

# Controls Renovations and End of Life (EoL) plan of major components of the controls infrastructure

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**LS2** DAYS

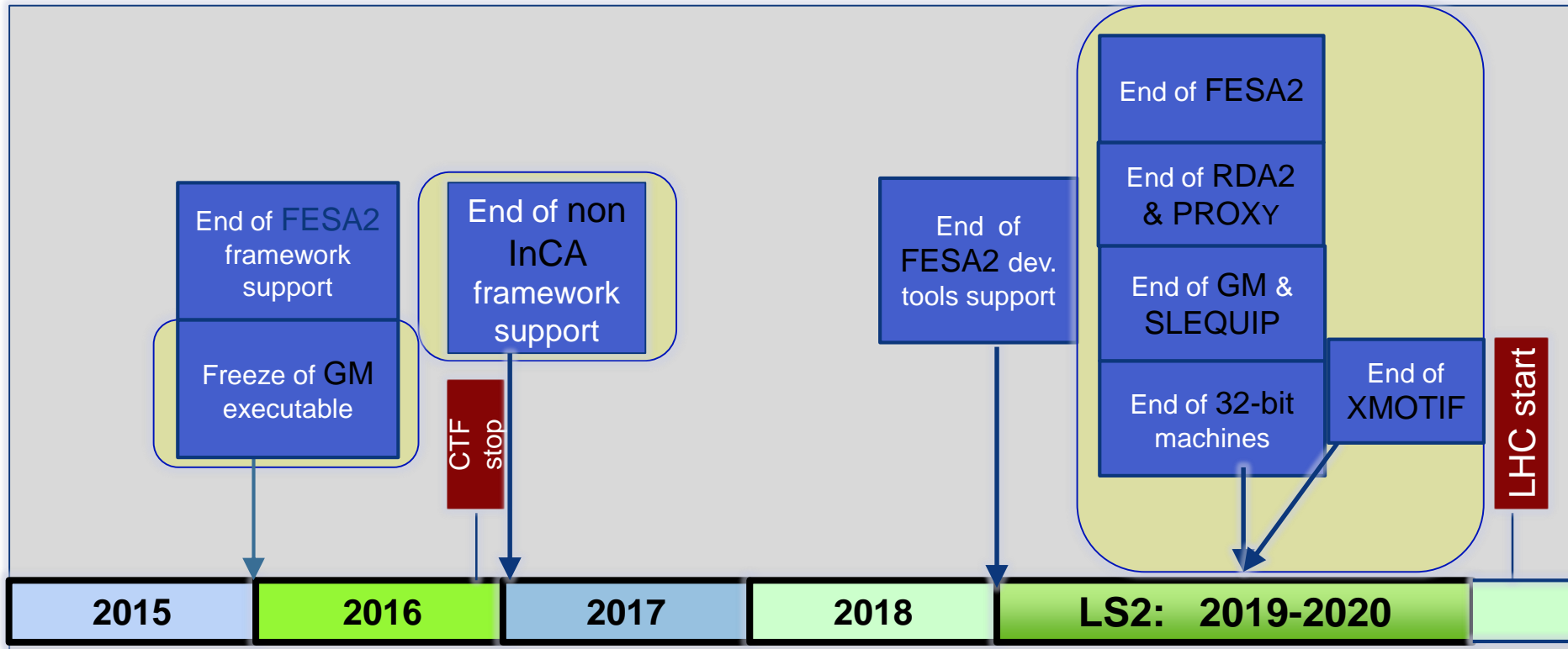
29-30 SEPTEMBER 2015

<http://indico.cern.ch/event/436424/>

# Contents

- **Post ACCOR Renovations and End of Life (EoL) of major Controls components**
- **Controls Consolidations & Renovations**

# CO Roadmap - EoL and Support



- **YETS 2015-2016**

- Freeze of all GM executable

- **End 2016**

- All FE installations and non-InCA JAVA AP framework for CTF will be stopped end 2016

- **Mid of LS2**

- No 32-bit OS machines (LynxOS + Linux)
- No RDA2 communication & proxies
- No GM or FESA2 executable
- No SLEQUIP
- No X/MOTIF AP

