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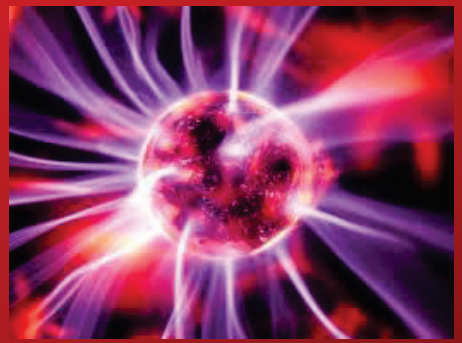

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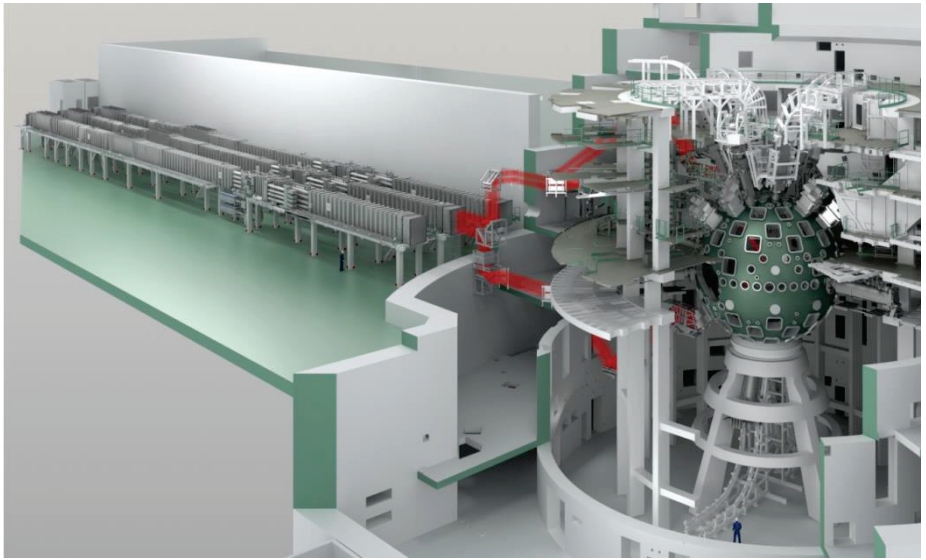
Laser Megajoule Facility
Control system status report



