



CMS

14 March 2012

**Minutes of the 33rd LHC Resource Review Board Meeting
(CERN, Geneva, 18th October 2011)**

Present:

C. -E. Wulz (Institut fuer Hochenergiephysik /HEPHY, Austria)
J. Sacton (FNRS, Belgium)
J. Lemonne (FWO, Belgium)
Q. Meng (National Natural Science Foundation, China)
Y. Zhang (National Natural Science Foundation, China)
Q. Chang (National Natural Science Foundation, China)
C. Jiang (IHEP Beijing, China)
D. Denegri (MSES, Croatia)
P. Razis (University of Cyprus, Cyprus)
D.-O. Riska (Helsinki Institute of Physics, University of Helsinki, Finland)
P. Eerola (University of Helsinki, Finland)
P. Rebourgeard (CEA/IRFU, France)
L. Serin (CNRS/IN2P3, France)
Y. Sirois (IN2P3, France)
K. Ehret (BMBF, Germany)
H. Mahlke (BMBF, Germany)
P. Schleper (BMBF/Hamburg University, Germany)
M. Fleischer (DESY, Germany)
K. Borras (DESY, Germany)
G. Vesztergombi (KFKI-RMKI, Hungary)
S. Katta (DAE, Mumbai, India)
F. Cervelli (INFN, Italy)
M. Diemoz (INFN - Sezione di Roma, Italy)
H. Kim (Ministry of Education, Science and Technology, Korea)
U.-K. Yun (National Research Foundation, Korea)
I.-K. Park (University of Seoul, Korea)
J. Królikowski (Ministry of Science and Higher Education/ University of Warsaw, Poland)
G. Barreira (Laboratório de Instrumentação e Física Experimental de Partículas /LIP, Portugal)
I. Golutvin (RDMS-DMS, Dubna, Russia)
V. Karjavine (RDMS-DMS, Russia)
M. Itkis (RDMS-DMS, Russia)
Y.V. Kozlov (Ministry of Education and Science, Russia)
V. Matveev (Institute for Nuclear Research of the Russian Academy of Sciences, Russia)
V. Savrin (Moscow State University, Russia)
J. Alcaraz Maestre (CIEMAT, Madrid, Spain)
F. del Aguila (Universidad de Granada, Spain)
T. Nakada (CHIPP, Switzerland)
Q. Ingram (PSI, Switzerland)
G. W-S. Hou (National Taiwan University /NTU, Taiwan)
I. Koca (Turkish Atomic Energy Authority, Turkey)
G. Hall (Imperial College London, United Kingdom)
A. Medland (STFC, United Kingdom)
J. Butler (Fermilab, United States of America)
S. Gonzalez (Department of Energy, United States of America)

T. Hallman (Department of Energy, United States of America)
S. Rolli (Department of Energy, United States of America)
R. Ruchti (National Science Foundation, United States of America)

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G. Tonelli, A. Ball, A. Charkiewicz, A. Petrilli, T. Rodrigo, J. Incandela

CERN

E. Tsesmelis, E. Van Hove, S. Bertolucci, H. de Groot, T. Lagrange, R. McLaren, J. Salicio Diez, S. Foffano (observer)

Scrutiny Group

S. Schmeling, B. Loehr

Excused

E. Gazis (NTU Athens, Greece)

T. Csorgo (KFKI, Hungary)

R. Iyer (Department of Atomic Energy, India)

K. Mazumdar (Tata Institute of Fundamental Research / TIFR, India)

R. D. Heuer (CERN)

C. Saitta (CERN)

S. Lettow (CERN)

P. Bloch (CERN)

R. Wallny (ETH Institute of Particle Physics, Switzerland)

Documents can be found in the RRB indico pages; accessible via the LHC-RRB home page
<http://cern.ch/committees/all/welcomeLHCRRB.html>

1. Introduction. S. Bertolucci, Director of Research and Scientific Computing.
S. Bertolucci welcomed delegates to the 33rd meeting of the RRB.

2. Approval of the minutes of the last meeting. S. Bertolucci, Director of Research and Scientific Computing.
CERN-RRB-2011-063 (report)
The minutes of the last RRB were approved without comments.

3. Status of the experiment. G. Tonelli, Spokesperson
CERN-RRB-2011-077 (report) CERN-RRB-2011-078 (presentation)

G. Tonelli presented the LHC/CMS operations and stated that 5.31fb^{-1} was delivered by LHC and 4.82fb^{-1} of data was recorded by CMS. Overall data taking efficiency was 91%. He said a few words about the Pile Up challenge followed by a comprehensive presentation of the status of the sub-systems, the physics results and the publications.

