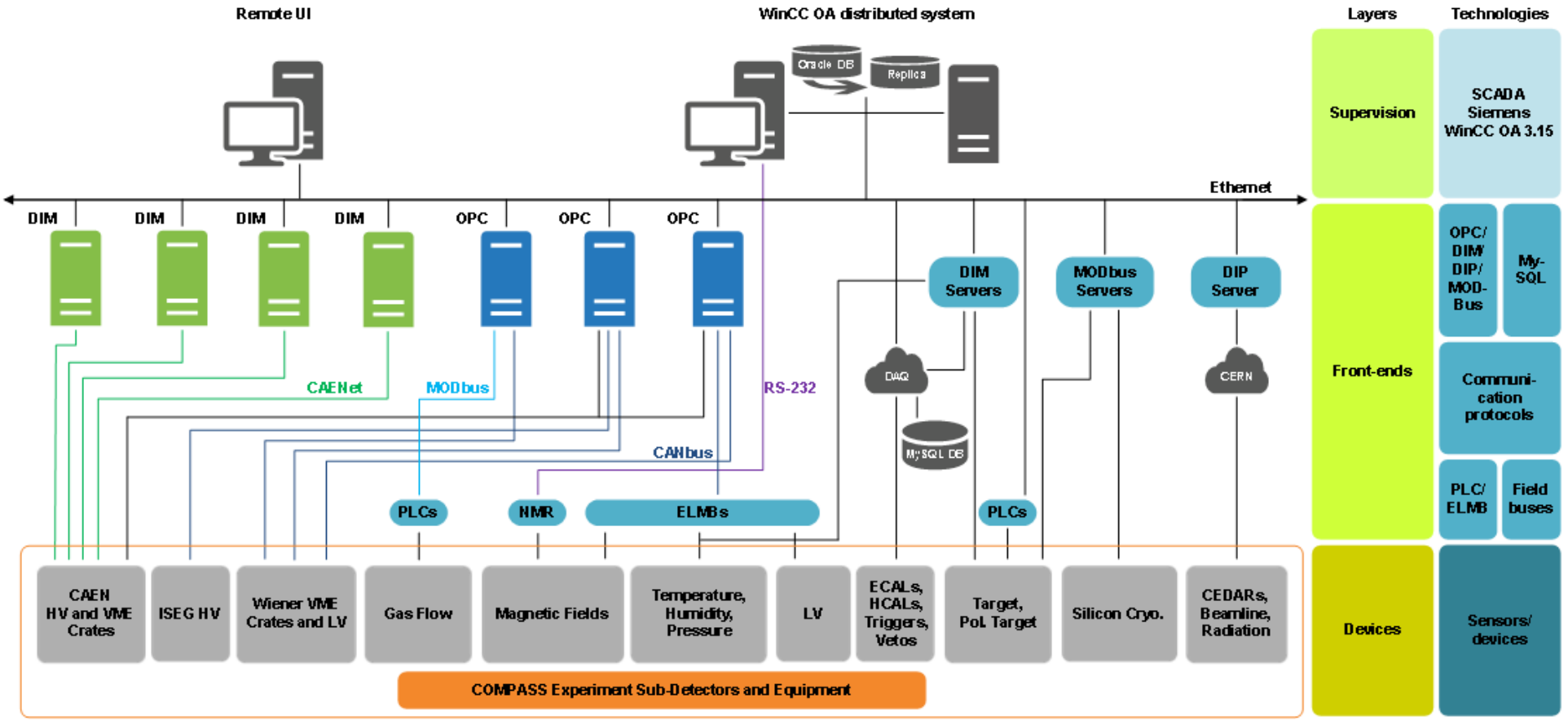
COMPASS DCS

Technical Board, June 2018

FCT Fundação para a Ciência e a Tecnologia

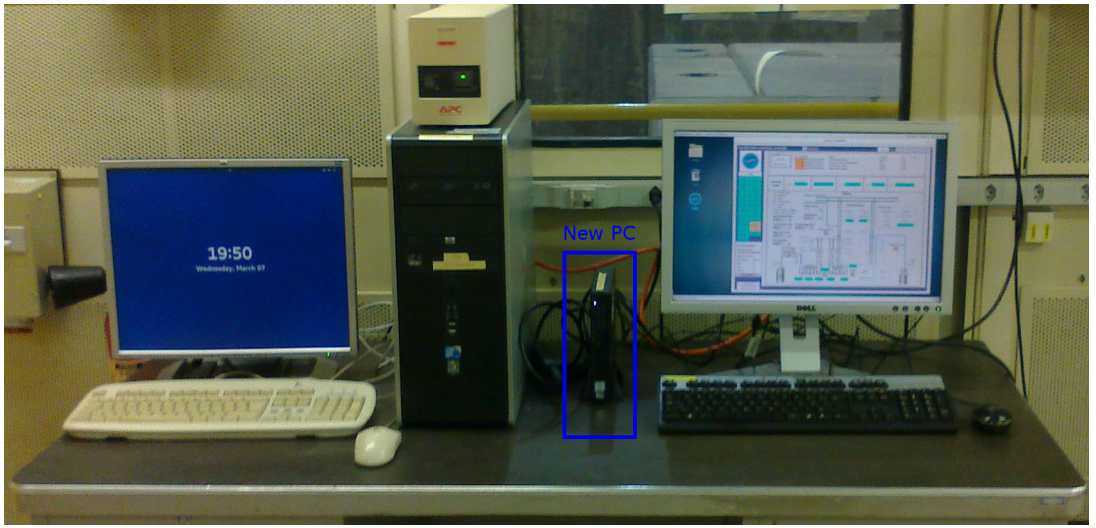
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

