EP-DT
Detector Technologies

LHCb Gas Systems

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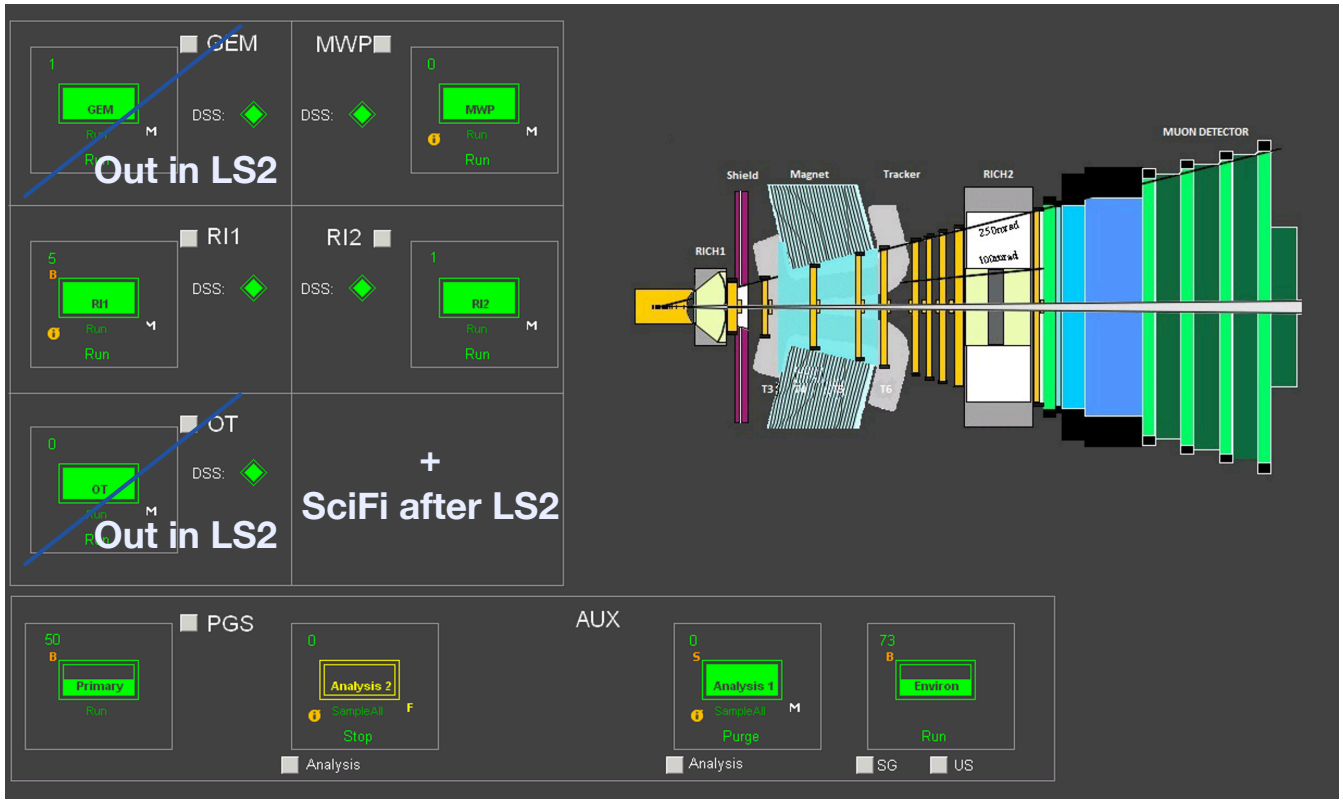
LHCb Gas Systems



- Gas system distributed in three levels
  - Surface (SG), Gas Service room (USC), Experimental cavern (UXC)
- Complex systems that have to ensure an extremely high reliability in terms of stability and quality of the gas mixture delivered to the detectors
- Each gas system is made of functional modules configurable to satisfy specific detector requirements

Work Package agreement

Mandate: EP-DT to maintain and operate the LHC detector gas systems

- The maintenance and operation of LHC gas systems has been operational since January 2008
- Complementary to this work package, EP-DT provided for each experiment a “Gas System Hand-Over Document” describing the status of each system when handed-over for operation
  - Hand-over is often very difficult.
- Gas Piquet 24h/24h 7d/7d
- Gas supply is EN responsibility
  - Our piquet does not cover the supply
- M&O budget for each experiment according to complexity and number of gas systems

Resources allocated for LHCb M&O:
- technician: 0.7 FTE
- physicist: 0.2 FTE

Valid until end 2018 —> new one will be release soon

https://edms.cern.ch/document/1721624/2

Work Package agreement: addendum

In last years several activities were done outside the M&O work package

Projects:

- Operation of detector technologies with gas recirculation systems at HL-LHC luminosities
- Gas systems R&D for upgrade/consolidation

Examples:

- Gas analysis (gas chromatograph, upgrade of gas analysis rack and more)
- Gas recuperation (upgrades/consolidations of the present CF4 and C4F10 plant, development of R134a-SF6 recuperation plants)
- Developments for future upgrades

Resources:

1 doctoral, 1 technical, 1 TTE (the latter for the 1st year 50% for CMS-CF4 recuperation) hired and integrated in the team.

