Laser Megajoule Facility (L.M.J.)
Control system status report

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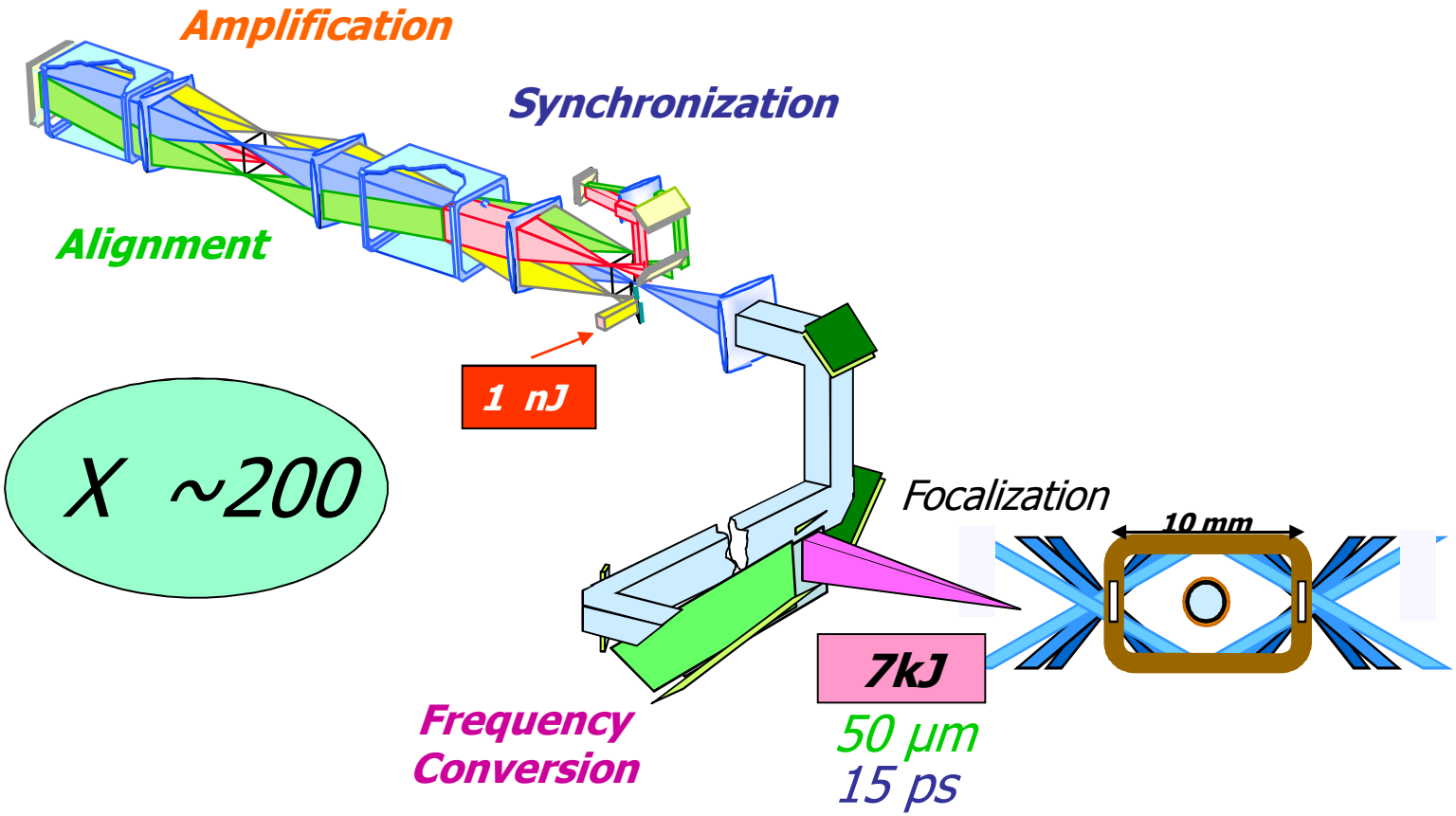
Presentation overview

- Laser Megajoule (L.M.J.) facility
- Control system architecture and industrial policy
- Software framework architecture
- Hardware architecture & virtualization
- Command control milestones

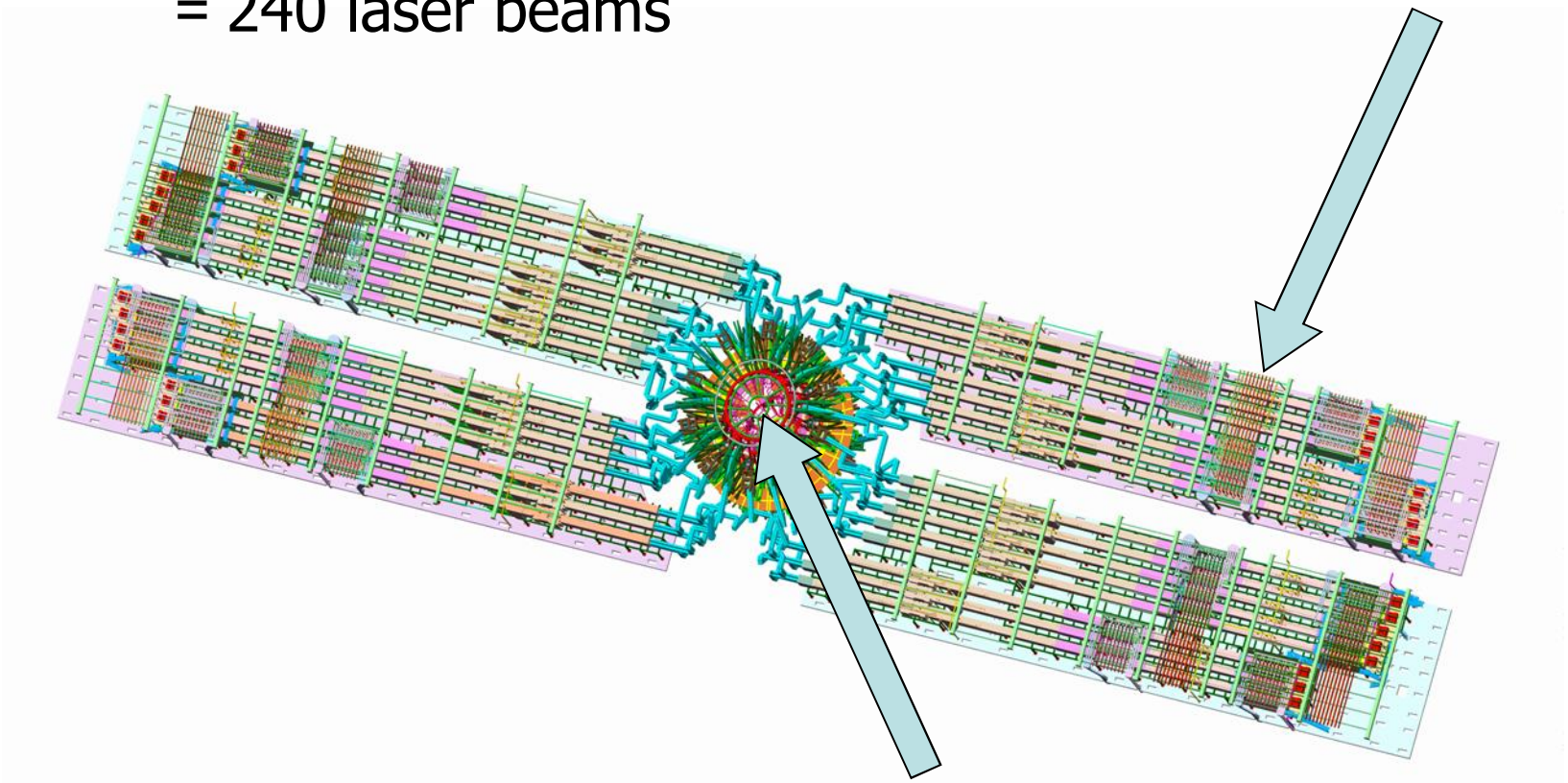
LMJ facility overview

LMJ is designed to deliver about 1.5 MJ of energy on tiny targets for high density plasma physics and fusion experiments