CERN/FIS-NUC/0017/2015
CERN/FIS-PAR/007/2017

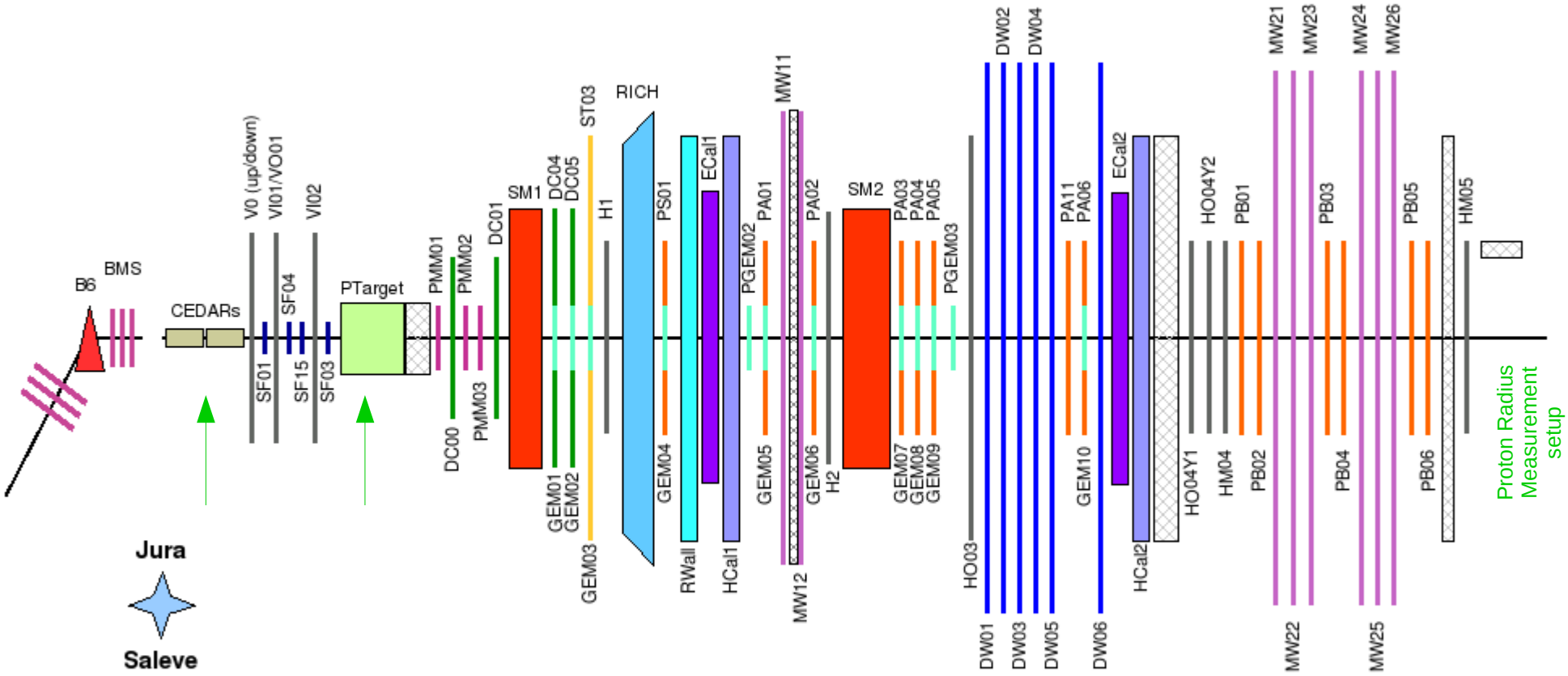

Remote UI
WinCC OA distributed system
Oracle DB
Replica
Layers
Technologies
Supervision
SCADA Siemens WinCC OA 3.15
Ethernet
DIM
DIM
DIM
DIM
OPC
OPC
OPC
DIM Servers
MODbus Servers
DIP Server
DAQ
CERN
MySQL DB
CAENet
MODbus
RS-232
CANbus
PLCs
NMR
ELMBs
PLCs
Front-ends
OPC/ DIM/ DIP/ MOD-Bus
My-SQL
Communi-cation protocols
PLC/ ELMB
Field buses
CAEN HV and VME Crates
ISEG HV
Wiener VME Crates and LV
Gas Flow
Magnetic Fields
Temperature, Humidity, Pressure
LV
ECALs, HCALs, Triggers, Vetos
Target, Pol. Target
Silicon Cryo.
CEDARs, Beamline, Radiation
Devices
Sensors/ devices
COMPASS Experiment Sub-Detectors and Equipment

