Minutes of LHC-CP Link Meeting 34 held on 06.05.2003

Present:
C. Balle, R. Billen, M. Bjork, A. Bland, A. Butterworth, E. Ciapala, A. Daneels, L. Deniau, F. Di Maio, B. Frammery, P. Gomes, A. Hilaire, Q. King, R. Lauckner (chair), R. Schmidt, J. Serrano, C-H Sicard, P. Sollander, A. Rijllart, R. Saban, M. Tyrrell.

Agenda

1. Matters arising from Previous Meetings.
2. LHC-CP News – R. Lauckner.
3. Signals Project - Goals and Milestones for Phase 1 – J. Serrano
4. LHC Test Benches – A. Rijllart
5. AB-CO-IN Support for Test Benches – P. Charrue
6. AOB.

Minutes

1. MATTERS ARISING FROM PREVIOUS MEETING

Robin clarified the statement defining shot by shot logging in the previous minutes. Otherwise there were no changes.

2. LHC-CP NEWS

Axel Daneels summarized the current tracking of the Controls work for the QRL. Two tasks are late with possible consequences on meeting the pre-commissioning deadlines. The UNICOS PVSS framework is delayed about 2 weeks to the 15 May. Less clear is the availability of the thermometer database for the cryogenic instrumentation. Paulo Gomes and Christoph Balle reported that the delays are generated by the failure of CNRS, Paris, to provide a data base for the cryogenic thermometers with the corresponding interface to up- and download data. These difficulties have to be solved in the first place, before looking for a calibration extracting tool for the PLCs.

Ronny Billen replied that this was new information. A previous analysis of these difficulties had led him to propose that a technical student, with appropriate supervision, could resolve these difficulties. The underlying data extraction problem appears to be more serious. Bertrand Frammery agreed to review this problem but pointed out that providing manpower from AB-CO could lead to unacceptable repercussions in other areas. Robin Lauckner said that he intends to dedicate a project meeting around the beginning of July to a review of QRL preparations.

Pierre Charrue reported that the testing of the PVSS vacuum application with the proposed GPRS wireless tunnel communication had revealed the latter to be not functional. The IT-CS group have proposed an alternative cabled solution using VDSL technology. Cable lengths can be up to 1.6 km which avoids the installation of active devices in areas unshielded from radiation. An RG11 socket (telephone standard) and a 230V outlet will be installed in each cell. The user must provide his VDSL modem. If he requires mobile access to the network he must also provide a 802.11b transmitter. Mobile communication would run at up to 11 Mbits/sec depending on distance from the antenna. Quentin King warned that he will use Blue Tooth, avoiding cables, for local diagnostics on his crates. There may be interference with 802.11b within a few meters of his crates.

3. SIGNALS PROJECT - GOALS AND MILESTONES FOR PHASE 1 – JAVIER SERRANO (SLIDES)

The OASIS solution being developed as the nAos replacement promises to satisfy the User Requirements items identified by the Signals working group. A complete system for monitoring and logging TT40 will be available by the end of August. However the deadlines imposed are very tight:

- May 13: final architecture (including logging) and APIs between different layers decided.
- June 25: Middle Layer finished.
- July 2: Front end software finished.
- July 16: GUI Application finished.
- August 11: Complete system tested

In particular the major bottleneck is the middle tier software which is being addressed by Stephane Deghaye, who is also developing the software in the Front End crate. Other activity includes the development of the GUI software by Delphine Jaquet assisted by Ioan Kozsar. Javier completes the team providing design effort and coordination.

http://ab-co-fc.web.cern.ch/ab-co-fc/AnalogSignals/nAos_for_TT40/main.htm provides detailed information concerning system design.

Claude-Henri Sicard enquired about the logging requirements to be met for the kicker system. Robin replied that the current waveforms of the 5 kicker modules should be logged. Each provides 8000 data points each SPS supercycle.

