



## Minutes of the 23<sup>rd</sup> Resources Review Board Meeting Held at CERN on 24<sup>th</sup> October 2006

### Present:

#### *Europe*

C.-E. Wulz (Repr. Bundesministerium für Bildung, Wissenschaft und Kultur, Wien)  
J. Lemonne (FWO, Brussels), D. Bertrand (FNRS, Brussels)  
D. Denegri (Repr. Ministry of Science and Technology, Zagreb)  
M. Raidal (NICPB, Tallinn)  
D.O. Riska (Helsinki Institute of Physics, Helsinki), J. Tuominiemi  
C. Cavata (CEA-Saclay, Gif-sur-Yvette), M. Dejardin  
F. Le Diberder (IN2P3, Paris), Y. Sirois (LLR, Paris)  
J. Richter (BMBF, Bonn), T. Hebbeker (RWTH, Aachen IIIA)  
E. Gazis (National Technical University of Athens)  
K. Galbats (National Office for Research and Technology), G. Vesztergombi (KFKI-RMKI, Budapest)  
U. Dosselli (INFN, Rome), F. Ferroni, F. Ferrini (Italian Mission, Geneva), G. Tonelli (INFN, Pisa)  
J. Królikowski (Repr. Ministry of Science and Higher Education, Warsaw)  
G. Barreira (LIP, Portugal)  
A. Petrov (Permanent Mission, Geneva), V. Savrin (Skobeltsyn Inst. of Nuclear Physics, Moscow)  
Mr. Lednicky (JINR, Dubna)  
P. Adzic (Vinca Institute of Nuclear Sciences, Belgrade)  
D. Espriu (Ministry of Education & Science), T. Rodrigo (IFCA-Univ. of Cantabria)  
Q. Ingram (PSI, Villigen), F. Pauss (ETH, Zurich), A. Rubbia  
R. Wade (PPARC, Swindon), R.M. Brown (RAL, Didcot)

#### *North America*

J. O'Fallon (DOE, Washington), J. Butler (FNAL), T. Ferbel (Univ. of Rochester), S. Gonzalez (DOE, Washington),  
M. Pripstein (NSF, Washington), J. Whitmore, R. Cousins (UCLA)

#### *New Zealand*

S. Marshall (Repr. Ministry of Research, Science and Technology, Wellington) A. Macpherson (Univ. of Rutgers)

#### *Asia*

P. Ji, (National Natural Science Foundation (NSFC), China), L. Shen, Y. Zhang  
A. Gurtu (Tata Institute of Fundamental Research, India)  
J-H. Kim (Ministry of Science and Technology, Korea), S. Ro (Kyungpook National University, Korea), S.K. Park (Korea University)  
Y.B. Hsiung (National Taiwan University, Taipei), S.C. Lee (Institute of Physics, Academia Sinica, Taipei)

#### *CERN*

R. Aymar, J. Engelen (chairman), C. Jones (secretary), S. Lettow, A.J. Naudi, J.J. Blaising, P. Geeraert, D. Jacobs, S. Schmeling, E. Tsesmelis, E. Van Hove

#### *CMS*

M. Della Negra, A. Ball, L. Foà, J. Nash, A. Petrilli, T. Virdee

M. Morandin (INFN Padova, Scrutiny Group Chairman)

**23<sup>rd</sup> Meeting of the CMS Resources Review Board RRB, 24<sup>th</sup> October 2006****1. Introduction****J. Engelen, Chief Scientific Officer**

J. Engelen welcomed RRB delegates to this 23<sup>rd</sup> session and commented that this was one of the last RRBs before the experiment would start, and that this implied that certain financial difficulties, maybe not inconsiderable, but small in relation with the investment already made, could no longer be postponed for resolution in the future. In this spirit any financial issues should be discussed with more vigour than usual, and if they could not agree on solutions today, they should certainly agree on procedures to take these issues further.

He introduced the CFO designate as of the 1<sup>st</sup> January 2007, S. Lettow.

**2. Approval of the Minutes of the 22<sup>nd</sup> Meeting (CERN-RRB-2006-064)**

The minutes of the 22<sup>nd</sup> meeting were approved with no comments. J. Engelen thanked C. Jones for having taken these minutes. There were no matters arising.

