Access strategy in the accelerator complex and experimental areas

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For the Access Team

thanks to P. Ninin, E. Sanchez-Corral, T. Ladzinski

Overview

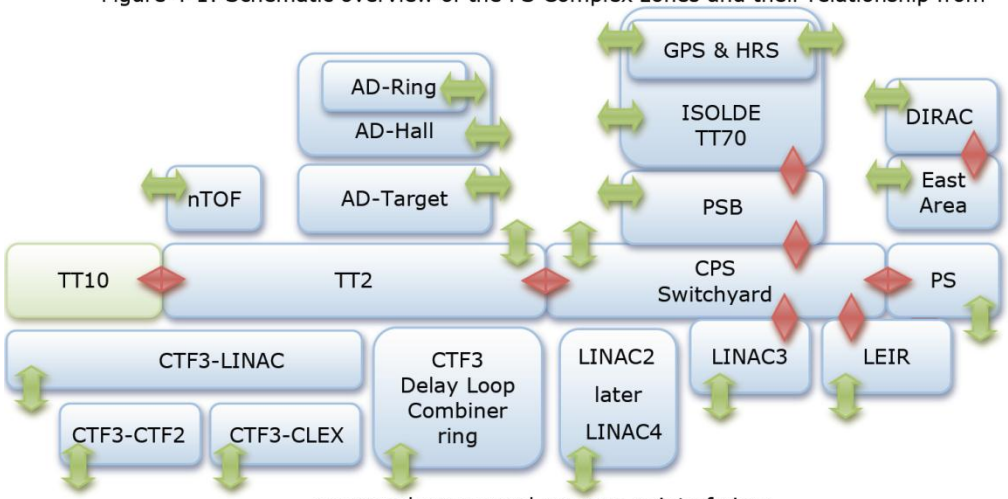
- PS
  - PS Primary Areas Project (PS PSS)
    - PSPSS Main features
    - PSPSS Installation planning
  - PS Secondary Areas news
- SPS
  - SPS Primary Access Control Project
  - SPS Secondary Areas news
- LHC
  - LACS/LASS Main updates
  - LHC Access Improvement Programme

PS PSS – PS Personnel Safety System

- Main difference from LHC is the different layout of the machines involved
- LHC has 5 chains & 12 EIS-f/m
- PS has 17 chains & ~100 EIS-f/m

	LHC	PS
Access Points	36	28
Doors	265	~ 100
Patrol Boxes	330	~ 110
EIS-f/m/ext	13	~ 100
Interlock "Chains"	5	17

Figure 4-1: Schematic overview of the PS Complex zones and their relationship from



personnel access and passage point of view.

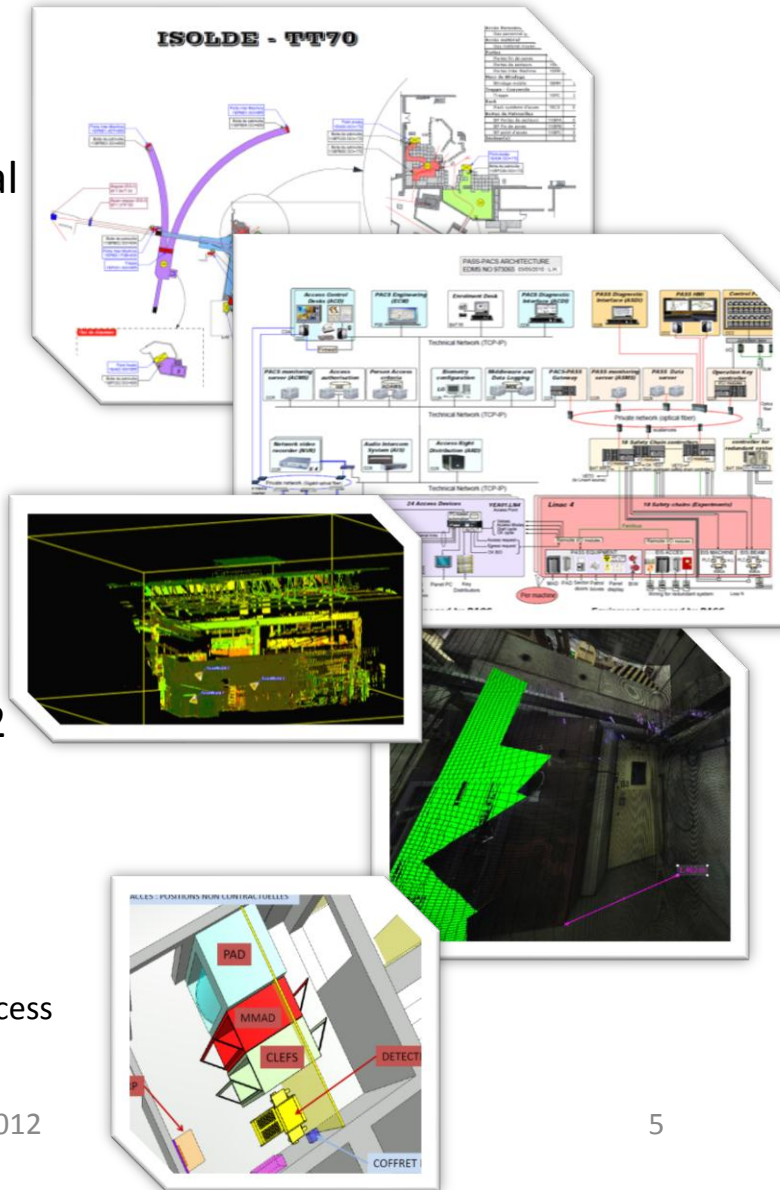
 from Functional Specification for PACS (901505)

