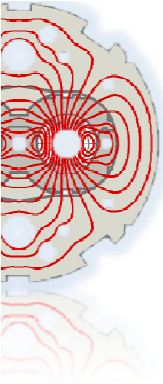


LHC Workshop Performance

Chamonix 2010

Session 5

of the LHC machine

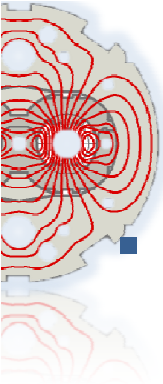
How should the access system be operated while LHC is not in beam operation?

Special thanks:

Simon Baird, John Etheridge, Serge Grillot, Magali Gruwe, Katy Foraz, Timo Hakulinen, Tomasz Ladzinski, Rui Nunes, John Pedersen, Laurette Ponce, Ruediger Schmidt, Matteo Solfaroli, Marco Zanetti…

… sorry for the ones I forgot

Contents



- **Organization**
  - Definition of the different scheduled periods
  - Sharing out of the roles between the different groups
- **Requirements on the LHC Access System**
  - Safety of personnel
  - Planning and coordination
- **How to have the control of the activities**
  - Current "control" of the activities
  - The AET – "Avis d'Execution de Travaux"
  - LHC Access System compatibility
- **LHC Access System**
  - Overview of the Access System
  - Additional requirements
  - Operation of the Access System
- **Conclusion**

Definition of the periods

Sharing-out of the roles

Next stops

ORGANIZATION

Definitions of the periods

- **The LHC machine is considered not to be in beam operation during 3 periods:**
  - **Technical Stop**

Period with no beam during which a restricted number of well defined interventions are scheduled. The machine is in standby mode, i.e. no warm-up above 80K, with equipment in standby mode but not necessarily fully "off". Technical stops would be a few days to a maximum of 2-3 weeks. No re-commissioning of the machine

  - **Shutdown**

Period without beam during which machine maintenance and installation are carried out. For a shutdown, the machine is put into a pre-agreed state (electrical locking-out, all beam related equipment off etc...)The minimum shutdown period would be several weeks

  - **Commissioning**

Period after a shutdown during which OP and equipment specialists test the machine hardware and interlocks (without beam). Access is only given for activities directly related to the hardware tests. The machine equipment should be considered as ON

Definitions of the periods

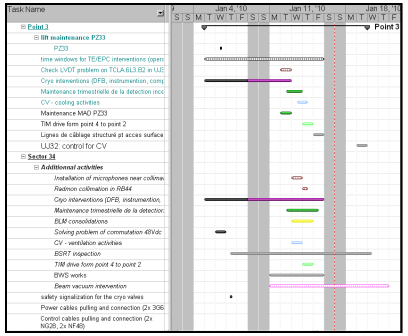
- **Activities during steps for each sector of the machine**

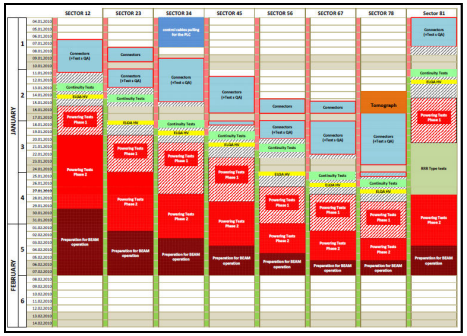
TECHNICAL STOP	SHUTDOWN	COMMISSIONING
Technical Stop **Radioprotection survey** Maintenance Interventions authorized by OP	**1.Safety** **Radioprotection survey** Electrical locking-out Cryogenic emptying of LHe	**1.Preparation for powering tests** QPS ready Power converters ready
	2.Activities Works (maintenance, repairs, installation…) Inspections Transports Individual System Tests	**2.Powering Tests phase I** PT with low current Interventions linked to PT
	3.Preparation for Commissioning Cool-down + cryo conditions Electrical Quality Assurance (ELQA) All electrical unlocking asked	**3.Powering Tests phase II** PT with High current Interventions linked to PT
	4.Patrols	