Looking ahead to the 2012 run, G. Tonelli presented the main points:

- Very likely 50ns. Issues for 25ns under study. Possibility to reduce further the β^* .
- Possibility to increase the energy: 8TeV (benefit everywhere: 10-15% in the low mass Higgs; x3, x5 in looking for high mass resonances.)
- Important to know the overhead in terms of additional tests needed for the machine or in the commissioning time needed to get back to production for physics.

- CMS is ready to face the additional challenges: higher pile-up conditions and/or higher energy (new MC production needed, new measurements of major SM processes etc).
- Computing resources requested for next year seem to be OK in 1st approximation.
- There will be a meeting of the experiments with CERN Directorate at the end of November in preparation for the discussion at Chamonix 2012.

Turning to financial matters G. Tonelli outlined the 2012 M&O-A Budget request stating that:

- The Preliminary Budget Request for 2012 at the April RRB was 16 MCHF
- The Revised Budget Request for 2012 October RRB was 15 MCHF
- Huge efforts had been made to reduce the requests and to smoothen the profile!
- Re-profiling the DAQ investments; expenditures for the long shutdown have been incorporated in the estimates for 2013 and 2014.

He then gave a breakdown of the major cost drivers and a budget profile for 2011 until 2015, demonstrating the smooth budget requests.

Turning to the CMS Upgrade Project, he announced that the Technical Proposal for Phase 1 Upgrade had been accepted by the LHCC and was now public. Technical Design reports were being prepared for Pixels, HCAL and Trigger. The Detailed scheduling of installation and commissioning depended on the timing of the Long Shutdowns

- Plans for the first shutdown are clear
- November workshop at Fermilab will work on putting together detailed schedule across Systems
- Overall schedule aiming to complete the upgraded detector components relatively early (2016)
- Maintain possible flexibility in installation

The CMS Upgrade Plan is as follows:

Shutdown	System	Action	Result	Physics
LS 1 2013-2014	Muon (ME4_2,ME1_1)	RPC and CSC (Complex YE4 installation) New electronics	Improved μ trigger and reconstruction ($1.1 < \eta < 1.8$, $2.1 < \eta < 2.4$)	W acceptance WH, $H^\pm \rightarrow \tau\nu$
LS 1 2013-2014	Hadron Outer	Replace HPDs with SiPMs to reduce noise	Single μ trigger Tails of very high p_T jets	Muons from τ Z/H $\rightarrow \tau\tau \rightarrow \mu X$
LS 1 2013-2014	Hadron Forward	Install new PMT to reduce window hits	Forward jet tagging Improves MET	Vector-boson fusion H
LS 1 2013-2014	Beam Pipe	Install new beam pipe	Easier pixel installation	b-tagging
LS 2 2017 or 18	New Pixel system	Low mass 4 Layers, 3 Disks with new ROC	Reduces dead time Improves b-tag.	$H \rightarrow b\bar{b}$, SUSY decay chains
LS 2 2017 or 18	HCAL Barrel and Endcap μ TCA trigger	Replace HPDs with SiPMs for longitudinal segmentation New electronics	Reduces pileup effects Improves MET Improves τ , e, γ clustering and isolation	SUSY $H \rightarrow \tau\tau$ $H \rightarrow ZZ \rightarrow l\tau\tau$
LS 3 >2020	TRACKER New Trigger Endcap Calo.	Replace tracker Replace trigger	Maintain performance at high SLHC Lumi	Guided by early discoveries

Before presenting the preliminary Money Matrix of the Upgrade, G. Tonelli made the following comments:

- Numbers in the table are “targets” or “proposals” that are the starting point for discussions with the Funding Agencies.
- The actual numbers vary between:
 - firm commitments based on approved funding
 - proposals incorporated into national plans but not yet funded
 - hopes for funding that are still at an early stage of discussion;
- CMS understands that each Funding Agency has its own process and timetable for reaching a final decision on the Upgrade;
- The costs are in a CERN metric that includes material costs and contracted labour without contingency and are in Swiss francs;
- The entries reflect the stated national interest in the various Upgrade; projects and the rough proportion of the financial commitment relative to the whole Upgrade.

The slide of the preliminary Money Matrix indicated the Institute/Funding Agencies’ interest in Subdetector-specific and Detector-wide items. This was complemented with a presentation of the preliminary spending profile from 2011 until 2016. The total was 64.5 MCHF.

