



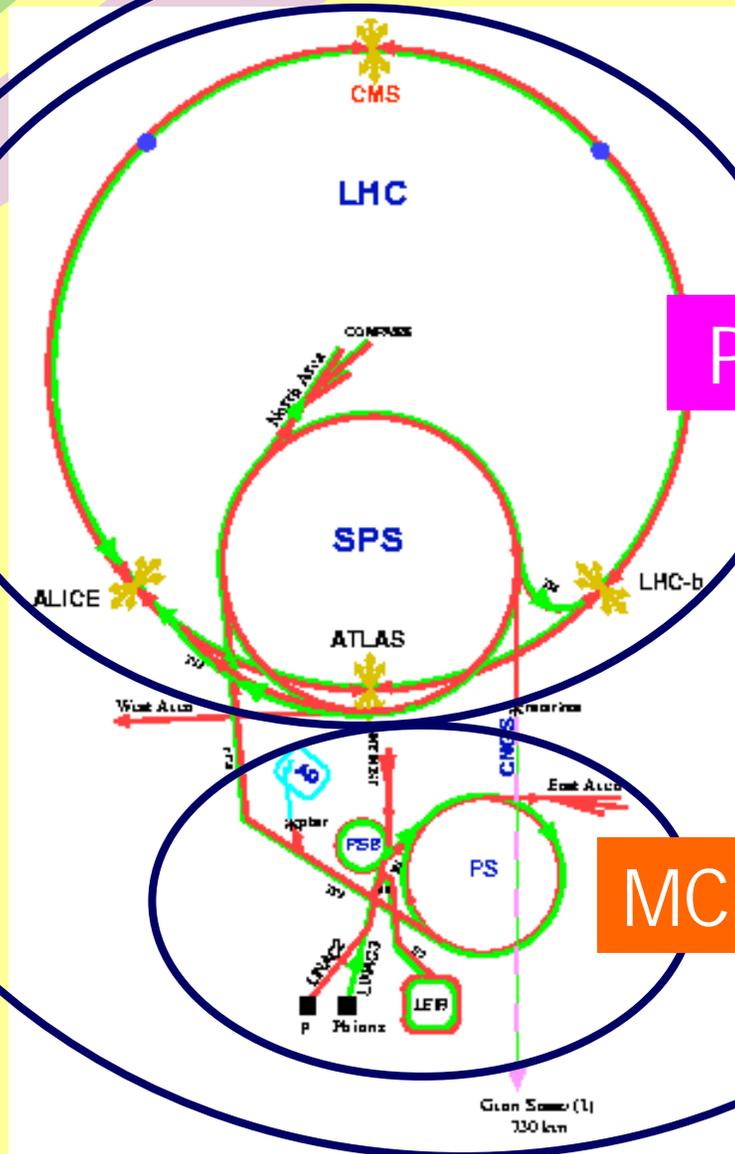
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# TOWARDS A COMMON MONITORING SYSTEM FOR THE ACCELERATOR AND TECHNICAL CONTROL ROOMS AT CERN

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- CERN Operation Today
- Why?
- What to Monitor?
- How to get there?
- The Method
- What does it look like?
- Benefits
- Perspectives ...

# CERN Operation Today



PCR

MCR

TCR



- **The LHC challenge**
- **Increase the overall accelerator availability** by reduction of restart time after (major) breakdowns
- **Monitor the availability of accelerators** for concurrent modes of operation in close collaboration with all operation teams
- **Tool for re-scheduling and training**