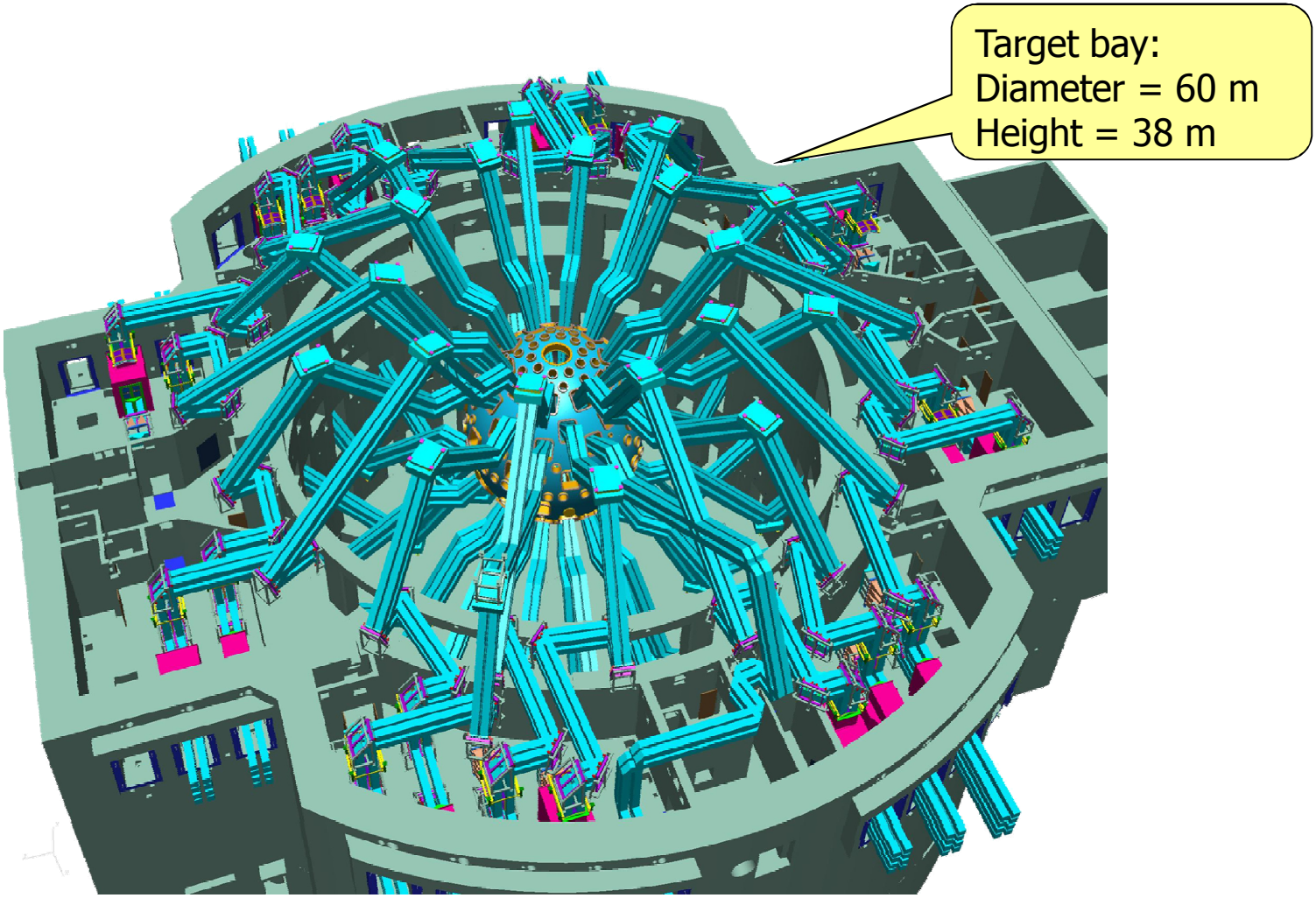
LMJ facility overview

Up to 30 bundles of 8 beams located in 4 bays
= 240 laser beams

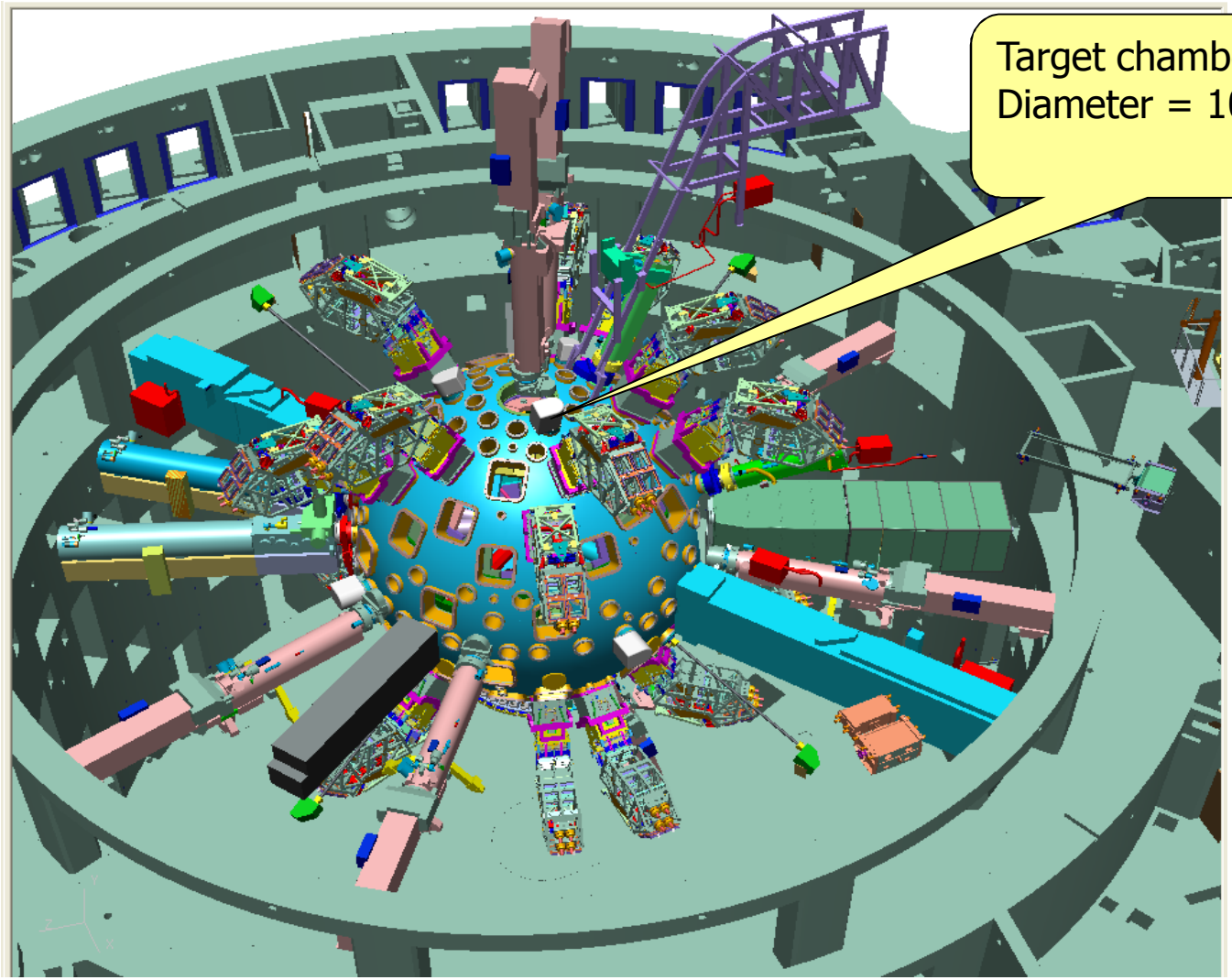


More than 1 MJ of 350 nm UV light on a target

LMJ facility overview



