Controls Session

IEFC workshop 2011

Wednesday am

Session Overview

Session chair: E. Hatziangeli; scientific secretary: B. Mikulec

INCA – The point of view of the main users	S. Pasinelli
ACCOR – What will change for operation and equipment groups?	A. Radeva
Industrial controls in the injectors – 'You (will) know that they are here'	H. Milcent
Databases for operations of the injectors – overview, dependencies and strategy for smooth upgrades of the data-driven controls system	Z. Zaharieva
PS & PSB cycle management review	S. Deghaye
Samplers in a 3-tier control system: plans and first experience	R. Steerenberg
Application development for operations in the coming years	M. Lamont

InCA - Point of View of Main Users

➢ InCA deployed in LEIR since 2009 and in the PS since 2010, planned deployment for PSB in July 2011, AD in 2012 and CTF in 2013
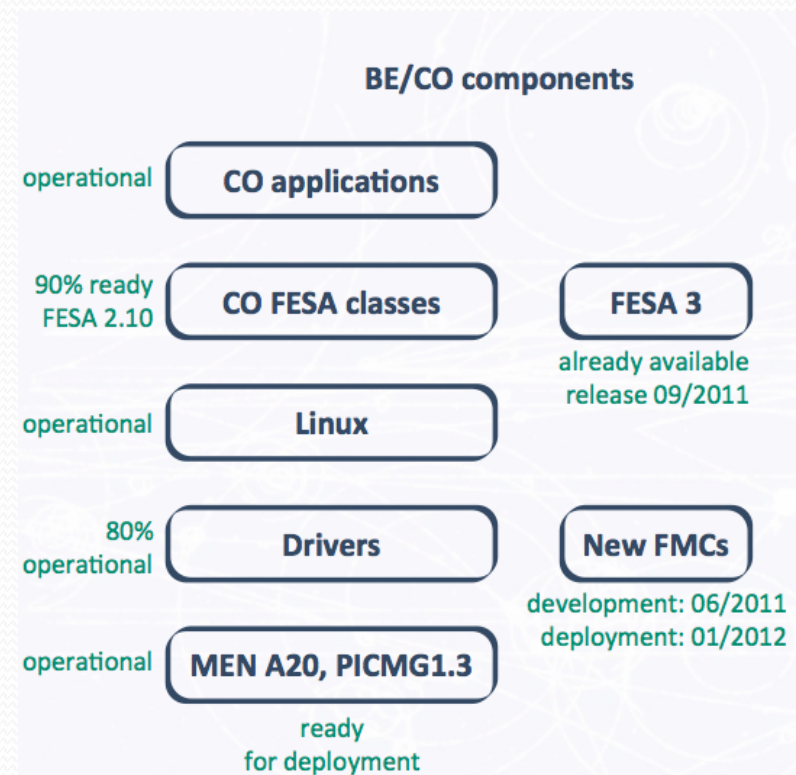
➢ Current InCA status:
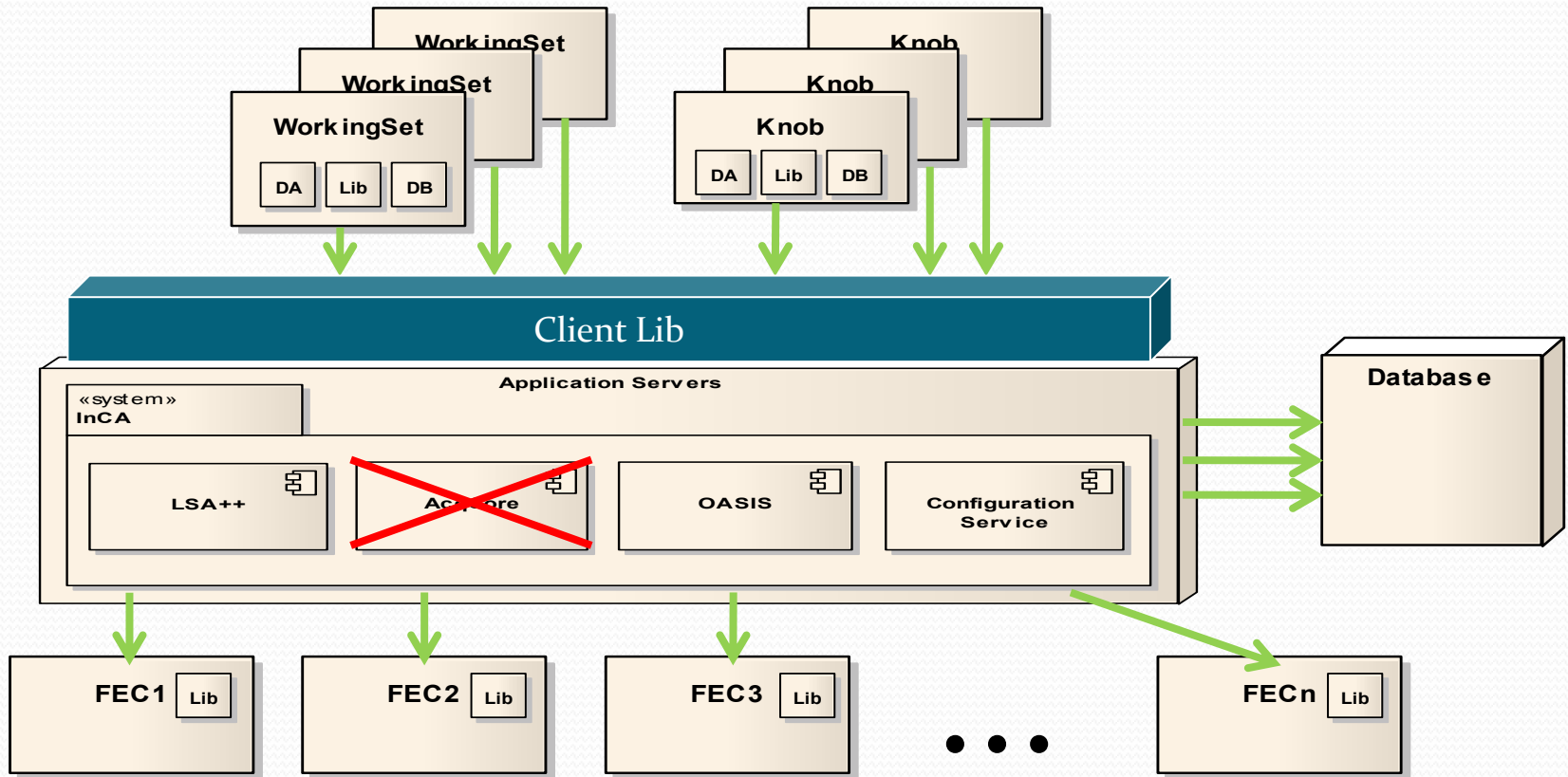
InCA – Summary

