Remote Participation

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LHC@FNAL


LHC AT FNAL
OPERATIONS CENTER
ATRIUM LEVEL
PROPOSAL
SEPTEMBER 30, 2005
Gary Van Zandbergen FESS/ENG

Previously

- **DESY**
  - **Attempt to motivate international collaboration for TESLA - Over ruled by DG**

- **GAN**
  - **1st : 2001 CORNELL**
    2nd: 2002 Shelter Island
    Cotogan2003 = 3rd GAN workshop
  - **2003 LARP motivated musings re. LHC collaboration**
  - **Support not forthcoming from ABMB@CERN**

LHC@FNAL Charge

- LHC@FNAL charge from Director Mike Witherell (April 2005):
- Define the high level requirements for a remote operations center for commissioning and operations of CMS and the LHC accelerator.
- Develop cost and schedule estimates for the implementation of a remote operations center.
- I would like the committee to prepare a preliminary report by the end of July 2005, describing the requirements and scope of a remote operations center located at Fermilab.
- The committee should prepare its final report, including a resource loaded schedule, by the end of 2005.

Motivation

- **Politics**
  - **US involvement in LHC**
    - **Ownership**
    - **Skills**

- **Prototype future international collaborations (ILC, ITER)**

Remote operations and maintenance: an important tool for LHC accelerator physics and crucial for the next generation of truly global machine collaborations

- **Leverage US skills**

What is LHC@FNAL?

1) **Allow experts located at Fermilab to participate in CMS and LHC commissioning and operations.**
   - Hardware and software necessary to participate effectively in CMS and LHC.

2) **Facilitate communication and help members of the LHC community in North America contribute their expertise to CMS and LHC.**
   - An extension of the CERN Control Centre (CCC). For example, to assist members of US/LARP in training and data analysis.
   - An extension of the CMS Control Room. For example, to provide a call center for US-CMS collaborators to access information about CMS **and** the LHC accelerator.

3) **A unique opportunity to have detector and accelerator experts in close proximity to each other solving problems together.**

LHC@FNAL Activities

Have developed various scenarios and envision the following types of activities for LHC@FNAL:

- Participate in CMS shifts during commissioning and operations
- Participate in LHC hardware & beam commissioning and operations
- Monitor data quality for CMS
- Monitor LHC accelerator components (e.g. systems built in the U.S.)
- Analyze the monitoring data for CMS and LHC
- Develop monitoring capabilities for CMS together with the LHC Physics Center (LPC)
- Develop software for the LHC
- Provide access to monitoring data and analysis results
- Provide training and data-analysis facility for members of US/LARP
- Provide a rapid response call center to get experts located in North America connected to CERN (data access, operational status, etc.)

AP - requirements

Six Scenarios were conceived and discussed

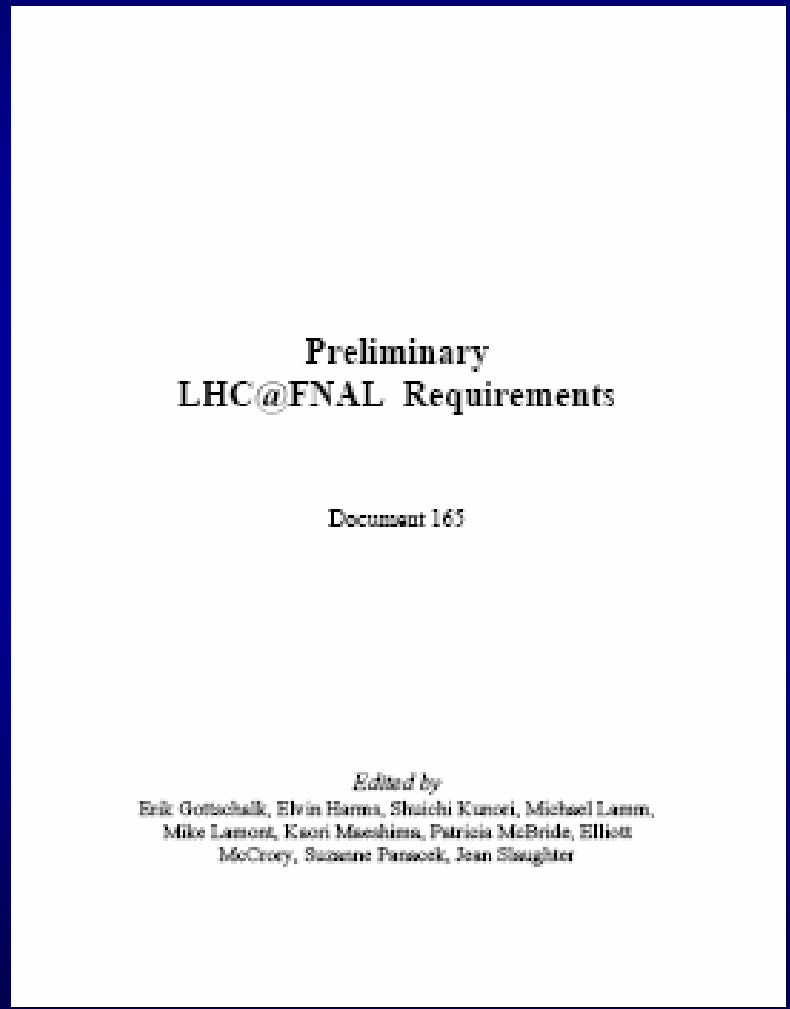
- **They covered key aspects of LHC commissioning and operation**
  - **Hardware commissioning of a U.S./LARP deliverable**
  - **Software contributions to LHC**
  - **Beam studies from both CERN and U.S. perspectives (2)**
  - **Diagnostics contributions to LHC via LARP**
  - **First beam**