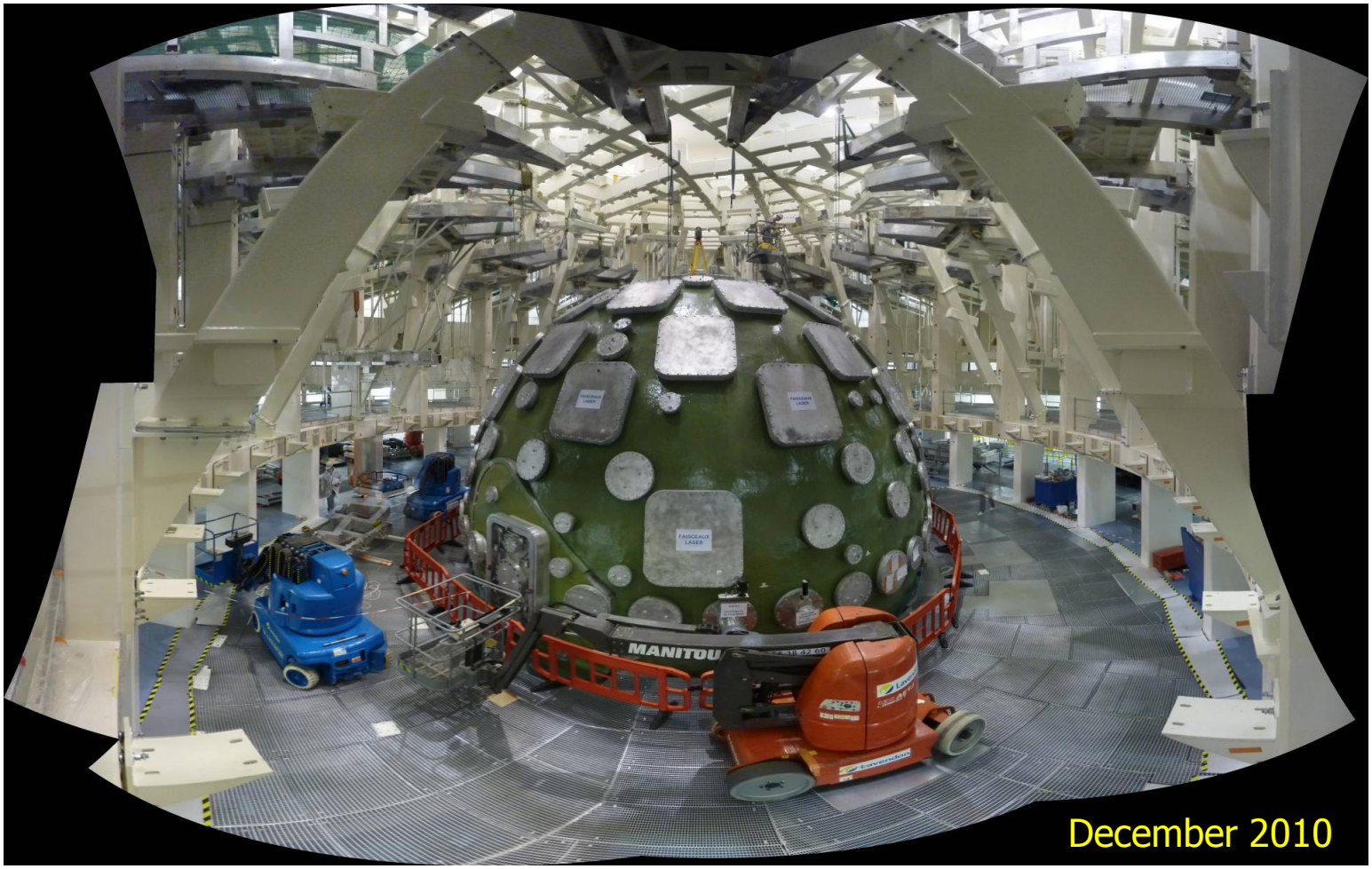
LMJ facility overview



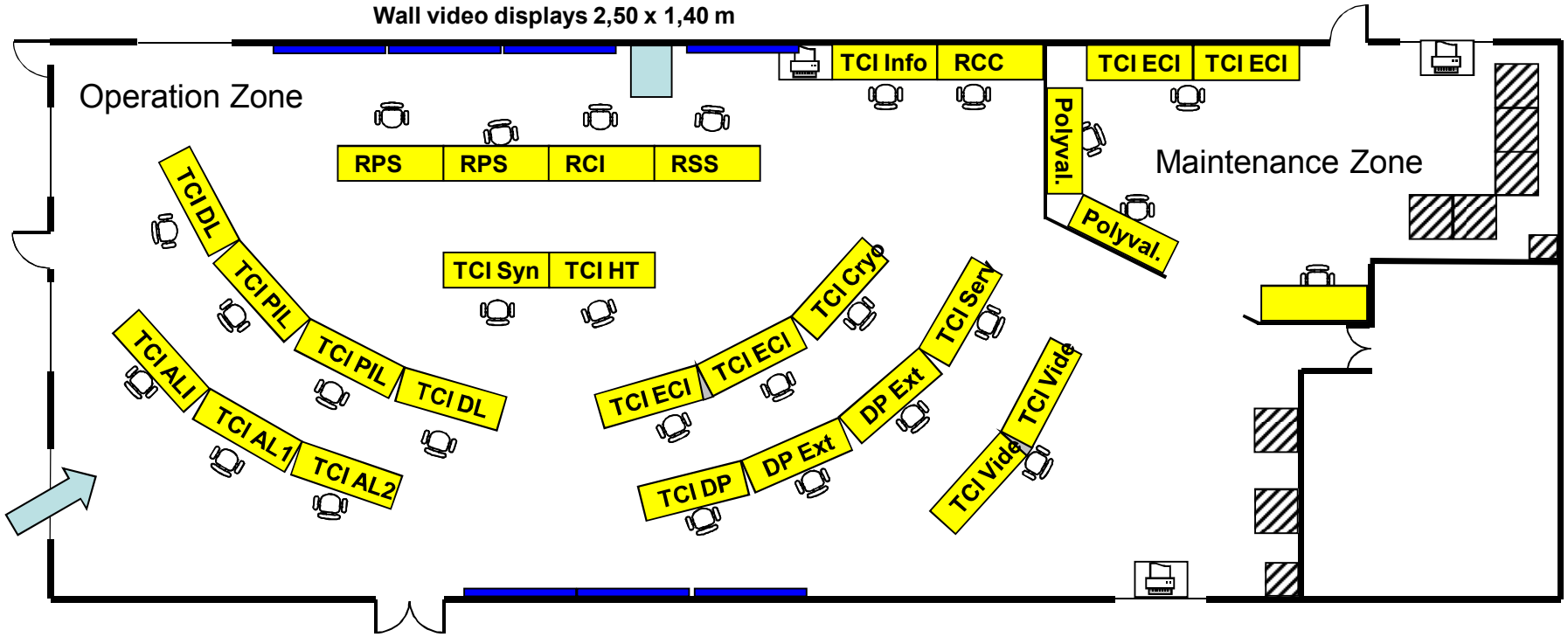
LMJ building

Laser bays

Target bay

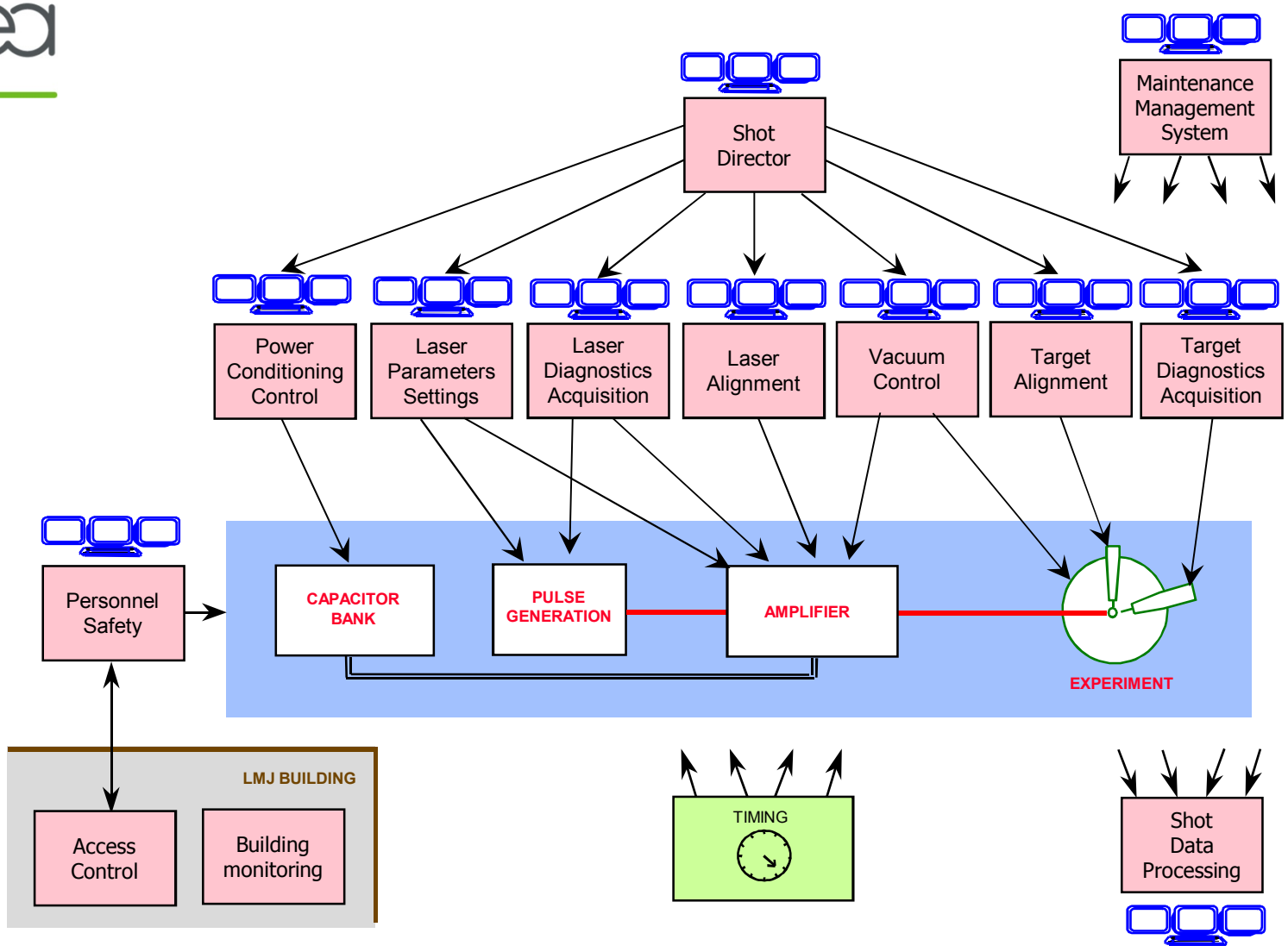


Control room



300 m2 (13 X 23)