- ✓ Improved functionality and very good support of InCA team
  - ✓ Well planned releases without perturbation
  - ✓ Close follow up of issues
- ➢ Need to solve some outstanding issues
  - ❑ Cycle creation, LKTIM,…
- ➢ Reduce InCA complexity for users and simplify DB configuration processes
- ➢ Release AcqCore before InCA deployment in PSB plus stable archiving and ppm-copy
- ➢ Improve documentation and provide continued training
- ☞ New functionality on the SW side can only be provided through serious and well-planned **HW controls renovation**
- ☞ Accelerate the migration from GM to FESA and renovate X-Motif applications

ACCOR: What will change for Operation and Equipment Groups?

- Controls Renovation has high priority for CO as the Injectors control system has reach end of life and it is impossible to add any new functionality
- Critical systems to be renovated:
  - No hybrid transceivers for PSB (TE/EPC) (30 yo)
  - RIO spares down to 60 – total installed 640
- ACCOR project should be extended beyond 2012 Already done till 2014 with original budget stretched
- Limited critical system renovation in 2012
  - Controls renovation should be put at an appropriately high level by Equipment groups
- Controls renovation work (P+M) should be planned and visible in APT by Equipment groups
- Agree to a formal EDMS approval procedure for every renovated systems
  - Signed and approved by CO, OP and corresponding Equipment group

Project Status

BE/CO components

operational	**CO applications**
90% ready FESA 2.10	**CO FESA classes**
operational	**Linux**
80% operational	**Drivers**
operational	**MEN A20, PICMG1.3**

FESA 3
already available release 09/2011

New FMCs
development: 06/2011
deployment: 01/2012

ready for deployment

ACCOR: What will change for Operation and Equipment Groups?