PS PSS Main Features

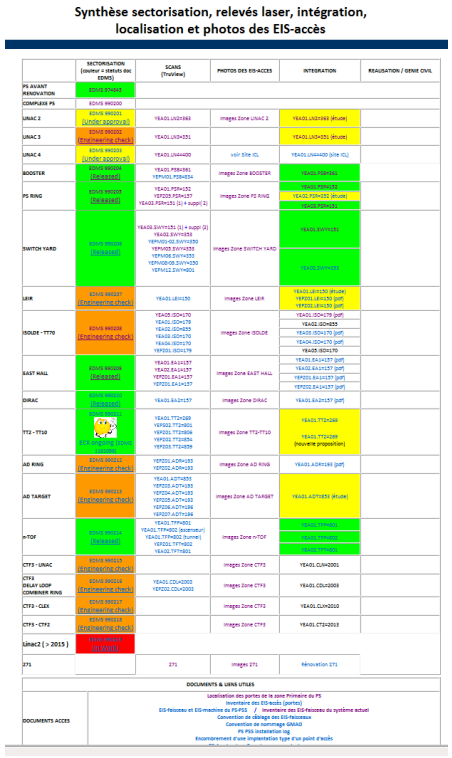
- Main differences wrt LHC Access System
  - Although Radiological risks covered, some other risks considered
    - External interlocks in special cases (ventilation, laser, etc…)
  - New Modes
    - *Special permit* mode - Magnet testing for specialists only
    - *Test EIS-f* mode - Testing of all EIS of a Zone by interlocking the upstream chain
  - Public Address
  - *Mini-MAD* "drawer" in Access Point for small material
  - Maintenance doors
- Main similarities
  - Biometrics (2 eyes)
  - MAD / PAD (improved unicity check)
  - Keys (trapped keys & improved key-taking sequence)

PS PSS Design Status

- Functional Specification & Sectorisation
  - Sectorisation documents under final approval
- Risk analysis
  - Safety functions defined
- Technical Specification done
- System design completed
  - Architecture design
  - Equipment selected & validated
- Test platform
  - Factory Acceptance tests completed
  - System validation on CERN platform 2012 Q2
  - PS0 test platform in buiding 271
- Integration studies ongoing
  - Area 3D scans done
  - Integration Studies
    - Difficulties due to lack of space for cables and access points

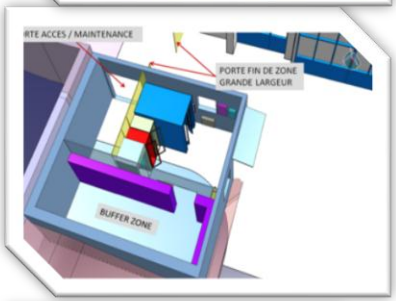


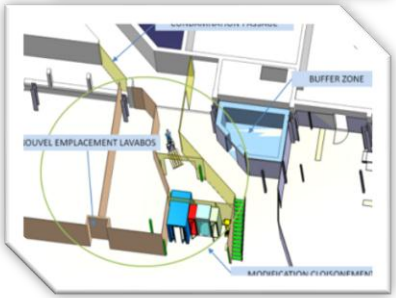
PS PSS Work in Progress

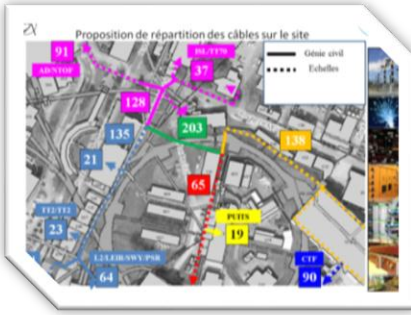

Synthèse sectorisation, relevés laser, intégration, localisation et photos des EIS-accès