Presented by J. Nicoloso

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Presentation overview

Presentation of the LMJ facility

Presentation overview

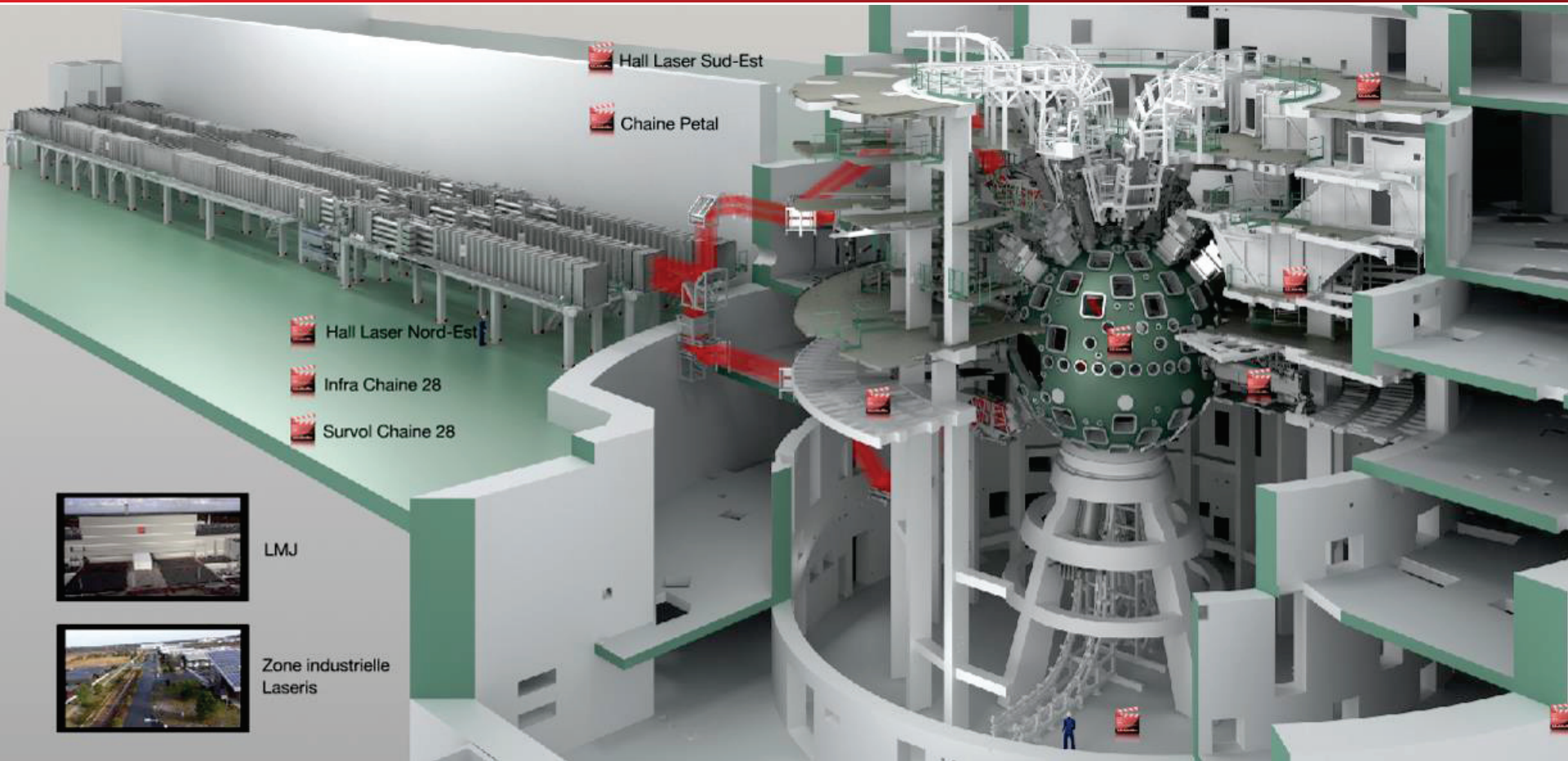
Presentation of the LMJ facility

Command Control Architecture

Presentation overview

- Presentation of the LMJ facility
- Command Control Architecture
- Command Control Integration