# Renovation Roadmaps by EQP Groups

- Roadmap received for almost all systems
  - Detailed planning available for each FE
  - More than **900 FEs** concerned
  - Roadmap provided by 10 EQP Groups
    - BE-BI (370 FEs): first feedback received but detailed roadmap expected end 2015
    - EN-EL (2 FEs): under discussion
- Compilation of all roadmaps done
  - One document with shared access to come soon for approval
- **We are grateful for the excellent effort put in by all equipment groups**

# Alignment of Renovation Plans & EoL (1/2)

- BE-CO EoL: freeze all GM executable by YETS 2015
  - CO proposal is not accepted for ABT, BI, RF
    - GM code should stay editable until LS2 to accommodate OP/MD requests
    - CO now in discussion with the Eq. groups to see how to facilitate this request
- CO EoL: All FE installations and non-InCA JAVA AP framework for CTF will be stopped end 2016
  - No objection from EQP & OP groups

# Alignment of Renovation Plans & EoL (2/2)

- CO EoL: Stop of RDA2/FESA2/32bit OS/GM/SL/XMotif by mid LS2
  - ✓ EQP Renovation roadmaps are compliant with CO EoL at 95%
    - For the most obsolete systems [GM, SLEQUIP], some renovation takes place late (LS2)
  - Very few renovations are not compliant with EoL
    - SPS BLM (10 FEs, LynxOS): renovation planning is LS3
    - Legacy B-TRAIN (~6 FEs) requested to be kept operational beyond LS2
      - BE-CO ready to help them so they could deploy 4 new systems during LS2: LEIR, AD, PSB and CPS
    - In discussion now with corresponding groups to see how BE-CO can help

# CO Tools for Renovation

- Massive Class/Device migrations (GM -> FESA, FESA2 -> FESA3) will take place until LS2
  - CO tools (FESA instantiation, CCDB migration) to be extensively used
- FESA Migration tools
  - Available in Eclipse since **end 2014**
  - FESA3 is stable -> **priority can be increased on tools improvements**, if required
  - Contact fesa-support for help & feedback on improvements
- Controls Configuration Service (CCS) tools
  - Presentation/demo of the new migration tools: **October 2015**
  - **On-demand training sessions** between CCS Support and EQP developers
  - Developers with new class design should contact CCS Support for migration tests on our testbed
- **User feedback on tools improvements is essential as soon as possible**

# Post ACCOR Renovations and EoL Summary

- We have now an **agreed roadmap** with all Eq. groups for the remaining **post ACCOR renovations (900 FEs)** and **EoL** of controls components
  - EDMS, shared-access document will be available soon
- Remaining actions
  - BI roadmap by end 2015
  - CO  $\leftrightarrow$  Eq. groups discussions on GM support until LS2
  - Dedicated meetings with Eq. groups to address the few renovations not compliant with EoL (SPS BLMs, B-TRAINS)
- Developers should provide **feedback** to Configuration Service and FESA **tools** for **needed functionality**

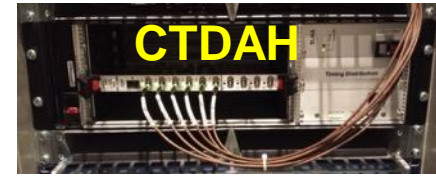


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# Renovation of Timing Pulsed Distribution Network

*Aim : Replace obsolete 40y old cards TTL-BLO and RS485 (400) with new VMEbus crates + modules + diagnostics*



## Budget

400 KCHF request to Consolidation Budget covering:

- ELMA contract for VMEbus crates (to be extended)
- VMEbus cards proto from BE-CO-HT
- Work will be done by BE-CO FSUs

Activity	Impact
Ethernet socket	EN/EL, IT/CS
HW production : • TTL-BLO : 500 CTARA + 500 CTDAH done • RS485 : Design to be completed	Design : BE/CO/HT Production : TE/MPE/EM Asset InforEAM: GS/ASE
Planning, Commissioning	EN/MEF, BE/OP, LS2 CO Coordinator

## Planning

Small nodes during TS

Medium nodes during EYETS 2016-17, YETS 2017-2018

Big nodes during LS2

# GMT Central Timing Renovation

*Aim : renovate the GMT Central Timing with White Rabbit (WR)*

*Why : driven by lack of stocks of current GMT receivers (CTR<sub>x</sub>) (>1000 installed)  
stock 200 remaining – 50/y consumed → lack of components*

