RAdiation Monitoring System for the Environment and Safety (RAMSES)

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Radiation Monitoring

Summary

- The RAMSES project
- Major requirements
- System architecture
- Installation example
- Organizational issues
- Milestones and plans

RAMSES Project

Scope/Mandate

- The RAMSES will provide LHC with a radiation monitoring system for the Environment and Safety covering *acquisition*, *transmission*, *logging* and *display* for the LHC machine, LHC experiments and experimental areas.
- TIS will exploit this system to assess radiation risks and to control the release of radioactivity.
- The system will also be incorporated into the accelerator and experiment control rooms.
- The mandate of the project team covers the system specification, prototyping, tendering, installation and integration of radiation monitors and industrial control equipment for safety systems.

RAMSES System

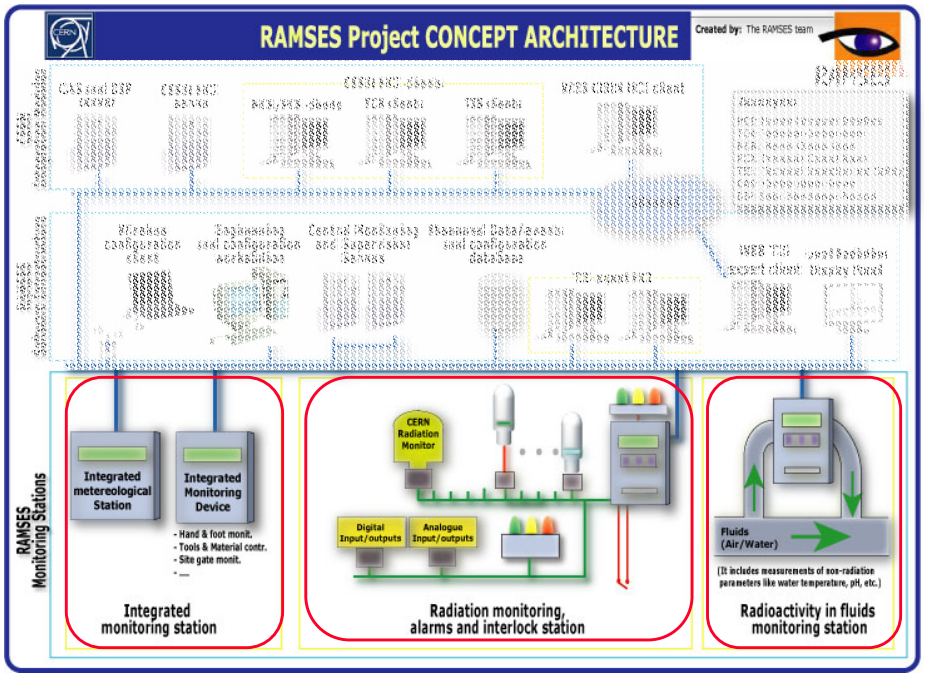
Major Functions

- Monitoring radiation variables (real-time)
  - Measurement of dose rates during LHC operation around the accelerator, in experimental areas and their annexes, on the surface and in the environment (prompt radiation)
  - Measurement of radioactivity in released gases and fluids (radioactive nuclides)
  - Measurement of induced activity during LHC stop/shutdown
  - Generation of local radiation alarms and transmission of remote alarms
- Generation of interlocks
- Monitoring of conventional parameters
  - Measurement of physical and chemical parameters in the released water (pH, temperature, conductivity, turbidity)
  - Generation of remote alarms in case of deviation from normal range
- Monitoring non-ionising radiation fields
  - e.g. electromagnetic fields
- Long term data storage
  - Measured values
  - Events (radiation alarms, technical alarms, system faults, etc)
  - System configuration