LMJ facility overview



Presentation overview

Presentation of the LMJ facility

Command Control Architecture

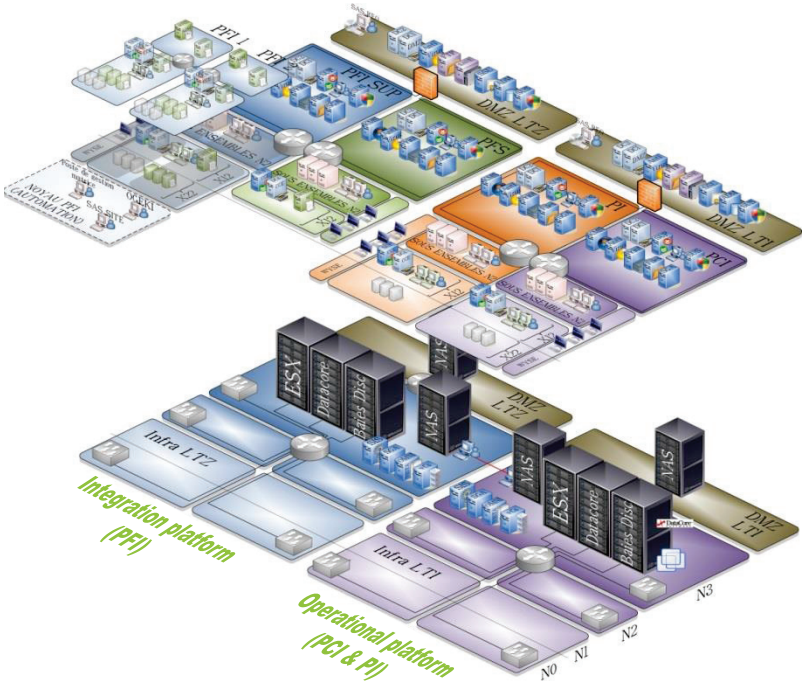
Command Control Integration

Hardware architecture

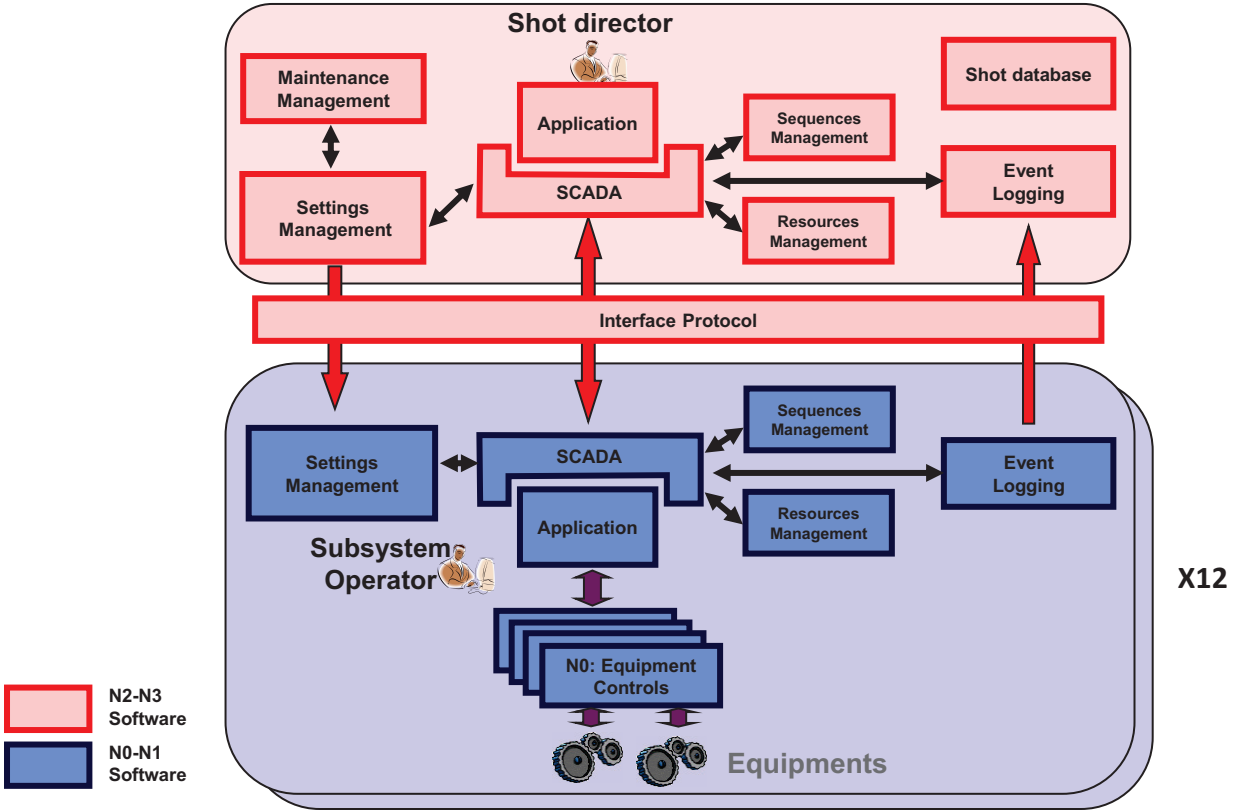
Supervisory levels are virtualized using the VMware VSphere Enterprise Plus suite