# “Gestion Technique Pannes Majeures” (GTPM)

<http://gtpm.web.cern.ch/gtpm/SPSRestart/index.html>

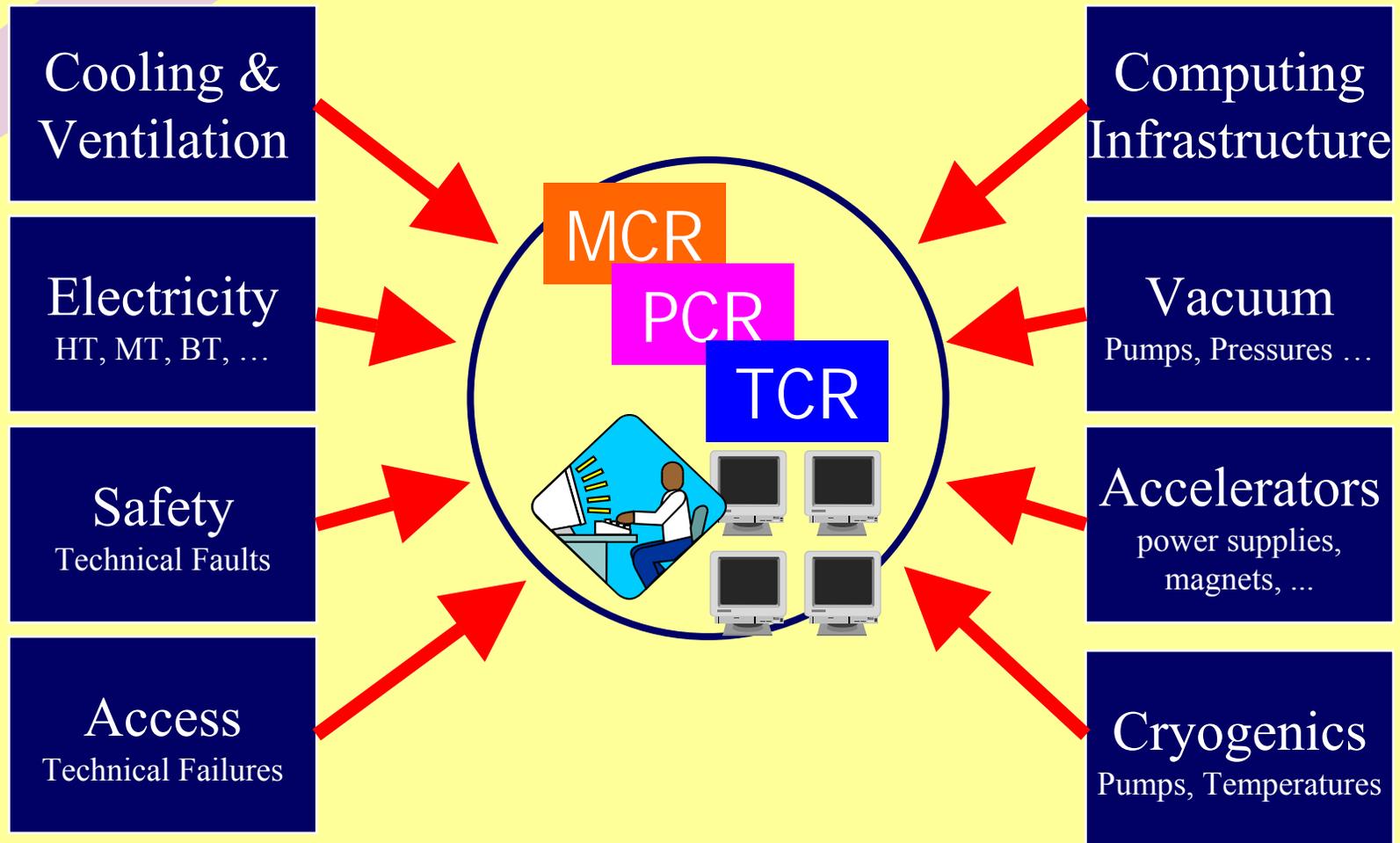


**TCR**



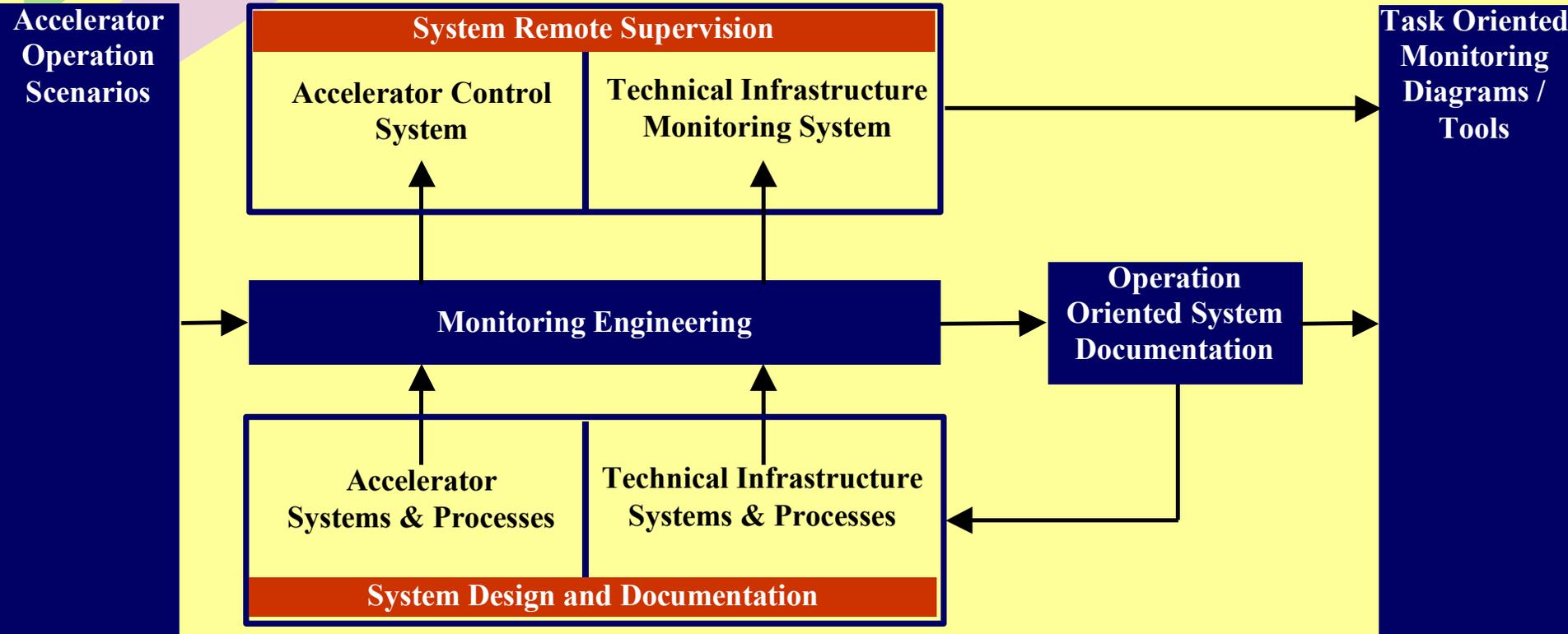
**PCR**

# What to Monitor?



- **Accelerator Oriented Monitoring**
- **Homogeneous method to define/engineer monitoring tools:**
  - **Identical for all actors:**  
(MCR, PCR, TCR, stand-by services, ...)
  - **Oriented to operator role & tasks**
- **Monitoring tools for:**
  - Failure assessment & accelerator restart
  - Systems, functions and correlations:  
(elec., cooling, RF, power converters ...)