RAMSES System

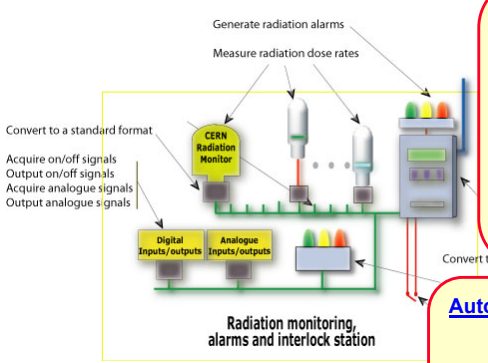
Major Requirements & Constraints

- Distributed Radiation Monitoring network
- Integrated software infrastructure (control rooms and networks)
- Flexible and modular design for easy configuration
- Industrial components
  - State-of-the-art radiation monitors and monitoring stations.
- Operational 24/24 hours a day, 365/365 days per year
- International standard in radiation protection
- Valid for the replacement of the current radiation monitoring system (ARCON)



RAMSES

Radiation Monitoring Stations

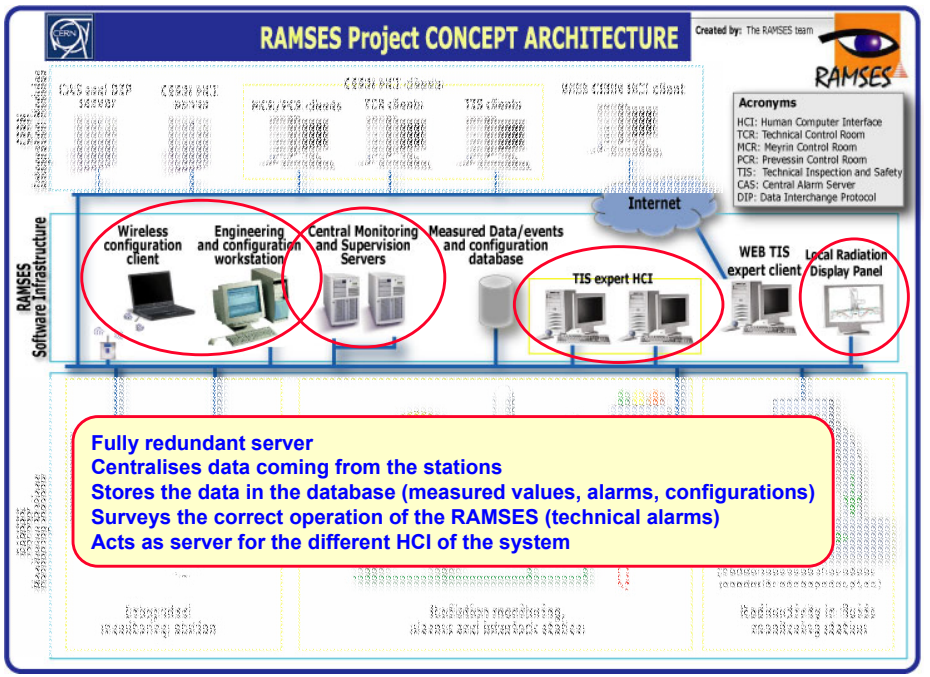


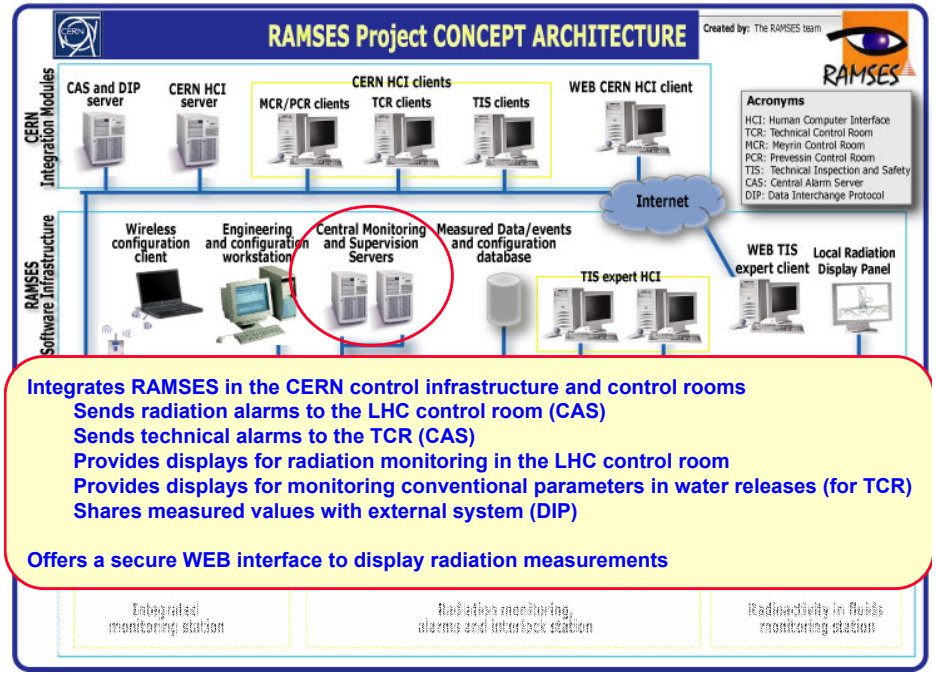
Monitors and alarm panels on a field-bus for
- Dose rate measurements
- Alarms (evacuation)
- Interlocks