Logical Architecture:
- 500 virtual machines

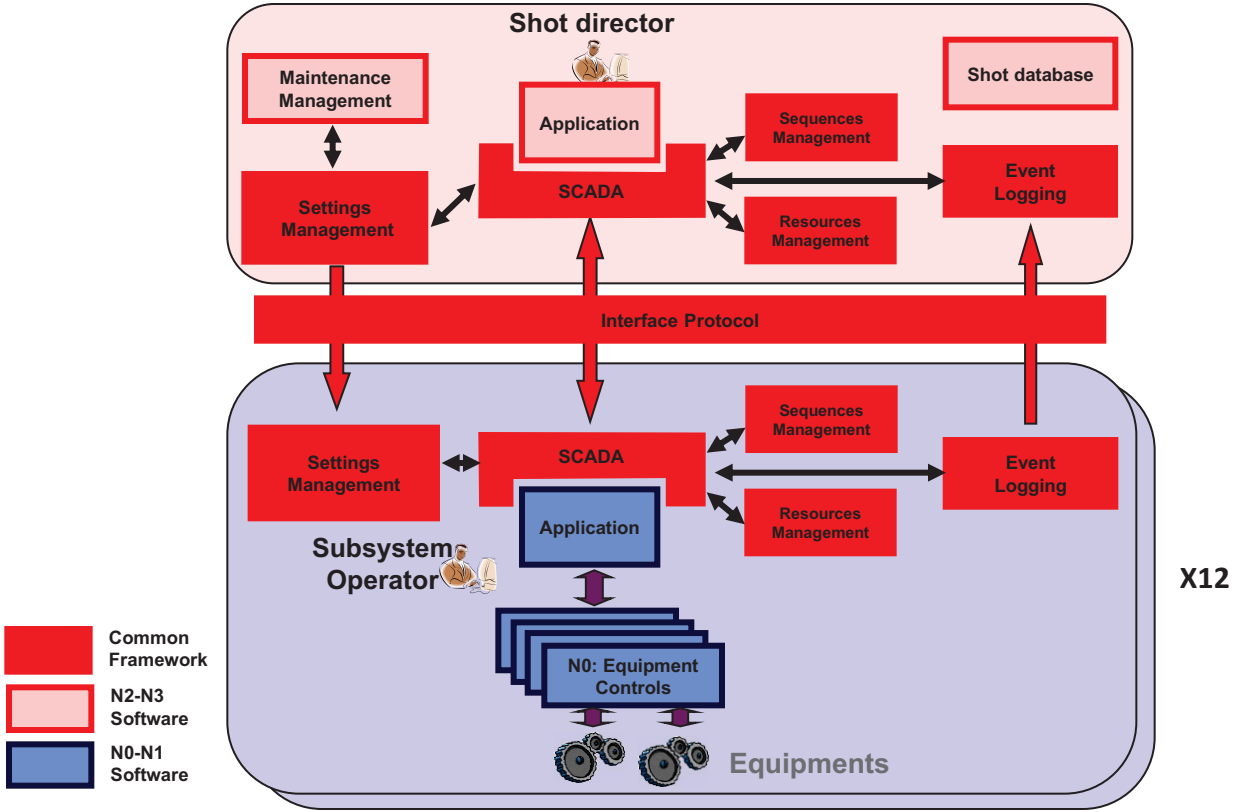
Physical Architecture:
- 16 hi-perf servers
- 100 TB disk space



