COMMITMENTS AND MAJOR ISSUES ON LHC CONTROLS SERVICES

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Abstract

This presentation will state CO group responsibility and organization for LHC control services, i.e. timing, interlocks, logging, post-mortem... It will also present CO commitments on the requirements listed in the 2 previous sessions. In particular, it will address the functionality and performance expected for the different operation stages and the procedures and tests foreseen to reach these objectives. Finally, current major issues (i.e. uncovered requirements) and possible 'Plan B' will be presented.

THE NEW AB-CO ORGANIGRAM

The Chamonix workshop is defined as technical workshop. But the title of the presentation and the guidelines issued by the chairman demand a concentration on the human resources situation of the AB-CO group. For this reason at first the new organigram of the AB-CO group as defined on the 11th January 2006 is discussed. (see http://cern.ch/ab-div-co/AB_CO_Organigramme.pdf) From the previous 6 sections the structure has been changed to contain 8 sections of more equal size. The sections have been arranged in order to minimize interdependencies between the sections. Sections dealing with the core activity of controlling the beams in CERNs accelerators have been distinguished from controls of industrial services and from interlocks.

With this new structure the group is confident, that most of the workload can be accomplished with the assigned permanent resources, but a significant number of temporary staff has to be added in order to fulfil the immediate requirements on accelerator controls at CERN.

A LIST OF AB-CO ACTIVITIES/PROJECTS FOR THE LHC AND THE RELATED INJECTORS

In total AB-CO will deliver about 50 different large work-packages for the LHC, for which going into technical details would be impossible. Therefore the convention is that if there are no particular mentions, the work will be completed in time according to the user needs.

1) Activities in the AP section;
Application Programs
section leader: **Eugenia Hatziangeli**

- Common Console Manager for the CCC
  Responsible: **Veronique Paris**
- Fixed Displays and online monitoring
  Responsible : **Jakob Wozniak**
  An important project for LHC operations and for Hardware Commissioning, which is entrusted to a non CERN staff.
- JAPC = Common access to equipment in Front-Ends
  Responsible: **Roman Gorgonosov**
  An important project for operations, which is entrusted to a non CERN staff.
- Java GUI components
  Responsible: **Greg Kruk**
- LASER : Alarm system for all CERN machines and services
  Responsible: **Katarina Sigerud**
- Logging: Logging applications for LHC/LEIR and for Hardware Commissioning
  Responsible: **Marine Pace-Gourber**
- LSA project inside AB-CO
  Core software for LHC/LEIR beam operation and for Hardware Commissioning
  Responsible: **Grzegorz Kruk**
- LEIR controls coordination
  Responsible: **Marine Pace-Gourber**
- Sequencer for Hardware Commissioning
  Responsible: **Francois Chevrier**
- SIS: Redevlopment of Software Interlocks
  Responsible: **Vito Baggiolini**
- OASIS: Analog Observation System (replacing nA0s)
  Responsible: **Stephane Deghaye**

The software effort is well organized as collaboration between AB-CO and AB-OP. The basic software components are defined. There is a large amount of implementation, testing and commissioning work to be done, for which the section will rely on temporary programmers. A need for 2 additional persons for hardware commissioning has been identified and 3 more for LHC beam applications. The path of getting these resources as project associates has so far not worked out and very soon other measures have to be taken in order to find people with the right profile.

A significant part of this software effort will be done by operators on their so called "2nd job". In order for this scheme to be efficient a significant training effort for these operators has to be organized.

2) Activities in the DM section;
Data Management
section leader: **R.Billen**

- Logging Service: Reception, storage and making available time-dependent data from the LHC or any of the LHC components, equipment or beam related, throughout the LHC lifecycle.

- Measurement Service: Similar as Logging Service with more frequent and rapid transfers of short-lived data, serving as temporary buffering with persistence for Java measurement applications.
  Responsible: **Chris Roderick**
- Controls Configuration management:
  Topology, relations and description of the controls infrastructure: application programs, servers, front-end computers with hardware components and software devices; including interfaces to maintain the information. For LHC the software device implementation is FESA.
  Responsible: **Maciej Peryt**
- Layout Management: Topology, relations and description of LHC layout components: functional positions of the LHC machine, electrical circuits and electronic racks; including navigation from different viewpoints and interfaces to MAD and DMU
  Responsible: **Pascal Le Roux**
- Asset Management: Registering and keeping track of physical equipment throughout its lifecycle from design, manufacturing, test, commissioning to operation and finally destruction.
  Responsible: **Zory Zaharieva**
- Naming Service: Identification (naming) is a prerequisite for all data management services, from conceptual design, drawings, and layout components to physical equipment.
  Responsible: **Ronny Billen**

The most important information to pass it that the users themselves are responsible for the quality of their data and that still significant effort is needed from several equipment groups in order to fill and maintain the data in the databases.