**3. Status and Financial Plan of the Experiment, M. Della Negra, Spokesperson**

Papers CERN-RRB-2006-087  
CERN-RRB-2006-105

Presentation CERN-RRB-2006-108

**3.1 Collaboration News**

M. Della Negra noted that there was a new group, already known to CMS, applying in September to join CMS as a full member, namely the University of Tennessee, Knoxville, USA and this would be voted in December 2006. There was also a Technical University wishing to join CMS as an associate member, namely the Technical University of Eindhoven, Netherland. This would also be voted in December 2006.

CMS had now elected a new Spokesperson for a period of 3 years to start 1<sup>st</sup> January 2007, namely T. Virdee, the current deputy. This was the last RRB for M. Della Negra as spokesman.

**3.2 Construction Progress**

M. Della Negra presented a summary of the construction progress since the April 2006 RRB. Over the summer three critical objectives were achieved. Firstly the experiment was closed for the first time on the surface. Then the Solenoid was tested to the design field of 4T. Finally cosmics were recorded in all sub-detectors working altogether, thus demonstrating that CMS could operate as a single coherent detector, as well as that CMS could operate as a worldwide collaboration.

For further detailed information on the construction progress, see the paper and slides of M. Della Negra referenced above.

**3.3 Conclusion**

In conclusion M. Della Negra noted that CMS Construction and Installation were making good progress. The Magnet Test Cosmic Challenge had proven that CMS could work, and they were now starting to lower and (re-)commission the experiment in UXC, USC.

Commissioning for Start-up and Collisions had begun, and they had put in place the final software: CSA06, HLT, Start-up Physics.

In terms of the Schedule, the Tracker was on time. It would be fully commissioned in TIF before installation at point 5 in June 2007. The ECAL schedule was driven by the crystal delivery schedule. The Endcaps had to be ready for the Physics run in 2008. The low mass Higgs in the two photon mode could be discovered in CMS alone with  $10 \text{ fb}^{-1}$ . The cost and schedule of the last

5500 endcap crystals were still being negotiated. Cabling of YB0 and the Tracker in the underground experiment cavern was on the critical path.

M. Della Negra concluded by emphasizing that the Initial CMS would be ready for collisions in 2007, and by quoting from the LHCC Deliberations (CERN-RRB-2006-096):

“...The new draft schedule v35.0 shows the detector complete and ready for final closing on August 31, 2007, with no contingency. Additional resources have been requested to the CMS RRB to consolidate the CMS schedule. It is realistic to expect CMS to have installed an initial working detector, without the EE and Pixel Detector, suitable for the first operation of the LHC starting in the fall 2007...”

### Discussion

J. Engelen noted that considerable technical progress had been made and invited comments at this stage of the presentation on the status of the CMS experiment, including comments on the LHCC Deliberations paper (point 4 on the agenda below).

R. Wade had heard recently of progress at the Tevatron and wondered whether this was in the same discovery space as CMS and ATLAS. M. Della Negra replied that they did not have the energy, and cross sections were very much energy dependent. They could hope perhaps to find the hint of a 3 sigma signal by putting together the data from CDF and D0, but it was a considerable challenge. J. Engelen noted that indeed there was a competition and that was why they could not bear any delay at all. He was sure that the experiments were stimulated by this. R. Wade noted that this should also stimulate the Funding Agencies. He added that signal to noise might be more important in a scientific article than in an article in the world press. D. O. Riska pointed out that the real competition was with ATLAS. J. Engelen replied that such competition was natural.

M. Pripstein asked, with respect to the critical path, whether it was possible to add more staff for cabling. M. Della Negra replied that this activity was saturated, and that the space was such that it was not possible to have more than two shifts of four people on the same side of the coil (that is four shifts on both sides). A. Ball wished to add that it was the word “compact” in the title of CMS that made the addition of extra cabling staff not possible. J. Engelen proposed to move on to the presentation of the CMS Financial Plan.

### 3.4 Financial Plan

M. Della Negra then presented the details of the Financial Plan. Upon the recommendation of the CERN management, CMS had prepared a global financial plan up to 2010, evaluating not only the shortfall for the low luminosity detector, but also the funds needed to introduce the staged items for the design luminosity ( $10^{34} \text{ cm}^{-2}\text{s}^{-1}$ ). The items under consideration in this global plan were presented in a prioritized way. All the information presented here had been previously presented in preceding RRBs.