Control system main functions



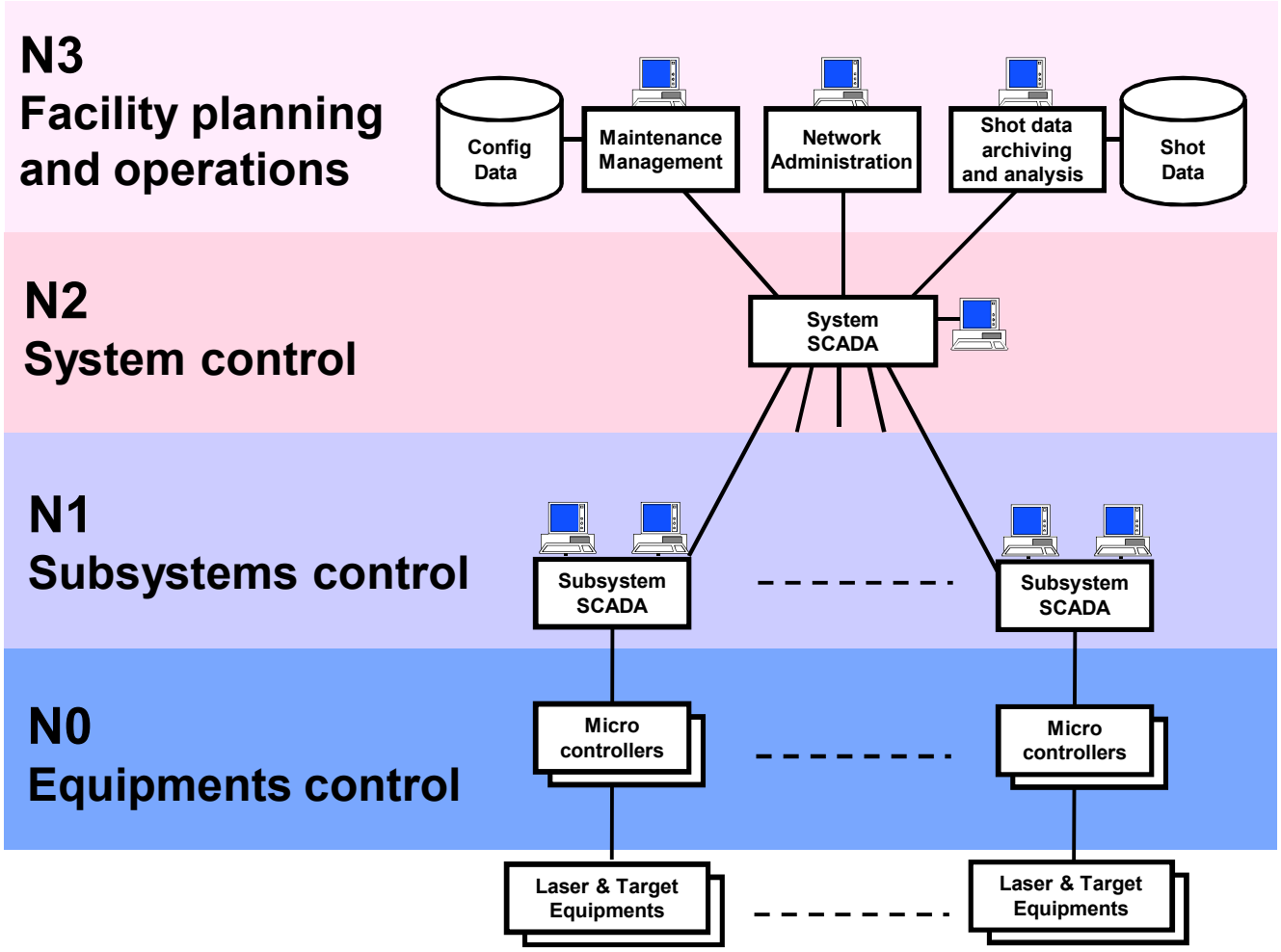
Control system architecture

Control Points
500 000

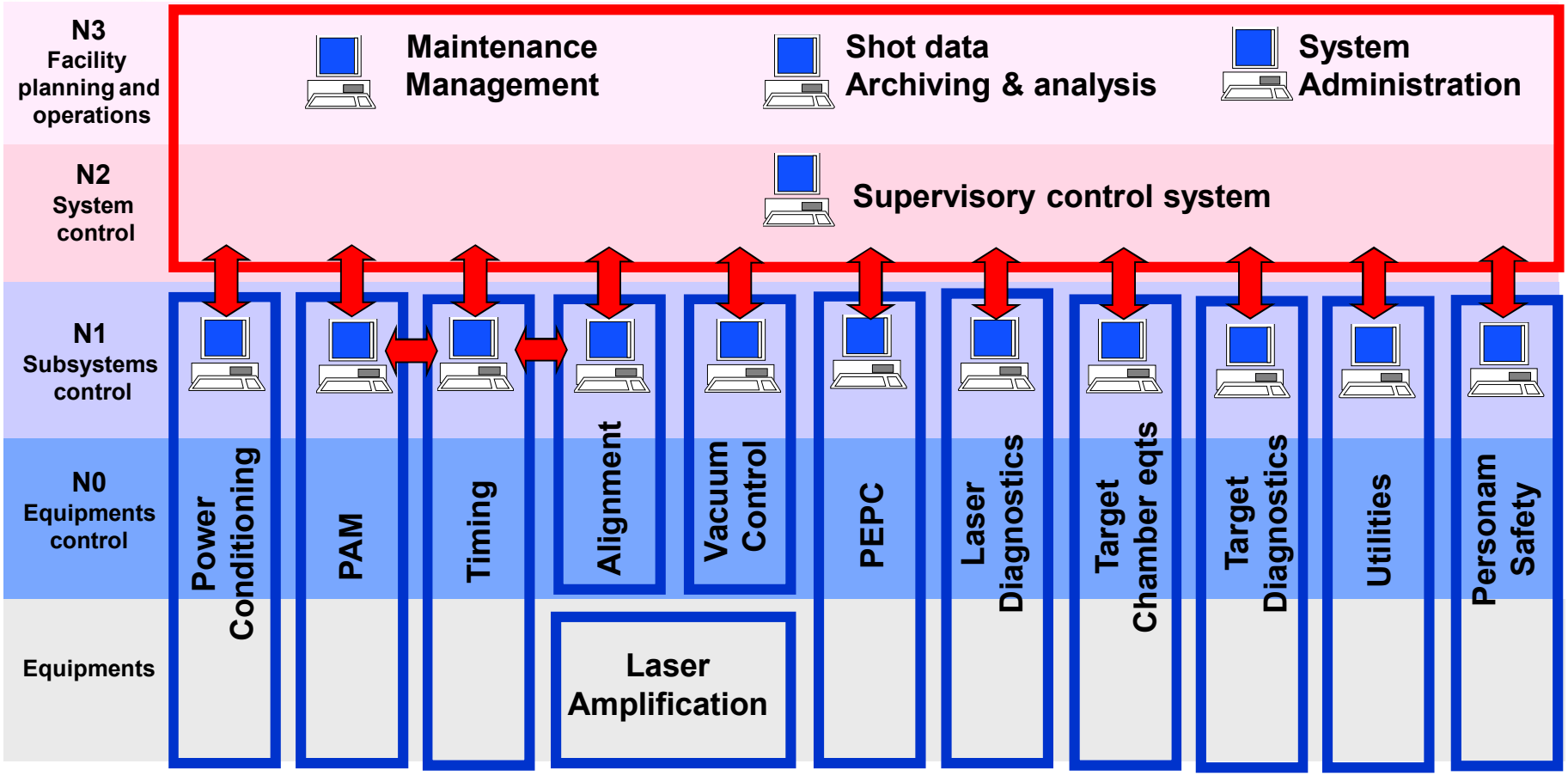
Alarms
100 000

Processors
500

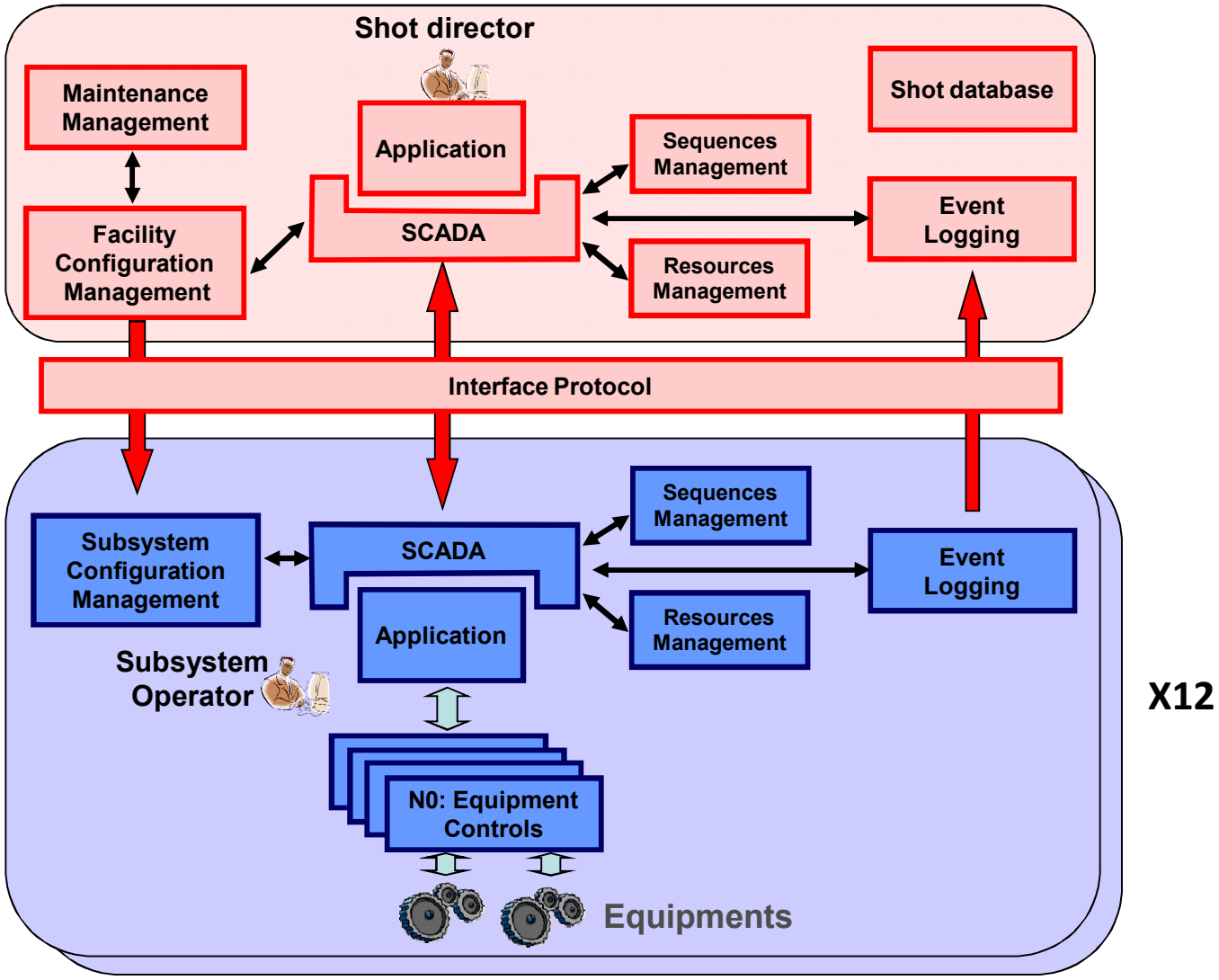
Shot data
~1 GB / shot
2 years on line



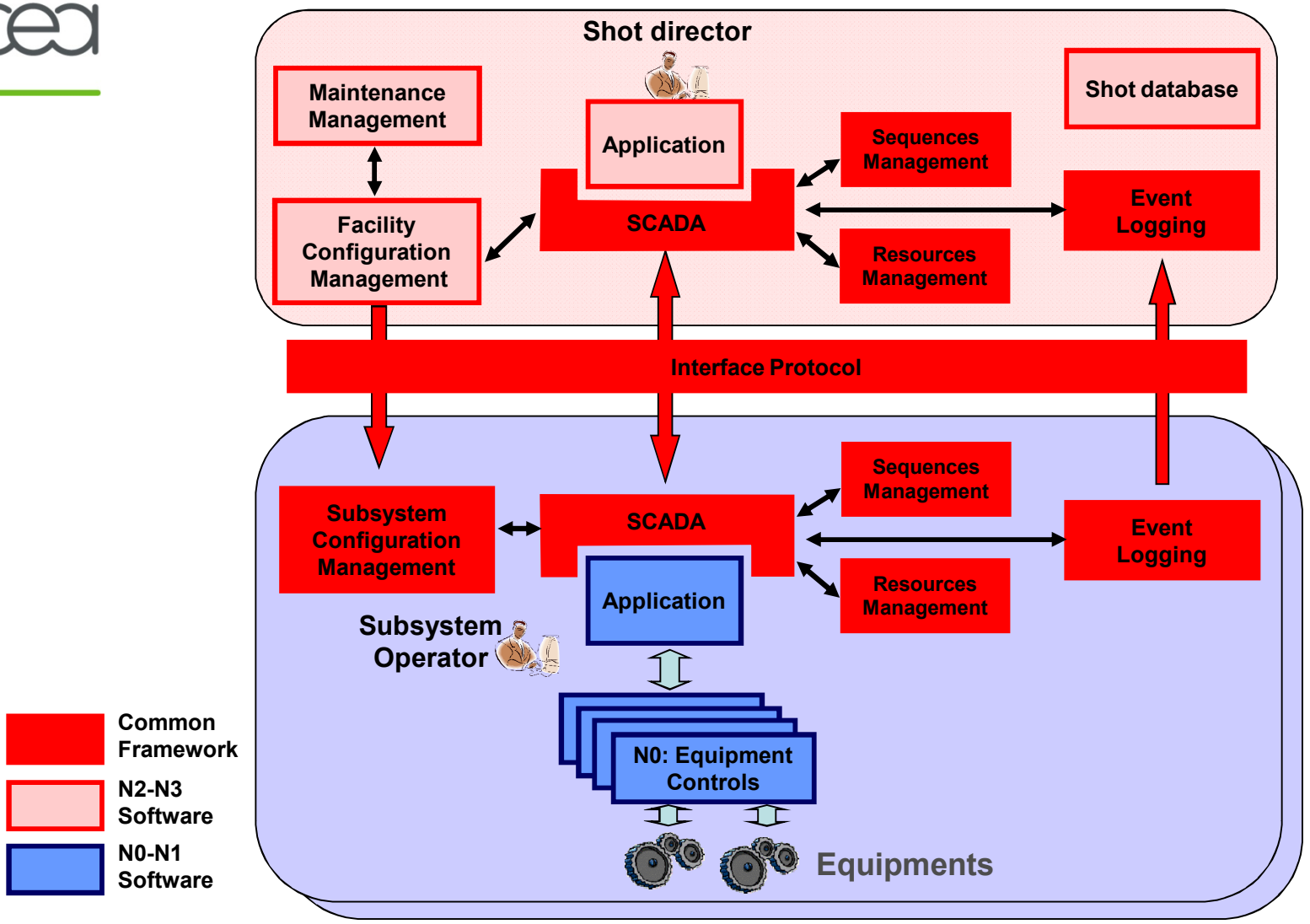
