Summary of ST/MA deliverables for LHC

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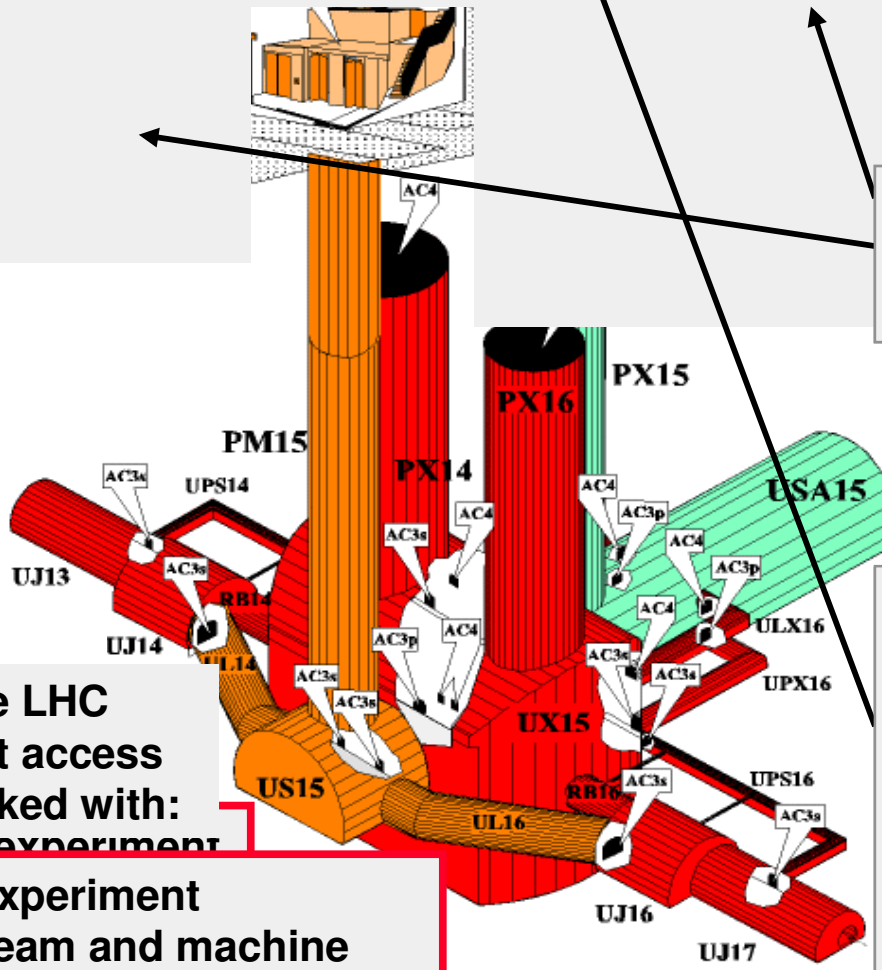
Summary of deliverables

- Access control systems
- Access safety systems
- Fire, gas and oxygen detection systems
- Evacuation systems
- Safety alarm transmission system (CSAM project)
- Technical infrastructure monitoring systems (TIM project)
- Radiation monitoring systems (RAMSES project)
  (in collaboration with TIS)

Access SAFETY systems - Example of point 1

Summary of deliverables



The LHC buildings access control systems

The LHC sites access control systems

the LHC experimental services areas access control systems: for ACCESSIBLE areas during beam operation

During beam operation, the LHC accelerator and experiment access control systems is interlocked with:

- the LHC accelerator and experiment

The LHC accelerator and experiment access SAFETY system: beam and machine interlock for personnel protection.