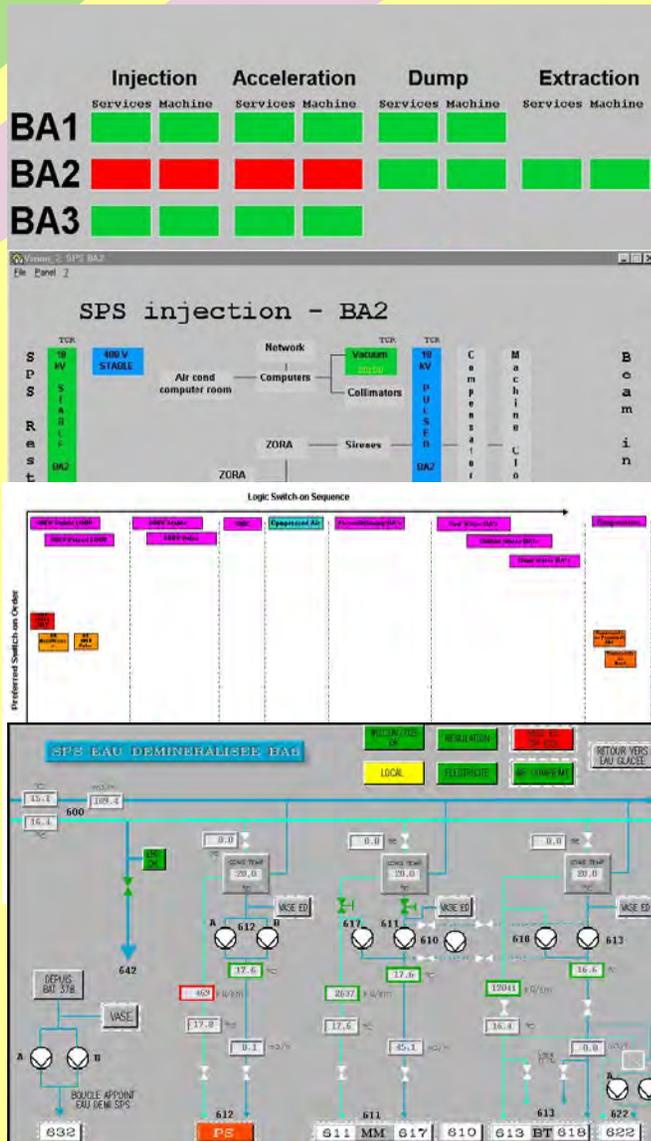
# The Method



# Individuation & Identification

- Operation scenarios
  - Injection, beam acceleration, proton physics, ion physics ...
- Actors & Responsibilities
  - control room operators, stand-by services, equipment experts ...
- Accelerators/Experiments: main systems/processes
  - vacuum, magnets, beam instrumentation ...
  - critical for the running of the accelerator/experiment
- Technical infrastructure systems
  - electricity, cooling, ventilation, access systems ...
- Sub-systems/processes
  - dipoles, kickers, cooling towers, demineralised water ...
- System/process/sub-process correlation
- Critical paths for each operation scenario

