Minutes of LHC-CP Link Meeting 23

Subject   :   LHC Controls Project

Date   :   14th May, 2002

Place   :   936-R-030

Participating		EST-ISS	no representative,
Groups	:	LHC-ACR	no representative,
		LHC-ECR	no representative,
		LHC-IAS	J. Brahy,
		LHC-ICP	F. Rodriguez Mateos,
		LHC-MMS	no representative,
		LHC-MTA	excused,
		LHC-VAC	R. Gavaggio,
		PS-CO	F. DiMaio,
		SL-AP	no representative,
		SL-BI	no representative,
		SL-BT	excused,
		SL-CO	A. Bland,
		SL-HRF	E. Ciapala,
		SL-MR	excused,
		SL-MS	no representative,
		SL-OP	M. Lamont,
		SL-PO	Q. King,
		ST-MA	P. Sollander.

Others   :   R. Claustre (Alarms)
                            Ph. Gayet (Core Team),
                            R. Lauckner (Chair),
                            B. Puccio (Machine Interlocks),
                            M. Tyrrell (Alarm Project).

Distribution   :   Via LHC-CP website: **http://cern.ch/lhc-cp**
                            Notification via: **lhc-cp-info@cern.ch**

Agenda   :   1. Matters arising from Previous Meeting
                            2. LHC-CP News   R. Lauckner
                            3. QRL Controls
                                  - Technical Services   P. Sollander
                                  - LHC Alarm System   M. Tyrrell
                                  - Communications Infrastructure   P. Anderssen
                            4. AOB

1. Matters arising from Previous Meeting

P. Gayet reported that the issue of junction boxes raised by J-C Guillaume has been included in a coordination initiative undertaken by R. Brun covering many aspects of World FIP installation and configuration.

M. Vanden Eynden was not present to report on progress with procurement of the VME front end hardware and in particular the foreseen needs of the QPS, the Multipole Factory and Post Mortem requirements.

ACTION: M. VANDEN EYNDEN

R. Lauckner reported that the working group on analogue signals has been launched, see below.

2. LHC-CP News   R. Lauckner

R. Lauckner reported that the 3rd LHC-CP workshop had included a good summary of project activities and the enlarged scope of the project had been reflected by a session dedicated to SPS controls issues. Attendance had been disappointing at some sessions.

The workshop had exposed the overlapping functionalities of the Alarm, Post Mortem and Logging activities and the teams are in discussion to resolve these ambiguities. Two meetings have only emphasised the close coupling.

The signals working group, led by E. Ciapala with J. Serrano acting as secretary has started work. The mandate and progress are available on their web-site: http://project-lhc-cp-sigwg.web.cern.ch/project-lhc-cp-sigwg/ . Members represent SL-HRF, PS-CO, SL-CO, PS-OP, SL-OP, SL-BT.

The Functional Specification for the Timing System has now been entered into the LHC Project Hardware Baseline and is following the official approval mechanism. For this the baseline tree has been extended to include controls, see http://edmsoraweb.cern.ch:8001/cedar/navigation.tree?cookie=1031720&top=1504900006&open=1504900006 . The interface specification for the TG1 receiver module is in the LHC-CP EDMS documentation in draft.

The Controls Board have re-discussed the purchase of PVSS licenses following difficulties experienced by the contractor for the CSAM. The extension has been split into 2 options, option 1 covers the research and accelerator sector but excludes ST apart from GTPM licenses. Option 2 includes all other ST projects. SPL has been asked to purchase option 1.

Meetings are planned in the SL Technical Committee and between the management of PS and SL divisions to define the mandate of the future accelerator controls group in the proposed AB (accelerators and beams) division.

The schedule and main topics for the next LHC-CP meetings are:

4/6	Cost to completion budgets, beam line planning	Charrue and Sicard, Daneels
18/6	Timestamping, FGC architecture	Bland, King
2/7	QPS Controls Requirements, Controls for Machine Interlocks	Milcent, Puccio

Another topic to be presented is the HRF test stands. The chairman welcomes requests for other subjects to be discussed.

