Run Control Systems

Upgrade: Configuration & Control

Vasco Barroso

First of all...

- A big thanks to the contributors:

    - Franco Carena
    - Giovanna Lehmann Miotto
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    - Andrea Petrucci
    - Clara Gaspar

Goal while preparing this presentation

- Do not present a TODO list

Result after preparing this presentation

- TODO list

Are you happy with the current system ?

- ALICE: "We are generally happy with the current system"

- ATLAS: "We are generally happy with the current system"

- CMS: "We are generally happy with the current system"

- LHCb: "We are generally happy with the current system"

Improvements and consolidation

LONG SHUTDOWN 1

Vasco Barroso, DAQ@LHC Workshop

Plans for LS1 - ALICE

- Optimize SOR/EOR sequences
  - Optimize SOR/EOR sequences
  - Speed up individual actions duration
  - Move certain SOR tasks to start of fill

- SYNC procedure
  - In-run recovery of detector's FEE

- Automation and Error Recovery
  - More (all) detectors

Increase Data Taking Efficiency

Plans for LS1 - ALICE

- Finite State Machine
    - SMI++ based
    - Increase code modularity
    - Increase configurability

Software
Consolidation

- Web-based GUIs
    - Profit from operational experience

Usability,
Remote
Access
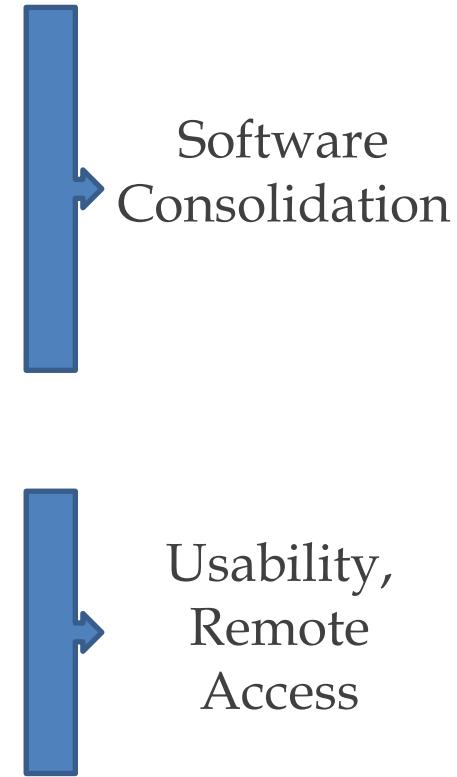
Plans for LS1 - ATLAS

- Automation and Error Recovery
  - Move from *Forward Chaining* (CLIPS) to *Complex Event Processing* (Esper)

Increase Data Taking Efficiency

- Parallelism in HLT
  - Control child processes

Other Systems Changes
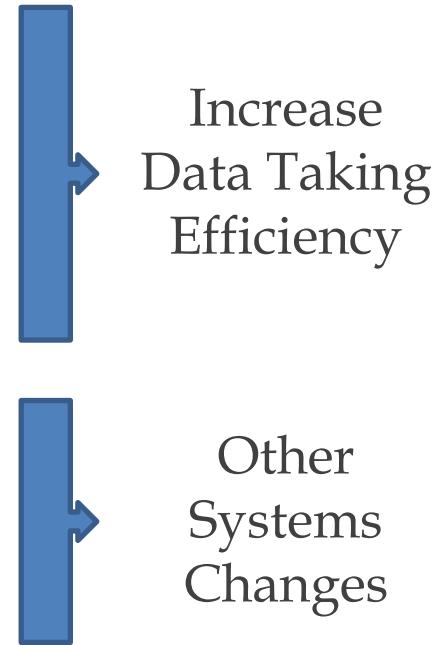
Plans for LS1 - ATLAS

- Finite State Machine
  - Replace in-house code by Boost C++ libraries whenever possible

Software Consolidation

- Archive more operational monitoring data
  - Counters, rates, etc
  - For post-mortem analysis
  - For overall system performance evaluation

Improve Expert Analysis

Plans for LS1 - CMS
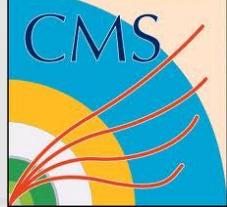
- Automation and Error Recovery
  - More (all) detectors
  - More error cases

- Single event builder slice
  - Find a replacement for the existing slice masking mechanism

- File-based HLT
  - Provide buffer of a few minutes
  - Dedicated control system that will interface with main run control system