Bertrand wanted to know if the need to dedicate data channels for LHC post mortem had been foreseen. Javier explained that it will be possible to restrict operator access to certain channels but a supplementary requirement to allow the operator to switch on data logging on demand was more difficult. Robin proposed that after the first project phase, essentially providing the TT40 system, the users' requirements will have to be reviewed. As a consequence the resources required for further work may also have to be reviewed. Javier said that Delphine and Stephane were already receiving support from the AP section of the CO group. Franck Di Maio emphasized that the schedule is too tight and warned that currently the project is lacking manpower. Robin responded that a compromise on the TT40 objectives could be discussed; meetings were being held with all involved.

Ronny asked about the visualization of the logged data. Robin said that generic tools from the String are to be considered but this was outside the scope of the Signals project.

4. LHC TEST BENCHES – ADRIAAN RIJLLART (SLIDES)

The IS section of AB-CO is responsible for control of benches for magnet quality tests and assembly assistance in industry and benches for magnet and other superconducting component acceptance tests and measurements at CERN.

The emphasis of Adriaan's presentation was on systems installed off-site at various suppliers. These are more difficult to support because of the distance. Systems are installed across several member states and outside Europe there are 3 systems in India and 1 in Fermilab. There are currently 31 systems off-site and 45 at CERN.

He showed an overview of all the systems together with the associated activities in the coming years. The first column shows the priority, next the length of the development period is shown in orange and the operational period, during which support is required, in yellow. Some systems, for example magnet geometry measurements and reference magnets, must continue to run after LHC start-up in 2007.

The team have a client base of around 55 people. The clients drove the choice of the measuring systems. LabVIEW is in general use, it was found to reduce development time by a factor of 3 – 4 with respect to procedural languages and the programs have proved easy to maintain. It is run on Sun and Macintosh platforms and different versions are in use as systems are upgraded progressively.

For a typical project requiring VME or GPIB (+LabVIEW) the preferred platform is Sun (workstation price $795 to $1395, good performance and robust). For DAQ systems based on NI-MIO cards the preferred platform is Macintosh (easy to configure, use and robust). For Visual Basic with I/O cards the choice is PC (Win NT, 2K).

Adriaan detailed the type of support needed for different platforms. For Solaris and MacOS the requirements are:

- Installation: PCI cards, system, drivers, users' configuration, LabVIEW, printer.
- Maintenance at CERN: monitoring, problem solving, repair of breakdowns.
- Maintenance in Industry: remote problem solving, repair of breakdowns.

For PC Windows NT and 2000:

- Installation: PCI cards, system, drivers, Visual Basic, LabVIEW, printer.
- Maintenance at CERN: by IT
- Maintenance in Industry: by Leica and Compaq.

Returning to the issue of remote systems Adriaan explained that remote debugging is generally not possible because of use of firewalls and other practices adopted by manufacturers. The IS section is developing diagnostic applications to be run locally for remote diagnostics with CERN experts in contact by telephone.

Some systems are especially critical because of possible penalties to be suffered by CERN if production delays exceed defined limits. The exact circumstances defining the application of these penalties are still being clarified by the MAS group. Explaining the failure statistics Adriaan pointed out that hardware failures pertain to measurement hardware and not the computers.

Bertrand asked if predictions for off-site failure rates are available. The statistics are rather low so far (only 3 failures in industry) but based on the current experience and the additional systems to be deployed we may experience upwards of 10 failures / year.

Javier asked if there was any indication of relative reliability of the computer platforms in use. Adriaan said that PCs had been troublesome; he quoted the experience of crashes when the screen saver started up.

Bertrand pointed out that standard support from the group would be hindered because the systems were not the same as used in accelerator control. Rüdiger Schmidt said that systems that will be used in LHC Operation should be considered first for migrating to a solution that is supported for accelerator operation. Adriaan added that new developments could also try to adopt supported systems.

In response to a query from Alastair Bland it was confirmed that, for the benches, LabVIEW will continue to be used in the coming years. Quentin mentioned that LabVIEW is used for first line intervention on the LHC power converters.

5. AB-CO-IN SUPPORT FOR TEST BENCHES – PIERRE CHARRUE (SLIDES)

Pierre pointed out that the responsibility for system administration of the test-benches was now in the IN section, the staff member originally concerned was relocated during the recent restructuring. Unfortunately many requirements for the test benches were specific but nevertheless the Solaris machines could benefit from the more general support effort. This could be applied to version control and management, remote monitoring, backup, configuration management and cloning. In addition integrating the duties into the section will reduce the reliance on one person for support.