# 4 Levels of Monitoring Tools



General States Overview

Accelerator Functionality View

Detailed Infrastructure Monitoring Diagram

Process Equipment View

# General States Overview

## Operation Scenarios

**Injection**

Services Machine

**Acceleration**

Services Machine

**Dump**

Services Machine

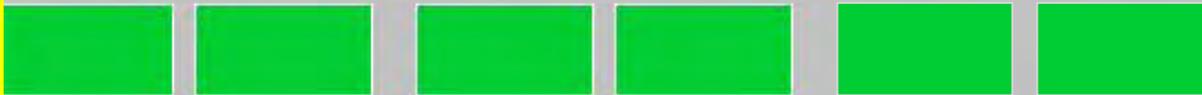
**Extraction**

Services Machine

**BA3**



**BA1**



**BA6**

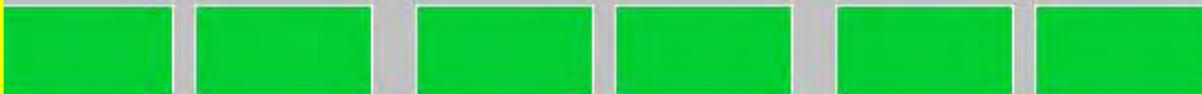


**Ideal switch-on Order**

**BA5**



**BA4**



