- Maintenance must be factored in

That's all!

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