TCP/IP network connection for
- Transfer of measurements and alarms
- Remote configuration

Autonomous stations for safety reasons
- Radiation measurements off-line
- Stores temporary measured values
- Generates radiation alarm
- Generates Interlocks

Certified equipment (Hardware&Software)





Integrates RAMSES in the CERN control infrastructure and control rooms
- Sends radiation alarms to the LHC control room (CAS)
- Sends technical alarms to the TCR (CAS)
- Provides displays for radiation monitoring in the LHC control room
- Provides displays for monitoring conventional parameters in water releases (for TCR)
- Shares measured values with external system (DIP)

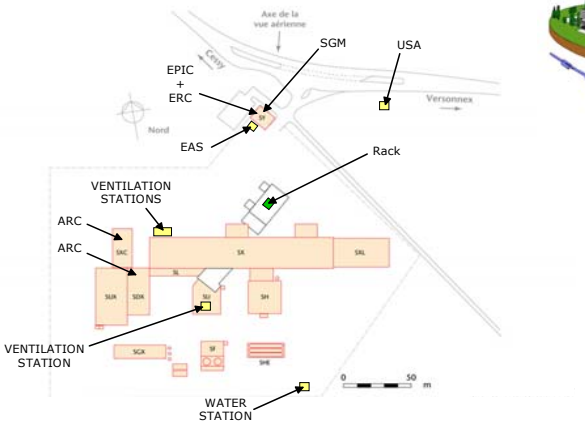
Offers a secure WEB interface to display radiation measurements

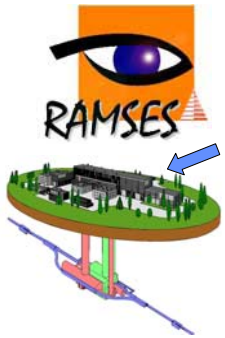
RAMSES System

Some figures

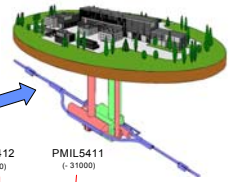
- 320 radiation monitors (~45 non-RP monitors)
  - additional 400 monitors for non LHC areas
- 24 racks equivalent (30 locations)
- 150 TCP/IP addresses to be requested
- 60 Km of cables (field buses, signal cables)
- Evaluation of powering needs <25kVA

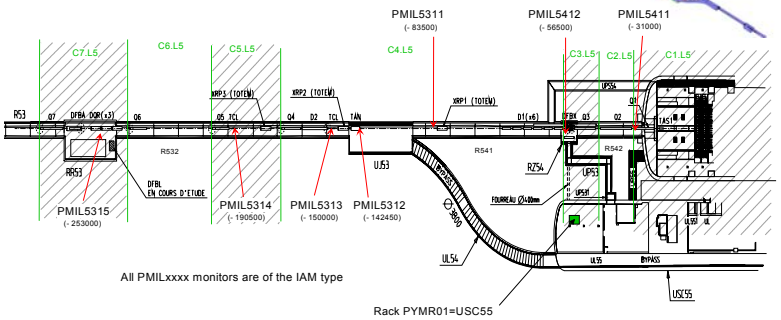
RAMSES
Installation example at LHC point 5