The completion of the Crystal procurement was the main financial problem for CMS which had to be solved for the low luminosity detector. The original plan, (RRB20, Apr05), was based on the expectation that Russia would contribute in-kind 7000 endcap crystals. Today the situation had changed:

- Russia had agreed to contribute only 1500 endcap crystals (RRB22, Apr06).
- For the current contract placed by CERN, 6 MCHF were not covered by firm pledges (RRB22).
- A new contract for 5500 endcap crystals had to be signed well before the next RRB and was being negotiated.

The resultant shortfall for the Crystals was estimated to be about 14 MCHF.

For the 2008 Detector, in terms of C&I and the Common Fund:

- At RRB20 in April 2005 the shortfall for C&I was declared as 3.2 MCHF. CMS had obtained firm promises for only 1.7 MCHF (RRB22). Hence the C&I shortfall was 1.495 MCHF.
- In addition, (RRB20), it had been hoped that 10 MCHF out the 13 MCHF deficit from the 2002 Cost to Completion exercise could be covered by staging or internal contingency. It had turned out that only 8 out of the 10 could be so covered,

This left a Common Fund shortfall of 2.035 MCHF.

The Total Shortfall for the Low Luminosity Detector was thus 17.530 MCHF (see slide 40).

M. Della Negra turned to the “High Luminosity Upgrade”. The list of staged items was presented last at RRB20 (April 2005) for a total amount of 24 MCHF. He then showed an updated list of Staged Items for this RRB. The list of staged items remained the same, except:

- Two more DAQ slices (4 MCHF) had been staged for the financing of TIF (RRB21) and of the manpower for cabling of YB0 and Tracker in UX (see CERN-RRB-2006-025, availability of sufficient manpower at CERN, p56).
- RPC items had been removed from the list. The upgrade of the RPC Endcap (RE) system was a separate in-kind project evaluated at 5.9 MCHF. A project had already been launched by China, India, Iran, Korea and Pakistan. Funding from Pakistan was already assured. Other funding requests were being prepared.

He then presented a Summary Table: Shortfall to Complete CMS.

<b>Shortfall to Complete CMS</b>	<b>MCHF</b>
<b>1.0 Shortfall 2008 Detector</b>	<b>17.530</b>
1.1 Shortfall Crystals	14.000
1.2 Shortfall Common Fund	2.035
1.3 Shortfall C&I	1.495
<b>2.0 Restore the full DAQ</b>	<b>8.400</b>
2.1 DAQ (4 slices)	8.000
2.2 Extra Infrastructure for DAQ	0.400
<b>3.0 Upgrade to Design Luminosity</b>	<b>16.600</b>
3.1 Third forward pixel layer	2.500
3.2 Complete Endcap	10.700
3.2.1 ME4/2 mech. and electronics	9.200
3.2.2 Restore ME1/1a electronics	1.500
3.3 Infrastructure, C&I	3.400
3.3.1 YE4	1.400
3.3.2 Extra installation costs	1.000
3.3.3 Extra neutron shielding	1.000
<b>TOTAL</b>	<b>42.530</b>

The first priority was to complete the low luminosity 2008 CMS detector (17.53 MCHF above). The second priority was to restore the full DAQ capability (8.4 MCHF above). The third priority was to upgrade to the design luminosity detector (16.6 MCHF above). The exact details would be determined after examination of the first data, and consideration of background and rate measurements.

For Step 1, completion of the low luminosity detector (17.5 MCHF), there were three components:

- in ECAL to cover the current crystal contract. CERN had taken the financial risk but needed to be reimbursed before 2010.
- in Common Fund (2.0 MCHF) and C&I (1.5 MCHF). This cash was needed immediately to continue installation of CMS.
- a new EE crystal contract to be placed by ~ Jan 07, before the end of EB crystal production (Feb 07).

Step 2 was the completion of the DAQ (8.4 MCHF). The CMS DAQ system was modular and consisted of 8 independent DAQ slices, each of which could handle 12.5 kHz of Level 1 trigger rate. The cost of each DAQ slice was 2 MCHF. The DAQ implementation plan was: 2 DAQ slices in 2007, 2 more in 2008, 2 in 2009 and the remaining 2 in 2010.