Activity	Impact
Fibers + Ethernet sockets	EN/EL, IT/CS
HW production <ul style="list-style-type: none"> <li>WR Switches : launch additional production</li> <li>WR HW modules (Timing Master + CTR WR version) : First design in 2016</li> </ul>	Design : BE/CO/HT Production : TE/MPE/EM Asset InforEAM : GS/ASE
Planning, Commissioning	EN/MEF, BE/OP, LS2 CO Coord

Budget
Covered by our operational budget
<ul style="list-style-type: none"> <li>White Rabbit modules and switches</li> <li>Cabling and sockets</li> <li>Work will be done by BE-CO FSUs</li> </ul>

## Planning

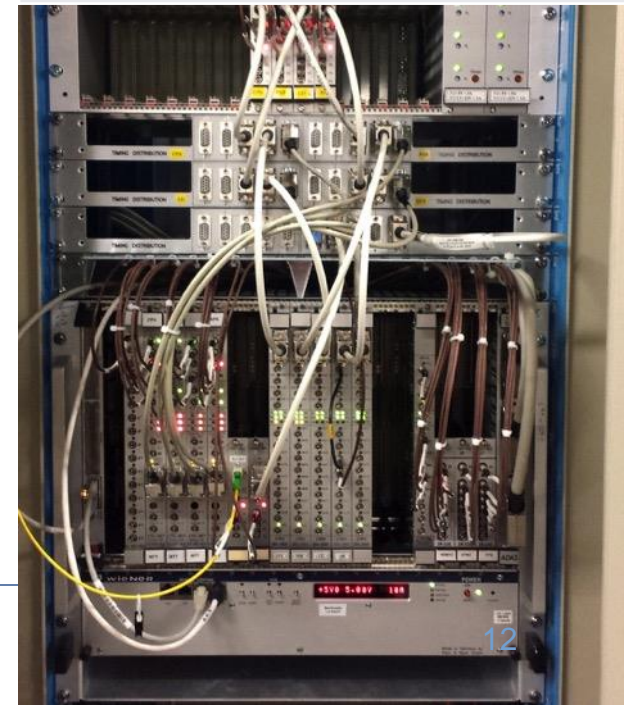
Develop hybrid GMT/WR master and hook the existing timing distribution to its GMT output. Then have a parallel WR distribution to gradually migrate front ends to WR

=> This would allow us to recuperate the CTR modules in those front ends to replenish the stock

YETS 2017-2018 : Deploy pilot for proof of design before LS2

LS2: Low intensity migration of part of LIC towards WR to recuperate CTR<sub>x</sub> stock

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# Renovation of GMT External Conditions

*Aim : replace the old GMT “external conditions” infrastructure with WR*

*Why : present installation on unreliable legacy hardware with long coax cables and unreliable contact interfaces – already issues – anticipate further degradation*

Activity	Impact
Fibers + Ethernet sockets	EN/EL, IT/CS
HW production <ul style="list-style-type: none"> <li>WR Switches : launch additional production</li> <li>WR contact interface : New design</li> <li>BE-CO Fellow will work on translation of the on/off switch to WR contact interface</li> </ul>	Design : BE/CO/HT Production : TE/MPE/EM Asset InforEAM: GS/ASE
Planning, Commissioning	EN/MEF, BE/OP, LS2 CO Coord

Budget
200 KCHF in consolidation request
<ul style="list-style-type: none"> <li>White Rabbit modules and switches</li> <li>Cabling and sockets</li> <li>BE-CO FSU Jobs</li> </ul>

Planning
Take the opportunity to make installation more coherent => need discussions with equipment groups
Migration during LS2



# Timing PLS-SU Receivers

*Aim : Replace these very old modules used by equipment specialists to diagnose timing locally, with a physical knobs and buttons and LEDs interface.*