DCS main PC → exchanged

- Same name → pccompass07 → no changes for users
- 4 GB of RAM from Old pccompass07 moved to pccompass04
- Old PC → spare PC



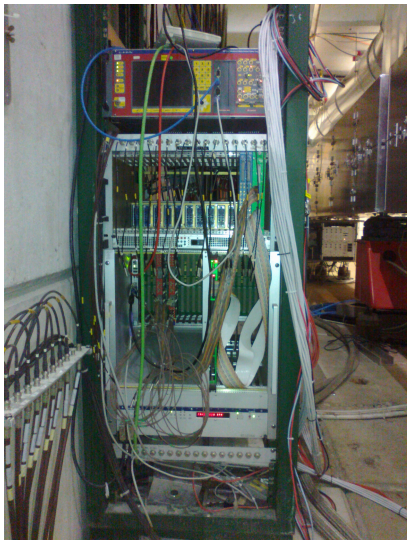
HDD for manual backups moved to pccompass04

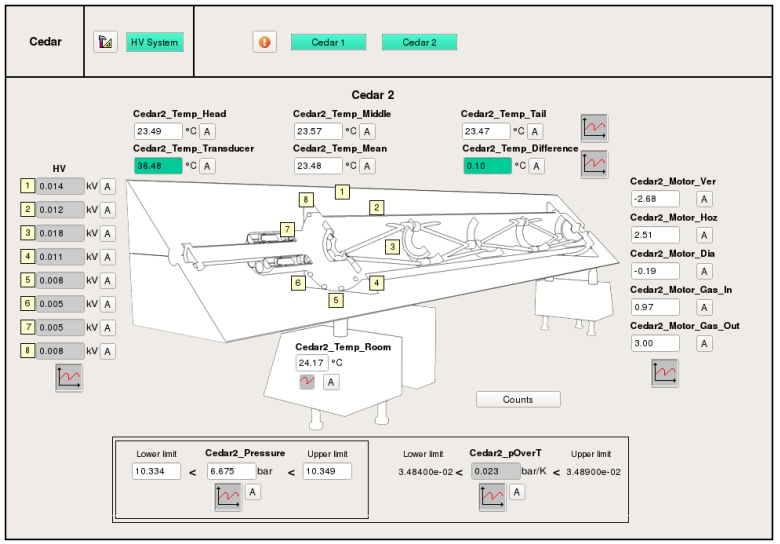

B6
BMS
CEDARs
V0 (up/down)
VI01/VO01
SF01
SF04
SF15
SF03
VI02
PTarget
PMM01
PMM02
PMM03
DC00
DC01
SM1
DC04
DC05
GEM01
GEM02
ST03
GEM03
H1
RICH
PS01
GEM04
RWall
ECal1
HCal1
PGEM02
PA01
GEM05
MW11
MW12
PA02
GEM06
H2
SM2
PA03
PA04
PA05
GEM07
GEM08
GEM09
PGEM03
HO03
DW01
DW02
DW03
DW04
DW05
PA11
PA06
GEM10
DW06
ECal2
HCal2
HO04Y1
HO04Y2
HM04
PB01
PB02
MW21
MW22
MW23
PB03
PB04
MW24
MW25
MW26
PB05
PB06
HM05
Proton Radius Measurement setup
Jura
Saleve

CEDARs

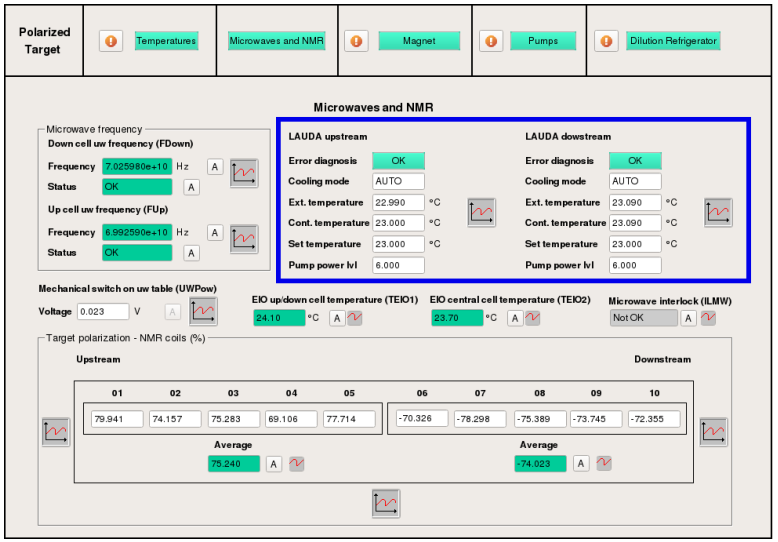
Integration ongoing:

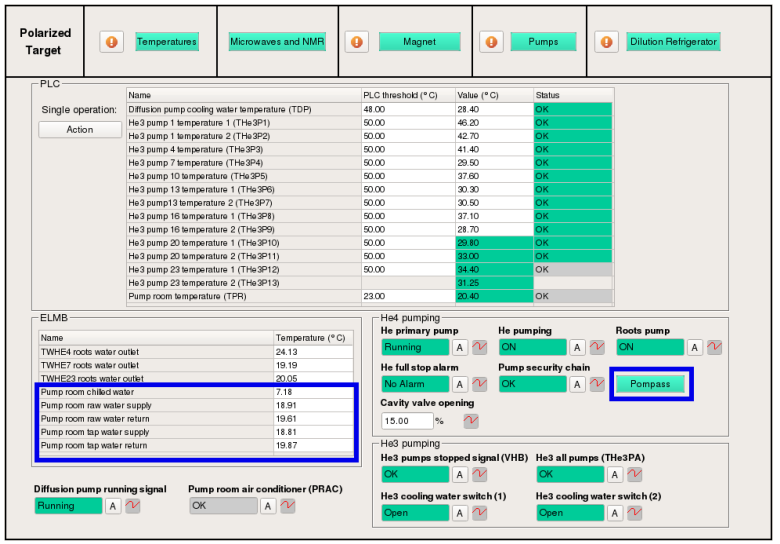
- High voltage
- VME crate
- DIP monitoring restarted and working