Claude-Henri asked if it was possible to set-up remote monitoring of Windows and Macintosh systems. Alastair said that he has software to monitor PCs; Macintosh may become more feasible with the introduction of MacOS 10. His ideal would be to integrate the status display of these systems into a single display.

Mark Tyrrell enquired about the alarm handling for these systems. Adriaan said that Alarms from the systems in SM18 are concentrated in a single location and are used by the measurement operators.

Pierre promised that his section will continue to explore ways of improving the support for the test benches. This will take place in more specialized meetings between the people concerned.

Reported by R. J. Lauckner

OASIS for TT40

Goals and milestones

Javier Serrano on behalf of the OASIS Project Team
LHC-CP meeting 34, 6 May 2003

A brief introduction

- OASIS: Open Analog Signals Information System
- Three-tiered architecture
- Uses AB-CO standard components: GUI Platform, J2EE, CMW and Equipment Modules.
- Replacement and enhancement of current nAos system. Also satisfies requirements for other systems.

Goals

- To satisfy the user requirements gathered by the Analog Signals Working Group (http://project-lhc-cp-sigwg.web.cern.ch/project-lhc-cp-sigwg/)
- To deliver a complete system by the end of August 2003, allowing to monitor and log analog signals from the transfer line.

Milestones

- May 13: final architecture (including logging) and APIs between different layers decided.
- June 25: Middle Layer finished.
- July 2: Front end software finished.
- July 16: GUI Application finished.
- August 11: Complete system tested.

Further information

- Minutes of project meetings and UML models of the different subsystems can be found at:

http://ab-co-fc.web.cern.ch/ab-co-fc/AnalogSignals/nAos_for_TT40/main.htm

AB/CO/IS Laboratory Systems
LHC test benches

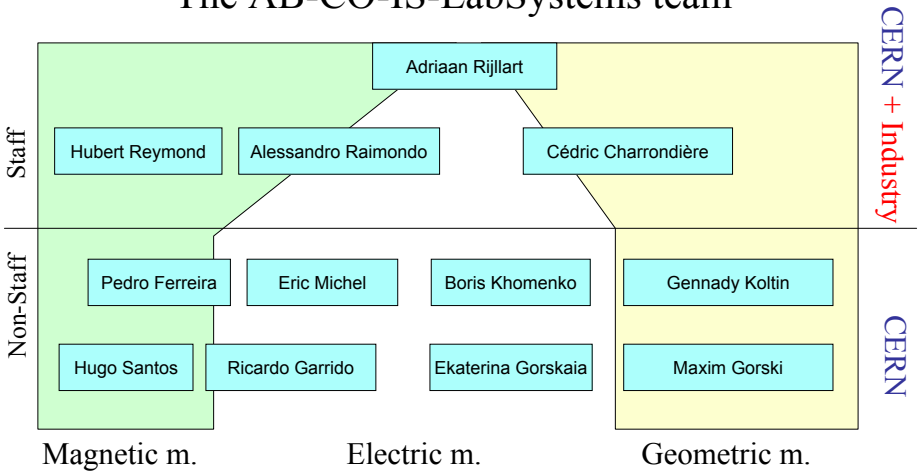
Magnet under test

Measurement and control

Benches for:

1. Magnet quality tests and assembly assistance in industry,
2. Magnet and other SC component acceptance tests and measurements at CERN.