Step 3 was the completion of the Design Luminosity Detector (16.6 MCHF):

- 3rd forward pixel disk (2.5 MCHF)
- Complete Endcap CSCs (10.7 MCHF)
- Infrastructure, C&I (3.4 MCHF)

The detailed plan would depend on examination of first data: e.g. backgrounds observed in the forward systems. (The completion of the Endcap RPC system was a separate in-kind project estimated at 5.9 MCHF)

M. Della Negra showed a detailed table (Table 2 in his presentation, on slide 48) which gave the distribution proposed by Funding Agency, together with a set of important comments on how this had been derived (slide 49).

He noted the evolution of the M&O A budget. With the present planning the integrated saving from 2003 to 2010 would be some 14 MCHF.

M. Della Negra concluded that CMS was indebted to the many Funding Agencies for their previous efforts to cover the additional costs incurred during the long construction period so far. The low luminosity detector completion was now approaching a successful end of construction.

Upon the recommendation of the CERN management CMS has prepared a global financial plan up to 2010, evaluating not only the shortfall for the low luminosity detector, but also the funds needed to introduce the staged items for the design luminosity of  $10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ .

A plan in three steps was proposed. The highest priority is given to the timely completion of the low-luminosity detector. In particular the order for 5500 endcap crystals had to be placed and 3.5 MCHF had to be secured to cover the shortfall in the Common Fund and C&I.

All the Funding Agencies were kindly invited to reach a rapid agreement on the first step of 17.5 MCHF in order to finish the low luminosity detector in time for the first physics run in 2008. CERN and CMS Managements were ready to meet the Funding Agencies as required so as to reach an agreement as soon as possible.

### **Discussion of the Financial Plan**

J. Engelen had a detailed question before opening the floor for comments. He asked whether, in general, the response from the Collaboration to manpower requests was good or did they need to hire this effort. A. Ball noted that the implied conclusion was correct and that it was not very easy to find such manpower for cabling within the institutes because one needed to start with a coherent professional team and to continue with that team throughout the whole activity. It was complicated and it needed people with experience. There were other activities where they would be able to deploy institute manpower and the willingness of the Collaboration to provide such people was good. M. Della Negra added that of the four cabling teams, three came from Russia and one from China, and these had to be paid. He believed the teams to be of the highest quality. The third shift overnight consisted of physicists to check the connections and there was no problem to staff this.

J. Engelen then remarked that those who were informed of the ATLAS financial plan would recognize qualitatively the type of problems that CMS had presented. CMS had not presented new elements at this RRB. Nevertheless there was a shortfall and CMS had prioritized the steps needed to fill this. On the first priority a discussion needed to be started with great urgency. The other steps needed discussion soon. One difficulty in the CMS planning was that the initial crystal price had turned out not to be realistic.

J. O'Fallon reported the following position: "We commend CMS management for its recent clarification of priorities in the proposed cost-to-complete of the CMS detector for  $10^{34}$  luminosity. We believe that the two sets of items of highest priority deserve a response as soon as possible. The items referred to in the third priority of CMS are more difficult for us to consider and we are not in a position to comment. We urge continued discussions among international CMS, CERN and U.S. managements to resolve remaining issues to the satisfaction of all parties"

He noted that they recognized the urgency and they wished to move ahead as rapidly as possible. J. Engelen thanked him for this and promised to follow this up.

D.O. Riska noted that they had been aware of the numbers for some time. At a previous RRB there had been an icy silence around the table following the presentation of a proposed sharing plan. He had proposed an extraordinary RRB to try to sort this problem out. Instead they had been presented with the table above. It was clear that no-one had spare money for 2007. He proposed pragmatically that, for steps 1 and 2, they might be able to pledge in a staged way for 2010/2011. This would allow CMS to borrow the money through CERN and hence to move forward.

J. Engelen hoped that these dates might be brought forward. The Director General noted that CERN was ready but that he would like to consider 2010 as the last date and not 2011.

R. Wade welcomed the CMS plan and noted that complete clarity was needed across the board. At the previous RRB he had doubted whether the RRB was a good mechanism for solving the problem. He was now sure that it was not. It was urgent that CERN organize meetings with the key Funding Agencies to try to sort this out. Money was needed in 2007 and 2008 and there was no time to wait until the next RRB. Some hard talking was needed.