Contracts management



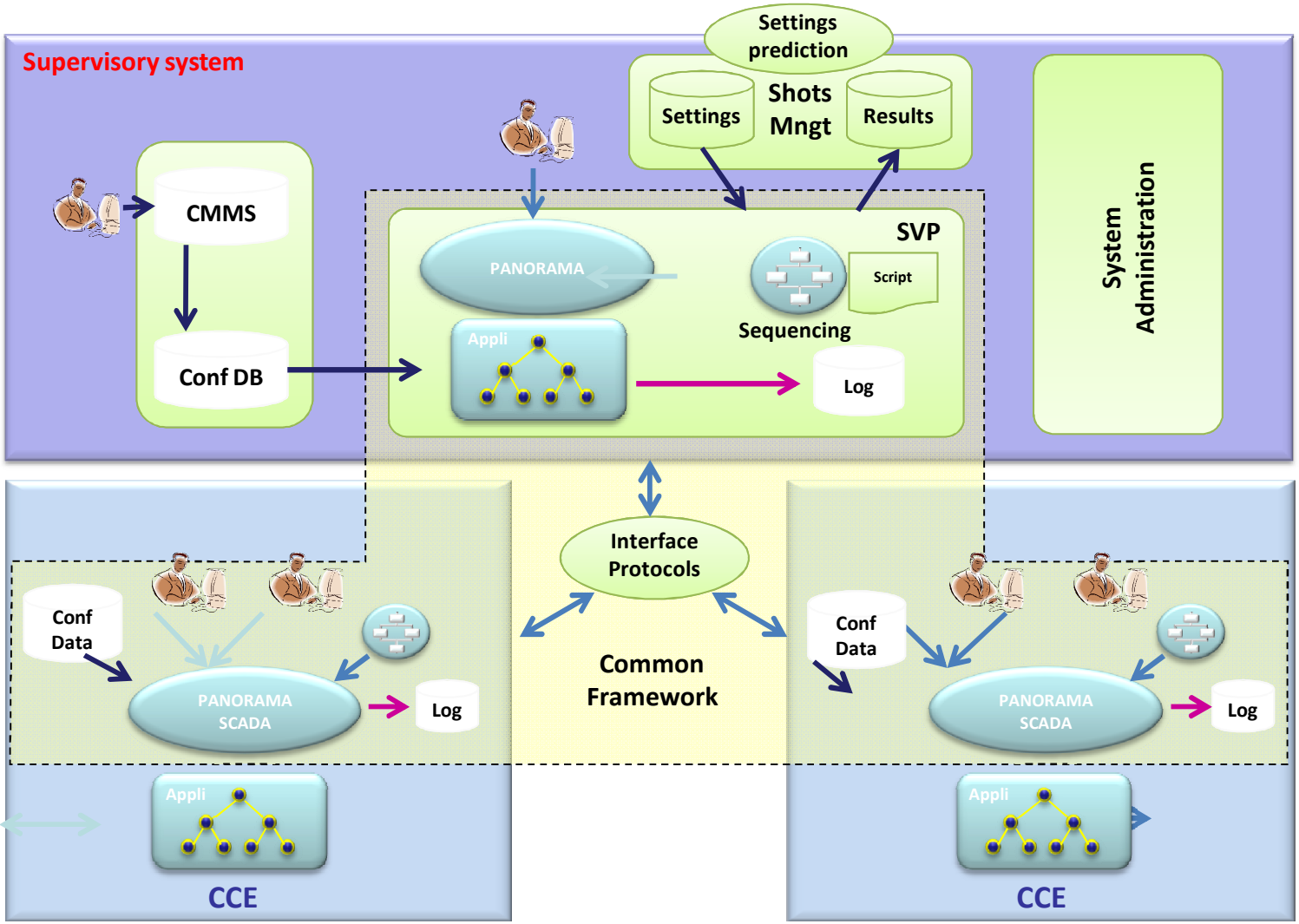
Software architecture



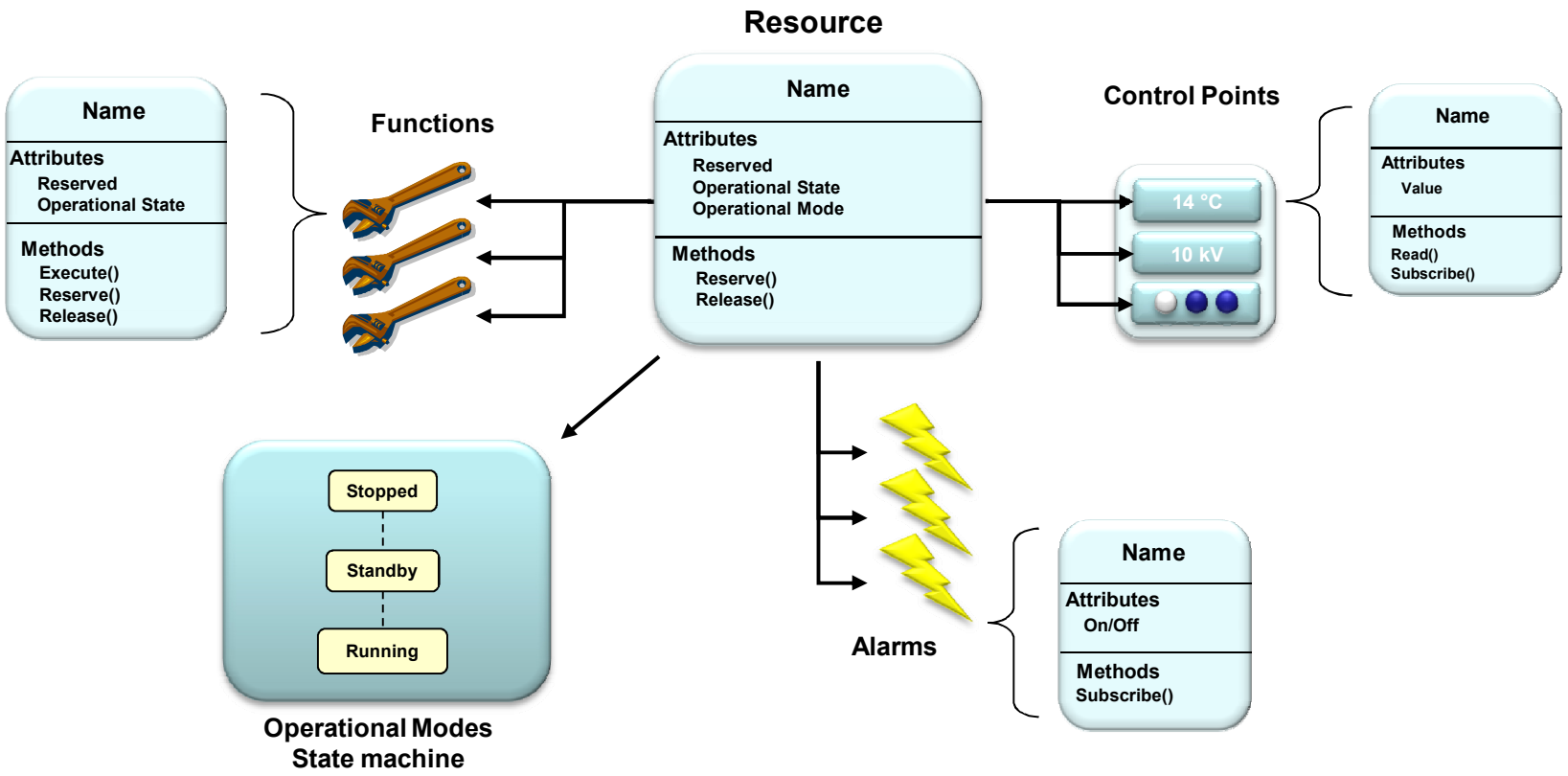
Software common framework



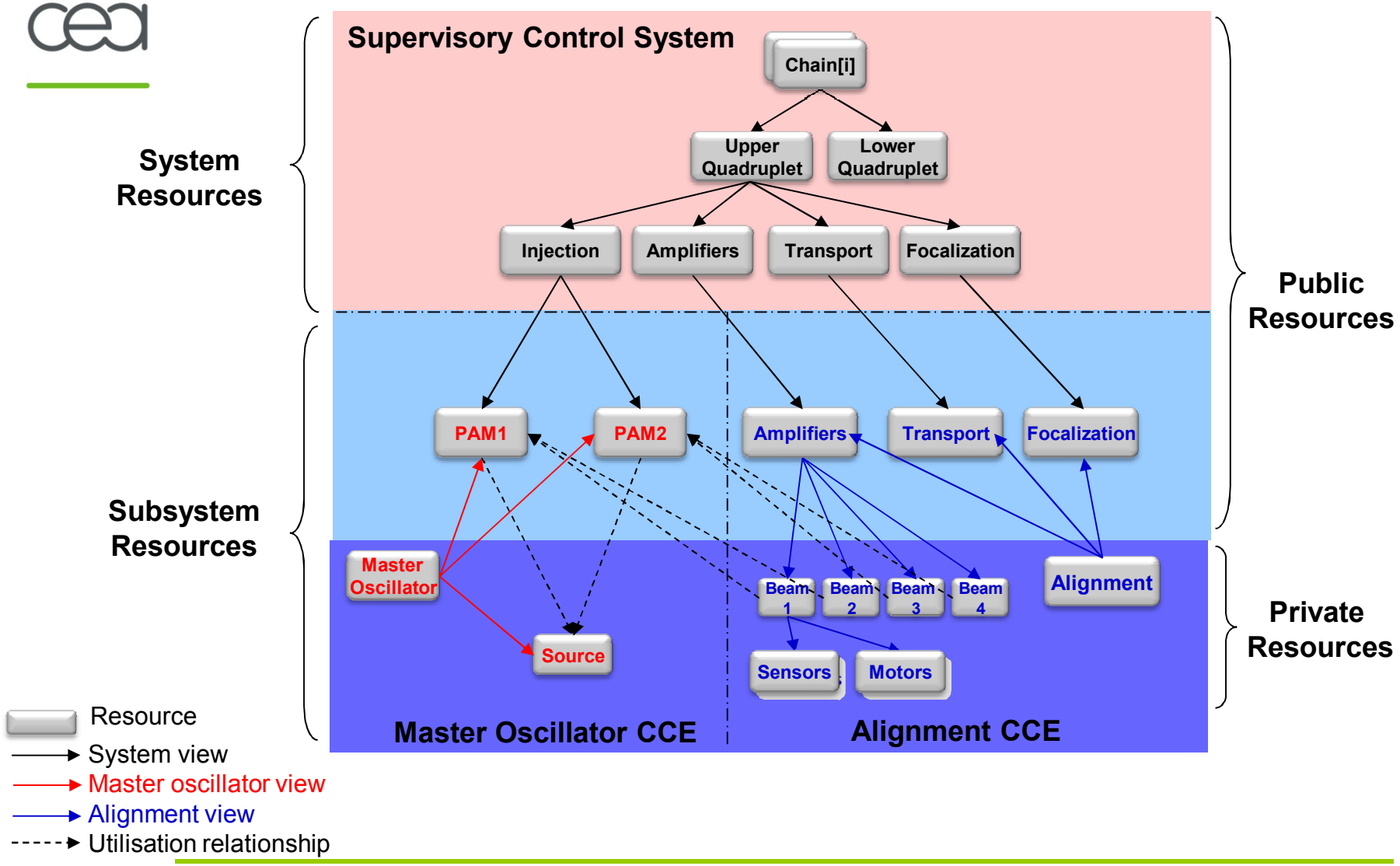
Software architecture global view



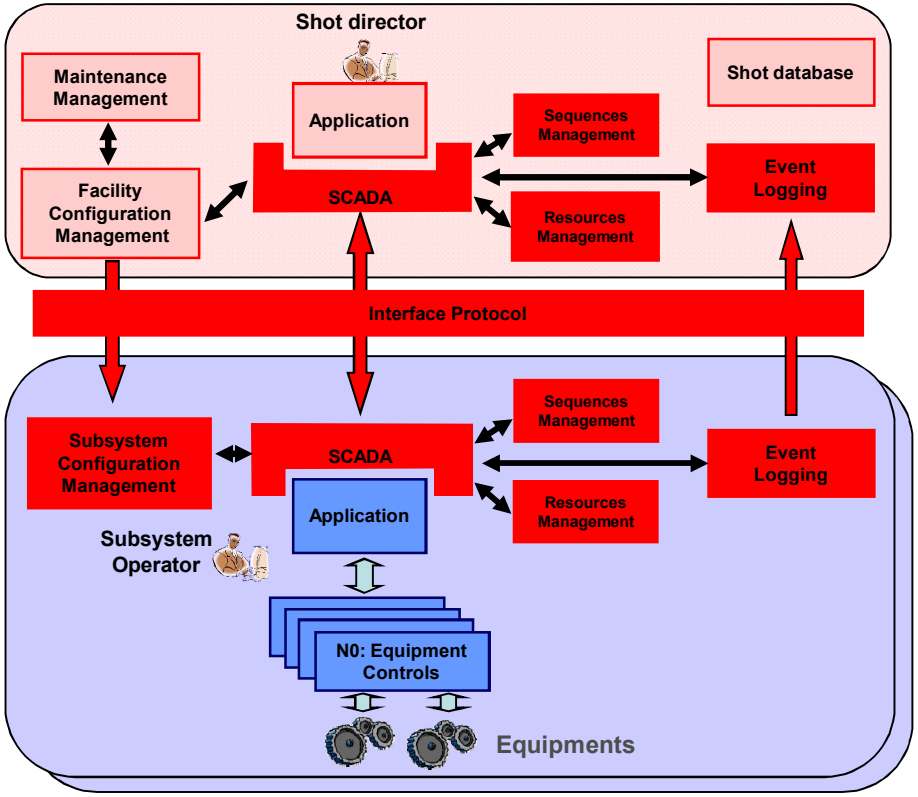
Framework data model