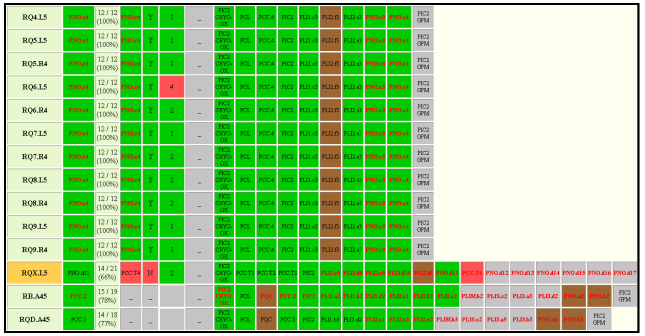
Sharing out of the roles

Planning and Coordination

Machine Status	Schedule Steps	Planning	Coordination
TECHNICAL STOP	Technical Stop	**EN/MEF**	**EN/MEF**
SHUTDOWN	Safety	**EN/MEF**	**EN/MEF**
	Activities		
	Preparation for commissioning		
	Patrols		
COMMISSIONING	Powering Tests - phase 1	**EN/MEF** (general overview) **BE/OP** (in detail)	**BE/OP**
	Powering Tests - phase 2		
OPERATION	Preparation for BO	**BE/OP**	**BE/OP**
	Beam Operation		







Sharing out of the roles

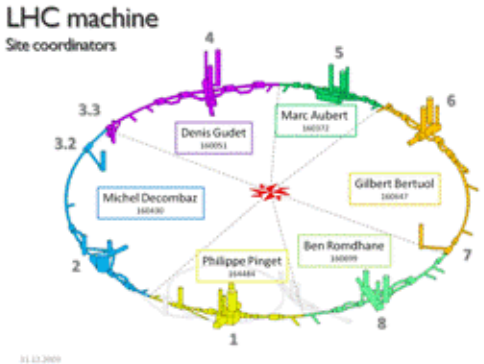
Safety coordination

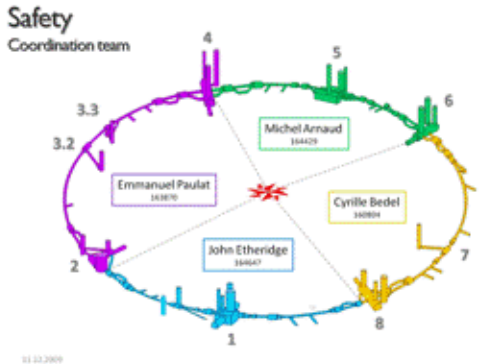
Machine Status	Schedule Steps	DSO	TSO / Site coordinators	Safety coordinators
TECHNICAL STOP	Technical Stop	BE	EN/MEF	YES
SHUTDOWN	Safety	EN	EN/MEF	YES
	Activities			
	Preparation for commissioning			
	Patrols			
COMMISSIONING	Powering Tests - phase 1	BE	EN/MEF	YES
	Powering Tests - phase 2			
OPERATION	Preparation for BO	BE	EN/MEF	/
	Beam Operation			

Session 4

John Pedersen's talk

John Etheridge's talk

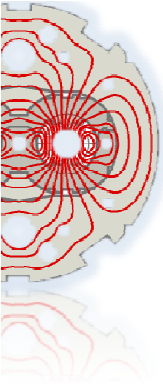


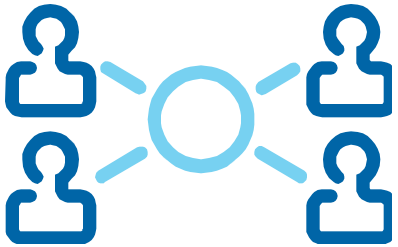


Next stops

- **TECHNICAL STOPs**
  - Depending on the re-start of the LHC
  - Each month

- **SHUTDOWNs**
  - **November 2010** (in 9 months)
  - Every 2 years ??