[PS PSS Sectorization and integration webpage](#)
Credits S. Di Luca

- Installation of Rack Control Room
  - Building 271
- First functional tests on test platform
- Civil engineering preparations for LS1
- New Buffer Zones
  - integrated with access points
  - DGS/RP & EN/MME collaboration
  - Optimize installation works
- Preparation of technical infrastructure for Installation
  - Support from EN/MEF
  - Optical fiber network
  - Cabling for Power, Controls and I/Os
    - With EN/EL & IT/CS
- Cabling galleries
  - Cable tranches or new galleries have to be made with EN/EL, GS/SE
  - Major effort to clean existing cable trays and install new cables







PS PSS Installation planning

- **Constraints** for planning during LS1
  - Requirements for Machine run
    - Linac3, CTF, ISOLDE ? - Operation dates still to be confirmed
    - Current system must be kept fully operational for these zones, including interlocks
  - Requirements to give Access
    - Current system must provide full access control functionality (but not interlock)
  - RP Constraints
    - ALARA working conditions, decay time for some areas
    - DIMR Procedure
  - Coactivity Management
    - Coordinated via EN-MEF (e.g. route Goward shielding)
- Objective
  - Installations **starting** in 2012 Q4
  - **Install all zones during LS1** starting with zones in the LHC injector chain
    - 2-4 months per zone - 2 zones installed in paralel
  - System Commissioning & Testing (BE DSO & OP) – 2 months – **Jan&Feb 2014**
    - LHC injectors operational by April 2014
    - Linac4 must be ready for HwC in 2013 Q1

PS PSS Installation Schedule

EDMS 1164433 v3

PS PSS Safety & Access system - Installation & commissioning planning during LS1

Last update: LS1 preparation meeting 25/11/2011

PS PSS I&C Stategy:

PSS inst. planning: RP & LS1 works constraints & PSS system (current, new) operation requirements

PSS Commissioning planning: safety chains and PSS system (new) operation requirements

works preparation | zone PSS PSS inst. & commissioning zone | PSS system commissioning | zone PSS operation

EN-MEF to correct/complete

* List of PAs in worksheet AccessPoint-Planning-Contraints

ZONE	Instal. order	PSS inst. duration (months)	Access Points (to be completed *)	Commiss. Order	New PSS sys Operation required	Beam to machines - LS1 Operation requirements
LINAC 4	1	2	YEA01.LN4=400	1	Mar-13	01.May.13
LINAC 2	2	2	YEA01.LN2=363	2	Mar-14	01.March.14
BOOSTER	3	2	YEA01.PSB=361	3	Mar-14	20.March.14
TT2.TT10	4	2	YEA01.TT2=269	6	Mar-14	01.May.14
CPS Switch Yard	5	2	YEA01.SWY=151 , YEA02.SWY=353 new RF	4	Mar-14	20.March.14
PS RING (2)	6	4	YEA01.PSR=152, YEA02.PSR=352, YEA03.PSR=151	5	Mar-14	10.April.14
nTOF-Primaire (1)	7	2	YEA01.TFP=801, YEA01.TFP=802	7	Mar-14	
nTOF-Target	8	2	YEA02.TFT=801	8	?	
EAST HALL	9	2	YEA02.EA1=157	9	?	
DIRAC	10	2	YEA01.EA2=157	10	?	
AD TARGET	11	2	YEA01.ADT=823	11	Apr-14	
AD RING	12	2	YEA01.ADR=193	12	Apr-14	
LINAC 3 (non-interlocked)	13	2	YEA01.LN3=351	13	non-interlocked	2*13wks
LEIR	14	2	YEA01.LEI=150	14	Aug 2014?	
ISOLDE / TT70	15	4	5 PA	15	?	? (ISO)
CTF3.LINAC	16	2	1	16	?	? (CTF3)
CTF3.DL/CR	17	2	1	17	?	?
CTF3.CLEX	18	2	1	18	?	?
CTF3.CTF2	19	2	1	19	?	?