Summary of Main Actions

- Combined coordination of priorities, planning and upgrades between ACCOR, LIU, 25 years Consolidation under one body
- The shared responsibility of the new renovated FE systems should become formally accepted
  - Equipment groups become the 1st line support for their front ends
  - CO is called if problem is related to CO supported infrastructure by Equipment groups
  - Put a coherent support scheme amongst all parties involved
  - Exploitation tools for 1st line support
- OP requests clearly a coherent solution across all groups towards exploitation
- Provide operations with improved diagnostics tools to be able to diagnose problems.
  - These tools are necessary for the diagnostics of the new samplers, for the new Controls responsibility model and for the timing renovation, but also to diagnose problems in general for CO systems composed of multi-layers.

Industrial Controls in the Injectors

➢ Present Industrial systems
- ❑ PVSS based applications
  - • POPS
  - • Vacuum Isolde
  - • WIC PS/SPS
  - • CIS
- ❑ RADE based application
  - • PS beam spectrum analyzer
  - • Linac 4 emittance scanner

➢ Future Applications
- ❑ All CV applications (e.g. RFQ cooling)
- ❑ WIC for HIE ISOLDE, Booster
- ❑ POPS post mortem
- ❑ Dashboard

➢ Support to the injectors projects
- ❑ Vacuum
- ❑ Cryo Instrumentation Expert Tool (HIE ISOLDE)
- ❑ Cryogenics (HIE ISOLDE)

➢ Use standard CERN accelerator hardware and software frameworks
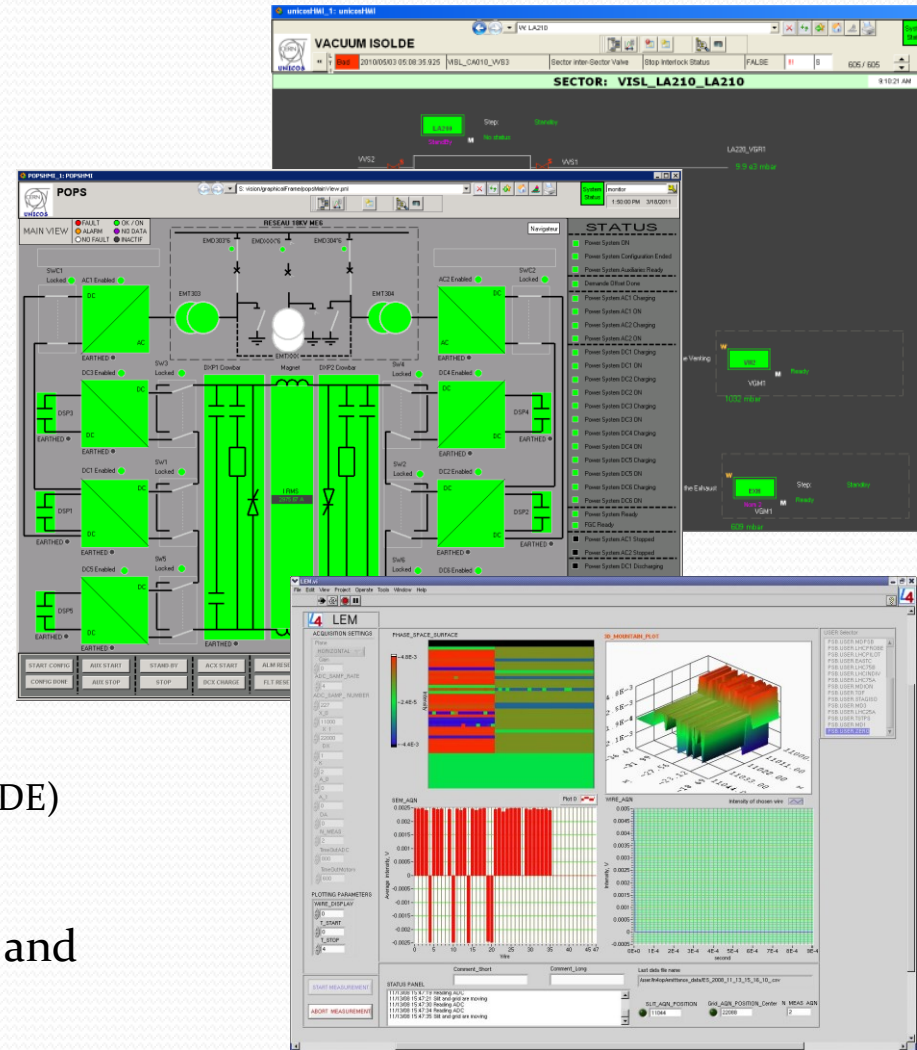
Industrial Controls in the Injectors