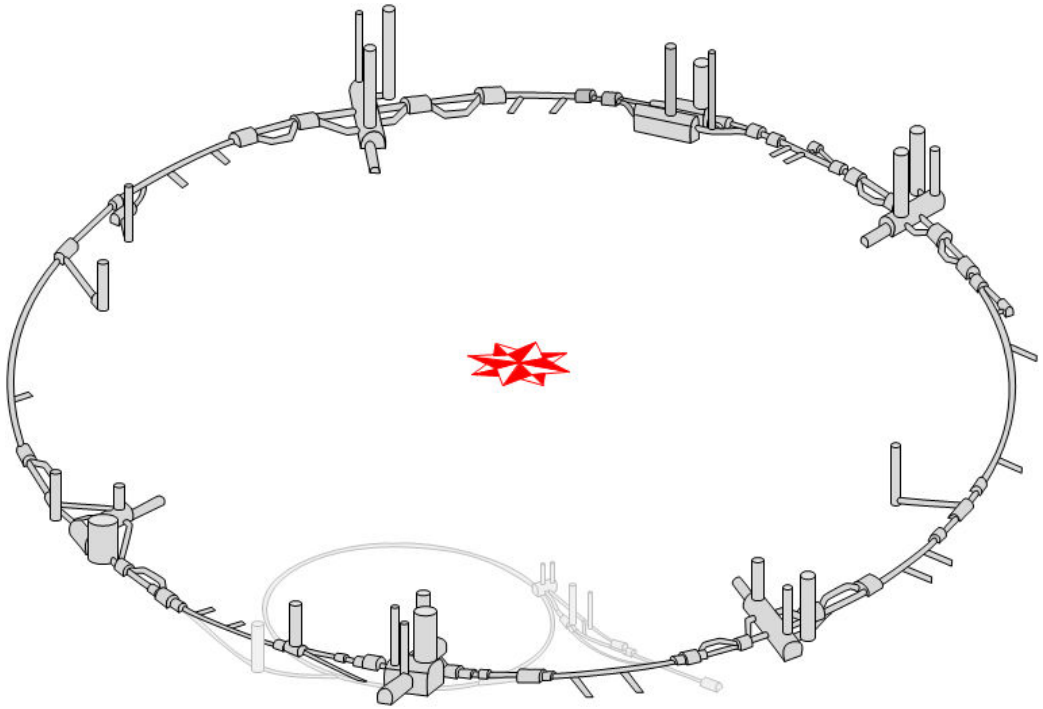
Safety of personnel

Coordination and Logistic

REQUIREMENTS on the LHC MACHINE ACCESS SYSTEM

LHC machine

- **Short reminder on the main hazards**
  - Radioactivity 
  - Cryogenic hazards - Helium release 
  - Electrical hazards that implies to have the H0B0 



Session 4

Safety of personnel

Safety of personnel requirements

- The people have to know the hazards present in the LHC (electrical, cryogenic, radiological,…) = safety courses
- The people have to know how using their biocell = biocell training
- The people need the non electrician training
- The people have to hold a dosimeter

Access System

ADaMS

- People must have their compulsory individual safety equipment

Safety rules - Own responsibility

TRACE AND CONTROL INTERVENTIONS




Session 4

Safety of personnel

Safety coordination requirements

- To know what happening in the machine
  - Be able to analyze working method
  - Have knowledge of the imported risks of all activities
  - Avoid risks due to co-activities
  - Avoid rushed and ill-prepared interventions
  - Avoid surprises
- Supervise site safety
- Supervise work authorization (electrical, cryogenics, radiological, …)
- Good communication with supervisors and coordination

AOC / ADI

CONTROL OF THE ACTIVITIES




Planning and Coordination

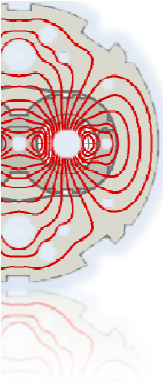
Coordination requirements

- Manage and coordinate activities // tests

ADI

- To know what is happening in the machine and what is the situation at all times
- Allocate time slots for interventions
- Manage and coordinate the co-activities
- Supervise the sum of ongoing activities
- Good communication with supervisors and safety

CONTROL OF THE ACTIVITIES



Current "control" of the activities

The AET – "**A**vis d'**E**xecution de **T**ravaux"

LHC Access System compatibility

HOW TO HAVE THE CONTROL OF THE ACTIVITIES ?