2012: Apr May Jun Jul Aug Sept Oct Nov Dec

2013: Jan Feb Mar Apr May Jun Jul Aug Oct Nov Dec

2014: Jan Feb Mar Apr May

LN4 PSS inst. (1 AP) | LN4 HW Commissioning | LN2 & PSB start-up

LN2 PSS inst. (1 AP) | SPS start-up

Access point civil eng.: *B361* | PSB PSS inst. (1 PA)

Access points civil eng.: B269 | TT2 PSS inst. (1 PA)

works Rte Goward

Access points civil eng. B151, B353 | SWY PSS inst. (2 AP) | PS start-up

Access points civil eng.: *B152,* B151, B352 | PSR PSS inst. (3 AP)

TFP PSS inst. (1 AP) | PS PSS system

TFT PSS inst. (2 AP) | Commissioning

EA1 PSS inst. (2 AP) | &

EA2 PSS inst. (1 AP) | DSO Tests

ADT PSS inst. (1 AP)

ADR PSS inst. (1 AP)

~~LN3 PSS inst. (1 AP)~~

LEI PSS inst. (1 AP)

ISO PSS inst. (5 AP)

Access points civil eng. | CLN PSS inst. (1 AP)

Access points civil eng. | CDL PSS inst. (1 AP)

Access points civil eng. | CLX PSS inst. (1 AP)

CT2 PSS inst. (1 AP)

Copper cables & optical fibers during 2012 and LS1

Operation of new PS PSS progressively following Accelerators start-up

10-01-2014-28-02-2014 CPS&CTF3 reserved for PS PSS commissioning

PS PSS commissioned, ready for OPERATION

(1) nTOF Primaire same safety chain as TT2.TT70

(2) SWY & PSR in same PLC, but 2 different safety chains

LN3 - LS1 Operation : 2 runs of 13 weeks, total of 26 weeks, BUT NOT in May-June, July (CV constraints)

ISO - LS1 operation: run with own source, 3 months Apr-June/2013

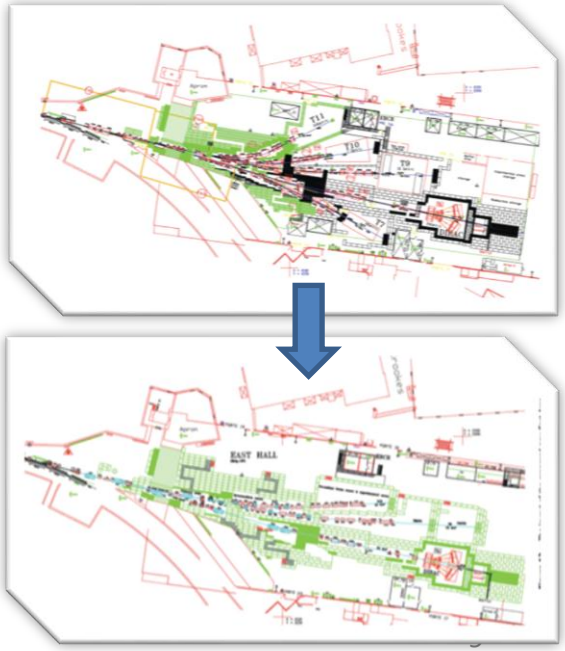
ISOLDE is NOT running but HIE-ISOLDE work continues or has high priority for work in that area according to their planning

CTF3 - LS1 operation: Unkown! Outside CV works in bld 378 (so NOT in MAY,June, July)

PS Secondary Areas

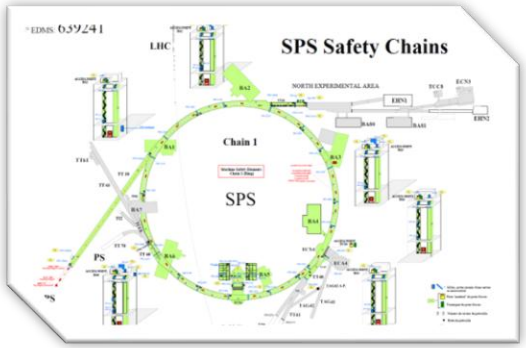
- Works during LS1 (AD & East Hall)
  - Add dosimeter badge readers & access control to restrict patrol mode to “trained” users
  - Similar to new North Area system
  - New Layout to include ELENA in AD