J. Engelen responded that he accepted that they had run out of time and they would organize such meetings. He noted that if one defined as "solvent by definition" the Member States and the US, then it was difficult to reduce substantially the size of the meeting from that of the RRB. If, in addition, one was encouraged to start bi-lateral negotiations they would do that as well, the admitted difficulties in doing so being fewer than the financial difficulties of CMS.

The Director General asked around the table whether the algorithm used by CMS was accepted. This was the first step to avoiding divergence. The second step would be to see who could pay and who could not pay at all. At the end of the meeting an overview was necessary.

J. Engelen agreed to follow this suggestion and invited delegates around the table to respond along these lines. The three steps involved slightly different algorithms, and they could perhaps postpone discussion of step 3 at this stage. It was however important to understand the situation of steps 1 and 2.

C.-E. Wulz for Austria thought that it was not unrealistic that they found the money but was worried that it would not come very soon. Austria had just had elections. No money was available currently.

D. Bertrand for Belgium also thought that this was not excluded, but for 2007 it was impossible. They had to ask for money one year in advance, so the earliest could be 2008. J. Lemonne added that the sharing mechanism was acceptable but there could be no contributions before 2008.

J. Engelen noted that he understood this argument but asked whether money could not be advanced out of the budgets of the institutes in the meantime.

The CERN position was clear, they would help CMS where they could but there was no money available as the Director General had clearly explained in writing to the Member States.

China announced that they needed time to discuss in detail.

Croatia hoped that step 1 would provide no difficulty, step 2 would require time and step 3 was out of the question at present.

Estonia was willing to contribute and Finland abstained.

France, CEA, would have preferred step 1 to be calculated on the PhD ratio. They would wish a balance between money and in-kind contributions.

France, IN2P3, was taking the necessary steps to make the cash flow easier for CMS. They would try to make their contribution available earlier.

Germany, BMBF, noted that steps 1 and 2 were not excluded and they would do their best to make this available in the years 2009 and 2010 only.

DESY could meet the contributions expected of it.

Greece noted that the number of PhD's attributed was too high; it was rather 12 than 17. He was not authorized to give an answer at this stage but promised to discuss this as soon as possible with the Greek committee.

Hungary wished to discuss the M&O budget together with these requests. In the case of a reduction Hungary could contribute the difference.

India was down for an in-kind contribution. A. Gurtu announced that their funding cycle was 5 years and they were making a request for this in-kind contribution. They would have to wait for the result. He questioned whether step 3 should be calculated on the basis of the number of PhDs or on the basis of the original contributions.

Italy noted this was a difficult answer to give on the spot. They agreed on the priorities and the method of sharing. They had been struggling to respect their duties so far, and were pleased to announce recently that, in the plan for the last CtC, that they had been able to bring forward money up to 2009 mostly into 2006. As of today they had no plan for this further commitment but they agreed that they needed to talk and to find something. J. Engelen noted that, in the 6 MCHF for crystals that CERN had pre-financed, they had expected a contribution from Italy. Clearly Italy was one of the Funding Agencies with whom they would enter into bi-lateral discussions. U. Dosselli agreed to postpone the discussion on step 3, but thought it essential to have such a discussion.

Korea was not in a position to make a statement at the meeting and would report after consultation.

Poland had just completed a funding round and noted that any new money could only be released for 2007/2010 at the end of next year. They were not authorized to say anything, but hoped to get the DAQ slice contribution (step 2). They were not sure whether they could get the step 1 money.

J. Engelen again asked delegates to try to re-arrange contributions within the money for their Institutes and thus to make an effort as CERN had done.

Portugal had the same problem as many others and they would do their best to see whether they could find some surplus money.

Russia noted that they were concentrating on the implementation of their obligations within step 1, including the delivery of the endcap crystals which they were going to supply on an in-kind basis. Only after this could they come back to the consideration of their participation in steps 2 and 3. They asked M. Della Negra whether his calculations included this contribution of 1500 crystals. M. Della Negra replied that they had included them in CtC 2, taking the current price.

Serbia could not say anything at this point. They would discuss and report back.