Current "control" of the activities

- **During the last SHUTDOWN**
  - GENERAL

    People need the access authorization (LHC-TNL)

    + AOC - "**A**vis d'**O**uverture de **C**hantier" with VIC – "**V**isite d'**I**nspection **C**ommune"

- **During the COMMISSIONING**
  - RESTRICTED

    People need the access authorization (LHC-TNL) AND access operators authorization

    + ADI - "**A**vis **D'I**ntervention"

    + AOC

- **During the TECHNICAL STOP**
  - RESTRICTED

    People need the access authorization (LHC-TNL) AND access operators authorization

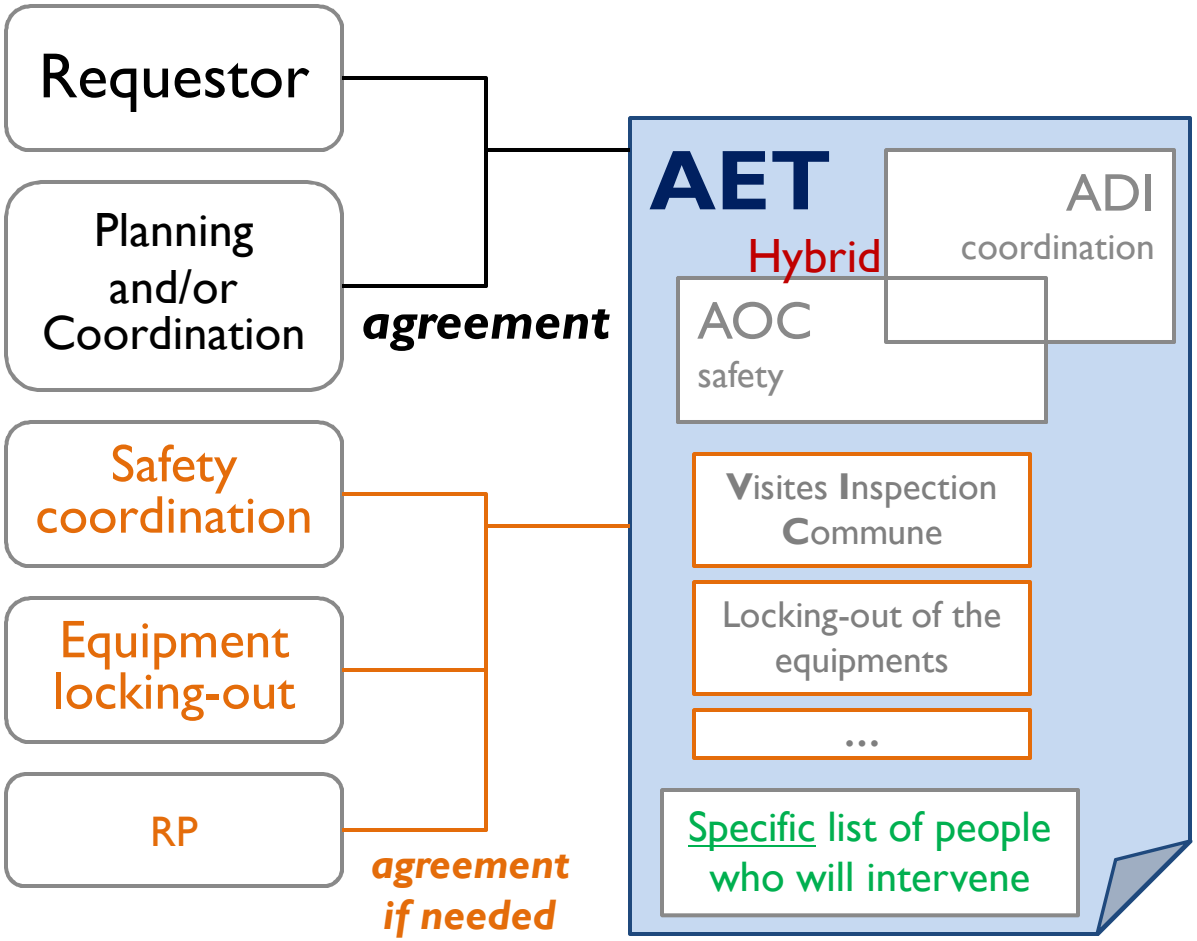
    + ADI

    + AOC

NOT ENOUGH CONTROL OF THE ACTIVITIES

The AET - "Avis d'Execution de Travaux"

