Consolidation of access systems for the injector Complex

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in behalf of the PS and SPS access project teams…

GS-ASE-AAS
GS-ASE-SSE
BE-OP

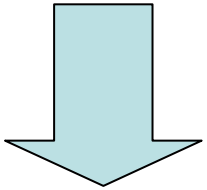
Outline

- PS Access System
  - Current situation
  - Project progress

- SPS Access System
  - Current situation
  - Perspective

Current Situation

- No more spare-parts
- Not possible to add new access points
- Evolution of safety norms



Renovation project launched
(GS/ASE)
In close collaboration with BE

Renovation Project (1/2)

- Objective
  - To secure the PS complex according to the same principles as the one done for the LHC
  - Access control : Biometry, “unicité de passage”
  - Access safety : Compliant with new safety concepts
  - Flexibility required by the operators of the PS complex
  - Installation without impact on operation & schedule

Renovation Project (2/2)

- Large scale project dealing with the replacement of most of the current Access equipment, controls racks and cables as well as the definition and acquisition of all the necessary safety signals from the Important Safety Elements (ISE or EiS) of the various machines.
- Scope of Works
  - **Mechanical** : Access points, doors, grids
  - **Computing**: authorization management distribution, supervision
  - **Safety Automation**: interlocks
  - **Electricity** : cabling, optical fibers, power supply, UPS
  - **Civil Engineering**
  - **preparing for new system and old system dismantling, while operating the accelerators**

Stakeholders

- Department and Equipment Groups
  - BE: Controls, Operation, RF, Safety
  - TE: Beam Transfer, Power Converters, Machine Protection, Vacuum
  - EN: Electricity, Handling, Maintenance & Installation, Dumps
  - GS: Access, Fire brigade, Site Engineering, Administrative Information System
  - IT: Communication systems, Database
  - FP: Procurement
  - PH Experimental areas
  - Safety: Radio Protection, General safety,
  - CERN Internal General Access Authority ?
  - External: External FR-CH ?
- Need the same good collaboration as we had for LHC