3.   QRL Controls

R. Lauckner introduced this topic explaining that the goals of the 3rd workshop had included the following points concerning preparation for the QRL Reception Tests:

- What has to be done?
- What systems are involved?
- Not so long now!
- Are we going to be ready?
- Status – intermediate milestones

It had not been possible to cover the topics of Technical Services, Alarms and Communications.

Technical Services   P. Sollander

P. Sollander said that the SF8 cooling towers will be operational from the end of November 2003. The control system is known technology and the TCR will probably elect to continue to employ DataViews for monitoring this system having abandoned the foreseen migration to PVSS.

The electrical distribution system is also known controls technology. For the QRL commissioning in sector 7-8 two new installations are required: a 3.3 kV substation for the cryoplant and a low voltage distribution line for the tunnel. The substation is being commissioned now and the low voltage line is scheduled for May 2003. The Electrical Network Supervisor (ENS) provides user interfaces, alarms and logging. The TCR will abandon the old views of the electrical system and use the ENS views as maintaining the TCR specific software requires too many resources.

P. Sollander explained that the philosophy for high level monitoring views is changing. Dedicated screens for technical sub-systems are to be replaced with general overviews showing the ensemble of systems associated with a facility at CERN such as the SPS. These views will also reflect the interdependence of the systems. This new supervision principle will be followed for the QRL.

M. Tyrrell and P. Gayet wanted more information about extracting information from the ENS system. ST-MA will extract alarm information for the CAS and status information as required by the GTPM SPS project. It was pointed out that more information would be necessary for logging and diagnostics to satisfy the LHC clients such as cryogenics and post mortem.

After the meeting P. Sollander provided the following information:

The TDS access to electrical data does not give the necessary timestamp precision. There is however, a possibility to access the ENS data directly on its Ingres database. The ENS and LHC Logging teams should discuss the mapping of the associated data.

ACTION R. Billen

Another issue is the time synchronization. The ENS computers are synchronized with a central GPS receiver and data is timestamped with a 5-10ms precision. ENS and LHC timing experts should review the synchronization.

ACTION A. Bland

M. Tyrrell asked if any problems had been experienced using PVSS for the SPS GTPM project. P. Sollander said that there had been difficulties but as the application is small the more serious instabilities encountered with larger projects had been avoided.

A. Bland and M. Tyrrell enquired about maintenance of information required to configure the GTPM displays. P. Sollander admitted that a large maintenance effort would be required to update this information. For some systems this responsibility has been left with the information provider, for example the SPS SEMs. However other configuration information concerning SL-Equip devices is copied into the TDS configuration database. Clearly it would be better to have a link to an equipment database. This is an issue that should be considered for future integration of data from systems like the CMW.

LHC Alarm System   M. Tyrrell

M. Tyrrell started by explaining that the most recent planning calling for LHC commissioning in 2007 presents difficulties for the LHC Alarm work. The past year has been spent reviewing the technologies that will be employed and this seems unrealistic in the new time frame. Nevertheless he understands that the new system should be ready for March 2003 if it is to be used by the control systems for the QRL.

The alarm team have invested 3 man-years in PVSS evaluation. They have made the decision not to use PVSS for the LHC alarm system. Apart from technical difficulties with the product he explained that the goal of the project was to build a software system with very specific functionality. In particular a major requirement is a powerful reduction engine. SCADA systems offer many more general facilities for control and supervision but cannot provide the specific needs of LHC alarms. The decision has therefore been taken to use component ware. In particular COAST is being tested as a tool to implement the reduction functionality.

The upgrade of the SPS Vacuum system to a process control architecture with PLCs and SCADA has been an important evolution for the current alarm system. Vacuum alarms are now exported from the SCADA and brought to the CAS using a Java API and a commercial publish and subscribe Middleware. This experience will be used for the new system to be deployed by March 2003.

He also commented that the project encounters difficulties because of the fragmented controls environment for the LHC.

M. Lamont pointed out that this lack of precision in choices for LHC Control derives from the long timescales that the speaker had already invoked.

P. Sollander requested clarification concerning the LHC Alarm Project mandate. M. Tyrrell replied that the TCR has been a serious consideration in all of the work. R. Lauckner reminded the meeting that the mandate called for the supply of all relevant alarm information to be beam . He would be in favour of the same facilities being used by the TCR however he said that safety alarms should not be delivered to the CERN safety services by this system. This is the role of the CSAM project.