- **Brief summary of the aim of the AET for the LHC**



The AET - "Avis d'Execution de Travaux"

The AET in a few words

- It is a collaborative project driven by Serge Grillot
- It has been drawn-up and verified by members of BE, EN, GS, IT, PH, TE departments and SC
- It will use the strong points of both documents AOC and ADI
- It will be more flexible and user friendly
- Only 1 form will be used for all agreements
- The signatures will change according to the machine status
- It will be directly linked to documents needed to execute the work (DIMR, VIC, ALARA, consignations, hot work permit, IS37…)

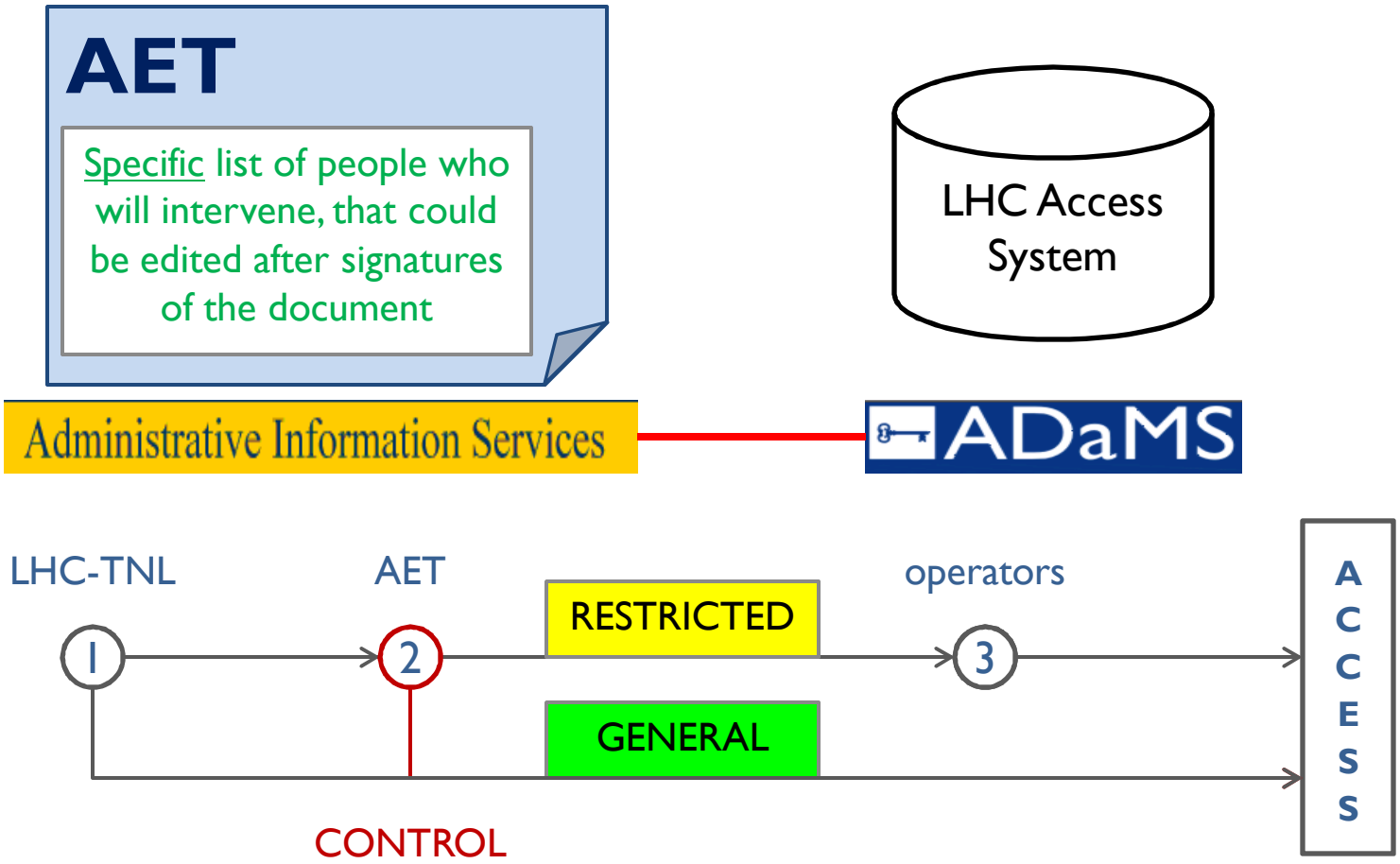
The aim of this tool is to respond to all stakeholders' requirements and be adapted to their needs (even the urgent maintenance, ODM…)