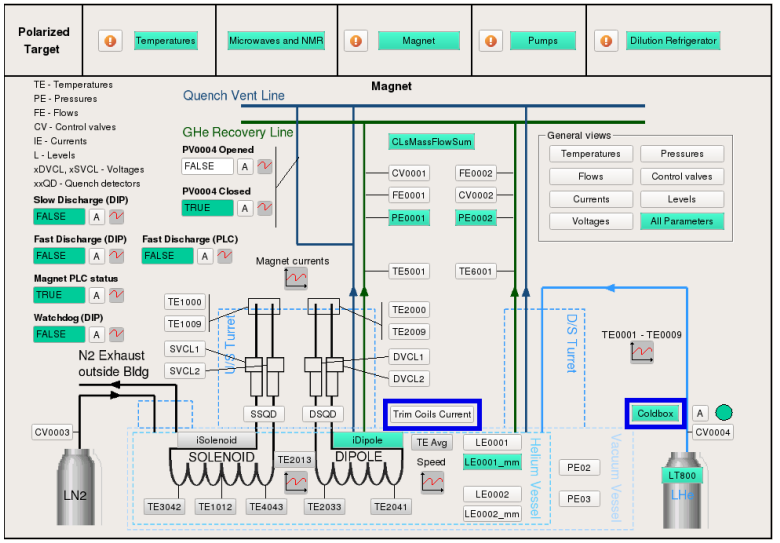




Polarized Target





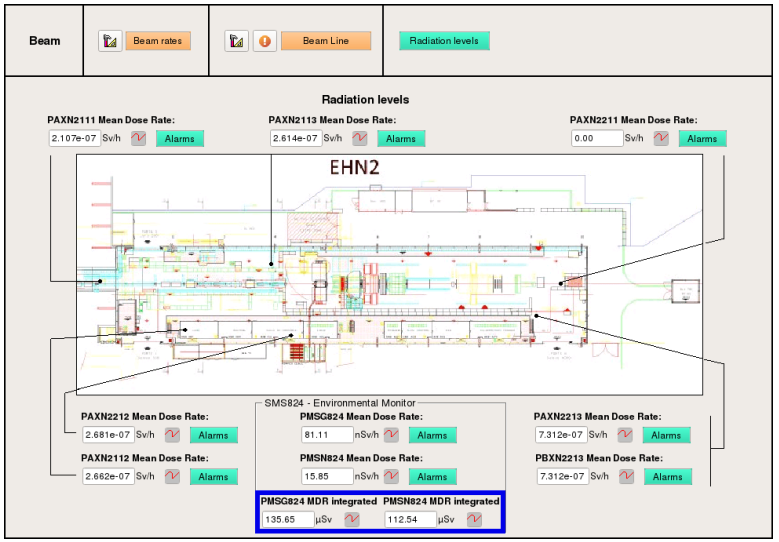


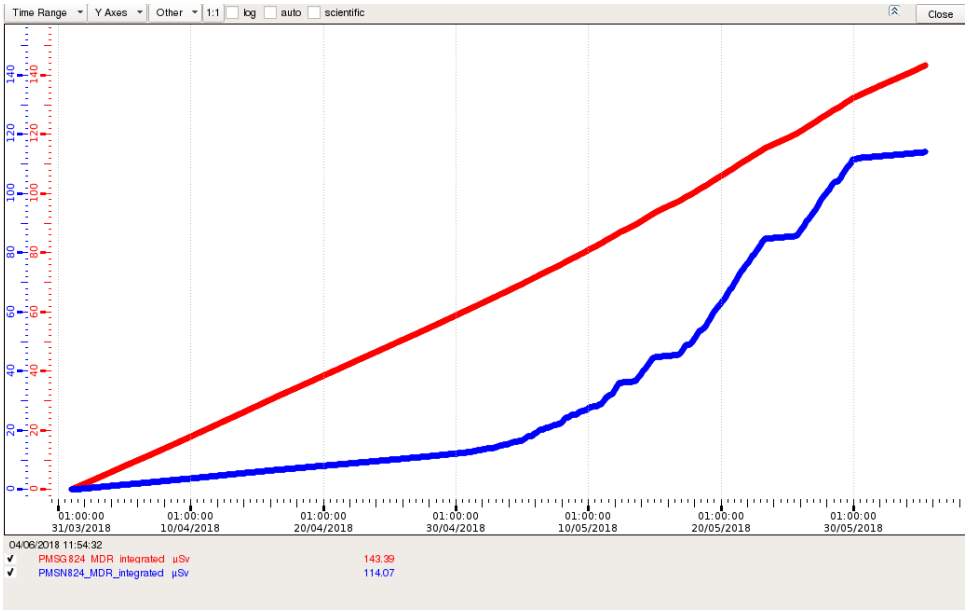
Monitoring improved

- Temperature
- Cold box
- He4 pump system
- Trim coils current

Alarms and notifications

Radiation levels

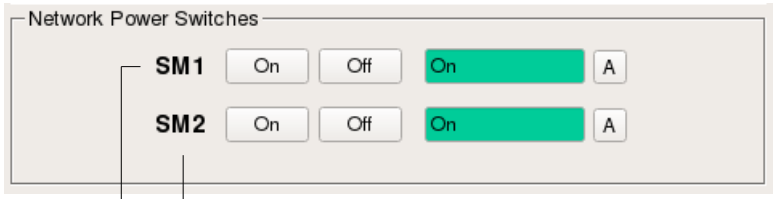




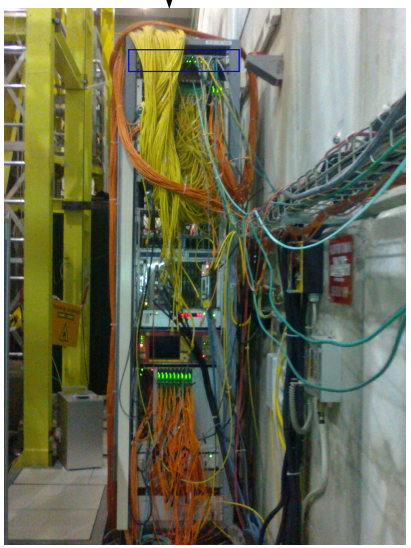
Environmental monitoring:

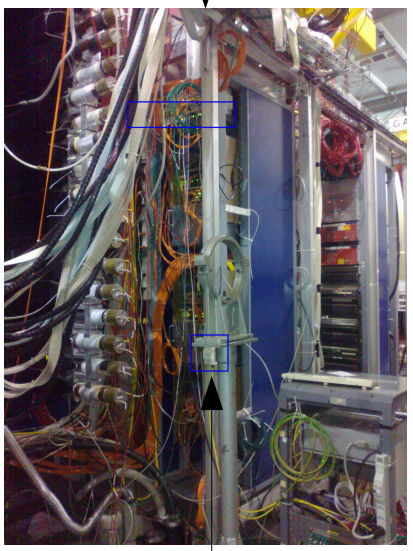
- Integrated dose

Network switches – remote control

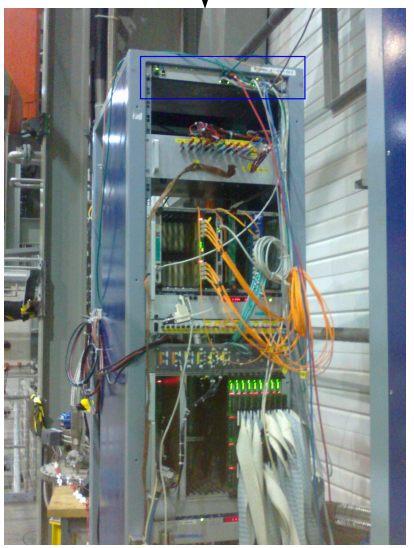


No remote control for the switch in the gallery

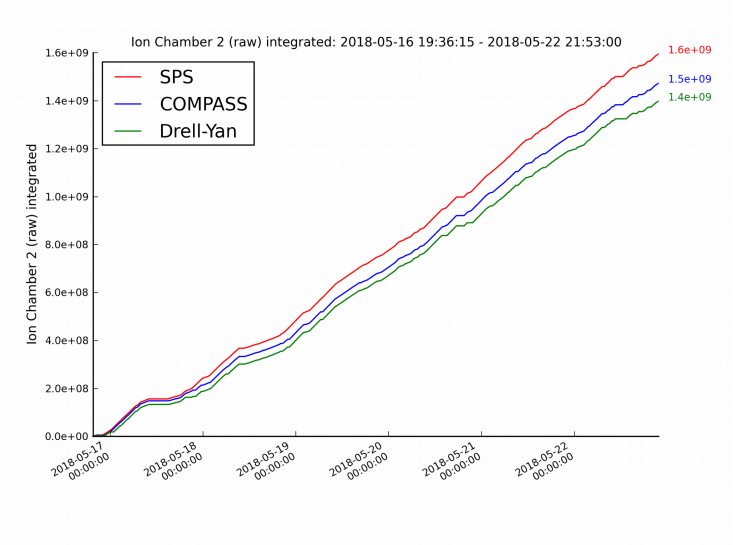


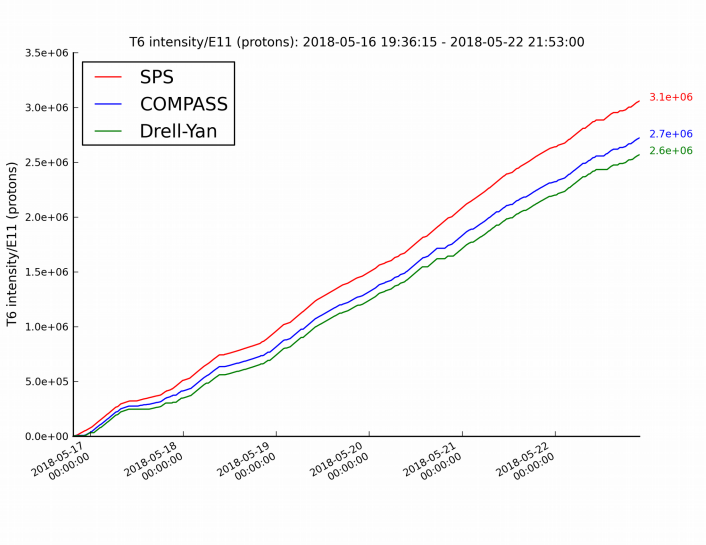


Power switch



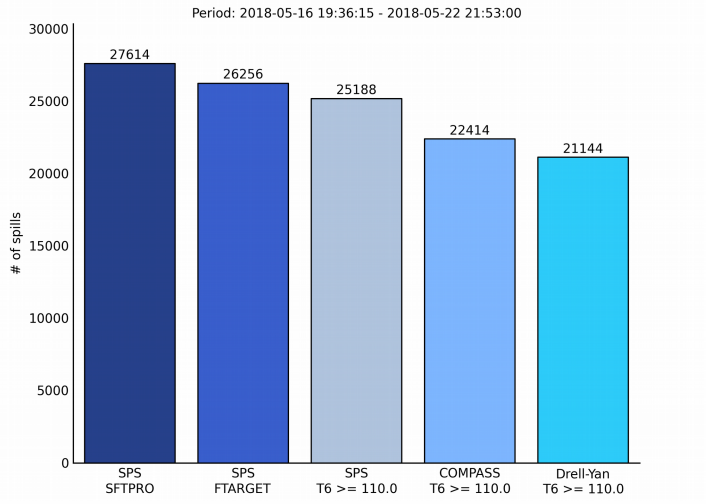
Others

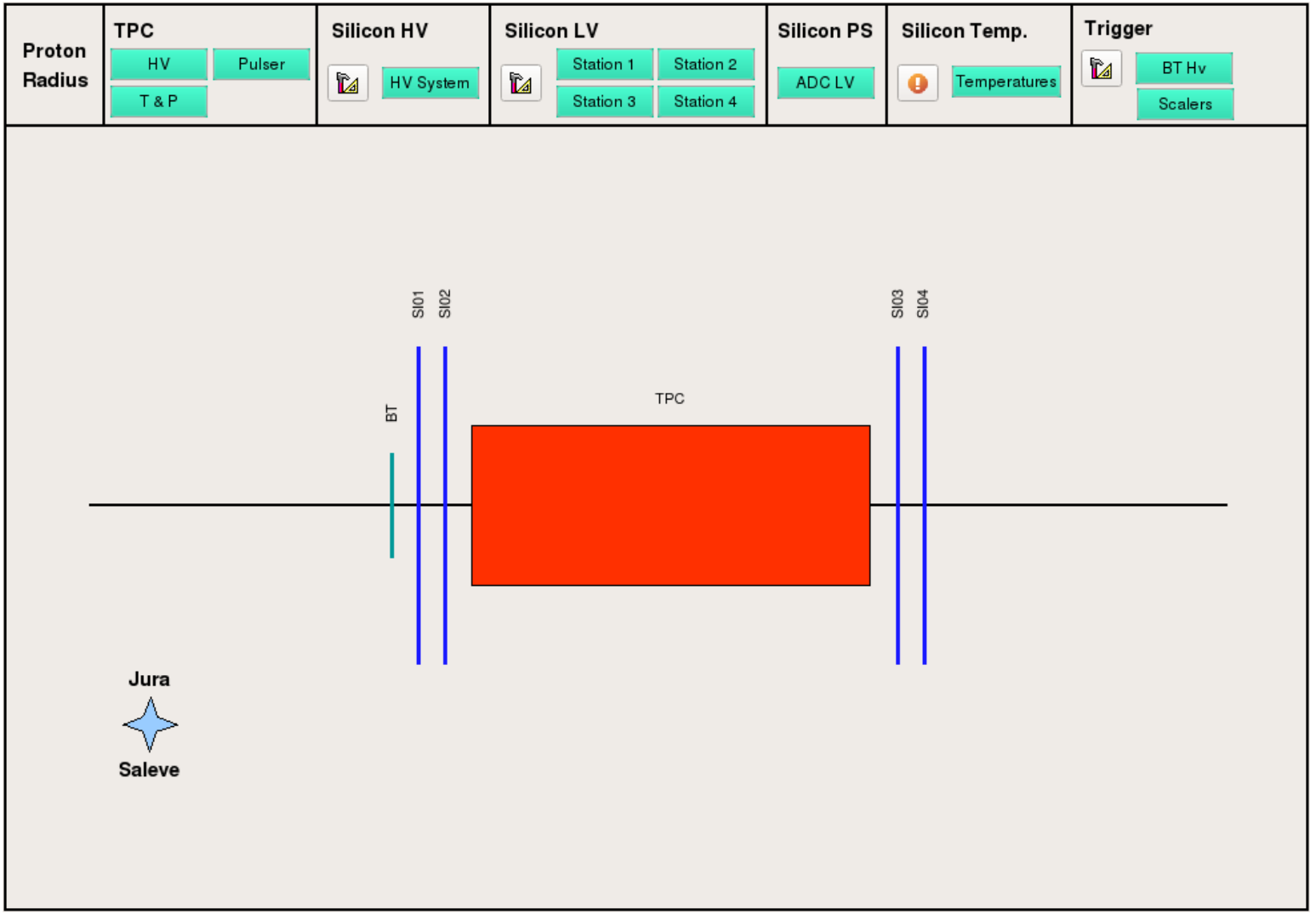




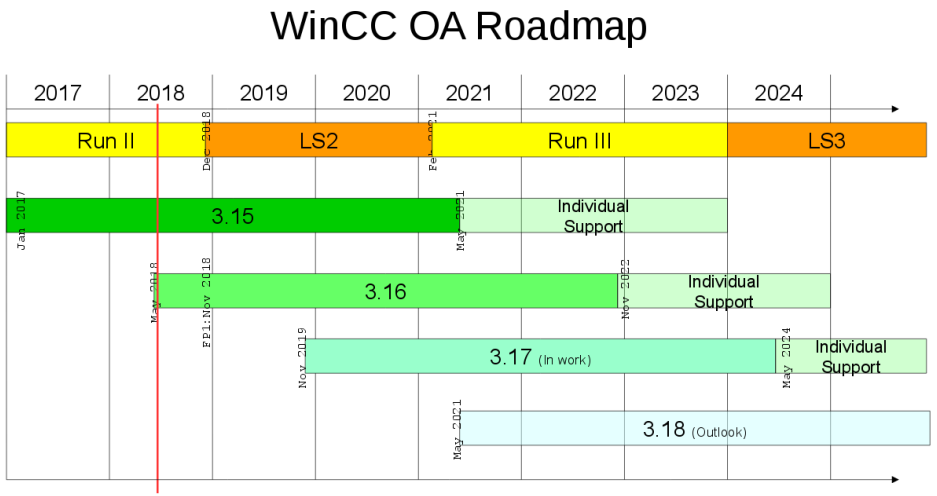
Tool to:

- Count spills
- Integrate T6, ion chamber 2
- Calculate mean values
  - Dead times
  - T6
  - Ion chamber 2




Proton Radius
TPC
HV
Pulser
T & P
Silicon HV
HV System
Silicon LV
Station 1
Station 2
Station 3
Station 4
Silicon PS
ADC LV
Silicon Temp.
Temperatures
Trigger
BT Hv
Scalers
SI01
SI02
SI03
SI04
BT
TPC
Jura
Saleve

WinCC OA



JCOP FWWG 29 May 2018

Proposed WinCC OA roadmap

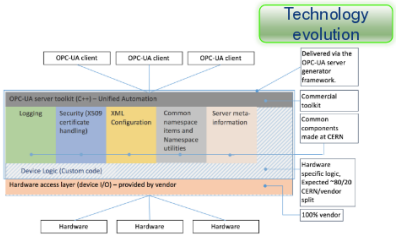
- WinCC OA 3.15
  - Current production version
  - Maintained until end of LS2
- WinCC OA 3.16
  - „Pilot" use starting now (ie. ALICE, protoDUNE)
  - Official support starting in Autumn 2018