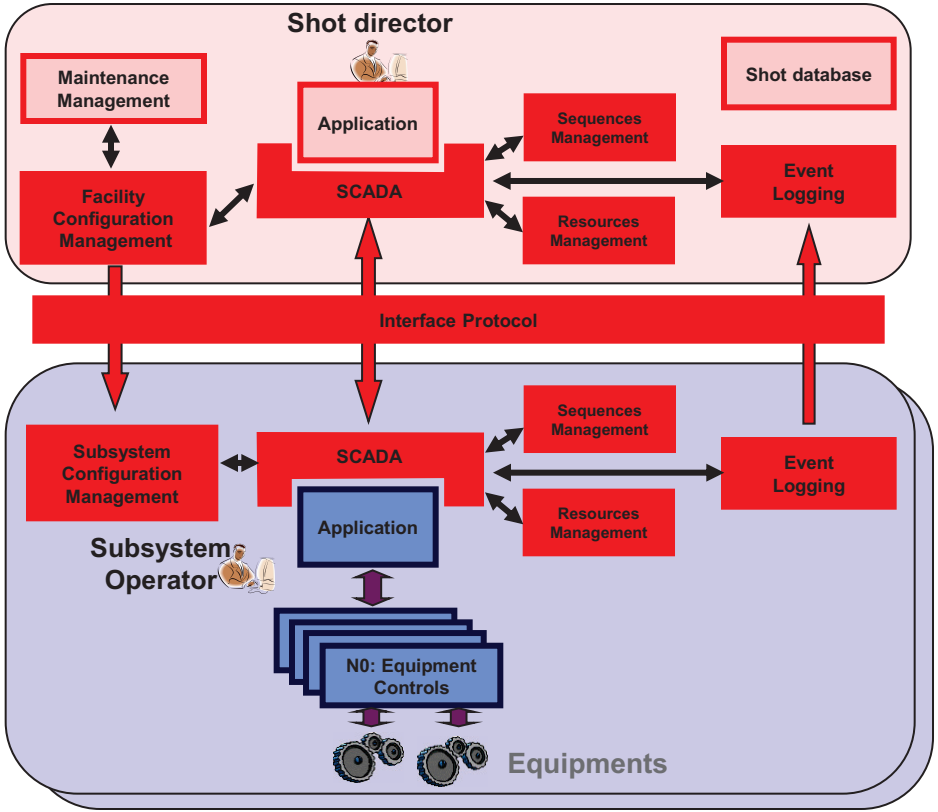
Software architecture



Software common framework



Software technical choices



Platform : PC, Windows

SCADA: Panorama E^2 from CODRA

Interface protocols: WCF

Specific developments: .Net

Database: SQL-Server, Oracle

CMMS: D7i from Datastream

File exchange: XML, HDF5

Data Acq : TANGO, Python

J. Nicoloso | ICALEPCS October 2015

Presentation overview

Presentation of the LMJ facility

Command Control Architecture

Command Control Integration

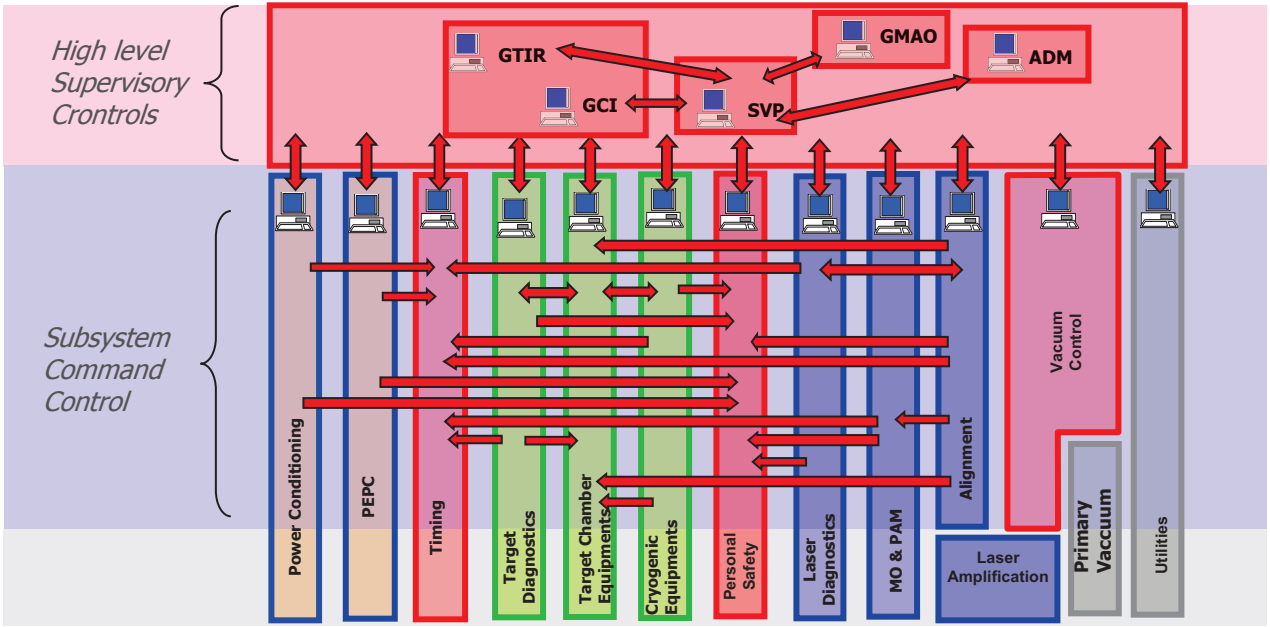
Integration issues & solutions

Issues

- 50 Interfaces between 12 contractors

Solutions

- Interface definition management
- Integration process management



The LMJ CC is distributed over the 4 main LMJ Systems :

Laser Subsystems **Control Command Subsystems**