Cost shared between the four experiments

Valid until 2020 —> to be renewed

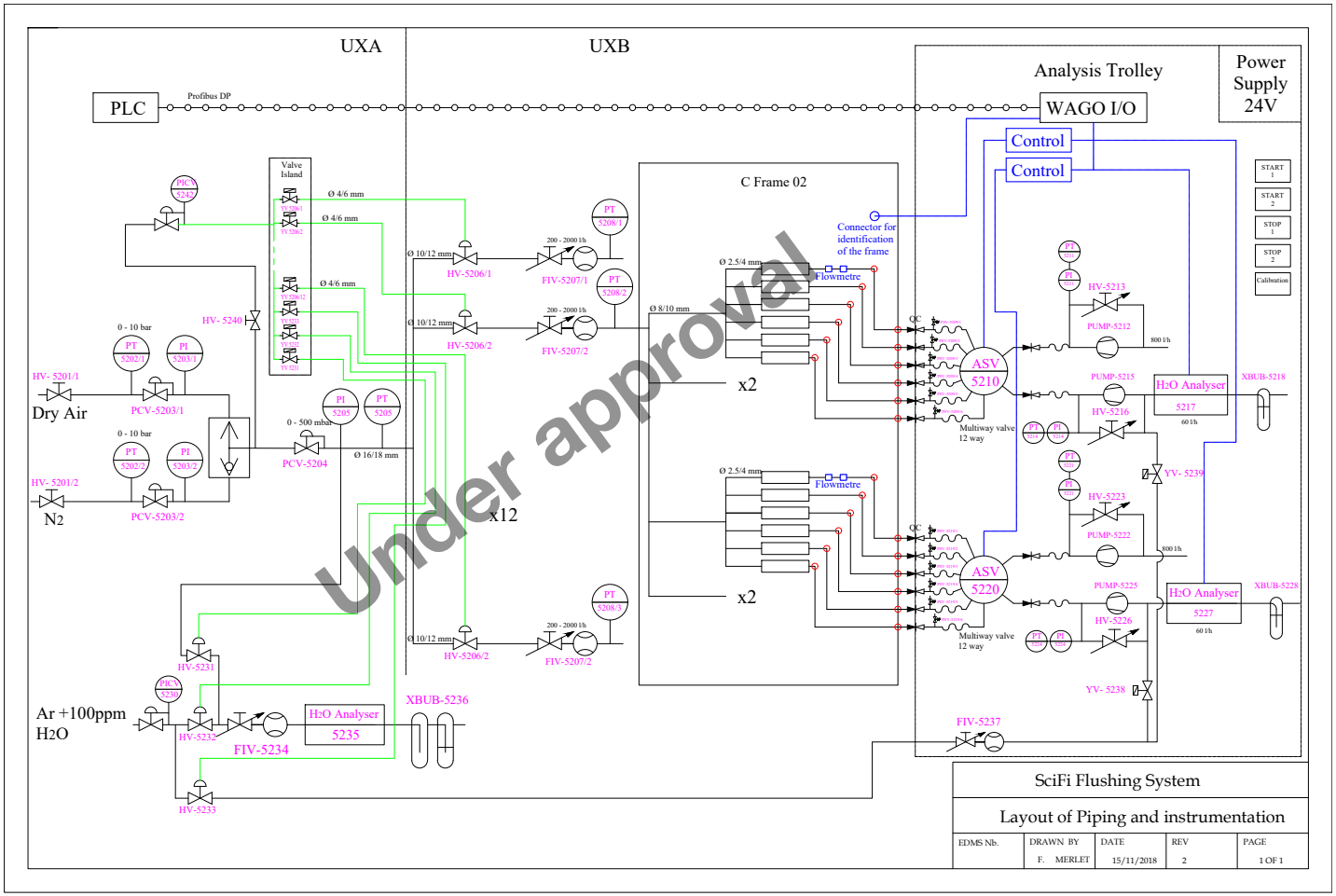
https://edms.cern.ch/document/1838074

New gas system: SciFi

New gas system for the SciFi detector —> not on M&O

- Work package agreement almost ready
- Cost of the system entirely paid by LHCb
- After commissioning, it will be included in the gas system M&O

Resources allocated:
2018: 0.3 FTE
2019: 0.4 FTE



https://edms.cern.ch/document/2052204/1

Beyond M&O budget

CERN Environmental Protection Stearing board (CEPS)

Special funds allocated for 2019-2026 by CEPS to boost activities in the addendum and many others
(human resources from the gas team and from CEPS budget)

For LHCb:

- CF_4 compression system for RICH2
  - New system to recuperate (and re-use) CF_4 of RICH2
  - 100 m^3
- C_4F_{10} recuperation system and mixture cleaning for RICH1
  - Every year ~2-3 times need to clean “online” RICH1 gas mixture —> very critical operation —> new system needed
  - C_4F_{10} stock is limited
- Gas analysis for recuperation systems (common to all experiments)
  - Gas Chromatograph analysis, Ion Selective Electrode analysis (fluorine analysis)
  - Others
- Environmentally friendly gases (common to all experiments)
  - Search and studies of possible new gases