PS need of Access

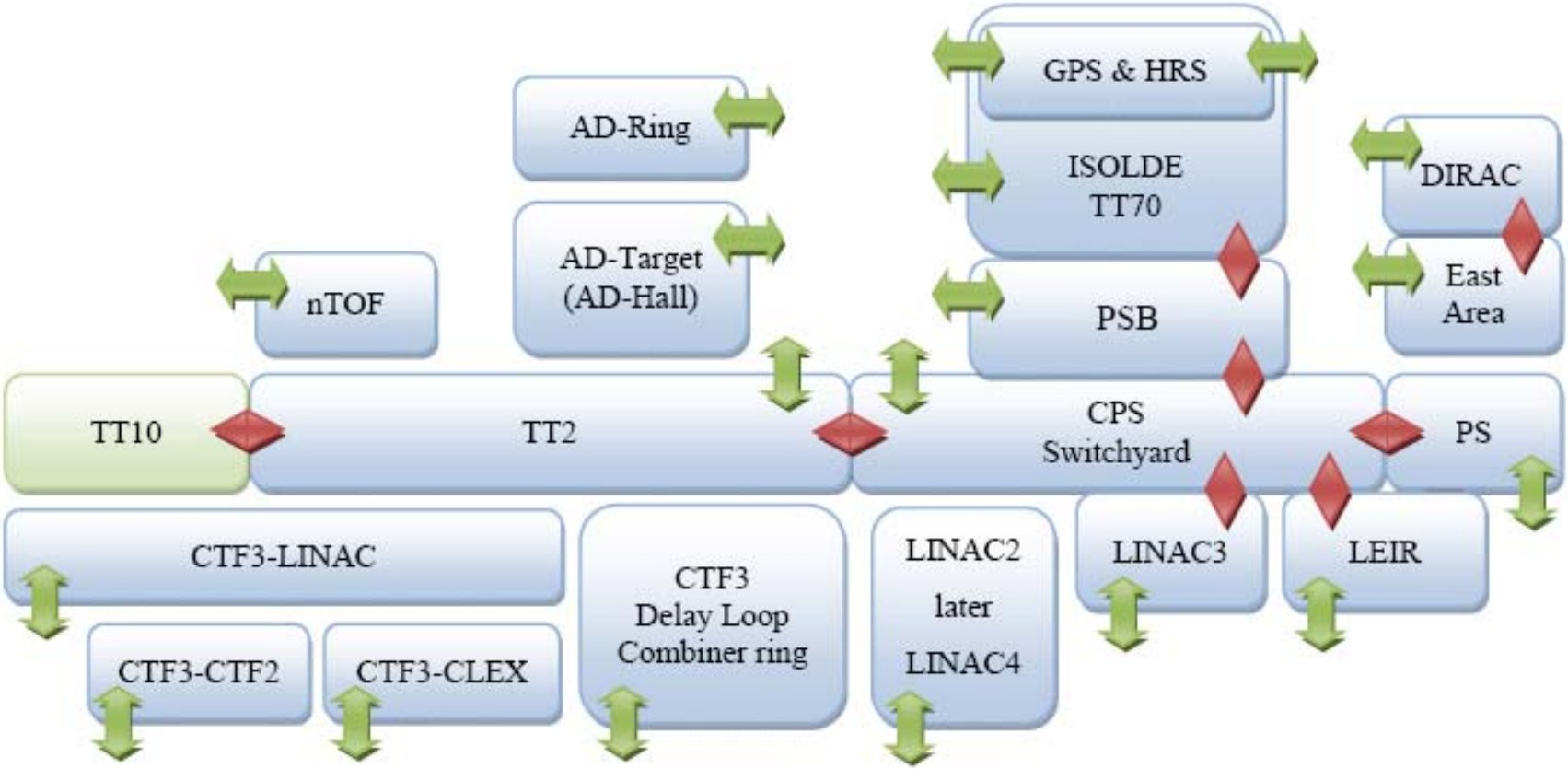
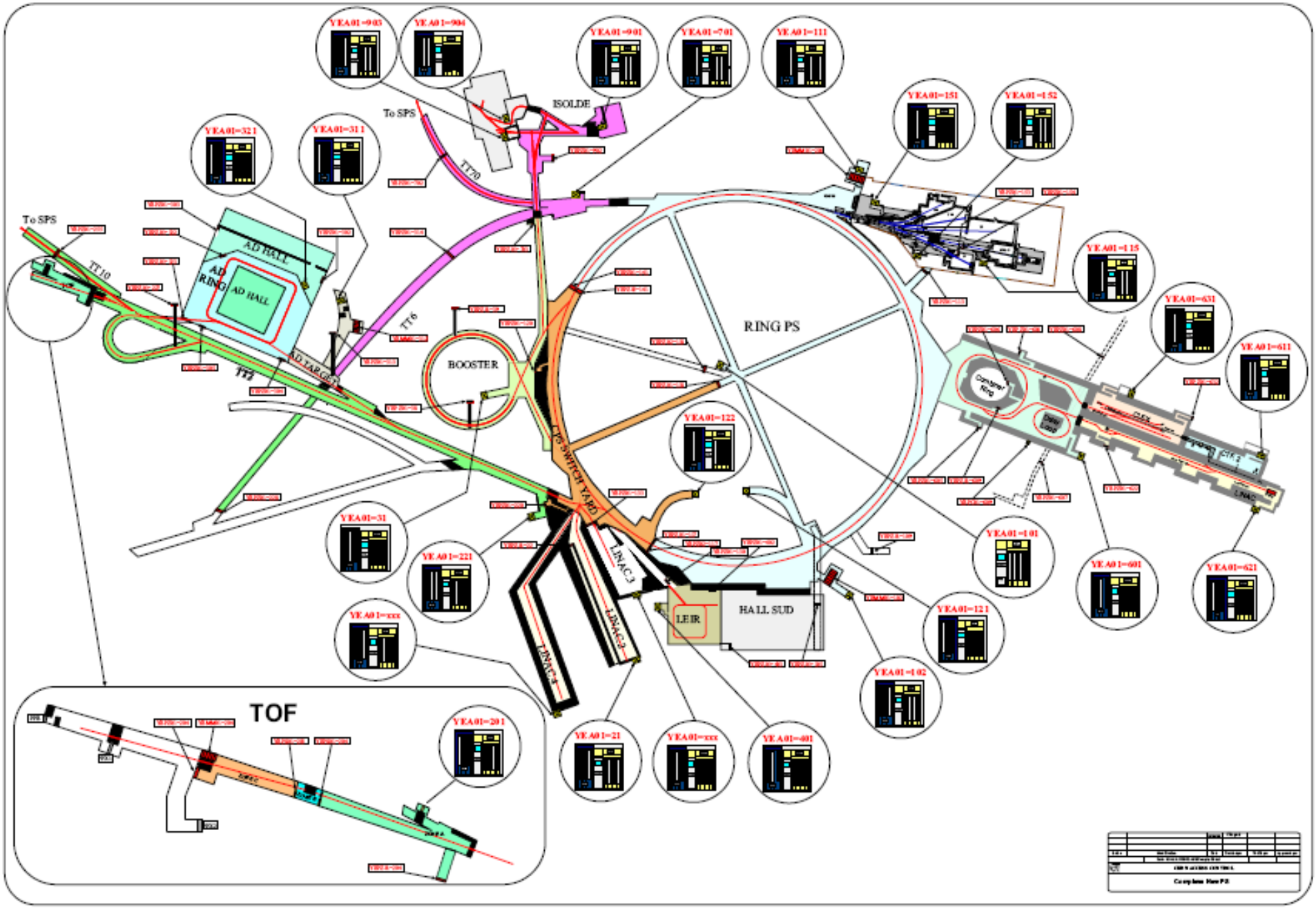