Experiment Subsystems **Building and Utilities Subsystems**

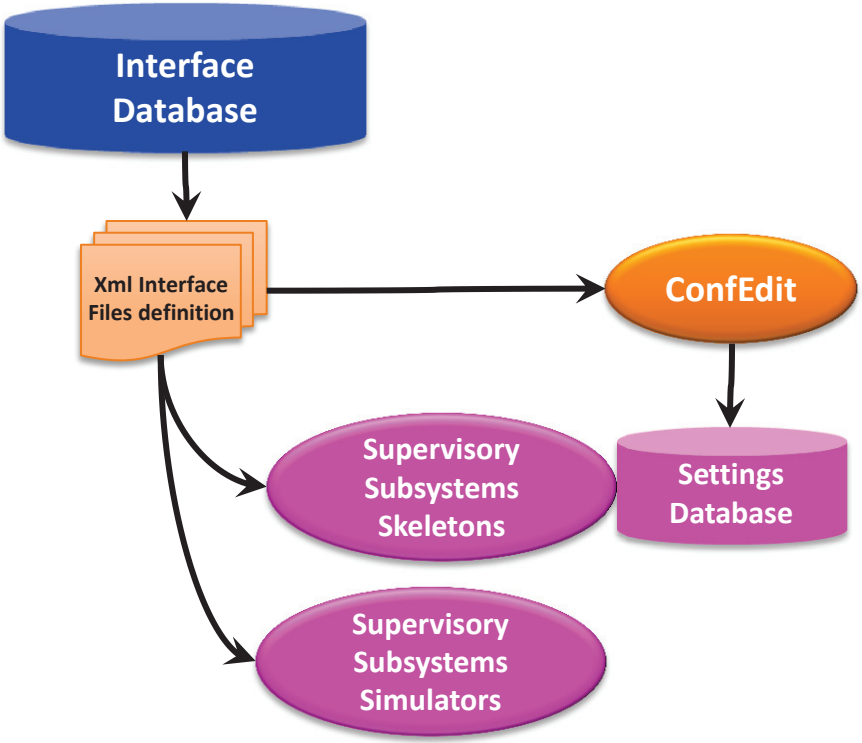
Interface definition

All external interfaces between subsystems are defined and manage in a central database

Interface definitions are exported as xlm files from that database

Dedicated tools allow to automatically generate from these xml files:

- Supervisory subsystems' skeletons
- Supervisory subsystems' simulators
- The device settings configuration database

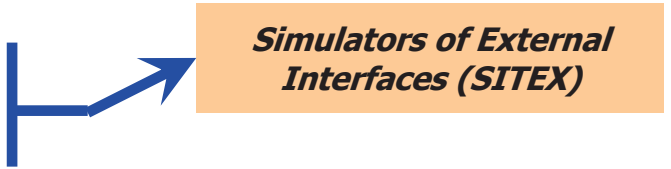


Integration process

Proceed to the command control integration outside the facility prior to machine integration

- Reduce as much as possible machine unavailability du to command control issues
- Correct bugs as soon as possible and debug without damaging the machine