- Depending on the East Area Renovation project (cf. East Area Day Workshop)
  - Change Secondary Access System Layout
  - Spin-off command of EIS-f to “CESAR-type” control
  - Install building access control to the Hall 157
    - Like 193 (AD) and EHN1 (North Area)



SPS Primary Access

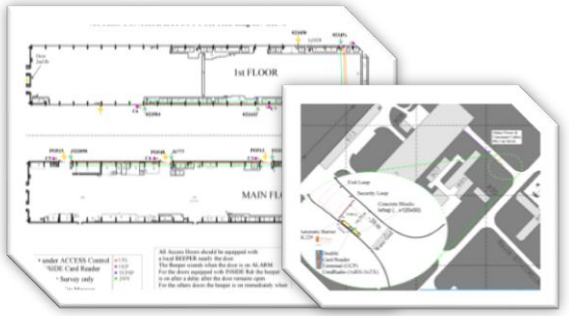
- 2011-2012
  - Upgrade of SCADA supervision
    - Non-supported FactoryLink → WinCC
  - "Usual" modifications
    - HiRadMat & other resectorisations
- During LS1
  - No special actions are foreseen
  - IMPACT tool can be used if needed

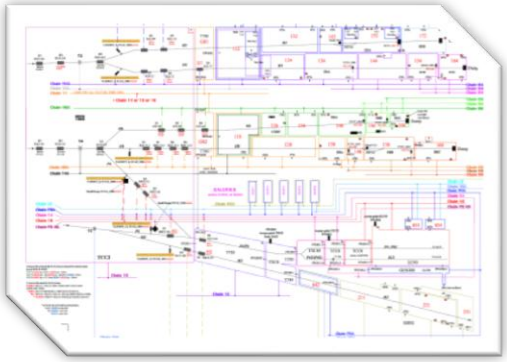


- New System Deployment during LS2 (when?)
  - Complete rebuilding is necessary
    - Obsolete safety & control architecture
    - Rapidly diminishing support for PLCs (S5)
  - Risk analysis phase started
    - Similarities with PS&LHC shall be explored
  - Development to start back-to-back with PS PSS project

SPS Secondary Access

- 2011-2012
  - Access control completely rebuilt in 2011
    - Aligned with PS AD and East Hall Secondary systems
    - Good performance
  - Access control to the NORTH Hall (EHN1) in 2012 Q2
    - Enforce use of dosimeter
    - Reduce vehicle parking on “Salève side”
- During LS1
  - Project for High Intensity Proton Beam
    - LOKN refurbishing
    - Safety Study ongoing
  - Additional access points for EHN1 galleries
    - tbconfirmed





LHC Access Main Updates 2011

- Updates done in 2011-2012
  - Integration of access with Impact
  - Automatic Key Distribution – New sub-mode
    - ECR LHC-Y-EC-0006
    - Deployed, useful during Xmas Break
  - 11 new key distributors
    - For some UJ areas
  - 2 new PADs in PM54 (CMS) installed
  - Biometry upgrade (2 eyes)
    - 9 oo 36 access points installed

LHC Access Improvement Programme

"Improve availability but don't compromise on safety"

consultation with main stakeholders in BE-OP & EN-MEF

LHC Access Improvement Programme

1. Interlock more than just Beam ↔ Access
   - He_2 / Air-tightness / Cryo / Powering
2. Performance Improvements
   - Access point improvements
   - Sectorization improvements
   - Maintenance improvement
   - CCC improvements
3. R2E-motivated relocations