Framework functional trees



Technical choices



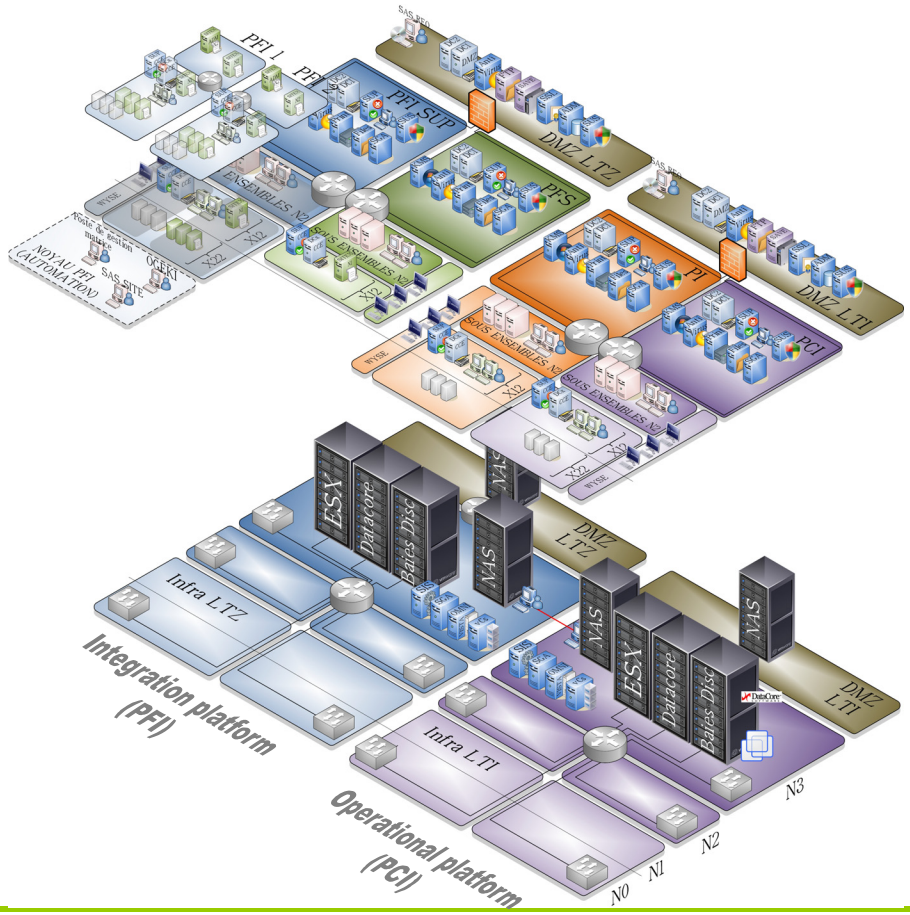
- **Platform : PC, Windows**
- **SCADA: Panorama E² from CODRA**
- **Specific developments: .Net**
- **Database: Oracle 10g , SQL-Server**
- **CMMS: D7i product from Datastream**
- **Interface protocols: WCF**
- **File exchange: XML, HDF5**