Summary

➢ ICE involvement is according to the needs
- ❑ EN/ICE: responsible for the control infrastructure
- ❑ Expert/equipment groups: responsible for the controlled process
- ❑ All request should go via the application expert or equipment group

➢ EN-ICE provides a Standby Service, to cope with hardware and software failures
- ❑ Stock of critical equipment spare is maintained
- ❑ The input of equipment groups is indispensible to maintain the stock of missing spares
  - • Clear reminder to the equipment groups is needed

- Logical break-down of the data in several data domains
  - Easier to organize and manage each individual area

- Interdependencies between the databases
  - Data is maintained only in one place (single source of data
  - Data propagation from one domain to another for the purpose of the accelerator complex operation
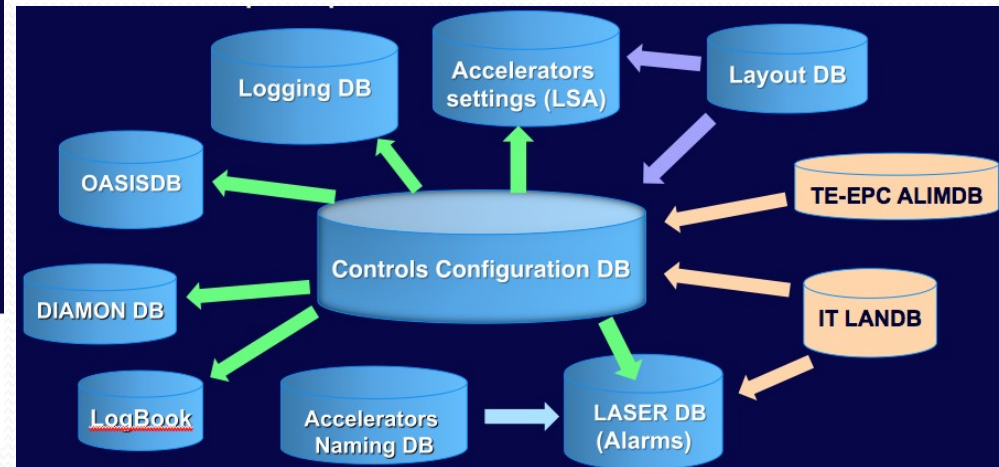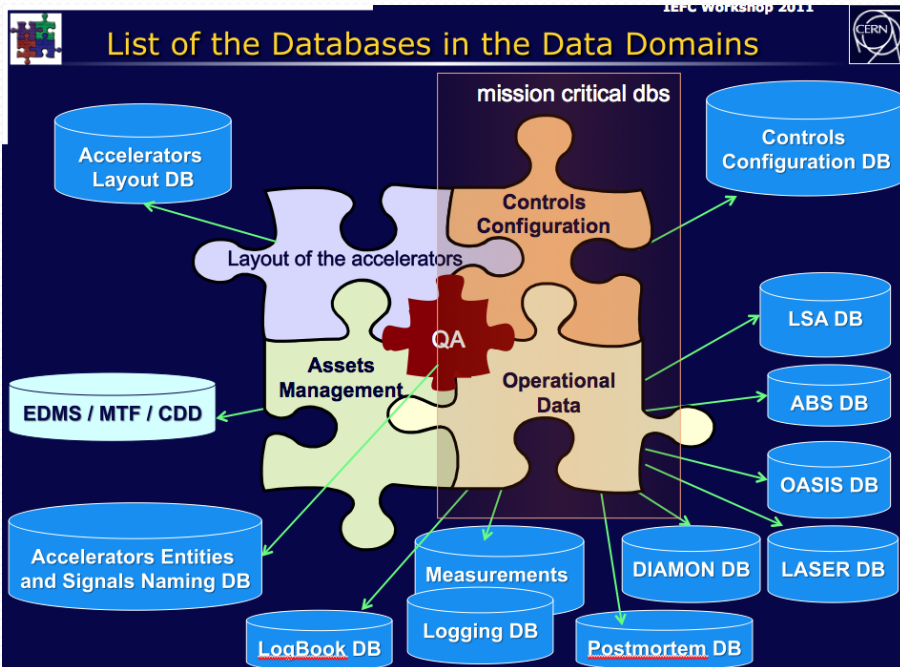
- DM team
  - Responsible for database structures, GUIs to modify/visualize the data and the initial data loading
- Data Owners – equipment experts, CO experts and Operators
  - Responsible for the data – to define data and keep it up-to-date