3) Activities in the FE section;
   Front Ends
   section leader: **Marc vanden Eynden**

- Department wide VME, cPCI and PC HW procurement, installation and maintenance (processors, crates, remote reset, terminal services); Responsible: **Guy Surback**
- CERN wide WorldFIP network infrastructure installation, commissioning and maintenance Responsible: **Raymond Brun**
- Department wide LHC control system installation coordination;
  Responsible: **Claude Dehavay**

- Timing distribution hardware installation and maintenance (for the copper and fibre systems) Responsible: **Roland Chery**
- Front end operating system, system administration and remote diagnostics Responsible: **Nicolas de Metz-Noblat**
- FESA: Front ends software architecture; development and support:
  Responsible: *to be announced by AB-CO in February 2006*

4) Activities in the HT section;
   Hardware and Timing
   section leader: **Javier Serrano**
- General machine Timing (GMT) Generation Responsible: **Julian Lewis**
- Beam Synchronous timing (BST) generation Responsible: **Pablo Alvarez**
- General Machine Timing (GMT) Reception Responsible: Ioan **Kozsar**

5) Activities in the IN section;
   Infrastructure
   section leader: **Pierre Charrue**

- File and application servers:
  Responsibles: **Alastair Bland and Enzo Genuardi**
- Operational Consoles:
  Responsible: **Edwige Bournonville**
- Monitoring, Support and Maintenance:
  Responsible: **Alastair Bland**
- LHC test benches support;
  Responsible: **Markus Bjork**
- CMW: Common Middleware: Essential communication protocol
  Responsible: **Kris Kostro**
- CNIC implementation:
  Responsible: **Pierre Charrue**

6) Activities in the IS section;
   Industrial Systems
   section leader: **Philippe Gayet**

- CERN wide UNICOS framework for industrial controls and PVSS application support
  Responsible: **Herve Milcent**
- Support for UNICOS applications development within equipment groups:
  Responsibles: **Philippe Durant; Claude-Henri Sicard**
- PLC small applications, development and CERN wide support;
  Responsible: **Jacky Brahy**

7) Activities in the MA section;
Measurements and Analysis
section leader: Adriaan Rijllart

- Post mortem analysis software;
Responsible: **Hubert Reymond**
- Fast Measurement Systems for Test Benches
(FAME) Responsible: **Cedric Charrondierre**
- Magnet Rescue Factory Systems (MAR)~
and SM18 test systems
Responsible: **Allesesandro Raimondo**
- Test systems in industry
Responsible: **Adriaan Rijllart**
- Corrector Tests in Bloc 4 and warm
measurements:
Responsible: **Hubert Reymond**
- Insertion Quadrupoles and SSS measurements
Responsible: **Cedric Charrondiere**
- Cable and Busbar test systems
Responsible: **Eric Michel**

8) Activities in the MI section
(machine interlocks)
section leader: **Bruno Puccio**

- BIC; Beam interlock systems
Responsible: **Benjamin Todd**
*One of the most important interlock systems
with a doctoral student as main responsible*
- PIC; Powering Interlock Systems
Responsible: **Markus Zerlauth**
- WIC; Warm magnet interlock system
Responsible: **Pierre Dahlen**
- FMCM; Fast Magnet Current Change
Monitors
Responsible: **Markus Zerlauth**
There will be fewer units than expected for
2006, but the full lot will be available in July
2007
- Safe beam parameters Generation
Responsible: Bruno Puccio
The SLP will be distributed by the timing
system under the responsibility of **Javier
Serrano**

9) Other Activities

- Real Time Feedback on beam parameters
Responsible: **Michel Jonker**
- Collimation Controls
Responsible: **Michel Jonker**
- Hardware Commissioning Controls
Coordination
Responsible: **Robin Lauckner**
- Post Mortem Project
Responsible: **Robin Lauckner**
- Machine Protection
Responsible: **Ruediger Schmidt**

PARTICULAR TECHNICAL ISSUES

1) Software release policy

The LHC as high energy and high intensity machine requires a more rigid control of software deployment and versioning control. Two major subsystems are handled in the following way:

FESA: Front end software:
The software package is developed according to user needs between one official release to the next.
Every new release is carefully tested before deployment. The testing period is presently about 2 weeks, so no rapid turn around can be expected. This software has to be stable before the LHC is commissioned.

Application programs:
A powerful versioning tools has been put into place, which allows the operation to switch dynamically between the current release, the past releases and the next release. This is very much needed, since the application software will develop together with the increasing knowledge on the machines.

2) Performance issues of the LHC control systems

All the relevant components of the LHC controls system have been tested on laboratory systems and on small machines/transfer lines. There are unsolved questions on the scalability of the system to its full size for the LHC.
The controls group will propose in spring 2006 an appropriate dry run by the end of the year 2006 in order to do significant scalability tests. In case of failure, significant modifications would have to be made to the controls architecture in order to gain on performance.

3) Sector Test

A major milestone in the planning of controls effort is the LHC sector test scheduled for late in the year 2006. This or an equivalent milestone has to be maintained for the final integration of the LHC controls system.

4) System Security and remote access

With the CNIC approach CERN has made a first and important step towards protecting the technical network from unwanted access. On the other hand several user communities (AB equipment experts, external collaborators) badly need efficient remote access to their equipment. The controls group will study an additional layer of security to be implemented on top of CNIC during spring 2006.