Gas, fire and oxygen deficiency detection systems

Summary of deliverables

- **The Gas, fire and oxygen deficiency detection systems included in the ST/MA deliverables are:**
  - The LHC Surface Detection of Fire, Gas and ODH systems
  - The LHC Underground Machine Fire Detection systems
  - The LHC Underground Machine ODH systems
  - LHC Experimental Areas Fire & Gas detection systems
  - The SNIFFER Experiment detection systems

- **Main Functions:**
  - To detect the hazard in an early stage and inform the Fire Brigade
  - To trigger local safety actions if possible (e.g. close gas valves, electrical cuts, etc…)

Evacuation system

Summary of deliverables

- The evacuation systems included in the ST/MA deliverables covers the evacuation of the main LHC caverns.
- Extension to all the machine is pending validation

- The LHC Evacuation system has two main functions:
  - Sound the emergency evacuation LHC
  - Sound a Beam Imminent Warning (BIW) before injecting the beam in the LHC.

CERN Safety Alarm Monitoring system (CSAM project)

Summary of deliverables

- **The safety alarm monitoring systems included in the ST/MA deliverables are:**
  - The SCR and TCR central monitoring systems
  - All LHC safety zones (10) alarm acquisition and display systems

- **Main Functions:**
  - A local monitoring from the 10 LHC safety zones
  - Fire Brigade central monitoring, archiving, display and reporting
  - Non-interruptible 24h/365d system based on redundant networks
  - Specific human computer interfaces and tools for the alarm handling

LHC Technical Infrastructure Monitoring system (TIM project)

Summary of deliverables

- **The LHC Technical Infrastructure Monitoring system included in the ST/MA deliverables covers:**
  - **the technical data acquisition, transmission, logging and display from all the LHC and LHC experiments technical infrastructure needing supervision from the TCR.**

- **Main Functions:**
  - **Integration tools**
  - **Transmission tools -> for the technical infrastructure**
  - **Monitoring tools**

Radiation Monitoring System for the Environment and Safety system (RAMSES project)

Summary of deliverables (in collaboration with TIS)

- **The radiation monitoring systems included in the ST/MA deliverables are:**
  - **The LHC environmental monitoring systems for the ventilation gas for all sites**
  - **The LHC environmental monitoring systems for the release water for all sites (radiation and non-radiation) for all sites**
  - **The LHC meteorological monitoring systems for the environmental impact evaluation**
  - **The LHC environmental radiation monitoring systems**
  - **The LHC radiation personnel protection systems for mixed radiation fields, X rays and photons for the surface and underground machine and experimental areas.**
  - **The LHC radiation personnel contamination monitor systems for β and γ radioactivity for all sites.**