*Why : Legacy hardware which we cannot produce any more - no stock problem*

## Activity

Possible replacement using a software-based system

Need prior discussions with the users

No cabling work is required

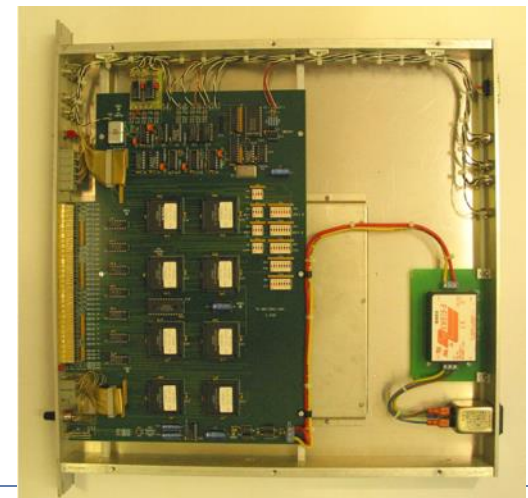
## Planning

Migrate some of the PLS-SU boxes before LS2

Perform a larger migration during LS2

## Budget

200 KCHF request to Consolidation Budget



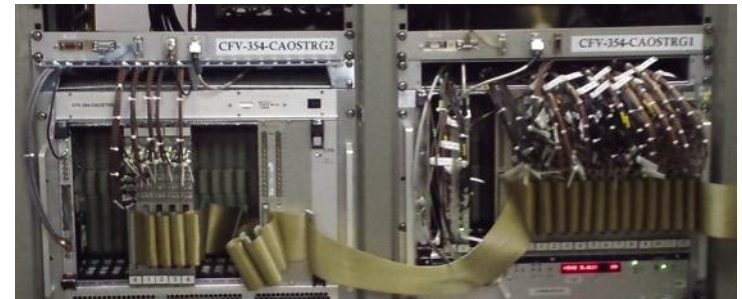


# OASIS – Consolidation of Oasis Triggers

*Aim: Replace OASIS trigger system by WR*

*Why : obsolete hardware – not enough stock of legacy CTC modules spares (components are not available)*

Activity	Impact
Fibers + Ethernet sockets	EN/EL, IT/CS
HW production <ul style="list-style-type: none"> <li>WR switch</li> <li>TDC Mezzanines &amp; Fine Delay</li> </ul>	Asset InforEAM: GS/ASE
Planning, Commissioning	EN/MEF, BE/OP, LS2 CO Coord



Planning
Prototype in next 2 years
<ul style="list-style-type: none"> <li>LS2: Full renovation</li> </ul>

Budget
<ul style="list-style-type: none"> <li>Money already obtained from the consolidation project</li> <li>Hardware is in process to be procured</li> </ul>

# OASIS - Eradication of VXI systems

*Aim : Replace OASIS VXI systems by WR*

*Why : VXI systems are >10years, very expensive,  
performance problems (not enough memory, not enough samples)*

Activity	Impact
Fibers + Ethernet sockets	EN/EL, IT/CS
HW production • SVEC + FMC/ADC Mezzanine	Asset InforEAM : GS/ASE
Planning, Commissioning	EN/MEF, BE/OP, LS2 CO Coord