The AB-CO-IS-LabSystems team



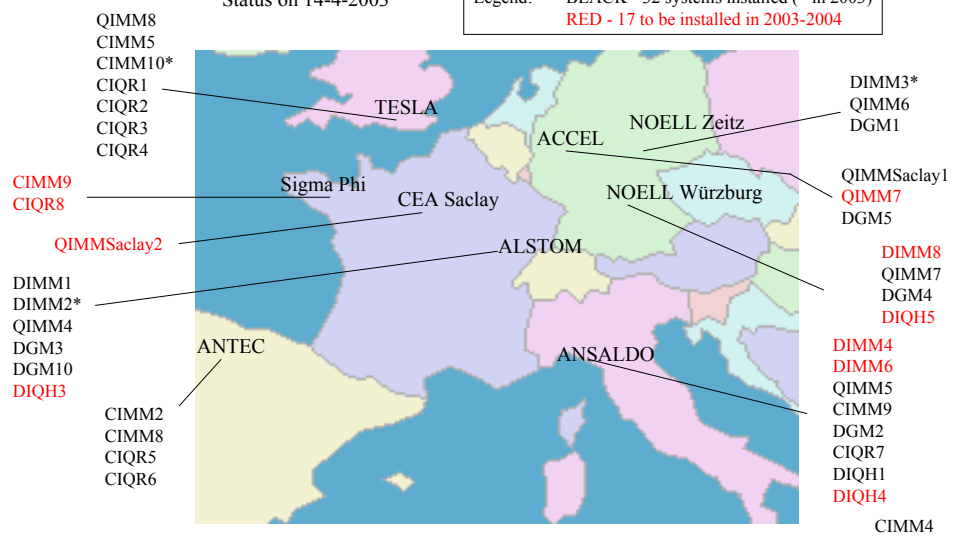
Cabling: Michel Duron (ENTC)

We rely very much on: Magnus Bjork (IN), Maciej Peryt (DM)

AB/CO/IS Systems in industry

Status on 14-4-2003

Legend: BLACK - 32 systems installed (* in 2003)
RED - 17 to be installed in 2003-2004



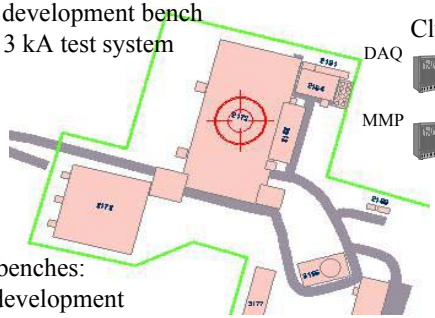
CIMM 11-17 to be made

MiniDAQ* —— Fermilab, USA

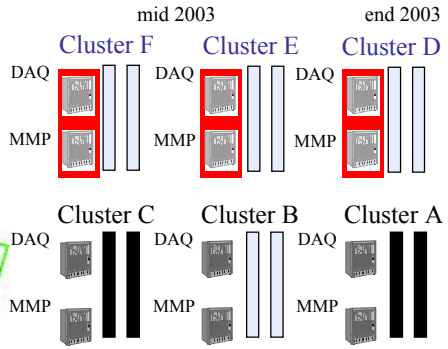
CAT, India ——

SM18 and SMA18

Also in SM18:
- String DAQ system
- Calibration bench
- Chaconsa SSS bench
- Badger bench
- DGM development bench
- HTS 13 kA test system



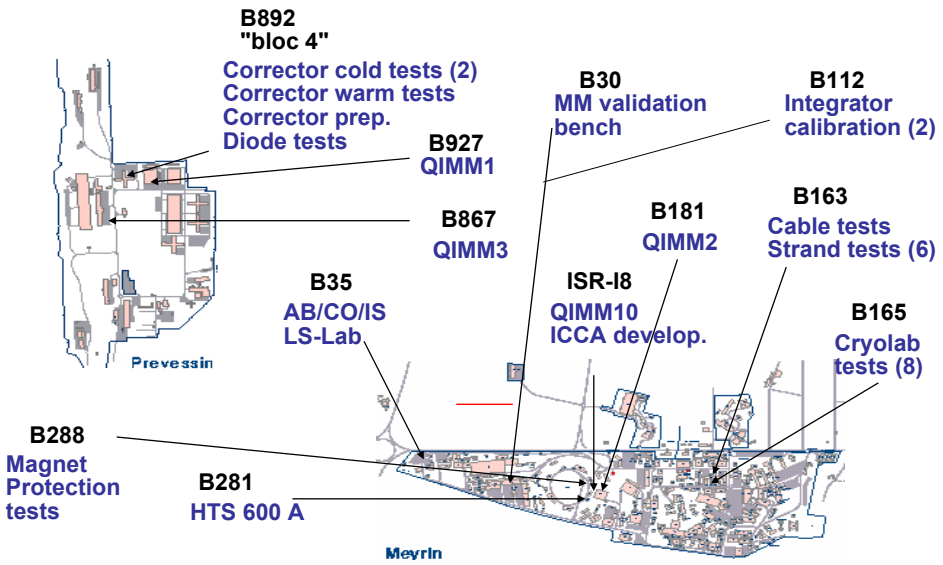
SMA 18 benches:
- DGMS development
- Fraunhofer warm mole
- CCD telescope calibration
- DIMM preparation