Promote the independency of the contractors



Integrate new lines in the LMJ building while using the commissioned ones

Integration process

A 3-step process:

Who ? *Where ?*

STEP 1 : Factory acceptance tests

- Acceptance tests for equipment
- Acceptance tests for control system

Contractors — In Factory

STEP 2 : Command Control Integration with equipment simulators

- Global tests for the supervisory system
- Global tests for each control subsystems
- Tests of the whole control system

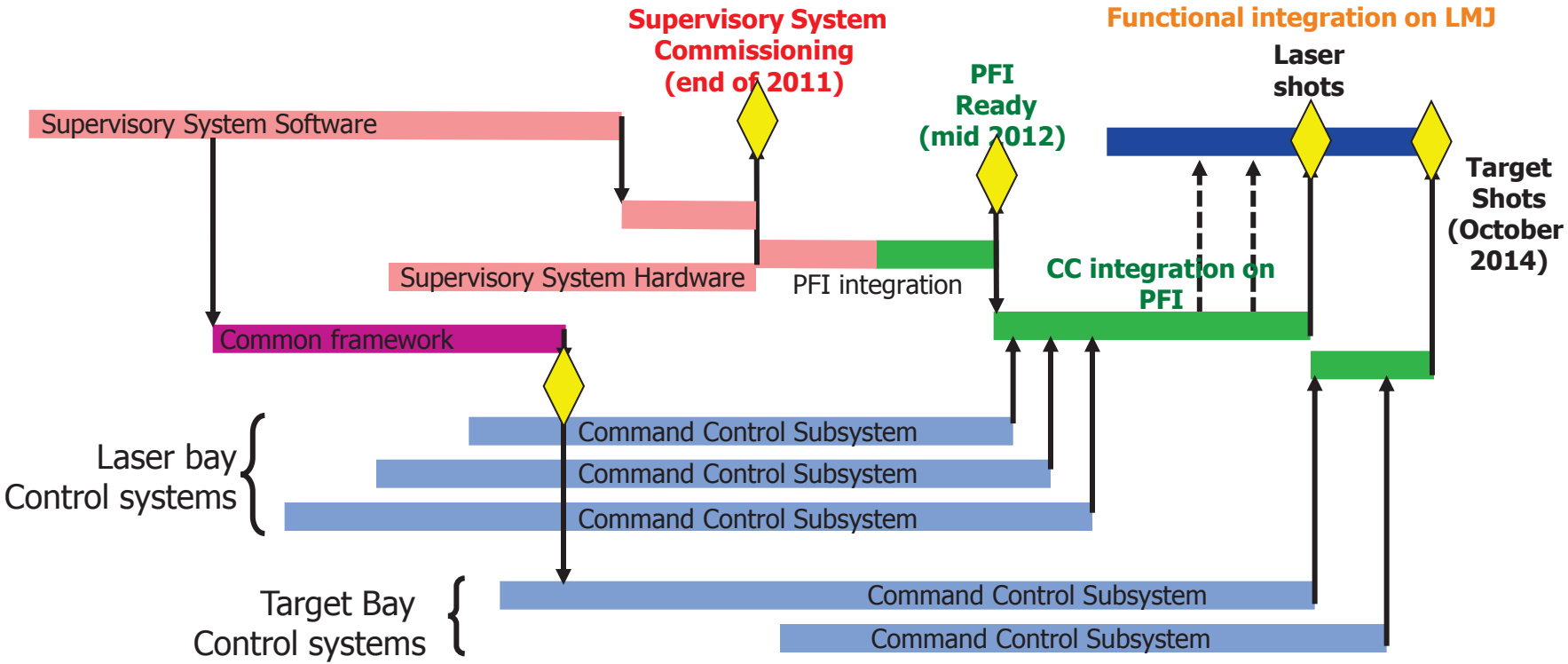
CEA — *Subsystem By Subsystem* — On PFI

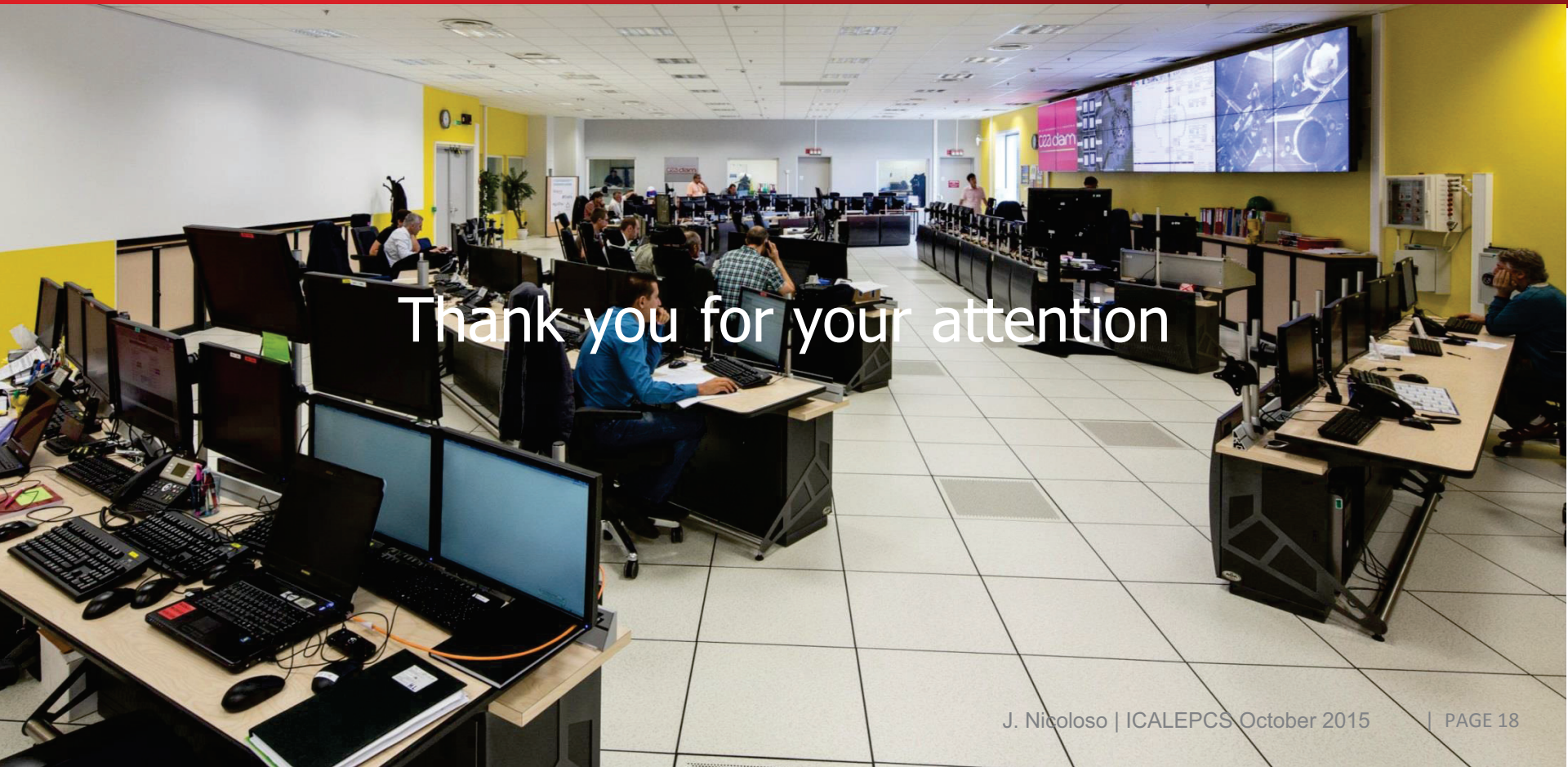
STEP 3 : Integration with real equipment

- Industrial tests for each subsystem
- System tests of the whole process
- Bundle delivery for validation from operations control room

Contractors / CEA — *Line By Line* — In LMJ

Control system milestones




Thank you for your attention