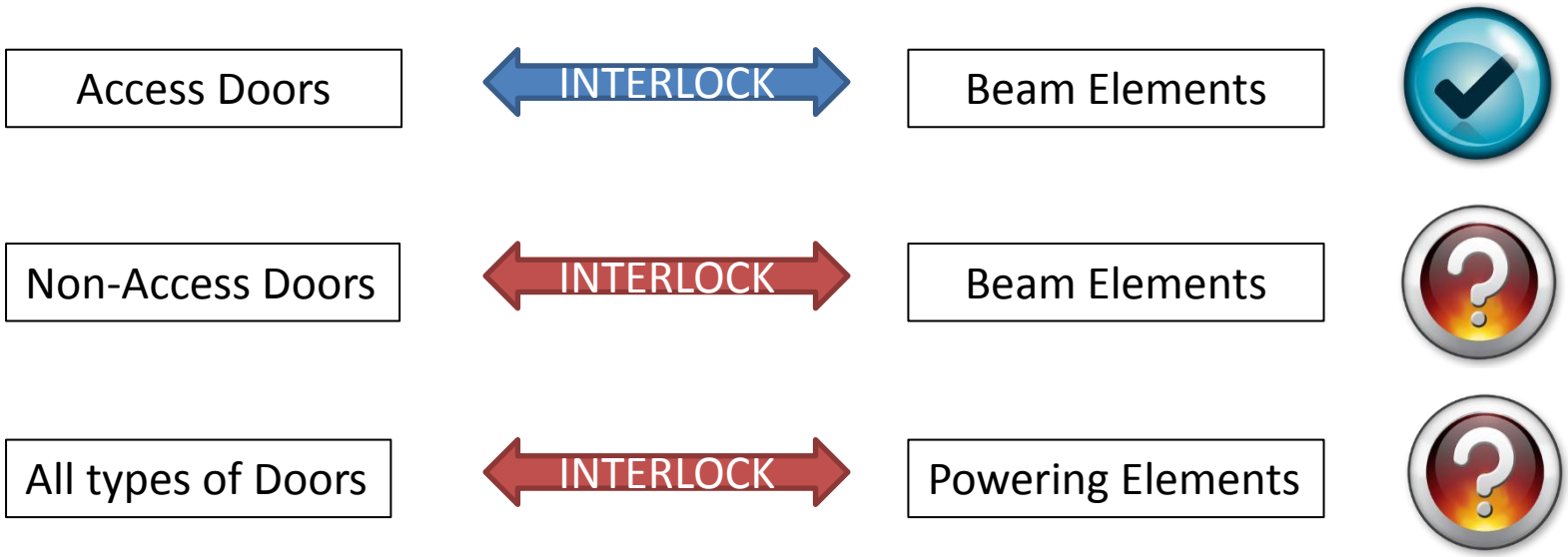
Interlock more than just Beam ↔ Access

- Access doors interlock the beam

- Other types of doors do not interlock the beam… should they ?
  - e.g. Ventilation & Overpressure doors
  - i.e : *Should a LASS-type system contribute to the risk reduction of personnel exposure to Cryo risk, ODH risk or activated air* ?
  - Acceptable impact on machine availability?
    - Should the beam/powering be stopped immediately ?
    - Should the patrols be lost if external envelope is not breached?

- Should a LASS-type system also interlock the power converters ?
  - e.g. using any type of available doors
  - i.e. : *Should a LASS-type system interlock the PIC to reduce the risk of exposure to a He2 discharge during powering tests?*
    - A safety HW interlock to be deployed in LS1, replacing current SW interlocks
    - Technical solution is available and agreed with PIC
  - Acceptable impact on the machine availability?
    - Increased number of elements that firmly interlock the powering.
    - Impact of safety constraints on availability for powering tests ?
    - Impact on maintenance of the power converters ? (bypass for tests?)