**BA2**

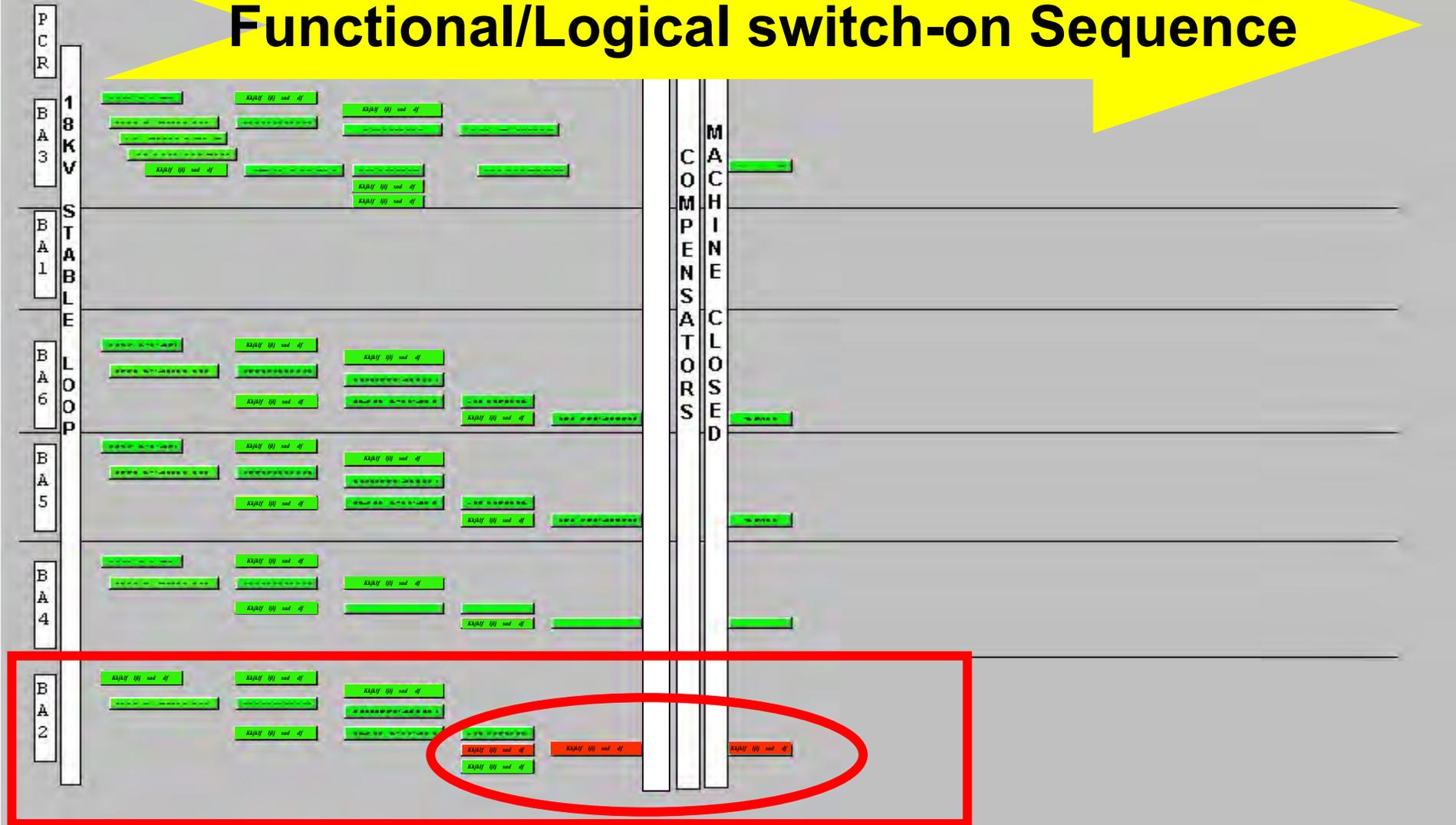


# Accelerator Functionality - 1

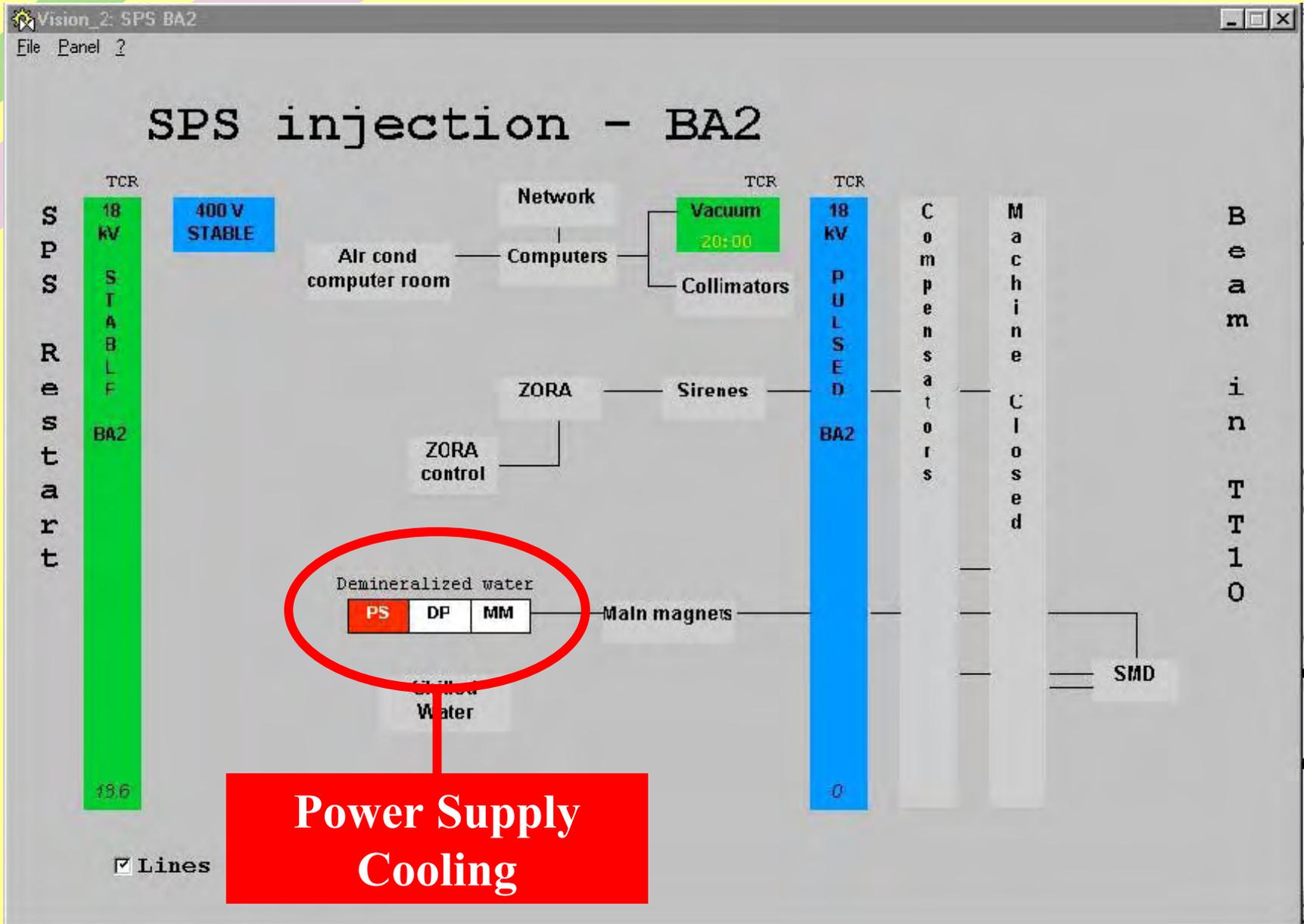
Vision\_1: ba2\_essai

File Panel ?

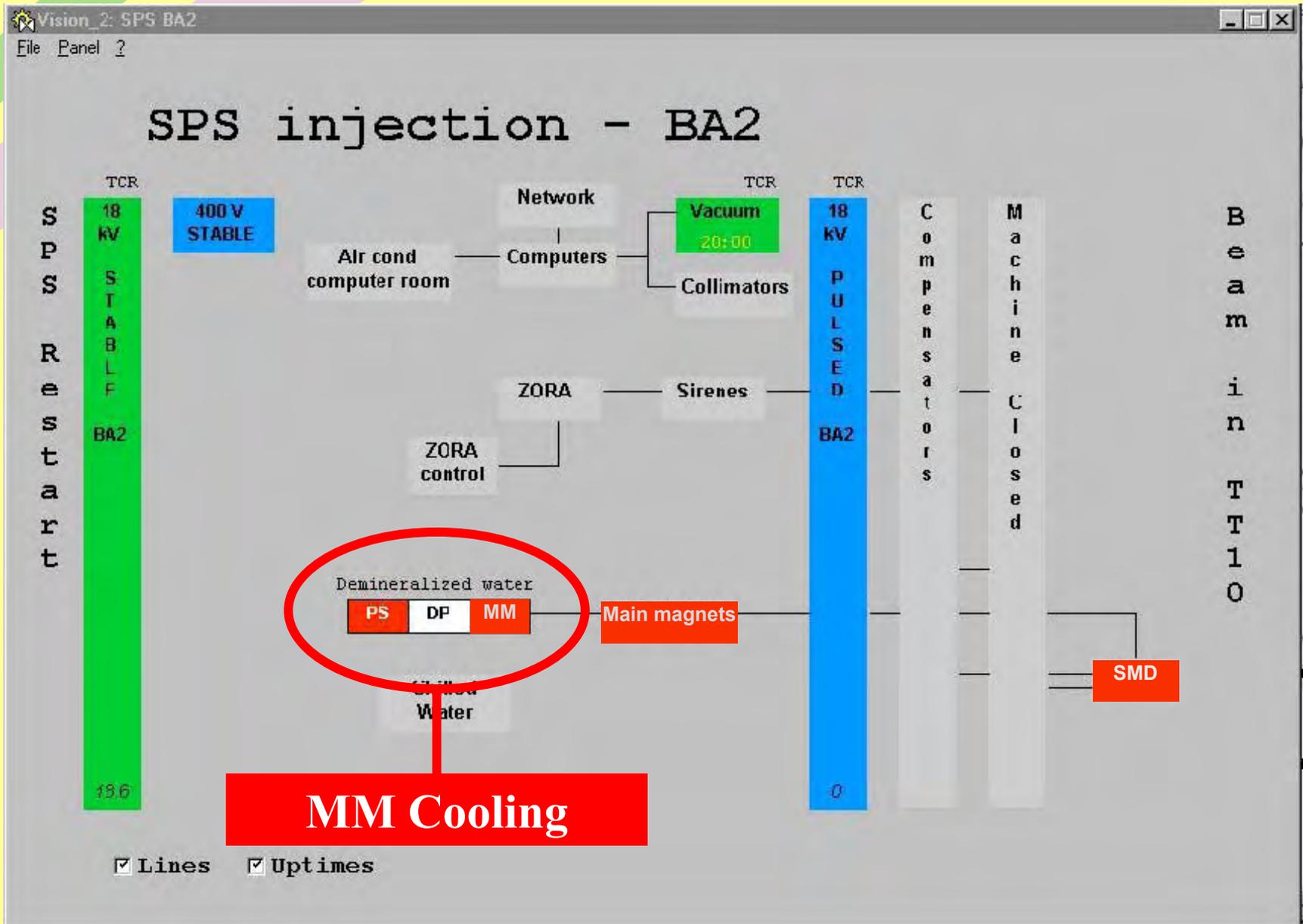
## Functional/Logical switch-on Sequence