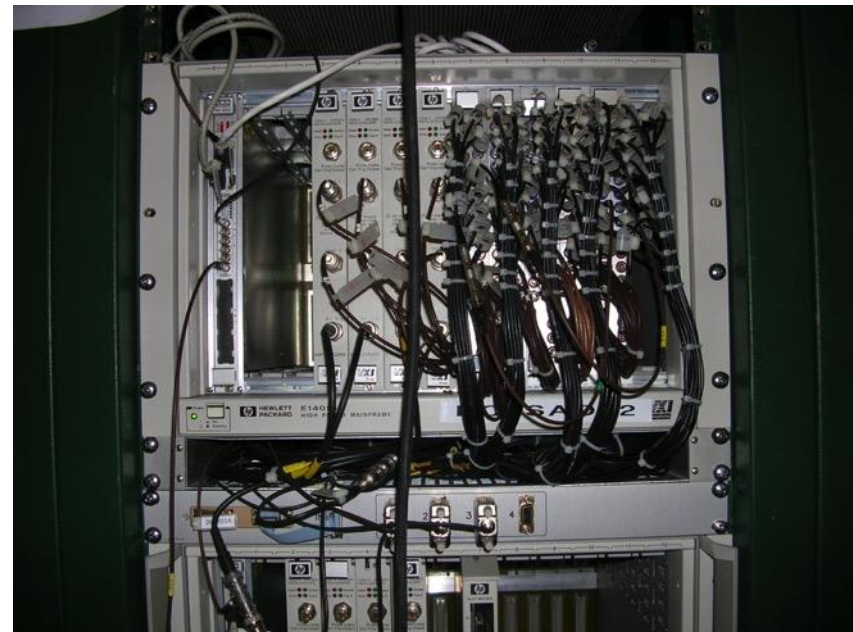
## Planning

EYETS 2016-17 : Partial renovation

LS2: Full renovation

## Budget

- Money already obtained from the consolidation project
- Hardware is in process to be procured



# LHC WorldFIP Infrastructure

*Aim : install the new in-house bus arbiters cards and associated high-level libraries to replace the WorldFIP Bus Arbiters (WorldFIP master) for all LHC systems (Power converters, QPS, Cryogenics, ..)*



FMC mezzanine board, to be plugged on the PCIe carrier (SPEC)

Activity	Impact
HW production <ul style="list-style-type: none"> <li>Bus Arbiter PCI cards done</li> </ul>	BE/CO/HT + TE/MPE/EM
New device driver + SW libraries: Proof-of-concept OK	Power Converters, Cryogenics, QPS, Survey, Beam Instrumentation
Agreement + Testing : Backwards compatible layer for clients who keep the old API <ul style="list-style-type: none"> <li>Encourage clients towards the new API</li> </ul>	Power Converters, Cryogenics, QPS, Survey, Beam Instrumentation
Planning, Commissioning	EN/MEF, BE/OP, LS2 CO Coord

## Planning

Deploy the new master in selected places before LS2 to get confidence and a general replacement during LS2 :

- TS 2016: install few non critical pilot(s) in LHC
- EYETS 2016-17: install few pilot(s)
- LS2: Full replacement

## Budget

400 KCHF allocated in consolidation covering

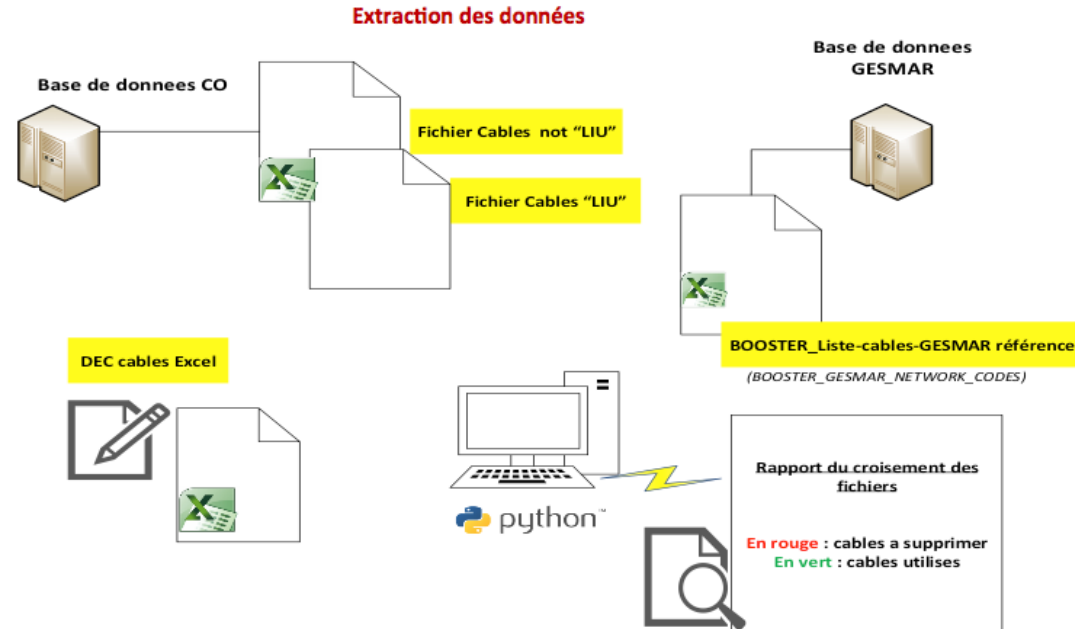
- cards production
- FSUs Job

Cu/Optical repeaters were already insourced (GOFIP) and we plan to insource the Cu/Cu repeaters before LS2 to ensure adequate stock. No need to replace the existing ones so far as they are not giving any problem



