Access System – LASS/LACS

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Outline

- Hardware/Software Status of:
  - LACS : LHC Access **Control** system
  - LASS : LHC Access **Safety** system
- Outlook to 2009
- Interlocking with the power converters
- Some organizational problems

Preliminary remarks

- Based on experience from 2008, and looking at the 2009 planning we should expect a significant number of interventions requiring controlled access
  - Controlled access is needed as soon as a sector is cold
- Most of the existing problems are linked to the use of the access system in RESTRICTED mode :
  - RESTRICTED mode was designed for a short access of a limited number of persons in a delimited area
  - it was never envisaged for extended periods to control interleaved activities by a large number of people (up to 320/day)
- Powering tests period will be more affected than beam operation because of the duration and frequency of access periods

LACS status

- System is operational, but treatment of non conformities (repeatedly mentioned since May 2008) still on-going
- Main issues for operation due to non-conformities :
  - Problem of key restitution/distribution
  - False patrol drop when going through the PAD
  - Tracing of person in underground areas in GENERAL mode (info for fire brigade): multiple exits and inter-site circulation
  - Stability of the application on the CCC consoles (crashes, video freezing...)
- New version of the LACS software deployed beginning of December on request of OP for testing in real conditions:
  - Problem during key restitution seems to be understood and fixed
  - But only couple of days of tests, in only 3 access points

LACS evolution during shut-down

- New version of the software promised for mid-January, postponed to mid-March for deployment on test bench : should correctly handle errors in case of communication loss
- New holder for PAD position contacts + full maintenance: should avoid spurious drop of the patrol even during the standard entrance/exit procedure

=> Now in GENERAL mode, not possible to test the modifications.

- Technical solution to make people in zone counter more reliable (mainly linked to exit problems) still under investigation
- No proposed solutions yet for all the other well known OP requests
- See review of OP requests at LHC-PerC presentation 14/11/08

LASS status

- The LASS contract phase is finished. System is operational.
- Main problems found during 2008 operation:
  - unexplained patrol drop in point 2 during beam operation
  - No distinction between Beam Imminent Warning and evacuation sirens (safety problem)
  - Connection between SPS interlocks chains and LHC access systems : cause of frequent BIW in point 8
- Last update done end of October :
  - Should solve the patrol drop
  - tested by Access team but DSO tests to be done

LASS evolution

- LASS upgrades must be fully validated : strict procedure is required by Access Team Project to guarantee the level of safety of the LASS (presented in LHC-PerC):
  - Includes test platform validation phase, update of the documentation, upgrade + tests
  - tests require no access and/or closing of the whole machine for a couple of day => GS/ASE should request to be included in the planning
  - DSO tests to be included in the planning
- Next release targeted for mid-April:
  - Scope of the new release: SPS signals sorting out and most of the OP change requests concerning LASS

MAD problem

- MAD still permits people to access in undetected manner.
- To date, GS/ASE's best proposed solution with existing HW = adjustment of **movement** detection parameters
- Tests by OP end of January:
  - Improvements : no false detection, no “accidental” intrusion
  - But still possible to enter too easily when deliberately trying
- What are the risks:
  - In GENERAL mode : possible entry in controlled area without proper access rights (many examples available)
  - In RESTRICTED mode : undetected entry allows presence of persons when reestablishing dangerous condition (powering/beam)
  - In CLOSED mode : no impact because MAD not usable

MAD problem consequences

- RESTRICTED mode does not provide the specified functionality
- Temporary compensatory measures are required to guarantee personal safety for 2009 run and a more permanent solution is mandatory for longer term
- Possible short term solutions?:
  - No access with material in RESTRICTED mode?:

    => not realistic, just because of bikes...

  - Systematic patrol after access and before powering (equivalent to no RESTRICTED mode)?:

    => Difficult: grouping access, multiplication of patrols and procedure replaces interlocks

  - Human control of the MAD usage (local or remote)? :

    => ONLY viable solution with dedicated guard (CSA) for the task 24h/7d and the proper infrastructure.

Interlock of the Power Converters with the LASS?

- A matrix of access conditions in the different zones vs powering zones has to be revisited/defined (Safety Task Force input)
- Short term possibilities: fixed display to help applying the procedure + proof of concept
- Principle: use the Software Interlock System to generate the logic from the LASS alarms and send commands to the power converters via the PIC
- Command to send via the PIC to be discussed: give/remove PC permit, Fast Power Abort/Slow Abort??
- Safety/reliability aspect of the proposed solution to be evaluated:
  - False trigger risk, safety level of the LASS alarms, SIS...
  - Efficiency of an interlock for personnel protection?

Other organizational issues (1/2)

- How to get enough patrollers?
  - Good willing decreases rapidly with the number of patrols to be done
  - Patrol requires MANPOWER and TIME!
- Who will rearm doors?
  - External/surface envelop, powering tests envelop?
  - Mandate and priorities to be agreed between different actors: CSA, site managers, teams on shift in the CCC

Other organizational issues (2/2)

- Flow of information between persons who authorize the access and on shift personnel needs to be improved
- Unique procedure for the whole period:
  - Access requests made by the users via Avis D'intervention
  - Requests approved by the coordinators (could be different persons for the different periods)
  - web interface used by the operators to grant access automatically filled from ADI (to be developed) or directly by EiC for access granted on the spot
- Restricted lists at the PAD (no operator action) not really efficient because we need a filtering of activities, not a nominative filtering (LACS task)

LACS vs OP constraints

- Customization of the application is an **iterative** process:
  - if all the requirements cannot be fulfilled for the deadline, we prefer to adapt to pragmatic technical solutions rather than pushing the deadline
- In practice: conflicting constraints
  - LACS contractor: start of implementation is triggered by a written specification from Access Team project (not by the OP request to ASE)
  - OP: Modifications must be implemented before we need to switch back to RESTRICTED mode
- For non-safety critical aspects, process from identifying the problem to the issuing of the specification is too long, to the detriment of defining the possible implementation(s)
- Systematic delays in software delivery result in a very lengthy process for fixing non conformities and for improvements

Conclusions

- Access system should be OK for operation with beam (CLOSED mode!)
- Main worry is the period before:
  - During the shut-down: tracking of people in the underground area
  - During the powering tests: how to guarantee that the proper zone is empty when dangerous conditions
- For the Access System to be adequate to safe use during the powering phase, specifications (and implementation) have to be revisited
- As the LACS/LASS projects are reaching the end, what about future developments, maintenance, manpower?

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