Interlock more than just Beam ↔ Access



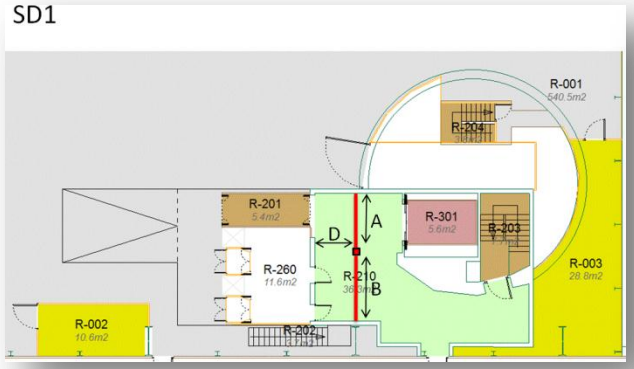
INTERLOCK = HW Safety-type interlock

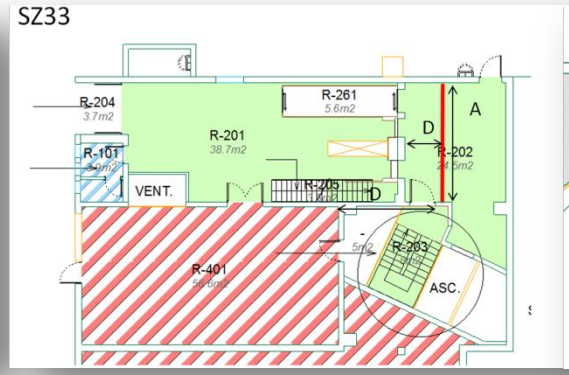
LHC Access Improvement Programme

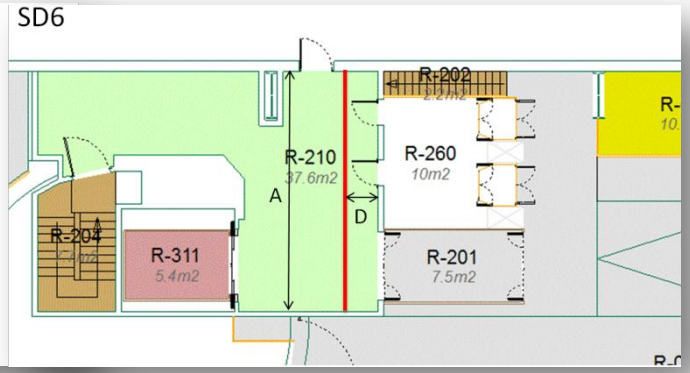
- Access point improvements
  - PAD : Avoid spurious patrol losses
  - MAD : Improve performance by alternative solutions
    - Human supervision in case of difficulty
  - Improve exit procedure
    - No green button
  - Improve information to users on refusal reasons
  - No biometry underground ?
    - if same access right
- Sectorization improvements
  - Improve sectorization (ALARA) of LHC3 and LHC7
  - New Zone/sectors for TZ32 pre-alignment tests for CLIC
  - Provide RP veto for TI2, TI8 and Dumps

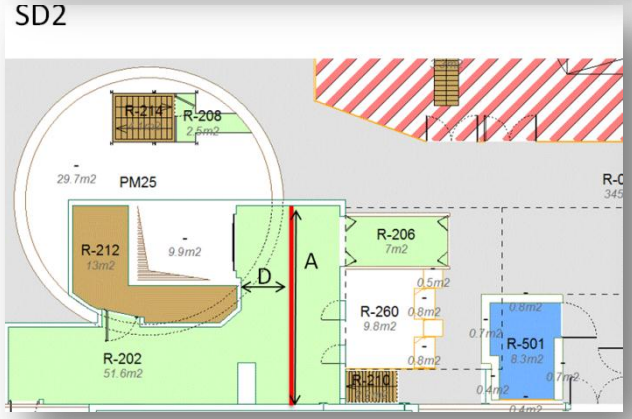
- Maintenance improvement
  - Bypass of the ToP access points
    - Allow maintenance during beam
  - ECR in draft
- CCC improvements
  - Upgrade LASS servers
  - Closely integrate ADaMS and IMPACT
  - Improve monitoring of “really closed” doors in CCC