It will centralize and improve the communication.

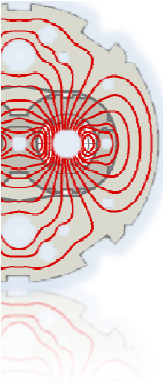
The AET must be put in place for the next shutdown

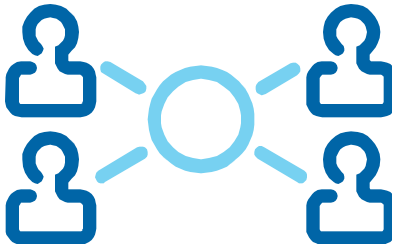
LHC Access System compatibility

- **Additional filter on the access list of people**



This will enhance the control of the safety and the smooth progress of work





Overview of the Access System

Additional requirements

Operation of the Access System

LHC ACCESS SYSTEM

Overview of the Access System

Although the Access System is functionally defined for OPERATION, it is operated during COMMISSIONING and TECHNICAL STOP and will be required for next SHUTDOWN

- **GENERAL**
  - People need the access authorization (LHC-TNL) + AET
  - Inter-site doors can be open

But can blocked by GS/ASE at any time

- **RESTRICTED**
  - People need the access authorization (LHC-TNL) + AET + access operators authorization
    - zones patrolled = we know the number of persons inside the zones
      for safety = Avoid the personnel to be exposed to Helium release hazard
      (during the powering tests phase 2)
    - zones non patrolled = we cannot know the number of persons inside the zones
      Meaningless for safety
  - Inter-site doors cannot be open
- **CLOSED**
  - People cannot enter
- **PATROL**
  - People cannot enter but patrol members

Additional requirements

- **During the TECHNICAL STOPs**

RESTRICTED with AET

  - Do not lose any patrols

- **During the next SHUTDOWNs**

GENERAL with AET

  - No constraint of accessibility (possibility to open the inter-site doors , quick access,…)

- **During the COMMISSIONING**
  - During phase 1

RESTRICTED with AET

    - Low current (I_max = software limitation AND hardware limitation)
    - Presence of persons is acceptable but limited to commissioning

    → Sector of tests must be restricted and patrolled [coordination request]

  - During phase 2

RESTRICTED with AET

    - High current
    - Nobody in the sectors defined by the access matrix for powering tests phase 2. Sectors must be restricted and patrolled [safety request]

Operation of the Access System

Access and patrols

** If needed only*

Machine Status	Schedule Steps	Access mode	Access console	Patrol Leaders
TECHNICAL STOP	Technical Stop	**RESTRICTED**	**BE/OP**	*EN/MEF & BE/OP**
SHUTDOWN	Safety	**GENERAL**	/	/
	Activities			
	Preparation for commissioning			
	Patrols	**PATROL**	**BE/OP**	**EN/MEF**
COMMISSIONING	Powering Tests - phase 1	**RESTRICTED CLOSED**	**BE/OP**	*EN/MEF & BE/OP**
	Powering Tests - phase 2			
OPERATION	Preparation for BO	**RESTRICTED CLOSED**	**BE/OP**	*EN/MEF & BE/OP**
	Beam Operation	**CLOSED**	/	/