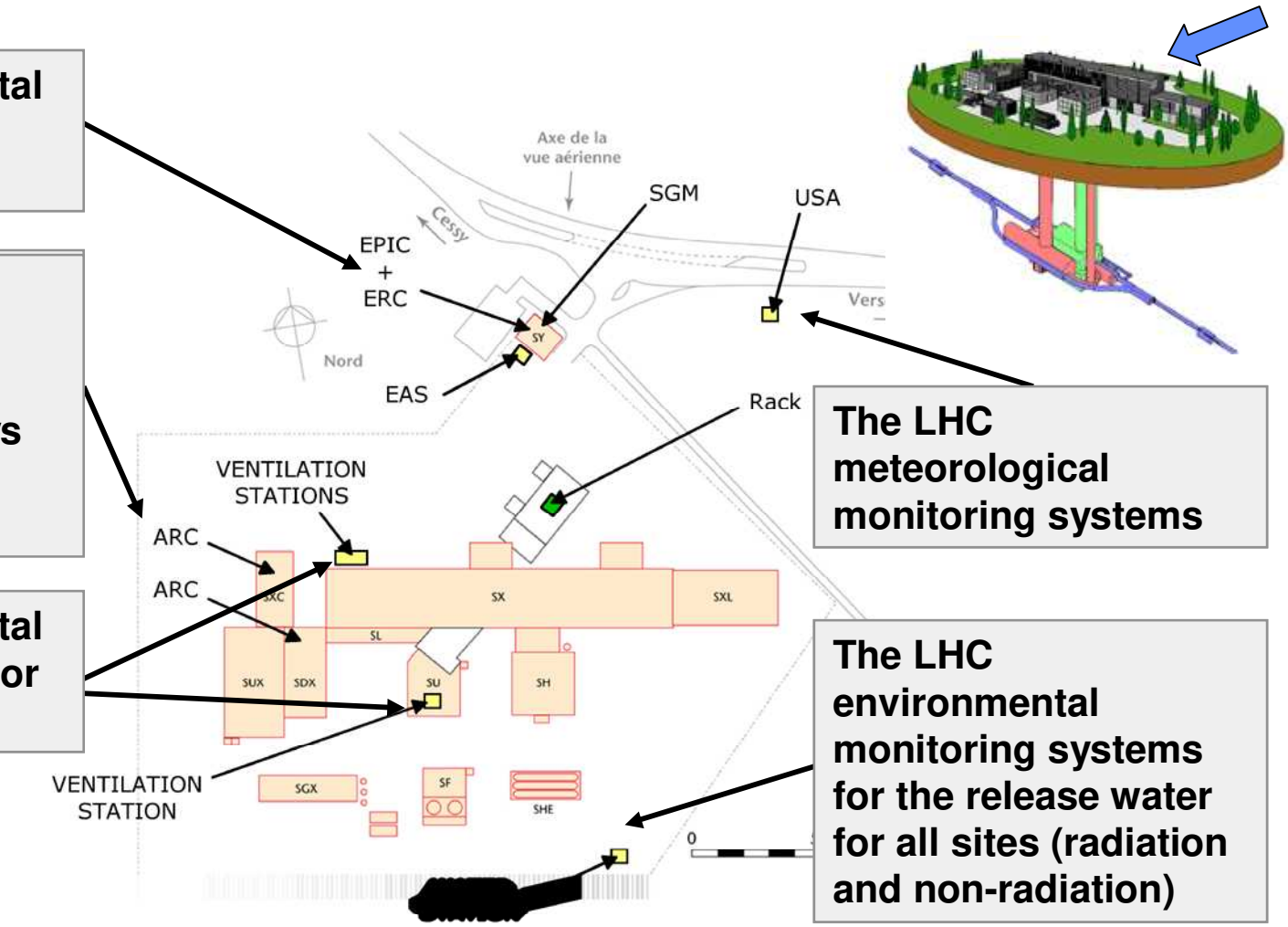
Radiation Monitoring System for the Environment and Safety system (RAMSES project) - Ex. part of point 5

Summary of deliverables (in collaboration with TIS)

The LHC environmental radiation monitoring systems

The LHC radiation personnel protection systems for mixed radiation fields, X rays and photons for the surface areas.

The LHC environmental monitoring systems for the ventilation gas



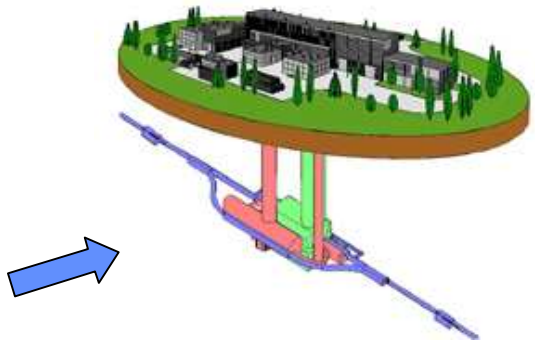
The LHC meteorological monitoring systems