# Accelerator Functionality - 2

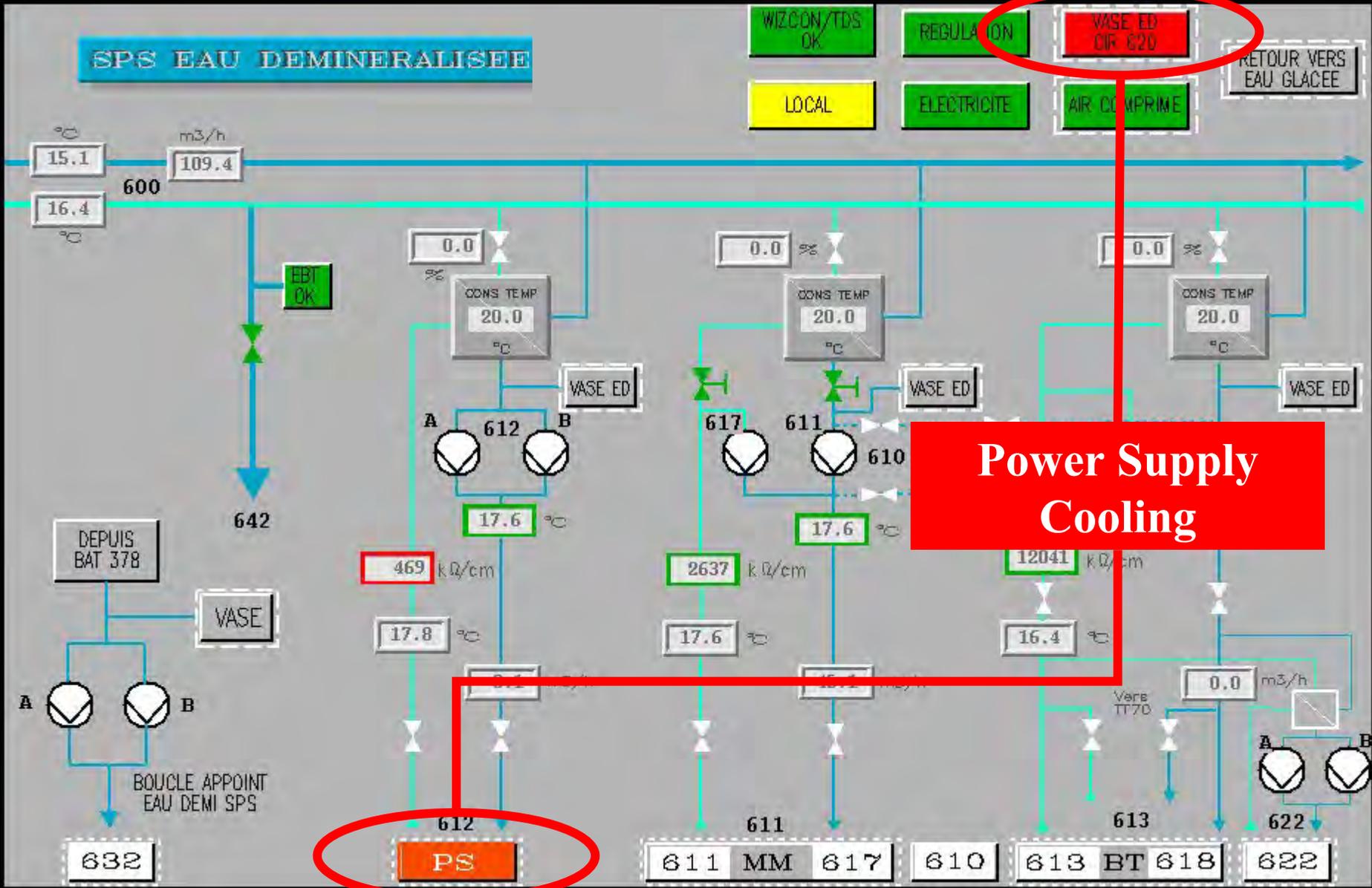


# Accelerator Functionality - 2



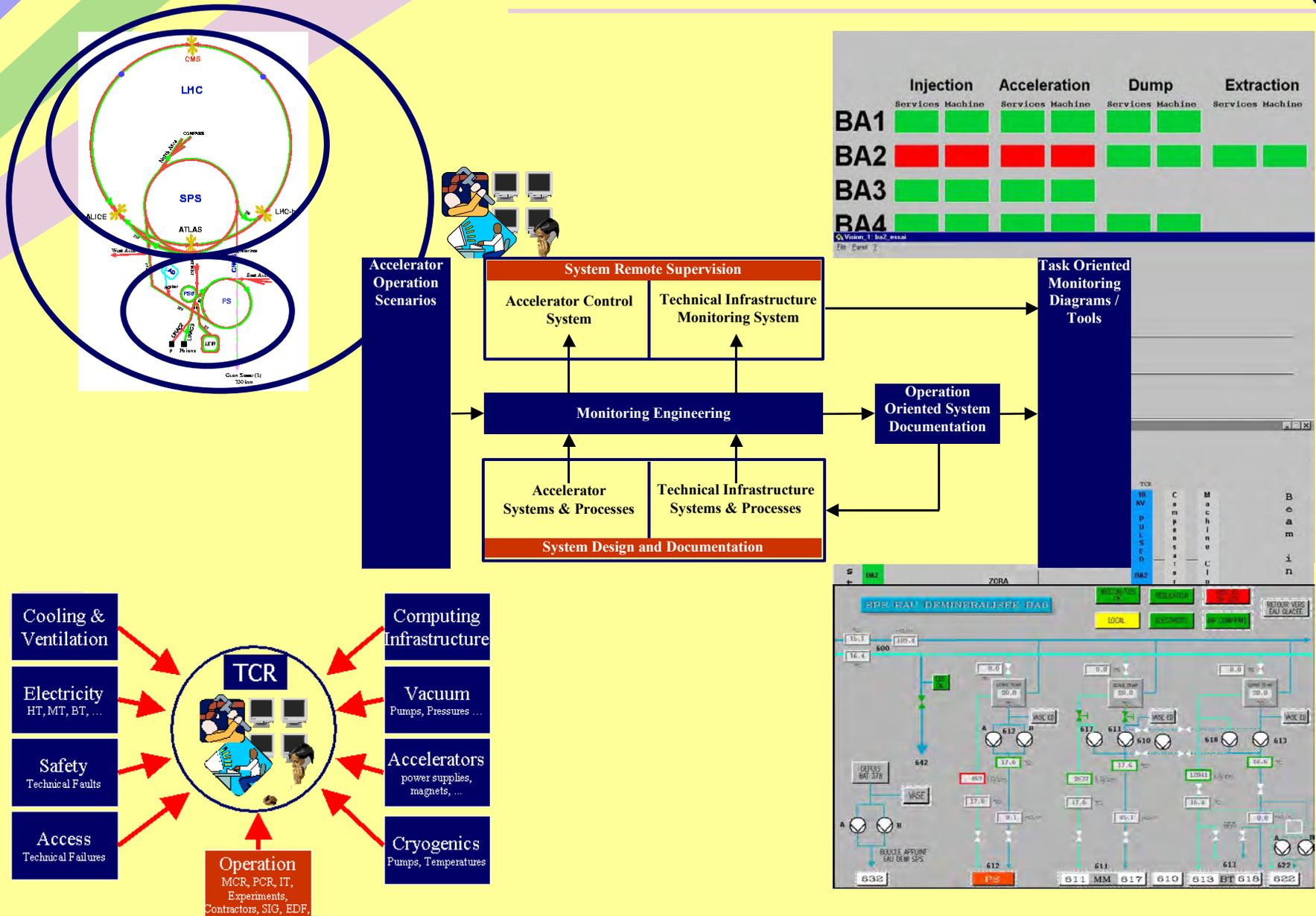


# Process Equipment



- **Improvement of collaboration** and understanding between all actors
- Best possible **restart strategy** to respond to the **operation scenarios**:  
(beam in TT10, beam acceleration ...)
- Impact estimation of failure to redefine priorities and **machine schedules**
- Impact evaluation of maintenance & process derivations on machine exploitation – **conditional maintenance**
- **Training tool** for newly recruited operators and external contractors

# Accelerator Oriented Monitoring



- Extension to the **PS-Complex**
- Extension to the **experimental areas**
- Complete implementation in **monitoring systems**
- Establish **Information & Data Management**
- Extension to the **LHC machine**
- Extension to **LHC experiments**

# BA2 – Beam in TT10

CPS beam to TT2 dump