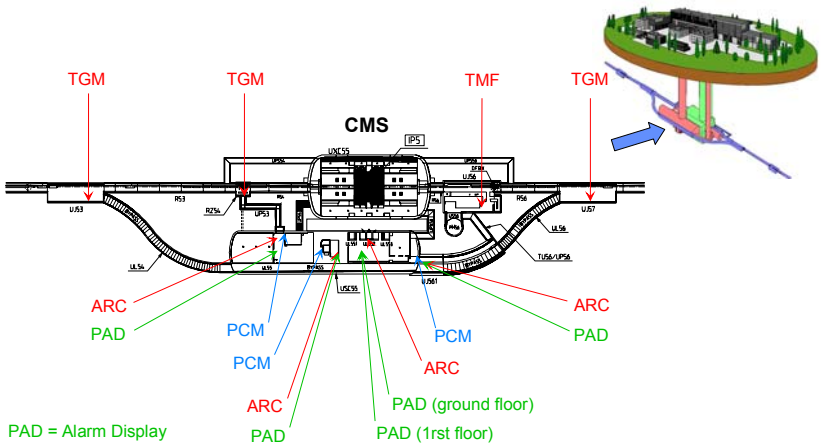


RAMSES
Installation example at LHC point 5





RAMSES
Installation example at LHC point 5



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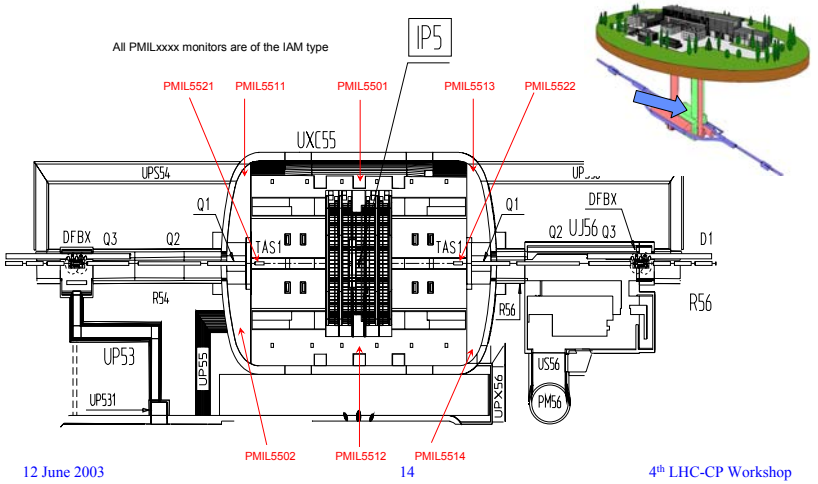


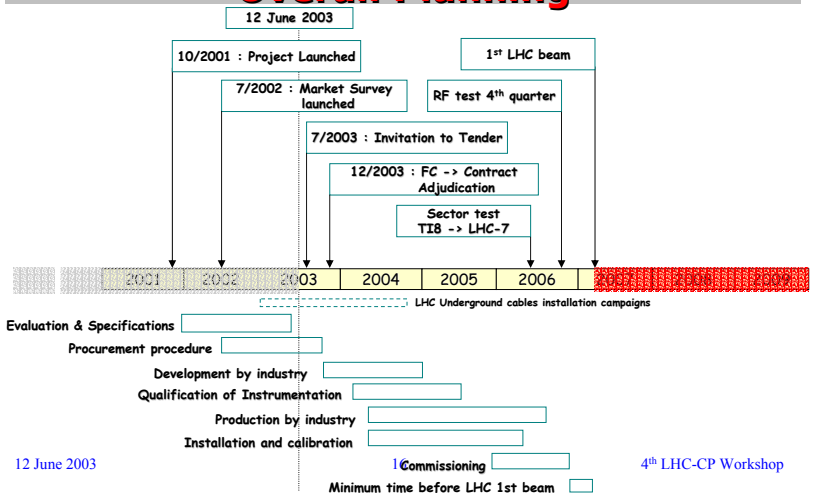
RAMSES Project

Organizational issues

- RIGHT BALANCE between keeping in-house know-how and out-sourcing
- Complete lifecycle management (quality assurance)
- STANDARDS (i.e. IEC 61508 for organization and validation)

RAMSES project

Overall Planning



Thank you for your attention !

Acknowledgements to the project team

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