LHC Requirements

- Four broad categories of Requirements
- Overarching (defined as ‘to extend over or throughout’)
  - Confidentiality
  - Space
- Hardware Commissioning
  - Access to data as U.S. hardware – magnets and instrumentation is installed and commissioned
  - Link to Field Control rooms in LHC tunnel
- Beam Commissioning
  - Activity in CCC
  - Software development
  - Sector test
  - First beam
- Post-LHC commissioning activities
  - Support of LARP deliverables
  - Beam studies
  - LHC upgrades

Recent Events

- **Requirements reviewed**
  - 21 July
  - Revisions made
- **Document submitted to Fermilab Director**
  - 29 July
  - Enthusiastic response
  - ‘comprehensive document’
  - Next steps
  - Space



Preliminary
LHC@FNAL Requirements

Document 165

Edited by
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LHC@FNAL - Summary

- **LHC@FNAL is up and running**
  - **Committee at work since early May**
  - **Preliminary Requirements drawn up, reviewed and submitted to Pier – positive response**
  - **Real work beginning**
    - **Introduce to larger audience**
    - **Design of center/space**
    - **Cost**
    - **Schedule**
    - **Pursue options for Tools**
    - **Prototyping**

- **http://home.fnal.gov/~eeg/remop.html**

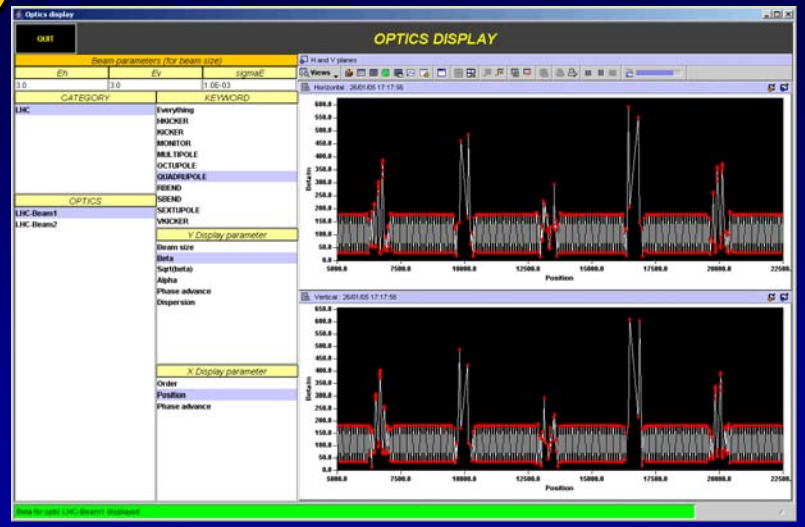
Yesterday..

FNAL is

- Running LHC software

- Looking at LHC data

- Reading the LHC logbook



Hi Mike,
I am running Equip State via terminal services, and I always get these errors (user name is FNALLHC and I am on cerntsdev01). Do you have any information on this?
Suzanne

22:18:34 - Executing command GET PELP PARM on cycle simpleSupercyclev1.simpleCycle.C0 on RPHGA.UA83.RQ7.L8B1
22:18:34 - Error getting result on device RPHGA.UA83.RQ7.L8B1
cern.japc.ParameterException: bad username
at cern.japc.ext.cmwrda.RDAParameter.getValueImpl(RDAParameter.java:131)
Caused by:
cern.cmw.IOError: [FGC - 54] bad username
at cern.cmw.rda.client.ServerConnection.raise(ServerConnection.java:877)

What's in for us?

- **Leverage US man power**
  - Instrumentation development
    - Expert support
    - Software Development
    - Commissioning
  - Software development
    - e.g. Targeted Machine Physics applications
    - US expertise
  - Hardware Commissioning
    - Expert support
  - Off-line analysis
    - HWC, beam based measurements etc.
- **CERN seen to collaborate**
- **Template for future international collaborations**

Or not? Dangers

- **Resources**
  - **Manpower.** Implementation and support for remote operations will not come for free
  - **Overhead.** Coordination is going to be hard enough.
  - **US Resources maybe not really available**
    - US down to the wire, own facilities to run, etc., what can they guarantee?
- **Confidentiality**
  - Dirty linen
- **Security**

Remote Participation - Conclusions

- It is technically possible.
- Strong motivation from the States, now embodied as LHC@FNAL
  - Enthusiastic, committed team
  - Backing from Fermilab management.
  - CMS will happen
  - Some accelerator operations experience
    - How versus What up to now…
  - Effort needs to be well focused for CERN to benefit.

- Formal approval & commitment from LHC accelerator sector is required
  - Grudgingly given – they didn't say no.

Acknowledgements: Elvin Harms & Erik Gottschalk

Publicity

- 6-7 December
- CARE HHH N3 ABI Meeting
- Hirschberg (close to Heidelberg) Germany
- Topics: Remote Diagnostics and Operations
- + Network Security + design of instrumentation for remote self diagnostics and repair intervention