P. Gayet remarked that cryogenic control does not depend on the availability of the LHC alarm system. R. Lauckner responded that the motivation behind providing general alarms and logging facilities in time for QRL reception testing was to stop the proliferation of unfederated solutions.

Communications Infrastructure P. Anderssen

P. Anderssen was not available to make this presentation.

4. AOB

R. Gavaggio reported that that the controls of SPS vacuum system were in full operation and the result has been very satisfactory. This shows that the group is well prepared for the QRL tests.

Long-Term Actions	People
Underground Control Rooms requested	R. Lauckner
Establish Post-mortem sub-project	R. Lauckner
Clarify Middleware Services to be used by LHC-CP	Core Team

Reported by R. Lauckner

Technical services for QRL

- What systems are involved?
- How are they controlled
- The new supervision concept

Cooling & Ventilation

- SF8 cooling towers
- Cryo plant cooling water
- Planned date end November 2003
- Local control with Wizcon

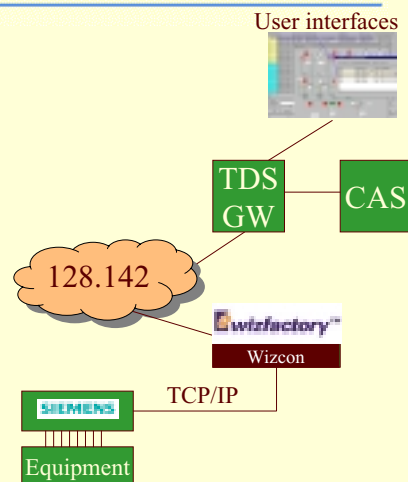## Cooling&Vent. - controls

- TDS Gateway for interfaces
- CAS interface
- Local control with Wizcon SCADA system
- PLCs for local data acquisition

User interfaces

TDS GW — CAS

128.142

wizfactory
Wizcon

SIEMENS   TCP/IP

Equipment

Electricity

- Power distribution for cryo plant – substation 3.3kV SHM – being commissioned
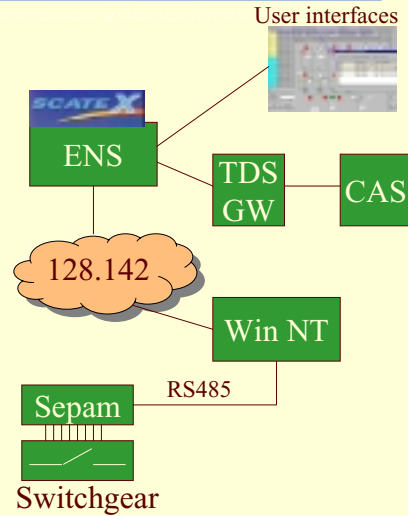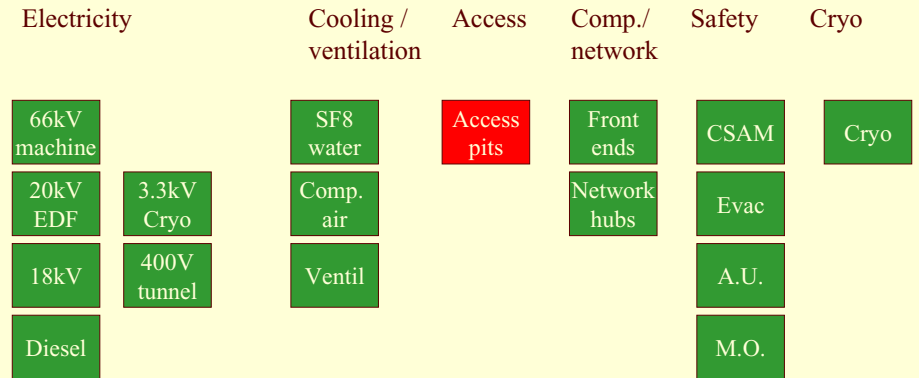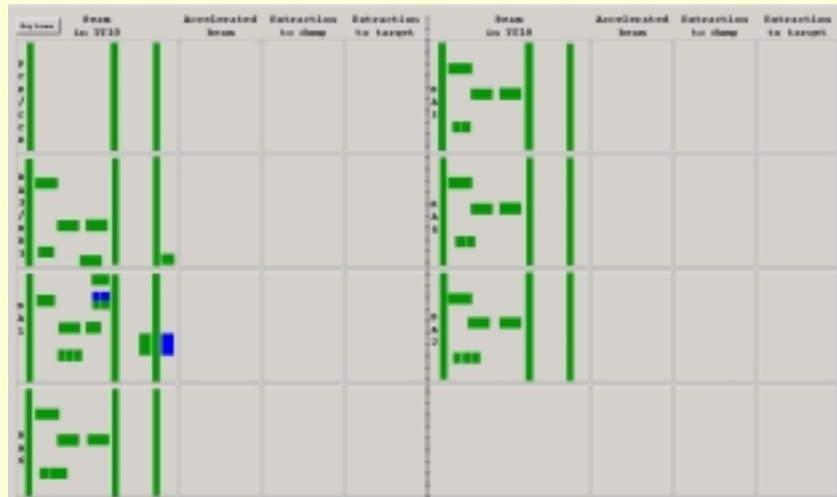- Low voltage distribution line (63A) in tunnel by May 2003