Spain was unhappy about steps 2 and 3 for two reasons. They felt that the basis of the calculation should be the construction and not the PhDs. Furthermore they thought the numbers were not yet mature. At this point they would be unhappy to commit anything for step 2 and step 3 although they would look at these numbers with great sympathy. For step 1, without making an absolute promise, they thought this money could be available in 2008.

Switzerland was happy to see that there was no request for step 1, given the high initial Swiss contribution. For steps 2 and 3, given the total amount of money that was requested, they felt that they would be able to ask for these additional funds and to receive them maybe in 2008 or 2009. PSI added that they were optimistic. They were committed to building the pixel detector which was a very important component of CMS. So far less than 20% of this had been assembled. If the yield went wrong, the costs could rise dramatically. As a consequence they were holding contingency money and the PSI Director had sent a letter saying that any surplus eventually available could be made available.

Taipei noted that step 1 and step 2 could be paid, maybe over 3 or 4 years.

UK accepted the algorithm for calculating the shares for the three steps. In terms of prospects they were happy to go away and look at this. In terms of timing, if such discussions could be organized with urgency, it was possible they could make money available before Christmas 2007.

USA reiterated that they recognised the importance of the high priority items in steps 1 and 2. In step 2 they had a high expectation that their colleagues in nuclear physics would come forth and cover a DAQ slice. They recognized that these items deserved a response as soon as possible.

A. Naudi reflected that this had been an interesting discussion but clearly CERN management would not be able to go to CERN Council asking to increase the debt unless there were appropriate written pledges, this was essential.

J. Engelen summarized that they had heard all the positions, clear and not so clear. He felt encouraged to enter in the bi-lateral discussions suggested in order to make progress before the next RRB. It was important at this stage that the experiment should not suffer last minute delays just because of a relatively small final amount money missing.

#### **4. LHCC Deliberations (paper only)**

Paper CERN-RRB-2006-096

**LHCC Scientific Secretary, E. Tsesmelis**

Delegates had no further comments to make and the RRB **took note** of the report of E. Tsesmelis.

#### **5. Financial matters**

Paper CERN-RRB-2006-078

**Head, CERN Finance Dept., P. Geeraert**

Presentation CERN-RRB-2006-083

P. Geeraert presented an update to the financial situation reported in the above paper, in which the information was correct to the end of August 2006. The full details can be found in his slides and in his paper.



New contributions had been received from Turkey and India for the Common Fund and C&I amounting to 45 kCHF, whilst new payments had been made for 1.06 MCHF. The remaining common funds amounted to 2.62 MCHF but with outstanding commitments of 5.56 MCHF.

New contributions to the M&O-A budget had been received from Italy, USA-DOE, Russia - Dubna, USA-NSF, Turkey, Croatia and Ireland amounting to 1.35 MCHF.

There were outstanding contributions to M&O-A prior to 2006 from Member States Bulgaria, Italy and Poland, and from non-Member State Korea and its Institutes, altogether amounting to 330 kCHF. For 2006 there were payments outstanding from Bulgaria, Poland, Portugal, Cyprus, Korea, Mexico, Dubna, and Taipei amounting to 446 kCHF. Total outstanding payments were thus 777 kCHF.

New payments against the M&O-A budget since August amounted to 2.743 MCHF, leaving a total of 4.1 MCHF. Outstanding commitments were 0.452 MCHF. Imminent payments for technical services would use up most of the available funds.

J. Engelen thanked him for this presentation. There were no questions.

## 6. Budgets

Papers CERN-RRB-2006-088  
CERN-RRB-2006-033

## Resources Manager, A. Petrilli

Presentation CERN-RRB-2006-106

### 6.1 Draft Construction Budget for 2007

A. Petrilli presented the draft construction budget for 2007, summarizing the funding requirements for all the payments planned in 2007 in order to follow the CMS construction schedule. He noted that in 2007 the magnet would be completed and all subdetectors would be in the integration/commissioning phase. The document covered requests for all subsystems for funds available under the CMS MoU and Cost to Completion (cf. CMS Financial Plan, CERN-RRB-2006-105). This Draft Budget for the year 2007 was based on the overall planning as presented in the Status Report and the Financial Plan of the experiment (cf. CERNRRB-2006-087 and CERN-RRB-2006-105), including funds not yet authorized.