currently 27 patrol leaders

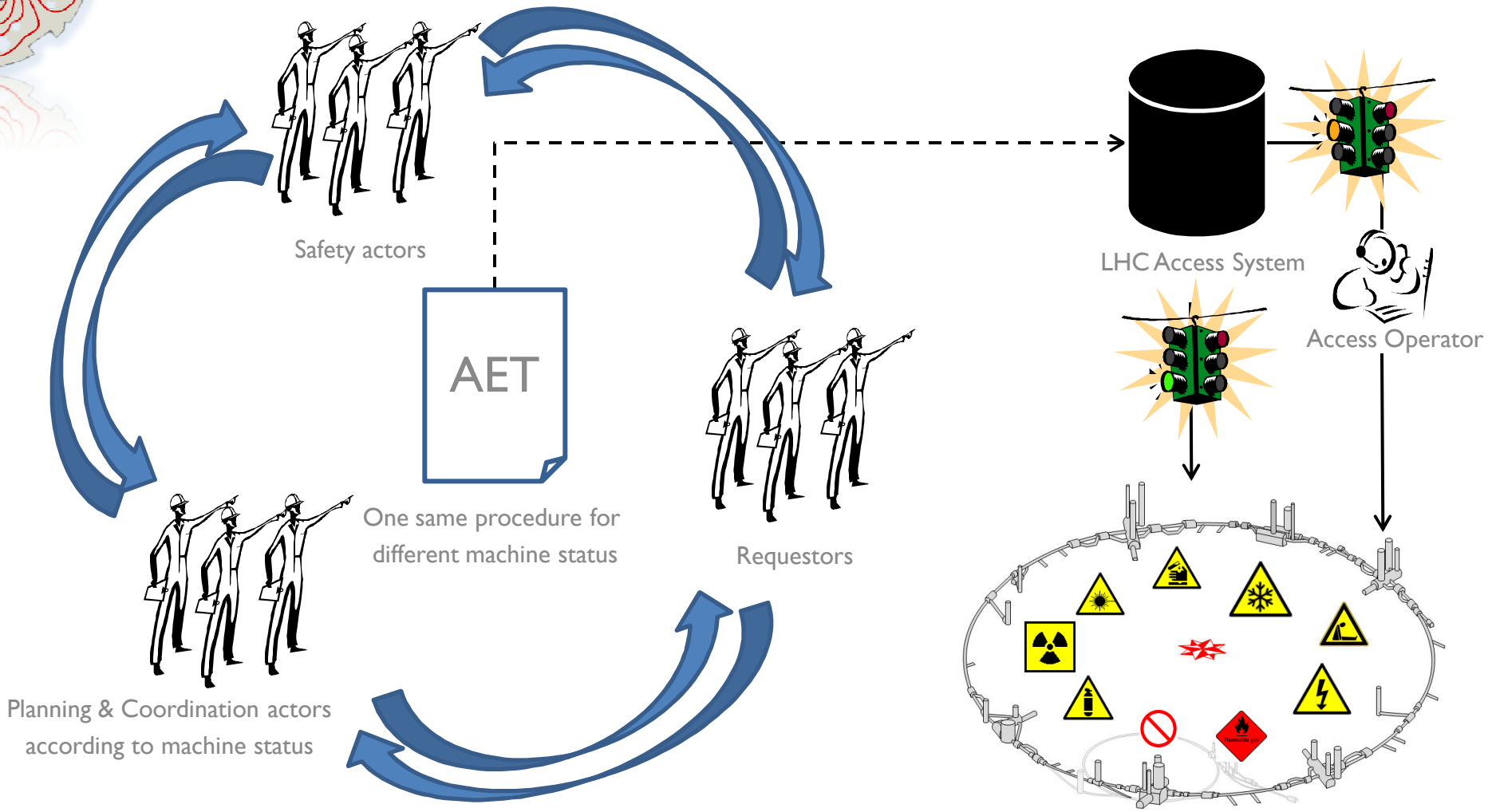
BE/OP to give access

+ Knowledge (access system, equipments, hazards, tests)
– Not only focused on the tests

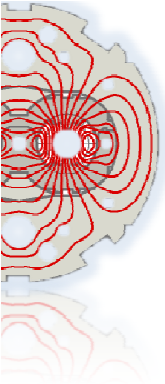
Do we need more persons qualified to give access ?

Conclusion

CONTROL OF THE ACTIVITIES



Access constraints will be taken into account to make the Schedule and Planning



Thanks for your attention