G. Tonelli concluded that:

- CMS continues to be in good operating conditions and is coping well with the challenge of instantaneous luminosity higher than $3 \times 10^{33} \text{cm}^{-2} \text{s}^{-1}$.
- Plenty of new physics results have been presented to the Summer Conferences and continue to be produced. No evidence for BSM physics so far.
- New exclusion limits for the SM Higgs have been produced. With the data CMS is collecting, it should be ready to discover the SM Higgs boson or to start excluding it in the full mass range.
- Detailed plans for 2012 running are in preparation: so far planned resources seem to be able to cope with the new challenges. CMS has revised (reduced) the M&O-A request for 2012. A new long term planning incorporating the LS1 and DAQ investments has been prepared and CMS expects to have a relatively flat profile.
- The collaboration is making progress in the Upgrade and a preliminary version of the Money Matrix for the sharing of the costs has been presented together with a draft spending profile.
- CMS is deeply grateful to all Funding Agencies for their invaluable support.

F. Cervelli commented that significant Upgrades are planned during LS 1 period (which is only 24 months away) and asked how funds would be raised for these activities. G. Tonelli replied that since completion and upscoping was included in the requests for Step 3 funding, part of investments needed for LS 1 are already ongoing. Looking ahead to LS 2 G. Tonelli was confident that after discussion with the Funding Agencies, completion of the Money Matrix would be possible.

D-O. Riska recalled that during the cost to completion phase, letters were sent to the Funding Agencies asking for a commitment (these could be preliminary, firm etc). He suggested that similar

letters, sent before the April RRB, would expedite the completion of the Money Matrix. S. Bertolucci agreed that letters would be sent in parallel with the submission of the TDRs to the Scientific Committees.

S. Gonzalez reiterated the USA's interest in participating in CMS Upgrades. The number of PhDs is a good starting point but the figures presented do not match the US project management practices. Although endorsement would be subject to USA reviews and availability of funding, S. Gonzalez was looking forward to continuing discussions on the scope of the contributions. G. Tonelli replied that CMS respected the different process and accounting methods of Funding Agencies and was very happy to move forward in this positive spirit.

T. Medland asked CMS what they considered to be the major operational risk. G. Tonelli answered that there were two major challenges: operation at 25nS and 50 nS. At 25nS CMS may not get the expected integrated luminosity due to problems in the machine. At 50 nS, the machine has been tested but for CMS the challenge is higher pile-up, the non-linear trigger and HLT. A. Ball added that the major technical risk was failure of the cold compressor system for the magnet. However, with the help of a loan from the CERN/PH Department, the replacement time for components had been reduced to 1 month.

S. Bertolucci expressed his gratitude for G. Tonelli's fruitful interactions with the RRB and the Scrutiny Group and invited the delegates to join him in a round of applause.

4. LHCC deliberations (paper only). E. Tsesmelis, LHCC Scientific Secretary
CERN-RRB-2011-093 (report)

E. Tsesmelis reported that the LHCC considers that CMS has made excellent progress in all aspects of the experiment and the Committee congratulates the CMS Collaboration on its achievements.

Delegates had no comments and the RRB took note of the LHCC report.

5. Financial matters. T. Lagrange, Head of CERN Finance and Procurement Department
CERN-RRB-2011-073 (paper), CERN-RRB-2011-100

T. Lagrange presented the changes in the status of Common Fund accounts with respect to the above report. Referring to the CMS Global Financial Plan (CERN-RRB-2006-105), he gave a summary of planned and received cash income for the three steps. A total of 370 kCHF had been received after 1 September 2011.

For Maintenance & Operations – Category A, additional Contributions received as from 1 September 2011 totalled 1.5 MCHF. Outstanding contributions stood at 888 kCHF for 2011.

6. M&O Budgets. A. Charkiewicz, Resources Manager
CERN-RRB-2011-079, CERN-RRB-2011-080 (presentation)

A. Charkiewicz began with the status of the M&O MoU signatures and Draft Budget for M&O 2012.

The M&O-A budget had been revised:

- The M&O category have been reduced by 1'698 kCHF as compared to the proposal made at the April 2011 RRB. The main factors contributing to this were:
 - Reducing the allocation for Online hardware by some 2 MCHF by re-profiling and revising the cost of replacing DAQ equipment in the period 2012-2015;
 - In agreement with the RRB Scrutiny Group it is proposed to create a special. Online Account allowing carry-over from year to year allowing flexibility in making purchases at the optimum time;
- An increase of some 150 kCHF is requested in the category of Detector Related Costs for Safety and due to moving the costs of Power Supply Maintenance from M&O-B to M&O-A;
- An allocation of 250 kCHF is requested for Collaborative Tools due to the continuous reliance of the Collaboration on EVO for its video-conferencing needs;
- Furthermore, modifications have been made to the projection of costs for the years 2013-2015 due to implications of the Long Shutdown planned for 2013 and part of 2014. This concerns the categories of Detector Related Costs, Test Beam Facilities and General Services.