Figure 4-1: Schematic overview of the PS Complex zones and their relationship.

Courtesy R. Steerenberg edms 970064, functional spec



Courtesy D. Chapuis & R. Bonzano

Numbers

- Important Safety Elements to interlock
  - Machine: 60
  - Access
    - Personnel Access: 24
    - Material Access: 24
    - End of door zone: 54
    - Sector door: 10
- Flow: 13000 Passages during shutdown
  - Operator supervised…

Remarks

- Difficulty to use the LHC PAD & MAD due to lack of space
- Civil engineering work required in a majority of cases
- New type of EIS access should be studied (smaller PAD, or small MAD)
- Expensive cable dismantling / installation
- Existing racks, cables, interfaces with machine elements have to be replaced completely

Preliminary Risk Assessment

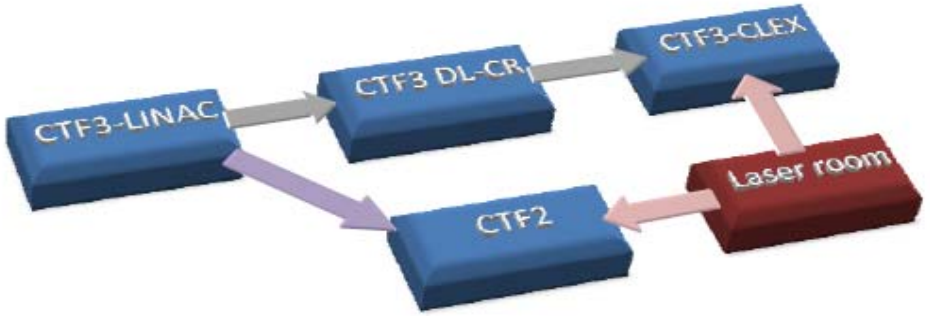
Potential risk	LINAC 2 SOURCE	LINAC 2	LINAC 3	LEIR	CPS SWITCHYARD PRC	PS BOOSTER	ISOLDE-TT70	PS	TT2	NTOF	AD Target	AD Ring	AD Hall	East Area	DIRAC	CTF3-LINAC	CTF3 DL CR	CTF3-CLEX	CTF3CTF2
Ionizing Radiation*		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Magnetic Field		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microwaves		Y	Y	Y	Y	Y	N	Y	N	N	Y	Y	Y	N	N	Y	Y	Y	Y
Electrical Hazards		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Lasers		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y
Vacuum and Pressure		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cryogenic fluids		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Flammable gasses		Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Chemicals		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Noise		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

