23rd Meeting of the LHC Resources Review Board RRB
Held at CERN on 23rd October 2006

1. Introduction - J. Engelen, Chief Scientific Officer

J. Engelen welcomed RRB delegates to this 23rd session. The minutes of the April 2006 Plenary Session, CERN-RRB-2006-060, were approved without comment.

J. Engelen reviewed the topics on the agenda of the present meeting, noting the opportunities to ask questions of the Director General during his report, and the important presentation of the current LHC machine status by the LHC Project Leader. Finally the conclusions of the M&O Scrutiny Group would be reported.

It was less than one year from the start up of the LHC project and hence this RRB was of particular importance, as would become clear in the subsequent presentations and in the separate sessions. CERN was no longer in a position to lend money to the experiments and one would have to face certain financial issues directly.

2. CERN Status and News – R. Aymar, Director General

R. Aymar welcomed the attendees to the April 2006 RRBs. He noted that the CFO would change at the end of the year. He thanked A. Naudi for his major contribution to the laboratory and he introduced his successor S. Lettow.

He had a mixture of good and bad news to present. Firstly the good news: he felt that the LHC construction had reached a point where there were no more really difficult technical issues for which one did not know a solution. There were many difficult things to be accomplished but he felt they were on top of the tasks.

The June Council had agreed on the proposal to close the beam pipe at the end of August 2007, and they hoped to get first beams and collisions in a pilot run before the end of the year at 900 GeV centre of mass energy. They hoped to make any necessary corrections during the following shut down such that the whole of 2008 could be dedicated to priority physics, which would be proton-proton physics. He was sure that everyone was polarized by, and working towards these goals.

The detectors should be working on this time scale in order to check their functioning with these low energy beams. For this a number of contributions in-kind and in cash were urgently needed in order to finish the detectors for this pilot run. Beyond that further contributions were necessary in order to finish the detectors up to the level of the MoUs, so that they could exploit the design luminosity of the accelerator in 2009/2010. He could hardly push the Funding Agencies strongly enough to consider their duty to participate in the funding and to fulfil their responsibilities.

This brought him to the next point which was that CERN was not in a strong position to help in this matter. CERN would finish the LHC machine in time, but the required budget has forced it to take loans amounting to 1.2 BCHF by the end of 2006. These loans had to be reimbursed, according to the decision of the Council, in 2008/2010. This amounted to 330 MCHF per year. During this time the personnel would reduce from 2600 to 2000, a decrease of 650 people. The material budget would total 250 MCHF, from which had to be subtracted 35 MCHF for the interest of the debt, and 60 MCHF for energy to run the LHC, leaving only 100 MCHF for all the facilities. With no additional funds CERN would be in a very bad shape to help. He hoped that the Members States would be able to provide some very necessary extra funding.

In this context he noted the strategy for the future of Particle Physics in Europe, decided by the Council at a special meeting in July in Lisbon. This had been a unanimous agreement. Currently they were in the most difficult stage, namely that of making an implementation plan. Such a plan needed resources, financial and human. This had been presented to the Council the previous week. He was convinced that the Council members had understood the need for such a Strategy and for an Implementation Plan, as well as the needs for realistic resources to pay for more personnel and to pay for the necessary R&D to be launched. Some of this R&D was needed simply to replace old tools, on whose reliability one depended for the LHC, such the Injection Line. He hoped these could be replaced in the timeframe of around 2015/2016, in time for an upgrade of LHC. He wished to involve the collaborating countries in such activities.

He turned finally to the subject of Open Access Publishing. This had been a trend in particle physics for 15 years but he felt one should go one step forward to the new schemes where the authors paid for the publishing of papers, rather than the readers paying for the journals. The transition was not so easy between the above two stable states but it was time to address it. There would be a meeting at CERN on the 3rd November which would present a new business model to several publishers. They hoped to form a consortium to support this scheme. Everyone was invited to contribute.

Discussion

In response to J. Engelen's request for questions, the problem of accommodation at CERN was raised. The Director General replied that the new Hostel building was scheduled to become available as of June 2007, and this would bring the capacity of the three hostel building to around 500 rooms in total.