- Continuous effort is being put into rationalizing, improving, federating and developing new functionality in the existing databases and their interfaces
  - High priority: describe the complete accelerator complex in the layout database => demanding in terms of manpower
- Data management requires the involvement of the data owners and data users
  - OP & Equipment experts should maintain the data in the configuration database
- OP & Equipment experts must verify the list of link people, responsible for the different applications and systems each year
 - Automatic sanity checks to be implemented by DM team

- Very important to ensure smooth data upgrades, as it has direct impact on operational systems and operations
- Must ensure a coherent set of data throughout all distributed databases
- Interdependencies of the data and impact of data changes should be easily available to the users
  - DM to provide tools to expose the interdependencies
- Push to deploy FESA 3.0 as soon as possible
  - Will allow to recognise and deal with changes to front-ends and interdependencies.
  - But also push to eradicate X-Motif applications …
- Non-backward compatible changes allowed with formal coordination and follow-up
  - Enforce the use of ECR for layout DB changes in all machines
- Move away from ORACLE - feasible?
  - Evaluate other databases in terms of performance and cost of migration

- ➤ More that 24 USERS are requested by Operations since a few years but "old" control system cannot provide this functionality
- ➤ More than 24 beams available even though never played at the same time
  - ❑ Will get worse this year with double batch
- ➤ Hardware solution not possible before LS1 due to size of the upgrade and complexity of the new channel cabling.
- ➤ Push the software solution based on LSA context mapping
  - ⇒ But …. InCA should be deployed in the PSB
- ➤ New solution is based on the notion of cycle, not user
  - ⇒ Adapt all Java applications to work with the cycle selector
  - ⇒ High priority to eradicate the implied X-Motif applications
- ⇒ Push for the Open CBCM renovation project to high priority
  - ⇒ Will allow the sequence manager to work with cycles
  - ⇒ Will allow for a real beam structure throughout all accelerators in LSA
    - ⇒ beneficial for derivation of statistics
- ➤ Strong request from OP to replace all GFAs during LS1 due to reliability issues
- ➤ Proposed solution for the LHC fast PSB-ring switching using makerules and virtual devices implies
  - ⇒ appropriate tools for OP to have full transparency

➢ 3695 instances of sampler classes currently used across the majority of the facilities