Electricity - controls

- Electrical SCADA detailed user interfaces
- CAS interface for summary alarms
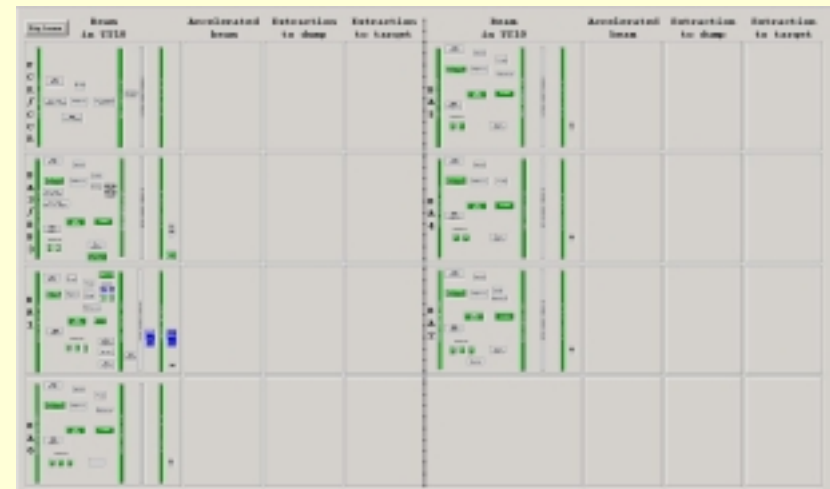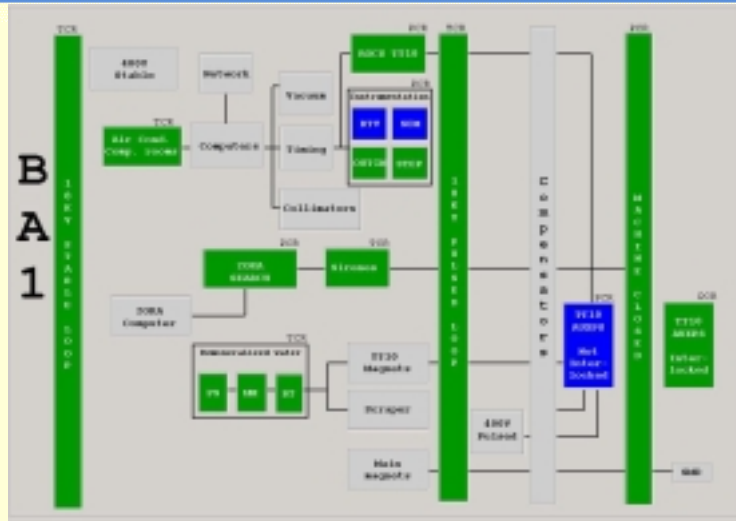- Local control with EFACEC NT machine and SEPAMs

User interfaces

SCATE X

ENS

TDS GW

CAS

128.142

Win NT

Sepam   RS485

Switchgear

Supervision principle

Electricity		Cooling / ventilation	Access	Comp./ network	Safety	Cryo
66kV machine		SF8 water	Access pits	Front ends	CSAM	Cryo
20kV EDF	3.3kV Cryo	Comp. air		Network hubs	Evac	
18kV	400V tunnel	Ventil			A.U.	
Diesel					M.O.	