Hardware architecture

- **N1, N2 and N3 layers are virtualized using the VMware VSphere Enterprise Plus suite**

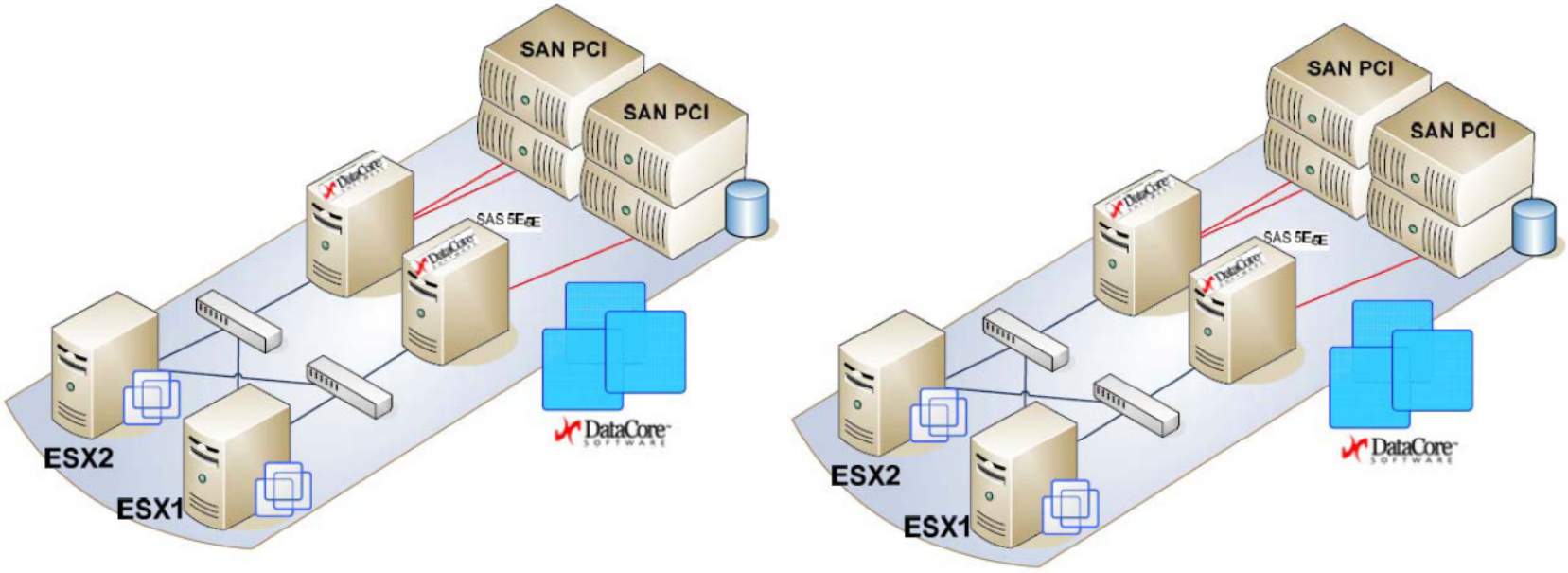
Logical Architecture:
- 500 virtual machines

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



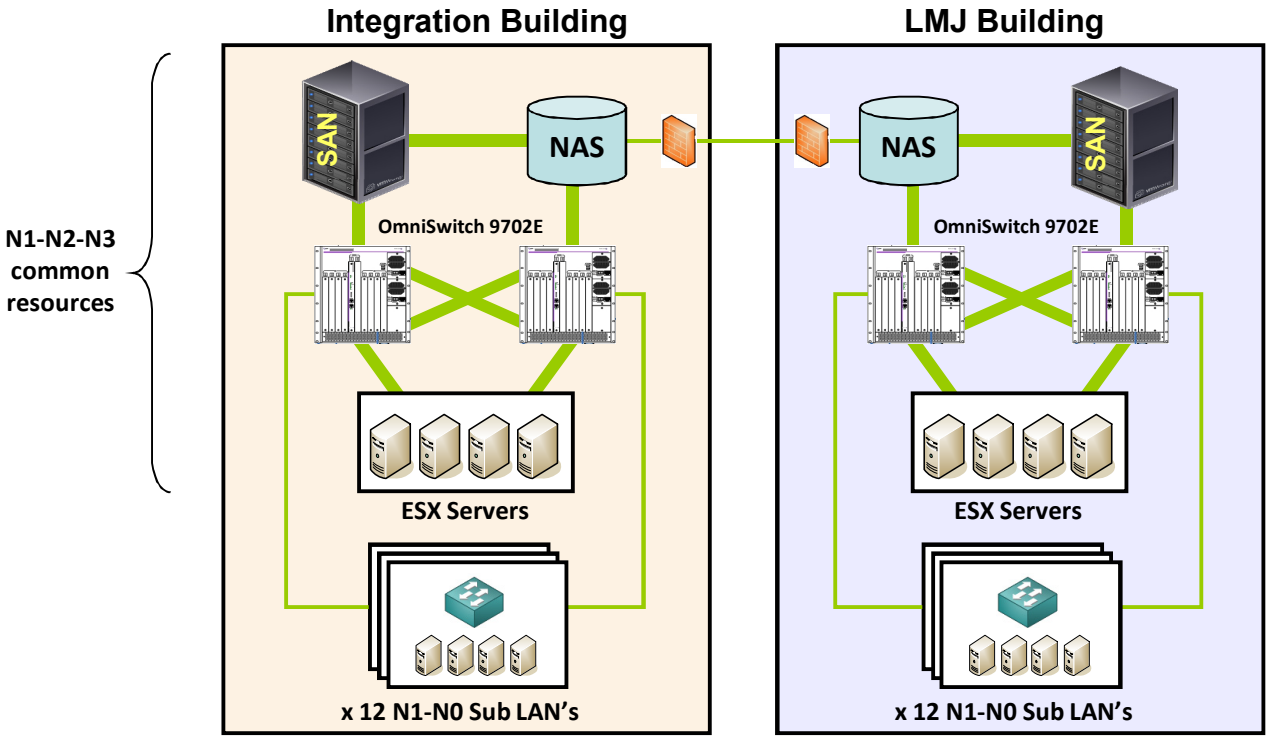
Hardware architecture

- **Each PFI & PCI platform consists of two virtualization infrastructures composed of:**
  - **2 DataCore servers, each one managing 12 To of disks,**
  - **2 ESX Dell PowerEdge R815 servers, with 4x12 cores and 128 Go of RAM,**
  - **1 VCenter Server to manage the VMware infrastructure.**