Half of clusters are equipped with measurement systems

The bench control room has 3 TestMaster workstations.

Systems' locations, other than SM18 and SMA18



LHC Test Benches, types, quantities

System types for Industry

D - Dipole
Q - Quadrupole
C - Corrector

MM - Magnetic measurement
GM - Geometric measurement
QR - Quench performance recording
QH - Quench heater test
DAQ - Continuous measurements

Number of systems

Actually in industry:	31
To be installed in 2003:	11
To be installed in 2004:	6
In total:	48

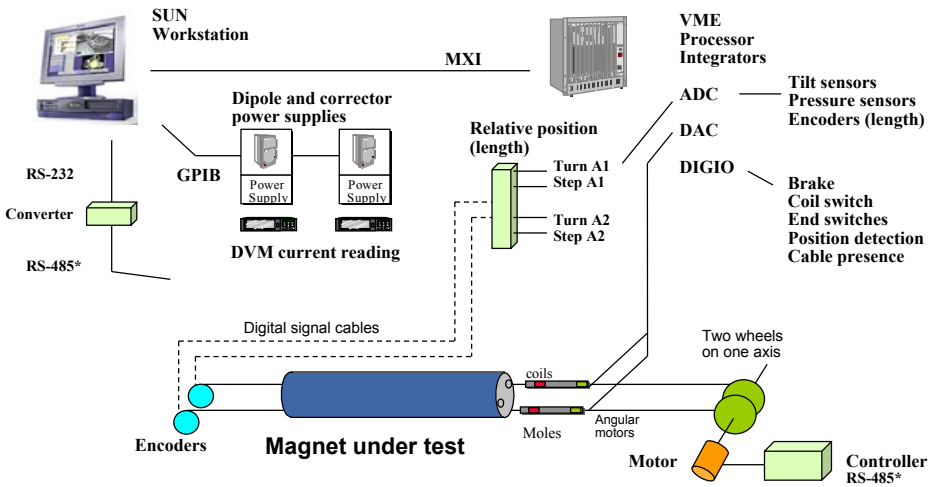
System types at CERN

Magnetic measurement
Geometric measurement
Quench performance recording
Loss, resistance and HV measurements
Quench heater test
Cable and Strand tests
Diode tests
Cryo components tests

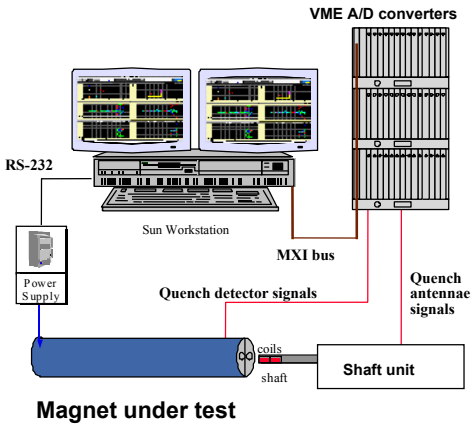
Number of systems

Actually at CERN:	45
To be installed in 2003:	12
To be installed in 2004:	3
In total:	60