Increase Data Taking Efficiency

Other Systems Changes

Ideas for LS1 - CMS
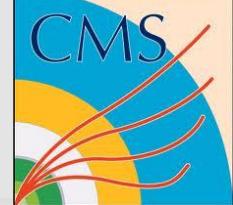
- Automatize certain top level actions
  - Reaction to LHC status changes
  - Schedule runs (e.g. detector calibration)

  Improve Operations

- Web GUIs consolidation
  - Toolkits to replace in-house code

  Software Consolidation

Plans for LS1 – LHCb

- Automation and Error Recovery
  - More error cases

- "Fully deferred" HLT
  - HLT1: real time, small fraction of data for calibration and monitoring
  - HLT2: data stored on disk and processed once calibration data is available (~ 1 hour)
  - 2 separated control hierarchies

Increase Data Taking Efficiency
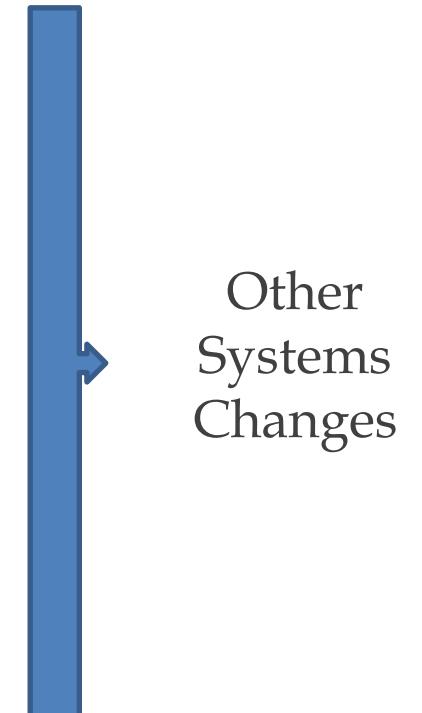
Other Systems Changes

Plans for LS1 – LHCb

- Move control nodes (150) to virtual machines
  - SPECS (PCI) => From PC to Ethernet attached CCPC box
  - Canbus (USB) => From PC to Ethernet attached CCPC box

  Infrastructure Consolidation

- Review sub-detectors Control Systems
  - Optimize control tasks

  Software Consolidation
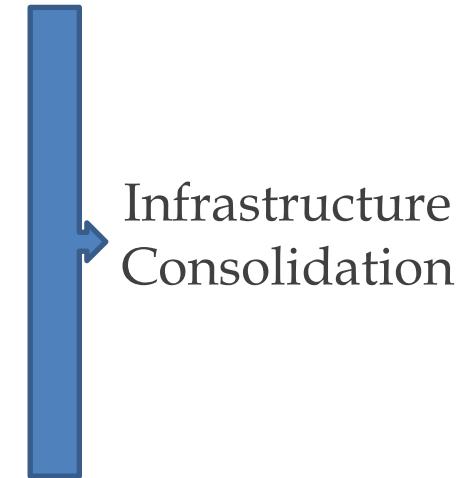
LS1 Overview

	ALICE	ATLAS	CMS	LHCb
Increase Data Taking Efficiency	🟩	🟩	🟩	🟩
Software Consolidation	🟩	🟩	🟩	🟩
Usability, Remote Access	🟩			
Other Systems Changes		🟩	🟩	🟩
Improve Operations			🟩	
Improve Experts Analysis		🟩		
Infrastructure Consolidation				🟩

Some white spaces might be done anyway:
- Not yet scheduled
- Not considered relevant enough to mention

The (not too) distant future

LONG SHUTDOWN 2

Plans for LS2 - ALICE

- Common DAQ/HLT/Offline framework
  - "ALICE Computing software framework for LS2 Upgrade" document released on Dec/2012
  - 13 working groups created
    - WG 10: "Control, Configuration and Monitoring"
    - Starting now
    - Back to the drawing board, "Clean Sheet Review"

- No plans for Control Systems yet

Plans for LS2 - CMS

- No plans for Control Systems yet

Plans for LS2 - LHCb

- New electronics for 40 MHz readout
  - Change in control link: SPECS => GBT
  - New ATCA crates

Technology Surveys

- Regular evaluation of new technologies
  - Message Queuing Systems
  - Frameworks: Django (python), Spring (Java)
  - Visualization: Splunk
  - …

- Can we benefit from each other's efforts ?

How to distinguish between hype and substance ?

Conclusion

- Plans for LS1:
  - Consolidation, Optimization
  - More automation
  - React to changes in other systems

- Plans for LS2:
  - Still too far away
  - ALICE: New online system
  - LHCb: New electronics (40MHz)

Late Decision normally applies to Control Systems: you first need to know what you need to control!