Controls & Monitoring and Its future in MICE

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Controls & Monitoring

Purpose:

- **Controls** refers to:
  - user interface to equipment
  - proper sequencing of equipment

- **Monitoring** serves to:
  - protect equipment (early notification)
  - protect data quality

Task divided into multiple systems:

- **Beamline:**
  - **Target, magnets, PA, DS, BS, Diffuser**
- **Particle ID**
  - **LM,TOF, CKOV, BPM, KL, EMR**
- **Environment monitoring**
  - **T, Humidity, radiation, water, He, …**
- **DAQ**
  - **DAQ—CDB—C&M interface, crates,network, …**

Task divided into multiple systems:

- **Tracking**
  - **tracker and spectrometer solenoids**

- **AFC**
  - **absorber and focusing coils**

- **RFCC**
  - **RF cavities and coupling coils**

How will this organization change for later MICE steps?

Task divided into multiple systems:

Beamline:
- Target, magnets, PA, DS, BS, Diffuser

• Particle ID
- LM,TOF, CKOV, BPM, KL, EMR

• Environment monitoring
- T, Humidity, radiation, water, He, …

• DAQ
- DAQ—CDB—C&M interface, crates,network, …

This is all part of Step I

Task divided into multiple systems:

- **Tracking**
  - **tracker and spectrometer solenoids**

  Steps II & III

- **AFC**
  - **absorber and focusing coils**

  Step IV

- **RFCC**
  - **RF cavities and coupling coils**

  Step V

So, the division by MICE "Step" is already in the plan

But we're not done with the planning: *a major consideration is not yet in place!*

Over arching control of C&M and DAQ with state machines defining MICE

MICE State Machines

Several Considerations:

1. **Subsystem C&M developed by different collaborators**
2. **Must be integrated to ensure safe use of resources and operations**
3. **MICE operates in different states over differing time periods:**
   1. **Shutdown/Installation**
   2. **Sleep (occasionally over weekends)**
   3. **Testing**
   4. **Data taking**

MICE State Machines

Different states requires different equipment (and data) monitoring requirements:

- **ignore many systems during shutdown state**
- **fewer systems ignored during sleep state**
- **nothing(?) ignored during data taking**
- **different parameters during testing or data taking?**
- **different alarms and different alarm limits**
- **different parameters and/or frequency to archive**

MICE State Machines

Different configurations:

- **Must be defined**

- **Must be "tagged" in the CDB**

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Step IV Example (10,240) run:

Start run will require:

- ◆ **Set magnet currents**
- ◆ **Set DS currents**
- ◆ **Set PA**
- ◆ **Set diffuser**
- ◆ **Set cooling channel magnets**
- ◆ **Absorber settings(?)**

All from CDB

- ◆ **Verify tracker ready**
- ◆ **Verify BS, DAQ, network ready**
- ◆ **Check hall environment**
- ◆ **Start DATE**

This must be properly planned !!!

New systems come online and are *(mostly)* accounted for

Integration for new systems requires proper planning