The present estimates for all payments in 2007 added up to 40 MCHF. Together with the payments made by the end of 2005 (418 MCHF), the 2006 budget planned payments (59 MCHF) and the estimated delayed payments (10 MCHF), the total estimated payments by the end of 2007 would total some 527 MCHF. This was about 98% of the revised cost of the Low Luminosity Detector (cf. Step 1, CMS Global Financial Plan, CERN-RRB-2006-105).

This Draft Budget was based on the breakdown of items in the CMS Construction MoU and its All-Silicon Tracker amendment. As in the past, all figures shown as Payments expected in 2007 were to be considered as best estimates at this time because the actual expenditure would depend, case by case, on commercial tenders received, contract negotiations, currency fluctuations and actual payments during 2006.

He presented an overview of Annex 10 showing the budget request for 40 MCHF and a deficit of around 10 MCHF, most of which was concentrated in the ECAL with 6 MCHF missing for the existing contract.

The present Draft Budget was not balanced: some 10 MCHF were not covered and would be needed in 2007 to maintain the construction schedule. The CMS Financial Plan detailed the breakdown of the deficit and proposed a global plan to complete the CMS detector with cash flow help from CERN and reimbursement from the CMS Collaboration up to 2010.

The RRB was invited to approve the Draft Budget (as presented in Annex 10) for CMS Construction in the Year 2007 for the funds available. It was imperative that a solution be found as

soon as possible for the 10 MCHF deficit which was part of the Financial Plan Step 1 (cf. CERN-RRB-2006-105). The RRB **approved** this draft budget for 2007.

## 6.2 Draft M&O Budget for 2007

A. Petrilli presented first the status of the M&O MoU signatures. There had been no change, but the Korean Delegation was proposing to sign in the next days.

He presented on behalf of the CMS Collaboration the Draft Budget for both Category A and Category B M&O expenses. The sharing of the M&O-A expenses was based on the PhD count. The list of PhDs participating in CMS had been updated as required by the M&O MoU. The sharing of M&O-B expenses was based on responsibility for all subsystems.

Both M&O-A and M&O-B expenses had been presented to the RRB Scrutiny Group for M&O and feedback had been taken into account. For readability, they presented all figures by Funding Agency. Details were available by Institute. For invoicing purposes, CMS would follow the same arrangements as for the previous year.

Changes with respect to the April RRB in M&O-A were the addition of A.3.02 collaborative tools, the replacement of the algorithm for the on-line computing A4, and the Core Computing had been reviewed. This had led to a global reduction of 3.3 MCHF over the period 2007-2010. For M&O-B they had similarly reviewed the Tracker, ECAL, HCAL and Muon, and this had led to a global decrease of 2.7 MCHF over the years 2007-2010.

A. Petrilli presented an overview of the 2007 M&O-A Budget in Annex A.1. The bottom line came to 9.7 MCHF. Category A.4, on-line, had been completely reviewed in light of the updated profile of DAQ purchases. An updated algorithm and schedule of replacements explicitly included purchase of 2 DAQ slices. Manpower hiring was re-profiled to follow hardware purchase closely. For A.9., Core Computing, the boundary between Category A and Category B jobs had been reviewed, leading to some 5 FTEs being moved from Category A to Category B.

The M&O-B Budget overview was provided in Annex B.1. The bottom line was 6.3 MCHF with 50 FTEs of technical manpower at CERN and 75 inside CMS institutes working on Core Computing. He also provided the overall view by Funding Agency for M&O A and B, with a grand total for 2007 of 15.1 MCHF.

A. Petrilli showed a review of the outstanding contributions for M&O-A. For 2006 these amounted to 6.8%. The total currently outstanding amount for 2002-2005 was 330 kCHF. Funding Agencies with outstanding contributions were kindly requested to rectify the situation as soon as possible.

He showed the graph of M&O-A Budget evolution which showed a reduction of 8 MCHF with respect to that foreseen, with 14 MCHF further reductions expected. The comparable graph for M&O-B showed a reduction of 0.7 MCHF with 5 MCHF further reductions foreseen. The M&O Category A and B budgets had both seen a decrease over the period 2002-2007, totalling over 9 MCHF. With respect to the October 2002 forecast, the decrease would continue in the period 2008-2010 totalling another 9 MCHF. Overall, the successive refinements to the M&O estimates will have led to a reduction in the budget of 18 MCHF.