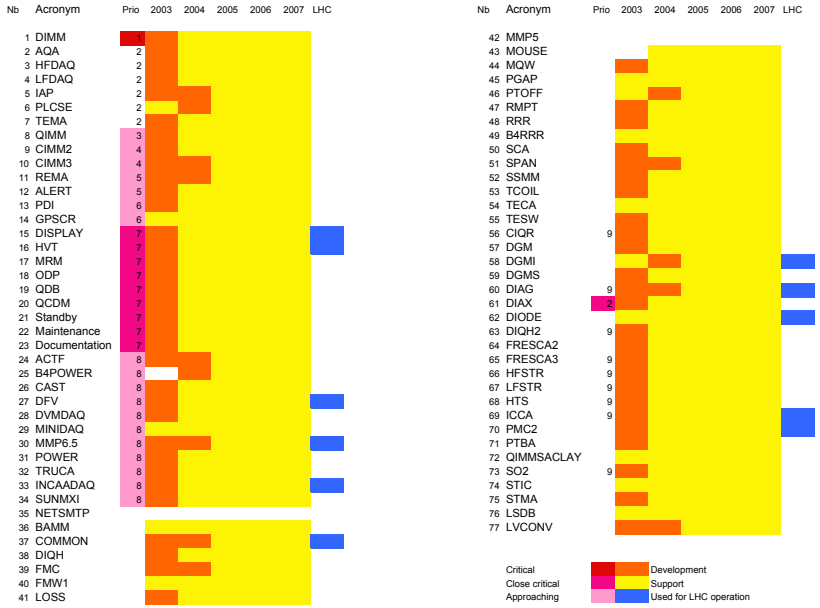
Example: The Magnetic Measurement system for Dipoles in Industry (DIMM)



SM18 Quench recording DAQ example



Current projects plan



Our hardware choices

- We search to optimise user satisfaction and all phases of our work: equipment choice, system configuration, software development, testing, installation and maintenance.
- For a typical project requiring VME or GPIB (+LabVIEW) our preferred platform is Sun (workstation price $795 to $1395, good performance and robust)
- For DAQ systems based on NI-MIO cards our preferred platform is Macintosh (easy to configure, use and robust)
- For Visual Basic with I/O cards our choice is PC (Win NT, 2K)
- We have no experience with Linux, first reports with LabVIEW were not encouraging. Not easy to configure, problems with instrument drivers.

Reasons for choosing LabVIEW

- LabVIEW is a programming language with building blocks (virtual instruments) allowing “Lego” type assembly. The gain in time and readability of the program is very high.
- It gives access to a large variety of instruments by license-free drivers (>1000) on many bus systems: GPIB, PCI, VME/VXI, USB, Serial …
- Available on many computer platforms, Windows, MacOS, Solaris and Linux.
- There are >400 companies active alliance members, building on NI products for there own products or services.
- Real-Time LabVIEW on PXI hardware offers synchronisation and timing otherwise only available using more complex systems.

Why didn’t we standardise on Windows?

- LabVIEW was developed on Mac in 1986, it went multi-platform in 1992. We use it since 1991 (AT-CO then) on Mac. Windows version didn’t work well during 1992 to 1996. Certain problems remain in W95, NT, 2K not present on Mac and Sun.
- Magnetic measurement systems were tried on Windows but didn’t work well. Users were not happy, we were not happy (many interventions). Users asked for Unix, we switched to Sun. Magnetic measurements for industry were kept on Sun too. Very satisfactory performance.
- String DAQ based on VME and Sun since 1995 for multi-user, multi-tasking, Oracle access, AFS, NFS, back-up and other services.
- DAQ systems based on Windows and PCI cards didn’t work well. We tried different PC’s with different versions of Windows, without success. We switched to Mac. Mac + SCXI has proven very satisfactory at CERN and in industry. At CERN many systems are in use (HTS, Cryolab, Block4). In Block4 it successfully replaced a broken Bakker Electronics system, based on special crates and GPIB, for a fraction of the cost.

Type and number of systems (estimate for end 2005)

Type of OS	Nb. Industry	Nb. CERN
Solaris 2.7 and 8	23	67
MacOS 8 and 9	13	32
Windows NT and 2K	6	12

Including machines for SM18 control room, off-line work, etc.

What type of support is needed?