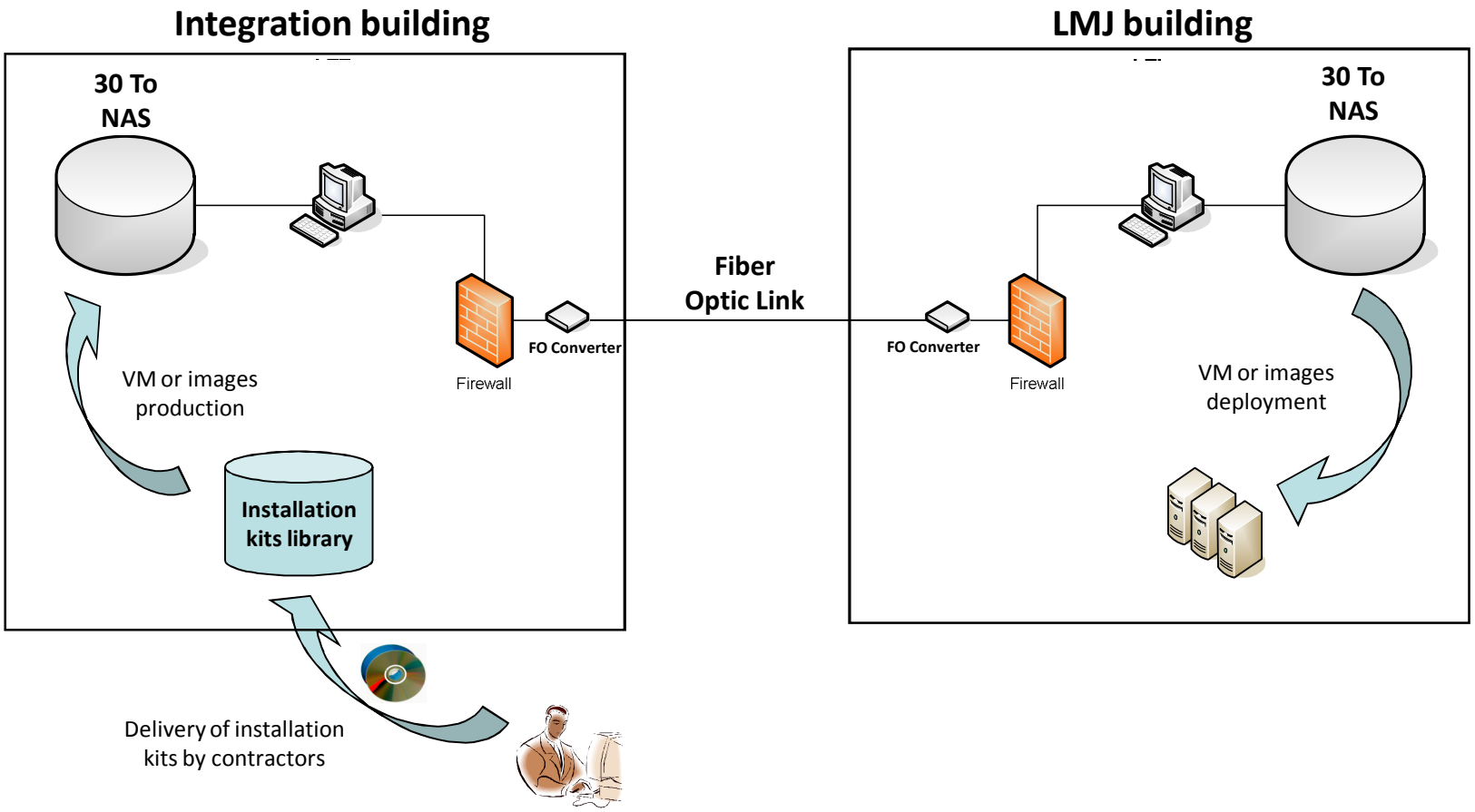


Network architecture

- **Two LAN's will be installed: one for the integration building, one for the LMJ building**
- **Each one's backbone is constituted of 2 redundant Alcatel Lucent OmniSwitch 9702E chassis federating N0-N1 sub LAN's and N1-N2-N3 layers common resources**

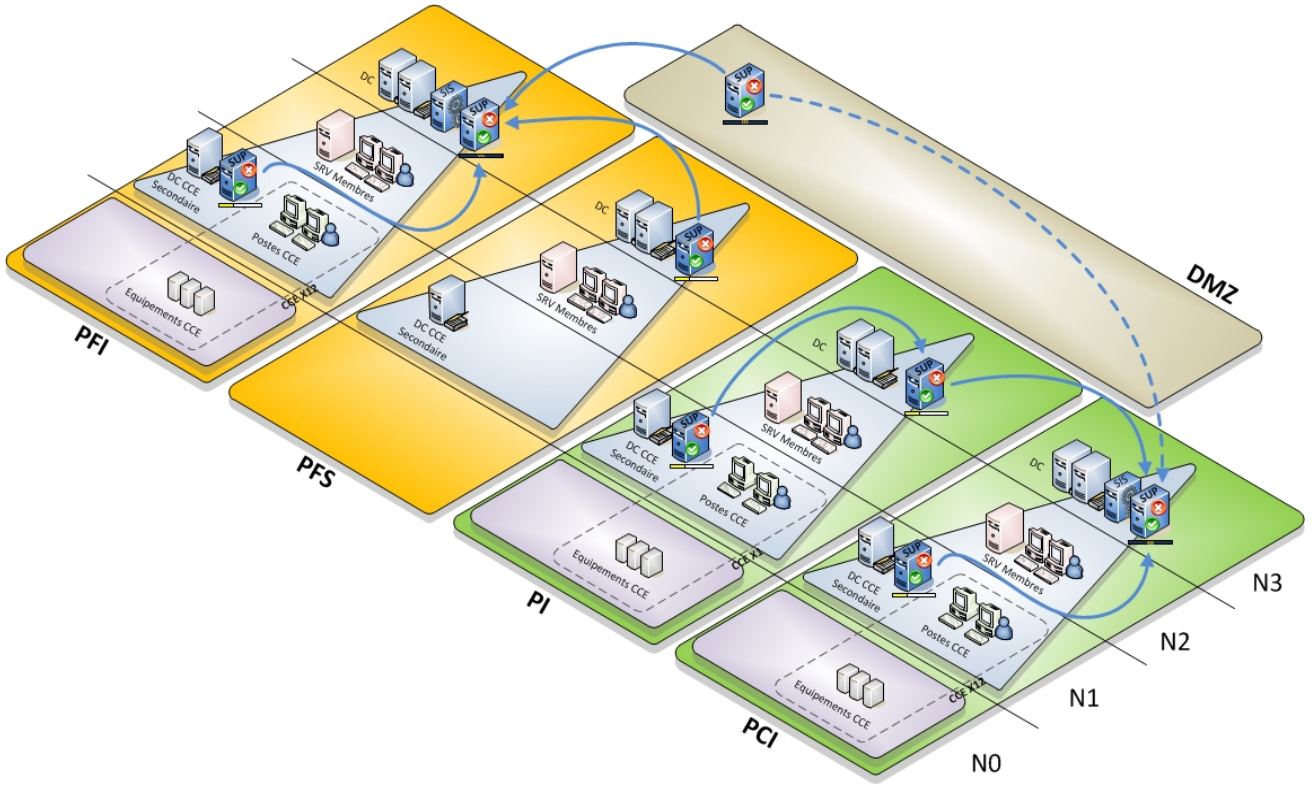


Software configuration management

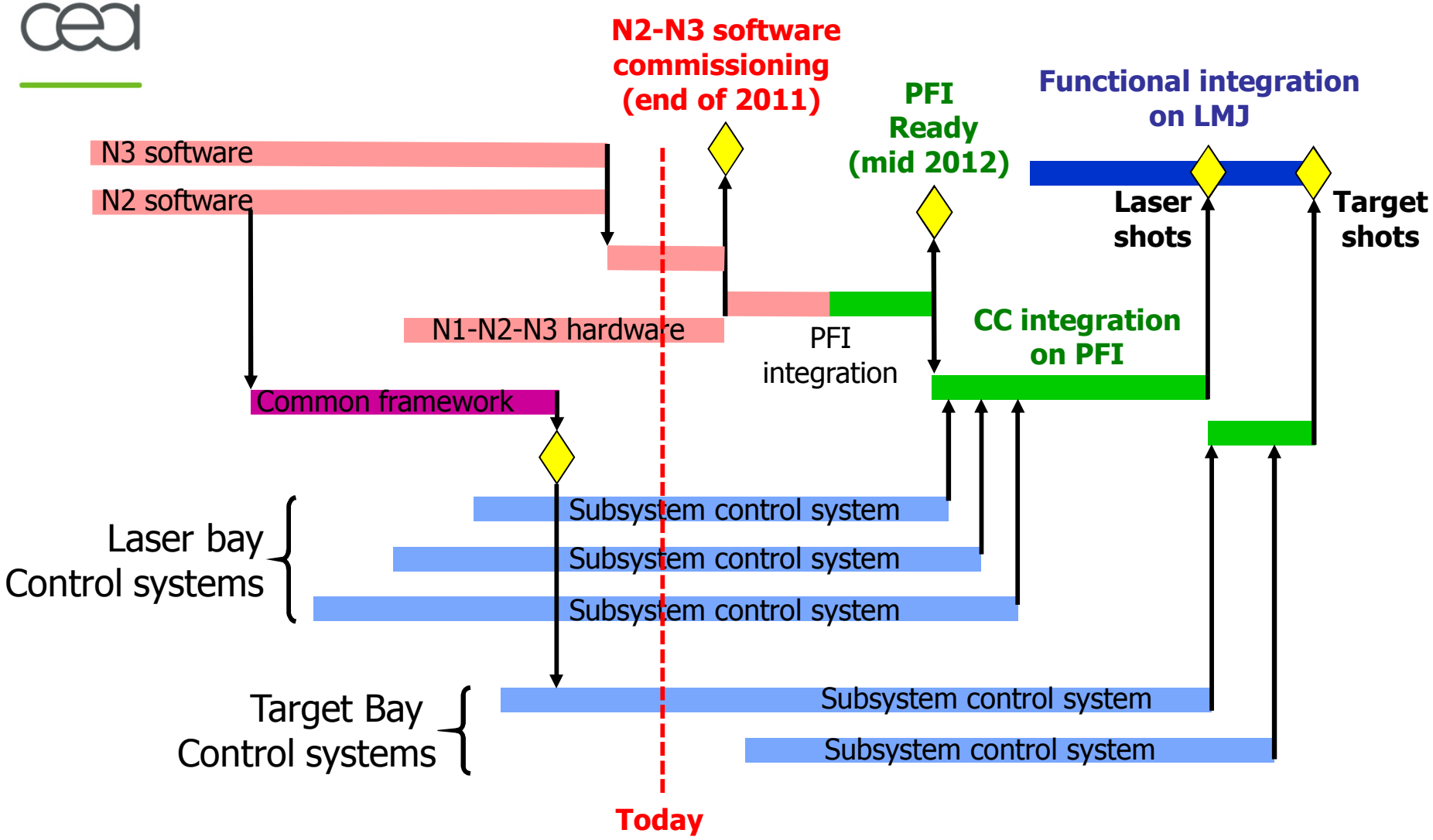


VRF contexts

- **Virtual independent contexts are configured using Virtual Routing and Forwarding technologies (VRF) to allow different test or operational contexts to be operated at the same time**



Control system milestones



Thank you for your attention