➢   2-tier   vs.   3-tier architecture (pilot: CTF3)
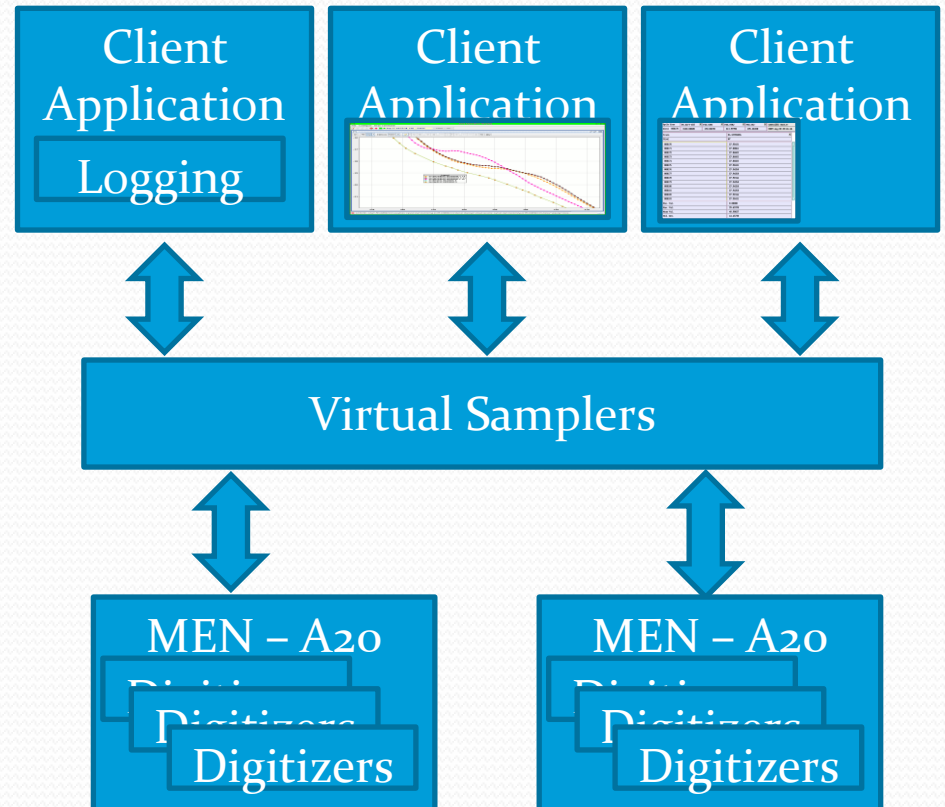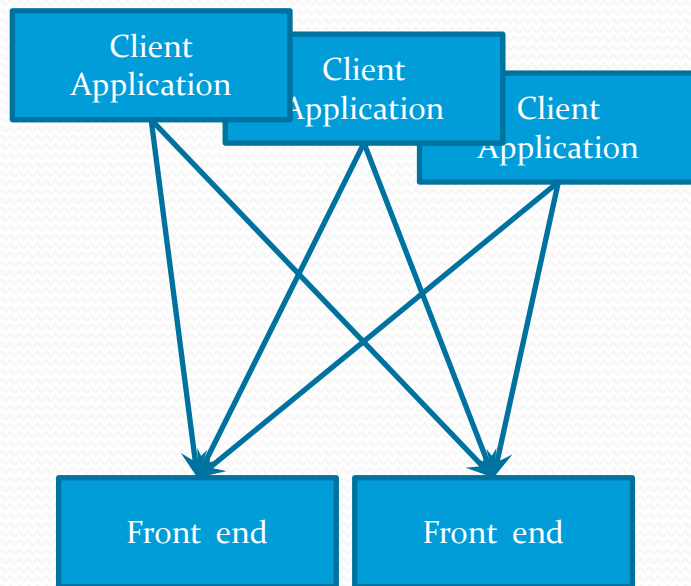
Samplers – Summary

- Samplers with permanent settings are indispensable for OP
- The new sampler solution in CTF3 works well for the 1.2 second repetition rate
  - BUT: ensure the performance is adequate for 5 Hz operation
  - Guarantee correct time stamping for signal sychronization
  - Provide improved tools for efficient multi-tier system diagnostics
- OP and CO are currently defining functional specifications
- The new strategy for samplers cannot be applied blindly to all renovated sampler installation or for the new systems
  - Case by case study is needed and special solutions might still be required

Application Development for Operations in the Coming Years

- Applications development: replacement of X-Motif applications should be pushed
- Support of CO for LSA should be kept high, even though the high development phase for LHC is over, there are still improvements needed
- The renovations and new applications will be planned for LS1
  - there us enough resources from OP to do serious work not counting the temporary resources and collaboration with LAFS
  - Take into account the upgrade of resource-hungry BI applications
- For the development through collaborations, OP and CO should come up with a setup that will make sure
  - The user requirements are provided by OP
  - The code will be developed by LAFS using our components and tools with shared supervision so that support can be assured
  - The final applications will be well accepted and supported by the operators when terminated and corresponding to the specifications

Summary

➢ InCA should be deployed in PSB this year – functionality requests are well understood and implementation is underway

➢ **GM classes and Xmotif application should be eradicated** asap

➢ Request to **increase the priority of controls renovation** – ensure coherent planning amongst all main projects (consolidation, LIU, ACCOR+equipment groups)

➢ As we move to a more complex control system and to **a shared responsibility** model, a **coherent and complete set of diagnostic tools** is a necessity

➢ Very important to **ensure coherency and smooth data upgrades**, which has a direct impact on operations

➢ Interdependencies of the data and impact of data changes should be available to the users

➢ A new solution is based on LSA context mapping and the notion of cycles provides a software-based solution to the cycle management issue which is problematic with double batch beams

➢ The new samplers solution based on MEN A20, OASIS FESA and virtual samplers works well in CTF3 and its deployment should now continue - watch for the 5Hz operations and the correct time stamping!

➢ The eradication and implementation of new applications will be planned for LS1; there are enough resources from OP to do this work; complemented by temporary resources and collaboration effort