- Beginning of Run III?
  - The decision depends on the content/compatibility/timing of WinCC OA 3.17 ans LS3 schedule
  - Upgrade to 3.17 during LS2 may be on very tight schedule (injectors startup in Q2 2020, commissioning of PSB in April)

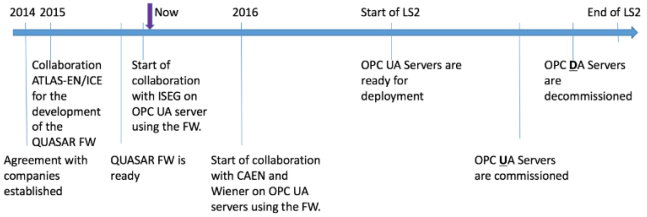
OPC-DA → OPC-UA migration

CAEN, Iseg, Wiener, Schneider, Siemens, CANOpen

OPC Evolution

- OPC-DA is being phased out -> Need to move to OPC Unified Architecture
- Decision to develop the OPC servers at CERN
  - Within CERN
    - EN-ICE and ATLAS collaborate to develop QUASAR, a framework which provides consistent implementations of OPC-UA servers
  - Outwith CERN
    - Planned collaborations with CAEN, Wiener and ISEG.
    - CERN to implement ~80% of device logic, expert knowledge required from commercial partners for 20% optimisation.
    - Per-vendor collaboration agreements to be negotiated to agree on goals and responsibilities of collaborations.
  - KT involved to assist with open sourcing QUASAR
    - LGPLv3 licensed.