- Which risks shall be covered by the new system ?

Figure 7-1: Relationship between the zone of the main part of the PS Complex after LINAC4 integration.

Safety Aspects

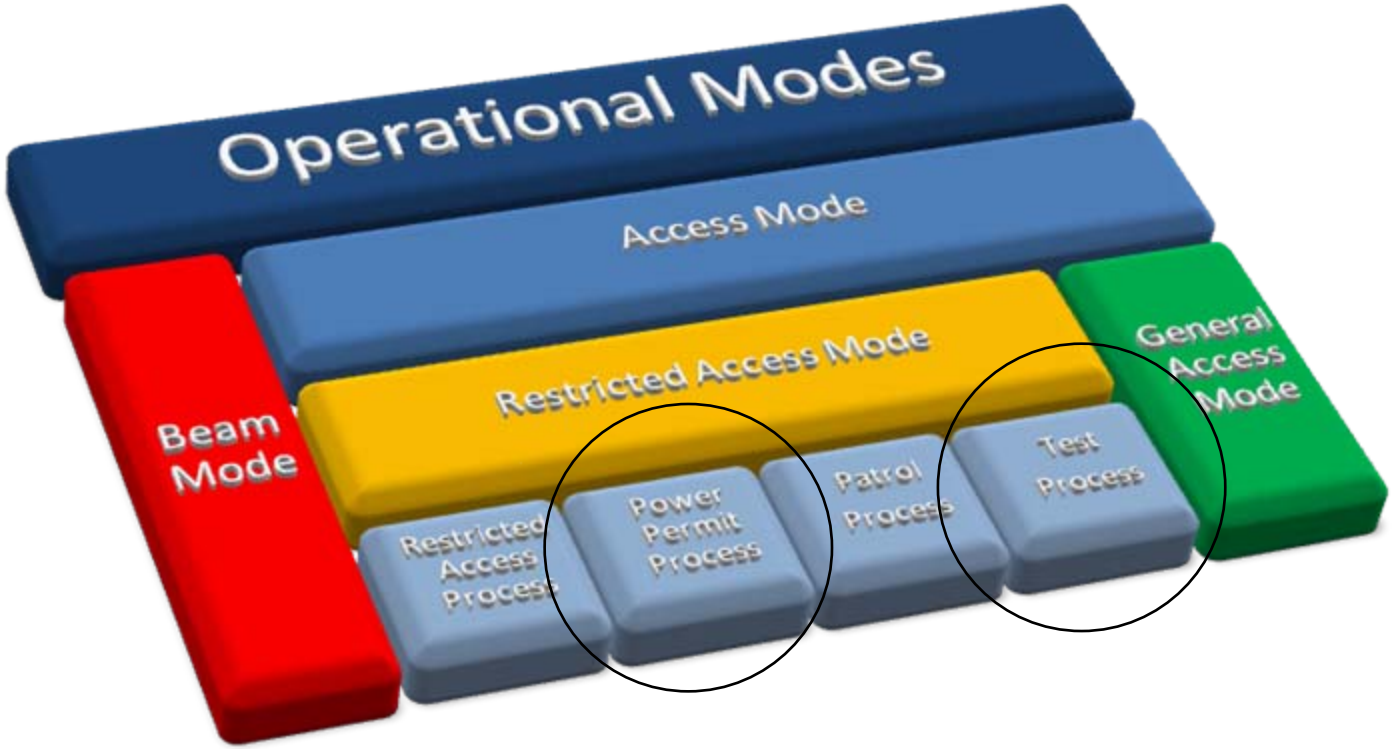
-Definition of the safety chains
-Definition of the necessary EIS
- Definition of safety signals
- By pass monitoring