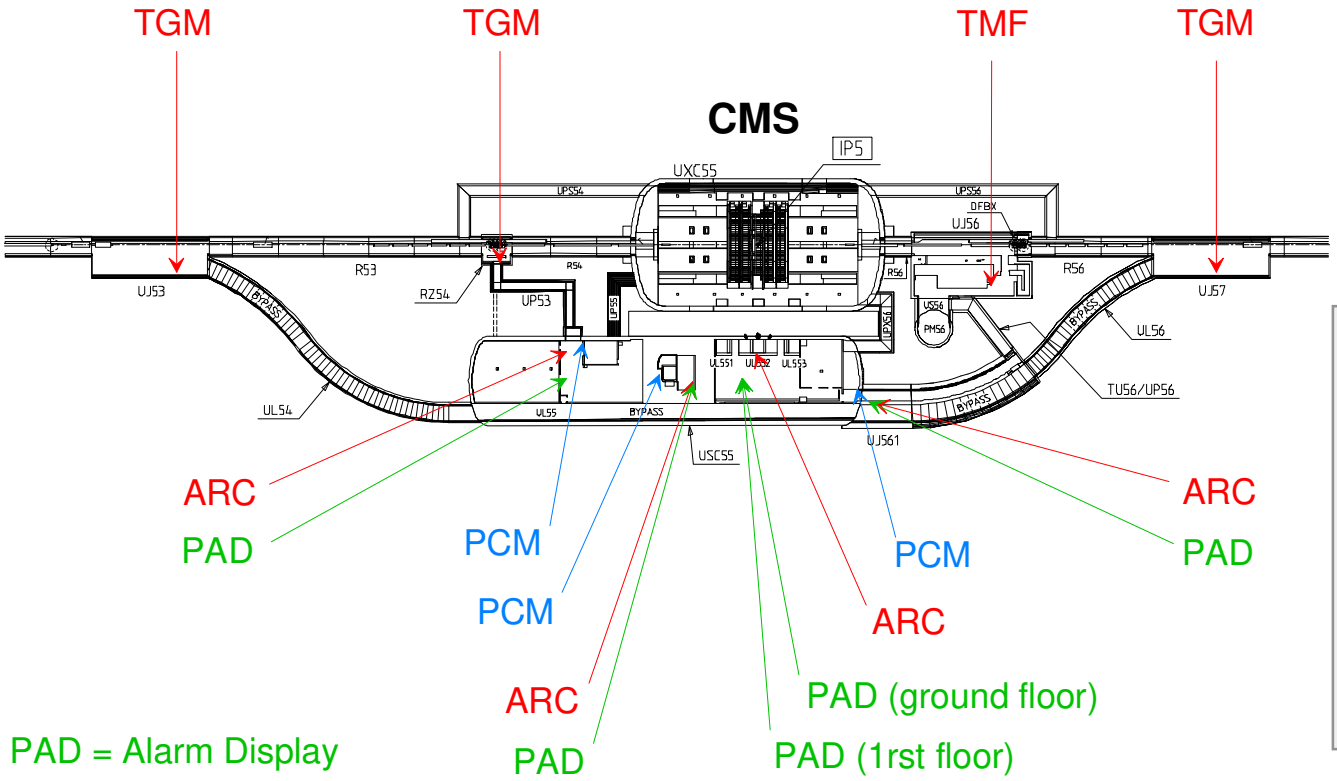
The LHC environmental monitoring systems for the release water for all sites (radiation and non-radiation)

Radiation Monitoring System for the Environment and Safety system (RAMSES project) - Ex. part of point 5

Summary of deliverables (in collaboration with TIS)

The LHC radiation personnel contamination monitor systems for β and γ radioactivity for all sites.





The LHC radiation personnel protection systems for mixed radiation fields, X rays and photons for the underground machine and experimental areas.

Conclusions

ST/MA deliverables: Facts and Figures

Systems/sub-systems:	~ 420
Engineering effort	~ 10 Man/year per year
Contracts	4 + 3 in preparation
Computers/ Workstations :	~ 130/40
PLC:	~ 200
Access gates/doors:	~ 10/80
Access identifications:	~ 150
Video cameras:	~ 100
Fire&Gas stations/sensors:	~ 140/1220
Radiation stations/sensors:	~ 80/360
Generic sensors:	~ 370
Generic Inputs/Outputs:	~ 6200
Total estimated value (EVM):	~ 31.000.000 CHF

Conclusions

Challenges -> our solutions

- **Specifications of some systems are still pending validation**
- **Working on engineering specifications and the contact with the requesters for final validations**

- **Among the last services to be installed**
- **Collaborations, integration with the coordinating committees, within Earned Value Management, on-the-field coordination.**

- **Matrix organisation**
- **Take care of the teams evolution**