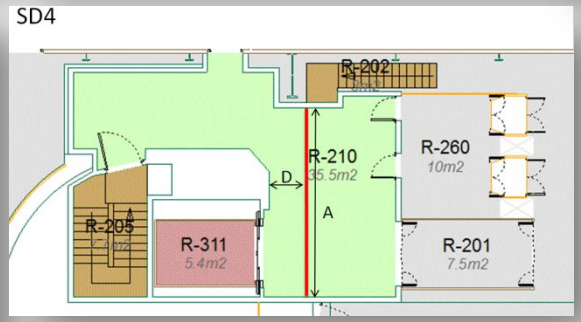
Curtain @ ToPit for Access Maintenance

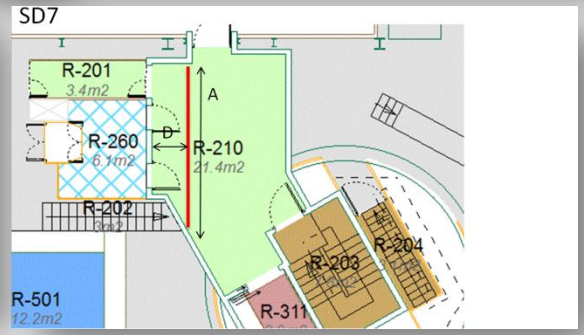




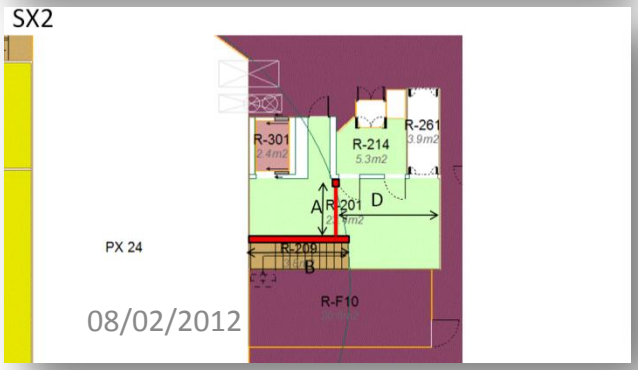


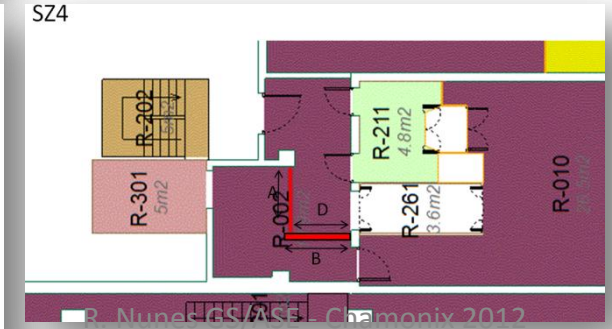


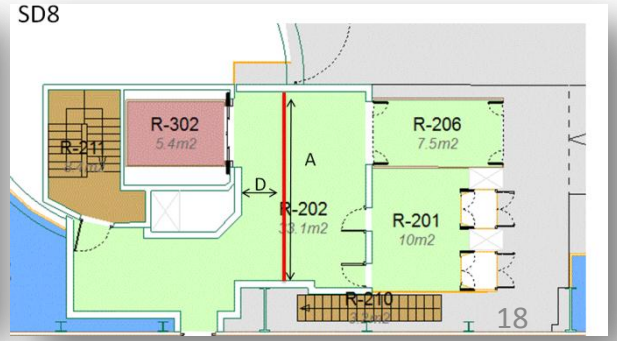




Drawings and layouts S. Di Luca

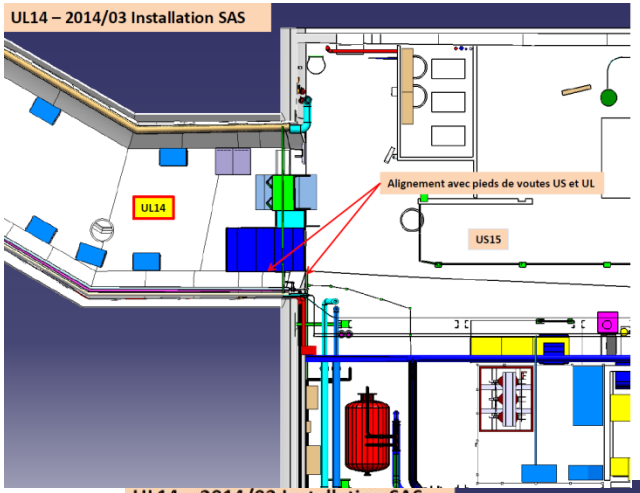


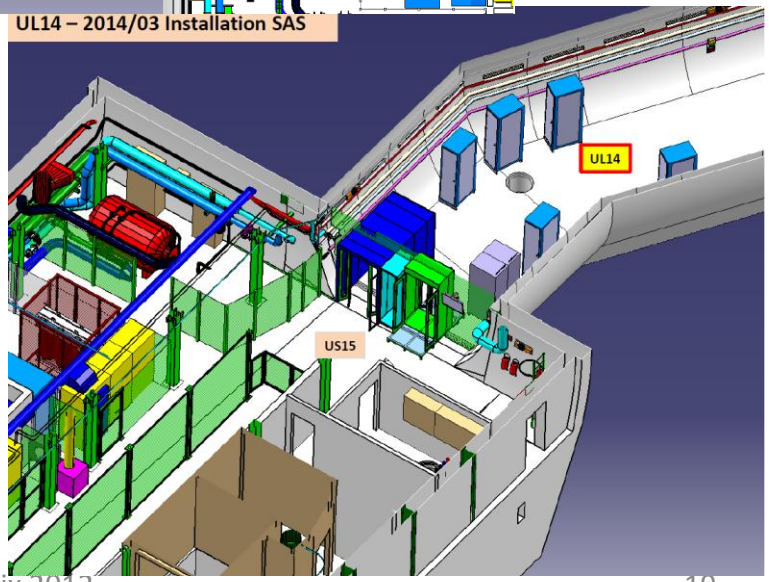




R2E-related Relocations

- Complete Access Point
  - UJ14 → UL14
  - UJ16 → UL16
- Controls racks relocation
  - UJ56 → USC55
  - UJ76 → TZ76





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