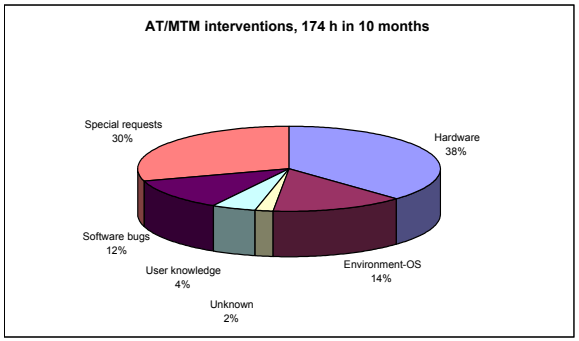
- Solaris and MacOS
  - Installation: PCI cards, system, drivers, users' configuration, LabVIEW, printer.
  - Maintenance at CERN: monitoring, problem solving, repair of breakdowns.
  - Maintenance in Industry: remote problem solving, repair of breakdowns.
- PC Windows NT and 2000
  - Installation: PCI cards, system, drivers, Visual Basic, LabVIEW, printer.
  - Maintenance at CERN: by IT
  - Maintenance in Industry: by Leica and Compaq.

How fast do we need to react?

For the industries

- Solaris (magnetic measurements)
  - Dipoles: within 48h for a blocking problem, to be agreed for less urgent problems. Spares need to be present on-site.
  - Quadrupoles: within 3 days if the situation is critical, otherwise 10 working days. Spares need to be present on-site.
  - Correctors: within 10 working days, or a spare system can be sent from CERN.
- MacOS (quench recording, quench heater tests and hall probe measurements)
  - Quench recording: within 10 working days. Due to cryogenic conditions, faster interventions could be asked for exceptionally.
  - Quench heaters: within 10 working days.
  - Hall probes: best effort, our aim is within 2 weeks.
- PC Windows NT and 2000 (geometric measurements)
  - Leica and Compaq are responsible for the PC hardware, system software and the Leica application. CERN is responsible for the working of the PCI cards and the DGM application. A replacement system is present in industry, repair is done at CERN and a new spare will be shipped within 2 weeks.

Intervention statistics at CERN



Notes
- Hardware: usually mechanical
- Special requests are not "problems"
- Bugs and user knowledge are usually related in new app. Releases
- Environment-OS: settings not identical between Suns, this can be improved !

Intervention statistics in Industry for 2002

1 broken hard disk on Compaq PC (Alstom)
1 broken NI multiplexer (over-voltage in Tesla)
1 printer port problem on a Sun (Tesla)

Conclusions

Our mission has many aspects, is interesting and various

- However our task is not easy: many scattered systems, many clients with different wishes …
- Very few staff members, doing development, testing, installation, support in industry …

but …

- Our young staff and multi-cultural visiting collaborators form an enthusiastic team
- Most are specialised, but with still some overlap

We need all the help we can get !

And you will enjoy the experience!

AB/CO/IN support for the LHC Test Benches

LHC-CP presentation

6 May 2003

AB/CO restructuring

- **Goal** : Put together the people doing the same job
- Magnus Bjork joined the **AB/CO/IN** section
- AB/CO/IN is responsible for the support of the AB/CO **controls infrastructure** :
  - OS support (mainly HP-UX, LINUX, LynxOS, SunOS, W2K (as consoles))
  - Configuration files (passwd, hosts, etc.)
  - System monitoring, Alarms
  - Backup, liaison with IT, …

LHC Test Benches needs

- **MacOS support**
  - Mainly done by IT DCS contract
  - No support here from AB/CO/IN
- **Windows NT**
  - Considered as Black Boxes as they are bought from a external firm (Leica). They are used in standalone mode
  - System Installation support.

LHC Test Benches needs

- **SunOS support from AB/CO/IN**
  - Manage the different SunOS installations, especially those sent to industry in ‘no network’ mode.
  - Share the monitoring tools, the backup service, the configuration files
  - Share the OS and Hardware installation, configuration and cloning methods
  - Therefore we should have **more than one person** who understands the system.

LHC Test Benches needs

- **LabView support**
  - Installation made with IT support
  - Application development in AB/CO/IS plus IT support
  - Installation and deployment can be supported by AB/CO/IN

Conclusion

- AB/CO/IN will offer **support and cross fertilization on the SunOS** machines as far as the installation, monitoring and deployment is concerned.
- Not much on the Mac and Win side.
- LabView installation does not need so much support.
- **More discussion** has to take place inside the AB/CO group to organize this support.