New SPS supervision

New SPS supervision

New SPS supervision

The LHC Alarm Service.

LASER (Lhc Alarm SERvice) Project Report

May 14th. 2002

http://cern/proj-laser

M. W. Tyrrell.

The LHC Alarm Service.

- **Talk Outline:**
  - Work performed in 2001.
  - The current situation.
  - Where are we today ?
  - Between now and March 2003 – QRL.
  - Conclusions.

The LHC Alarm Service.

- **Work performed in 2001:**
  - LASER User Requirement document published
  - New technology investigations:
    - New technology training – software and hardware
    - Made a vertical slice using new technologies:
      - Hundreds of Fault State Generator Modules (FSGM)
      - FSGM Published Fault States into topics
      - A J2EE platform subscribed to the topics
      - Investigated FS analysis tools, and archiving
      - J2EE platform published FS into a topic tree, 100's
      - A 'Java alarm console' subscribed to the topic tree

The LHC Alarm Service.

- **Work performed in 2001:**
  - New technology investigations:
    - Experience gained:
      - Java, J2EE platforms
      - Enterprise Java Beans, Net Beans Platform
      - Java Web Start
      - JMS, Sonic middleware, hierarchical topic structures
      - Controls Middle Ware (CMW), OPC
      - Analysis engines: JRules, COAST.
  - PVSS evaluation:
    - Training, consultancy, prototyping
    - Investigated: scalability, reduction algorithms, performance
    - Decision made: 'not to build LASER using PVSS'

The LHC Alarm Service.

u **The current situation:**

- n **Environment:**
  - l **Fragmented**
  - l **Naming ?**
  - l **Databases ?**
  - l **Middleware ?**
  - l **Business layer - which J2EE platform, if any ?**
  - l **Controls: (Divisions, SL + PS -> AB) ?**
  - l **Project decisions made today, difficult:**
    - u **No overall, strong direction**
    - u **Many different ideas**
    - u **Result: make best decision for the work in-hand**

The LHC Alarm Service.

u **Where are we today ?**

- n **SPS ring pressure - ION pumps:**
  - l **2 months before start-up, system moved to PVSS !!**
  - l **Connected to the current alarm system using New technologies:**
    - u **W2000, driver**
      - **Java PVSS API used – library built at CERN**
      - **Alarm System API, built upon JMS / SONIC, publisher**
    - u **SPSSRV, HP-UX, gateway:**
      - **Subscribes to PVSS FS**
      - **Injects FS into the current alarm chain.**
    - u **SPS pressure FS visible in TCR and PCR.**
    - u **Setting-up COAST to subscribe to these FS**
  - l **Hopefully, useful for QRL – connecting to PVSS**
- n **Investigating Enterprise Java Beans for the alarm console**

The LHC Alarm Service.

u **Between now and March 2003 – QRL:**

- n **Define the FSGM interface to LASER**
- n **Clarify the question of an 'alarm template' for the FSGM**
- n **Build an alarm console prototype**
- n **Organise a formal training course for COAST**
- n **Clarify and provide an alarm database infrastructure**
- n **Use experience from the SPS PVSS system for QRL**
- n **Alarm screen, PVSS interaction for PVSS FS.**
- n **Finally, provide a prototype alarm system for QRL:**
  - l **A complete new alarm chain**
  - l **All QRL FS available in the current alarm system.**

The LHC Alarm Service.

u **Conclusions:**

- n **Since the project was launched:**
  - l **Had 2 LHC re-shedules**
- n **LHC beam now scheduled for 2007:**
  - l **This is a LONG way down the line !**
  - l **Which technologies will be available in 2007 ?**
  - l **AND which technologies of today will NOT be supported !**
- n **We must keep an open mind**
- n **We must stay as flexible as possible**
- n **WE MUST STRIVE FOR COMMON SOLUTIONS**