The 2012 M&O-A Budget is 15 MCHF. The 2012 M&O-B Budget stands at 6.6 MCHF with 8 FTE.

As agreed at the October 2010 RRB, a scrutiny was put in place for the M&O-B Budget. The process was carried out in two stages:

- An internal scrutiny was carried out by Internal Scrutiny Groups (ISG) established for each Sub-system and provided a written report to the CMS Resources Manager;
- Reports of the ISGs were transmitted to the RRB SG together with other relevant documentation. This was complemented by dedicated meetings and presentations from all CMS Sub-systems.

The RRB SG concluded that the budgetary process in each Subsystem had been carried out in a thorough and satisfactory manner.

A. Charkiewicz presented the 2012 total M&O Draft Budget for Cat A and Cat B for each Funding Agency.

Turning to Outstanding Contributions for M&O-A, he stated:

- There are no outstanding contributions for 2002-2010;
- The total outstanding amount for 2011 is 1'206 kCHF which is 9 % of the total invoiced 2011 contributions;
- CMS expresses its appreciation for the timely payment of contributions by the Funding Agencies;
- We kindly ask Funding Agencies with due contributions to make these payments as soon as possible

He explained how the Cat A estimates are determined and noted that the M&O category B estimates have changed since the April RRB. He also presented graphs of the evolution of M&O A and B.

A. Charkiewicz then expressed CMS' appreciation to the RRB Scrutiny Group for the constructive help in closing the 2010 Expenditures and preparing the 2012 Draft Budget.

He closed by inviting the RRB to:

- Approve the Draft Budget for M&O Category A for the year 2012;
- Take note of the Draft Budget for M&O Category B for the year 2012 and its sharing among the CMS Funding Agencies.

Referring to page 14 of the presentation, B. Loehr remarked that the costs for the replacement of the on-line computers were the second highest item in the M&O-A. This underlines the importance of reaching an agreement in 2012.

M. Fleischer asked in the special DAQ account would be zero at the end of 2015. B. Loehr replied that the balance should be close to zero but the actual amount was undecided and the final details have yet to be defined. S. Bertolucci agreed that the account should not be used as a bank but as a buffer to allow the experiments to minimise the cost of replacing equipment.

I. Koca introduced himself and the Turkish Atomic Energy Authority (TAEK). The agreement for both ATLAS and CMS, which was signed in 2003 between CERN and the Scientific and Technical Research Council of Turkey will expire at the end of 2011. In order to pay future contributions, CERN and TAEK would need to sign a new agreement. S. Bertolucci suggested that the body of the agreement could stay the same and only the signatory would need to be changed. This would be followed up after the RRB.

There were 18 Turkish PhD scientists in 2011. I. Koca announced that he would soon meet with the other participating institutes in Turkey, and this could lead to a revision of the number. T. Nakada asked, and received confirmation, that the figures for the current year would be unchanged and that any revisions of the number of PhDs would only affect next year's budget.

Referring to the report of the Scrutiny Group, T. Medland asked whether, should the detectors need to be opened during the 2011/12 Technical Stop, the associated costs were profiled into budget projections. A. Charkiewicz replied that the costs were not profiled. A. Ball stated that opening the detector is unlikely due to beam vacuum issues and confirmed that there were no reserves to cover cost of opening the detector.

B. Loehr reminded the meeting that in 2009/2010 an emergency bushing replacement needed to be carried out to avoid serious risk of leaks. The cost of this operation was estimated at around 1 MCHF and led to a corresponding deficit in 2010 which, with the agreement of the Scrutiny Group, was transferred to 2011 budget. He asked for an update on the deficit. A. Charkiewicz replied that savings had been made which reduced the deficit.

The RRB endorsed the budget.

7. Summary. S. Bertolucci, Director of Research and Scientific Computing.

There being no further business, the chairman closed the meeting. The next meeting of the RRB will take place on the 23-25th April 2012.