IV JCOP Workshop 2015

Implementation Progress

The 3 servers are based on the quasar framework, with the HAL layer being provided by each vendor. Goal: Production ready by start of LS2.

Server Implementations: Status

Company:	ISEG	CAEN	Wiener
HAL status:	*linux: OK.* *win64: work needed.*	*linux: OK.* *win64: OK.*	*linux: work needed.* *win64: work needed.* *(NB: work has started)*
Server status	*linux: available, in end-user testing (ATLAS, ALICE)* *Win64: HAL required.*	*linux: available, in end-user testing (ATLAS)* *Win64: 'just' cross-compilation required.*	*linux: HAL required.* *Win64: HAL required.*
Overall status:	On track.	On track.	Effort required.

JCOP FWWG 6 February 2018

OPC-DA → OPC-UA migration

COMPASS non-compatible hardware

CAN

Currently using:

- PEAK PCI
- KVASER PCI

PCI cards to be phased out!

CAN Evolution

Today's Status

- Various CAN interfaces
  - ISEG: PEAK (PCI & USB) and SYSTEC(USB), Wiener: KVASER(PCI), SYSTEC(USB) ELMB: KVASER(PCI), SYSTEC(USB)
- Different ways to interface these gateways to the OPC Servers
- Newly supported and recommended Ethernet-CAN interface: ANAGATE based on Linux running on ARM CPUs

Technology evolution

Plans

- Ongoing and LS2 plans (with OPC DA being phased out)
  - Homogenize the CAN hardware and software across CERN to facilitate installation, maintenance and support
  - Drop of the support of the Wrappers (after OPC DA decommissioning)
  - ANAGATE: recommended solution for upgrade and new developments
    - SYSTEC will continue to be supported beyond LS2
- LS3 and beyond
  - Recommendations to JCOP to evaluate alternatives to CANbus for future detector electronics

CERN | EN ENGINEERING DEPARTMENT | ICE INDUSTRIAL CONTROL

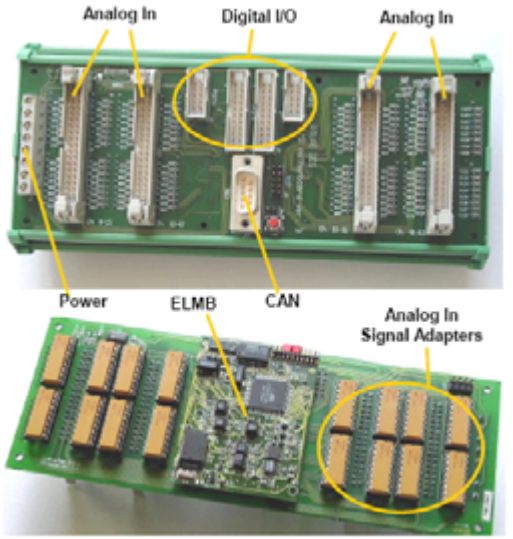
Philippe Gayet EN-ICE 9

IV JCOP Workshop 2015

Embedded Local Monitor Board (ELMB)

ELMB:

- General purpose plug-on I/O module
- CANbus industry strandard
- CANOpen as high-level communication protocol
- Used to read analog inputs and for digital input and output
- Old and not produced anymore



Nowadays, other boards exist on the market

- Raspberry Pi, Beaglebone, etc

→ Might be an option for low radiation areas, ex: barracks

CERN ELMB++/ELMB2:

ELMB successor requirements

Status and Plans for the Replacement of the ELMB → Radiation hard option

ELMB++ monthly meeting

Discussion on MDT RO in Phase II

SLiC

SLiC:

- Used to monitor and control old CAEN equipment:
  - SY127, SY403 and SY527

- SLC5 / i386, custom kernel build options
  - SLC5 / i386 - End of General User Support: 31st March 2017 (Dedicated experiment support is maintained)
  - Dedicated support for experiments and accelerator controls will be maintained for four months after LHC Long Shutdown 2 start: until 31st of March 2019.

- CAEN A1303 PCI CAENET controllers, driver v 1.7

- COMPASS is the only known user at CERN

- Not supported since many years

Plan

- Upgrade WinCC OA to recommended/supported version
- Upgrade DCS hardware *
- Migrate from OPC-DA to OPC-UA *
- Update DCS project **

* When not possible: freeze the components and maintain on a best effort basis

** Might be an opportunity to create a new project and include features not available at the time the current project was created, ex: JCOP FSM.

Thank you!