# Removal of Obsolete Cables

- **133** obsolete control cables will be removed from the Booster (out of 1540) in 2015-16 YETS
  - Cables checked against CO DB & GESMAR
  - More obsolete cables should be in the paper lists (not in GESMAR)
- Possible Improvements
  - Move all information from paper to digital (big gain as paper contains the oldest cables)
  - Put fiber optic cables in a DB
  - Asset management of the cables and GESMAR could be part of the Asset management system
  - Electronic follow up of all (de)cabling demands would ease the work progress follow up from the clients
- An excellent initiative in the form of a WG was put in place up by EN/EL to establish a single common method/process for cable disconnection with all users and BE-CO is participating



# Other Hardware Upgrades in a glance

System	Aim	Motivation	Performed by	Potential impact	Impact on	When
<b>SPS Intercom</b>	Replace the present infrastructure with new technology	Old technology and spare parts - will not survive after LS2	GS-ASE + BE-CO (public address ++ system)	Change of habit	SPS Operations	LS2
<b>CCC Consoles</b>	Replace the consoles installed early 2015 and recycle them in the local CRs	Regular technological upgrade (working lifetime of 3-4 years)	BE-CO	Minimal to none	CCC Operators	End LS2
<b>CCR Backend Servers</b>	3 first days of the year for system maintenance and upgrades of all the servers	Dedicated end of year maintenance	BE-CO	Minimal to none		YETS 15/17 EYETS 16 LS2
<b>Database servers and storage</b>	Replacement certain hardware + additional disk storage	Regular end of maintenance replacement	IT-DB BE-CO	None		LS2

# Upgrades of Control Software Services

System	Aim	Motivation	By	Potential impact	Impact on	When
Layout Services new database & tools	New approach: distributed data management (enable eq. groups to manage their data reliably using new CO provided tools)	Layout Database Scale & Scope has evolved significantly over last 12 years Current system, tools and approach have reached their limits	CO-DS	<b>Generic access user/passwd will be replaced by specific per system user/passwd</b>	Current programmatic users of the Layout database will be impacted	Production in 2018
DIAMON	DIAMON with ALARM functionalities	To simplify alarm definitions and allow immediate upgrades of alarm configuration	CO-IN	Minimal to none	Deployments in close collaboration with all users	TS, YETS 15/17, EYETS
CMW	New version of RBAC server	Server independence from online DB access	CO-IN	Minimal to none		EYETS, YETS 17
	New version of CMW<->DIP Gateways -> RDA3 driven by DB config.	Ensure consistency of deployed configuration				
	New major version of CMW Directory Server	Easier to evolve and maintain				

# Upgrades of Control Room Applications

System	Aim	Motivation	By	Potential impact	Impact on	When
<b>LSA DB</b>	To automate import of new FESA class versions	OP request to automate the propagation of changes from CCDB to InCA/LSA	CO-APs	Applications accessing or changing settings via LSA/InCA.	OP applications developers	YETS 2015-2016
<b>Settings Management</b>	Consolidate and simplify the high level Settings Management	Reduce complexity overall by extracting the exceptional cases	CO-APs	All applications depending on APs public APIs	Application developers	LS2

# Controls Consolidations/Renovations Summary

- LHC WorldFIP Bus Arbiters (**FIP master**), concludes the insourcing of **WorldFIP technology** inside BE-CO
- **Timing Distribution Network** (cabling requests)
- **GMT Central Timing and External Conditions** (cabling requests)
- **OASIS Triggers and VXI systems** (cabling requests)
- Removal of **133 obsolete cables** in **PSB** (cabling requests)
  - Improvements to **cabling data management & workflow** would greatly **facilitate** (de)cabling needs
- Upgrades of the hardware infrastructure, controls software services and high level applications
  - **Work is planned and coordinated with the users**
  - **Impact** on most work **is estimated low**
- The BE-CO work planning is followed up by the LS2 CO coordinator in close collaboration with the EN/MEF planning team