3. LHC Machine Status Report – L. Evans, LHC Project Leader

L. Evans presented (transparencies available on the LHC RRB web pages) the current status of the LHC machine and the progress made since the previous meeting of the RRB in April 2006. He showed the injection line completed, and its point of arrival in the machine. He presented a number of slides from the LHC Progress Dashboard, starting with the situation of the cold masses of the LHC dipoles. Out of a total of 1232, there were only 15 left to be delivered and these should arrive with in the next 3 to 4 weeks. The whole production, including spares, was foreseen to be finished in October 2006 for installation in the tunnel, after cold testing, by the end of March 2007. He showed the current state of installation, with five sections fully installed with dipoles (slide 5).

Similarly the cryogenics overview showed that there were few areas which had not yet been commissioned and accepted. He showed photographs of the major helium storage above ground, surface compressors and surface cold boxes, underground cold boxes for liquid helium and similar installations for superfluid helium. All of these were now installed and almost all were accepted and operating. He showed also the cryogenic distribution unit where two refrigerators could be diverted into one octant in the case that fast cool-down was required.

L. Evans showed a part of Sector 1-2, which was the only part where there were no magnets as yet, and the injection line T12 whose tunnel was also being used in order to minimize the surface transport of the main dipoles, and the subsequent perturbation to traffic. The QRL line was especially high at this point in order to allow for such movements.

They had been struggling with the production of the Arc Termination Modules. These were very complex modules which included the use of high temperature super-conductors. The problems with the manufacturing had been resolved and hence this was another problem behind them. They were being installed on schedule.

The interconnections of the magnets, and associated testing and quality assurance, were major tasks. The first two arcs had taken very long because of, on the one hand, the natural learning curve for such a complicated process, and on the other hand the interference between this work and the transport of the magnets. Work in the following octants was now proceeding much faster and they were confident that they could keep up the rate required to finish this work on time.

L. Evans showed the klystrons and RF modules installed at the machine. He noted that the RF system was simpler than that required for LEP. Another component where there had been problems to achieve the required rate were the collimators which were there to protect the machines and experiments. He explained the plan for dealing with this situation. Finally he showed the important milestones.

The plan for the commissioning of the machine was as follows:

- Sectors 7-8 and 8-1 would be fully commissioned up to the field needed for 7 TeV in 2006-2007
- The other sectors would be commissioned up to the field needed for de-Gaussing (1.2 TeV)
- Initial operation would be at 900 GeV (CM) with a static machine (no ramp, no squeeze) to debug machine and detectors.
- Full commissioning up to 7 TeV would be done in the winter 2008 shutdown ready for a high energy run in 2008.

L. Evans concluded that:

- The QRL and DFB problems were now resolved. There was some delay in collimator production but sufficient collimators were available for 2007. The rest would be installed in 2008.
- Seven octants of the machine had been liberated for magnet installation and interconnect work was proceeding in 4 octants in parallel. Magnet installation was now steady at 25 per week. Installation would finish at the end of March 2007. The machine would be closed in August 2007.
- Every effort was being made to establish colliding beams before the end of 2007 at reduced energy. The full commissioning up to 7 TeV would be done during the 2008 winter shutdown ready for a Physics run at full energy in 2008.

The Chairman thanked L. Evans for his presentation. The Director General noted that having the machine working before Christmas would be a very welcome present to all the teams who were working so hard.

4. M&O Scrutiny Group Report - M. Morandin

Paper CERN-RRB-2006-104

The Chairman of the M&O Scrutiny Group presented the general observations and conclusions of the group in 2006. The detailed conclusions for each experiment would be presented in the respective RRBs. He outlined the composition of the group and their method of working. He acknowledged the quality of the work and cooperation of the Resource Coordinators in the experiments.

His report can be found in the above paper and is not repeated here.

His conclusion was as follows. The SG had looked at the M&O budgets of the four experiments and had examined in detail some of the line items, leading in some cases to refinements of the proposed estimates. The RRB-SG recommended that the 2007 estimates for the M&O budgets be approved by the RRBs.

The SG took the opportunity to remind the RRB how essential it was for the experiments to receive contributions to the Cat. A accounts in a timely manner, in accordance with the rule established in the M&O MoU (50 % paid by 10th February and the remaining 50% paid by the 10th June).

J. Engelen thanked M. Morandin for his report. He noted that M. Morandin was retiring as Chairman of the SG and he thanked him especially for his most serious work. There were no further questions.

5. Summary

In summary J. Engelen noted that there had been impressive progress towards collisions in 2007.

C. Jones
March 2007