The following Funding Agencies had not yet regularized their past payments to M&O-A: Bulgaria, Korea - signature 25/10/2006, Poland. The CMS Collaboration would formally remind the Link-persons for Bulgaria and Poland of the actions to be taken for late payments relating to participation in the CMS Collaboration. J. Królikowski announced that he expected the Polish contributions to be paid by the end of the year.

The RRB was invited to approve the Draft Budget for M&O Category A for the year 2007 and the Draft Budget for M&O Category B for the year 2007 and its sharing amongst the CMS Funding Agencies

### 6.3 Report of the LHC RRB Scrutiny Group for 2006

M. Morandin

Papers CERN-RRB-2006-104

M. Morandin reported that the major item discussed with CMS on M&O-A concerned the on-line profile. With respect to the original budget, the current schedule allowed one to re-allocate money foreseen for replacement of obsolete equipment in order to purchase new DAQ slices. Comparing old and new profiles it was clear that it was possible already in 2007 to buy new slices. The Scrutiny Group could not decide on this special use of the M&O funds on its own and referred it to the RRB to decide.

It was clear that CMS had tried to reduce in a few areas the amount of M&O-A funds, for example in Core Computing and also for the on-line system management. This had helped them compensate for increases in other areas.

For M&O-B the Collaboration had reported that they had started the process of establishing MoUs with the Institutes covering service tasks such as Core Computing. The Scrutiny Group clearly welcomed this development.

As a conclusion the Scrutiny Group invited the RRB to approve the budget, with the caveat mentioned above concerning the DAQ slices.

#### Discussion

J. Engelen thanked him for this report. He noted that the principle that data acquisition equipment would become obsolete and needed to be replaced through M&O funds was accepted. Whether the postponed slices could also be funded through M&O-A was another issue, on which the RRB needed to decide. It had been presented at previous RRBs by CMS.

After some discussion and clarification R. Wade noted that, although this was not an ideal way to do things, one had seen how difficult it was to collect money from the Collaboration and to pay for items, and since this offered a ready-made mechanism to address partially a problem which they all shared, he proposed that they accept the use of M&O-A funds in this way.

With this decision made, J. Engelen asked the RRB to approve the CMS M&O Budget. U. Dosselli noted that formally the RRB did not have to approve the M&O-B, they had to take note. This was agreed. He also asked the Collaboration, since it was possible for the Core Computing part to have in-kind contributions, whether it was possible to have a table of the different contributions as ATLAS had shown. This was noted.

The RRB **approved** these Draft Budgets as formulated.

### 7. Scrutiny Group Composition in 2007

J. Engelen used this opportunity to thank M. Morandin for his hard and serious work as retiring Chairman of the Scrutiny Group. INFN had proposed G. Batignani as a new member of the Scrutiny Group and this was agreed.

The normal maximum term in office in the Scrutiny Group was three years. However, exceptions could be made if approved by the RRB. V. Luth was proposed by DoE and NSF to continue as their representative for a fourth year and this was agreed. Similarly E. Tsesmelis was proposed to continue as CERN member acting as linkman to the Technical Services for a fifth year in view of his very special position, and this was also agreed. CERN was seeking for another name to replace R. Landau who had served three years.

B. Stugu had represented the smaller Member States for three years and a replacement was needed. J. Engelen invited the RRB to send him suggestions for candidates.

He concluded that the procedure was such that the Scrutiny Group would elect the new Chairman from the members.

### **8. Summary, Future Activities & A. O. B. J. Engelen**

The Chairman noted that this was the last meeting of M. Della Negra as Spokesperson of CMS and he thanked him for his considerable efforts for CMS and for this Board.

J. Engelen noted that this was also the last CMS RRB meeting for A. Naudi and he thanked him. The best compliment he could offer him was one coming from the experiment: he was considered as a friend of CMS. T. Virdee wished to confirm the great assistance that A. Naudi had provided to CMS and thanked him on behalf of the experiment.

<p>The next RRB meetings in 2007 will take place at CERN on <b>Monday 23<sup>rd</sup>, Tuesday 24<sup>th</sup> and Wednesday 25<sup>th</sup> April 2007</b></p>
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There being no questions and no further business, the Chairman thanked the participants and closed the meeting.

C. Jones