Courtesy R. Steerenberg edms 970064, functional spec

Figure 3-2: Relationship between the zones of the CTF part of the PS Complex

Operational mode



Courtesy R. Steerenberg 970064, functional spec

edms 989349

Rationalization

- Of the operational modes
  - LHC modes + test + power permit
- Of the access supervision by CCC
- Of the Man Machine Interface

5.1.3 COLOR CODES

At present the color coding in the security chain displays in the PS complex is beam oriented. This means that when all conditions in a zone are good to produce beam the security chain will display the conditions concerned in green. In the LHC and the SPS an opposite logic is used, red when the beam can be produced, indicating danger.
The system shall use the colors, and meanings as described in ….

Specification stage

- Preliminary Risk Assessment (edms 983789 – S. Grau)
  - Which risks shall be tackled by the system ?
- Sectorisation and location of the access equipment
  - V1 drawing for each zone (edms 974645, 974799 – D, Chapuis,…)
- Definition of the EISbeam and EISmachine securing the risk identified for each zone (edms 977004)
- Description of the existing system (edms 901496 – R. Steerenberg)
- Proposed changes (edms 901503 - R. Steerenberg & all)
- Functional specification (edms 901505 - R. Steerenberg)
  - Same principles as for LHC
- Technical requirements (edms 977036 – L. Hammouti)
- Definition of the Man Machine Interface used in the CCC
- Architecture aspects and lesson learned from the LHC
- Budget estimation

- Most of the documents are “in work” and the approval process should be started in order to launch the implementation

Implementation

- LHC Access system experience
  - Components and subsystems feedback
  - Already major evolutions of the off-the-shelf components (biometry, Evolynx)
  - Contractors performance
  - Flexibility
  - LHC Access Control infrastructure already available
    - Link with HR DB, authorization management, B55 for enrolment

- Implementation in two stages:
  - Pilot stage
    - The underlying infrastructure for Access Control and Access Safety is put into place
    - Sample of each EIS access working perfectly – All NC Removed
    - East Zone
  - Production stage (starting with LINAC 4)
    - Installation and integration of all the access points, doors, etc, system commissioning

- Work breakdown in technical WP rather than a large scale contract

Other aspects

- Impact on Controls renovation
  - MPS
  - System supervision, diagnostic, alarms
- Budget revision after validation of the specification
- Do we have enough safety signals available from the Machine Important safety Elements ?
- Control racks in B354 (cabling cleaning, powering, fibers)
- Installation conditioned by LHC planning

SPS Acces

- Safety : redundant interlock system operational (IRSN – OK)
- Evolution of the access control for use of the RFID Dosimeter completed (IN and OUT)
- Replacement of the Access points of the Experimental areas.

- Maintenance
  - System is based on an obsolete Siemens S5/SINEC H1 architecture
  - Obsolete FactoryLink supervision

- Perspective
  - Option 1 : big renovation project LHC style (XXMCHF)
    -> no HR resources available
  - Option 2 : Migration to Siemens S7 and new supervision (2 MCHF)

Conclusion

- PS
  - Many CERN groups concerned
  - Project started, already good specification available
  - Validation of the Preliminary Risk Assessment and specification
    -- > for Precise estimates & to start implementation
  - BE representative collaboration to be « re-energized »
    - Functional aspects & Safety Aspects
  - System architecture is progressing
  - Planning under study (following the LHC schedule)
  - Milestone LINAC 4

- SPS
  - Evolution of the current system
  - No resources available to start a large scale renovation project