M E M O R A N D U M

To: Members of the RRB via J Engelen - RRB Chair

From: M&O Scrutiny Group[1]

Subject: M&O Scrutiny Group Report for the October 2005 Resources Review Boards

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Introduction

The RRB Scrutiny Group (SG) met twice after the April 2005 meeting of the RRB, at the beginning of June and in mid September. The tasks of the SG were to comment on the collaborations' spending of the 2004 budget, to review their 2006 cost estimates and to comment on the sharing of 2006 Cat. B costs.

The Group met with J Engelen at the end of their June and September meetings.

The SG has greatly appreciated the depth of knowledge and the quality of the documentation that the Resource Coordinators have provided, especially those additional documents required to address SG questions. The SG has noted once again that the work of the group could be facilitated if the format and definitions of the budget reports and projections were further harmonized across the experiments. The SG has proposed to define, in cooperation with the Resource Coordinators, a set of tables that are similar across the four experiments in time for the next budget cycle starting with the 2006 April RRB meeting.

1. Year 2004 Cat. A spending overview

Experiment	Estimates without power	Spent and committed
ALICE	1070	930
ATLAS	2630	2596
CMS	2379	2070
LHCb	509	663

Table 1 – 2004 M&O Category A budget versus actual expenditure (kCHF).

Although the key factor in reducing the amount of late or missing payments remains CERN's active involvement and support, the SG acknowledges the efforts that the Collaborations are making to avoid that a recurring contribution deficit could otherwise develop into a serious shortage of resources, as the M&O budgets are approaching the steady state. The CMS and ATLAS collaborations both reported that they were in the process of defining procedures within their Collaborations in order to deal with those cases where Funding Agencies persist in delaying or neglecting M&O Cat. A payments. Such procedures would involve a series of escalating sanctions, culminating in exclusion from the Collaboration as a last resort. Clearly this is a serious and delicate matter to be resolved within the Collaborations. Nonetheless such a procedure seems to be essential. The SG recommends that a similar approach is also adopted by the Alice and LHCb collaborations.

Missing payments are one of the main causes of budget underspending since the M&O accounts need to have a positive balance in order to operate; (Resource Coordinators cannot authorize payments or commitments exceeding available cash). Another common reason for underspending is delay in the schedule. The question then arises of how to handle budget surplus. The SG addressed the issue last year and recommended that, in case of any surplus being reported, "*Funding Agencies are entitled to expect that their obligation are reduced at the earliest possible future time, following a procedure that the RRB should define*".

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The SG, responding to solicitations expressed by some of the Resource Coordinators, developed a proposal that was discussed and received favourable feedback from the experiments. **The SG recommends that any surplus, defined as the difference between the budgeted and the actual expenditures, incurred in year N is entered as an initial income in the preliminary budget of year N+2.** This procedure, which is compatible with the timing of book closing and budget approval defined by the RRB meetings dates, will cause, as a consequence of any reported budget underspending, a corresponding subsequent reduction of the Funding Agencies obligations.

2. M&O Scrutiny

The SG examined a few general issues that were common across the experiments. The most important one was the introduction of Core Computing in the M&O 2006 preliminary budgets, following the approval of the Core Computing MoUs[2] by the RRB. The SG asked the experiments to provide clarification on a few key points which were provided in written documents (available from the SG web page).

2.1 Core Computing

The inclusion of Core Computing in the Maintenance & Operation budgets stems from the necessity of the experiments to provide official recognition and resources for the relevant tasks, services and computing resources that the host laboratory is not supporting as part of the commitments defined in the LCG MoU. The RRB have received and approved the Core Computing Memoranda of Understanding. In those documents each experiment has divided the Core Computing M&O into Cat. A and Cat. B requests.

2.1.1 M&O Cat. B requests

Generally speaking, Cat. B services form the larger part of the contributions. They are provided on a voluntary basis. The fraction of institutions which provide Cat. B manpower differs from collaboration to collaboration as shown in the following table.

Experiment	Institutions providing Cat. B manpower	Total number of Institutions	Fraction
ALICE	7	87	8%
ATLAS	51	152	30%
CMS	31	161	19%
LHCb	26	47	55%

Table 2 – Institutions participating in Core Computing activities (Cat. B)

The SG expressed concern that recruitment of manpower for Cat. B on a purely voluntary basis might result in a deficiency of available FTEs in critical areas and the collaborations were asked to comment on possible backup plans. The collaborations confirmed that in the past there had been difficulties in filling Cat. B positions, but they expressed the belief that the situation would improve since the Core Computing efforts were now becoming recognized in the M&O budget. They also reported that no mechanism for pro-quota sharing had so far been taken into consideration. The SG believes that the experience gained in 2006 will be very important in order to verify the success of the model and indicates that an enlargement of the number of institutions involved in the Cat. B Core Computing effort should be considered.

[2] "Core Computing MoU" is used in this document as a short form of the correct title "Addendum No. 1 to the Memorandum of Understanding for Maintenance and Operation of the xyz Detector – Core Computing". There is one for each of the four experiments.

2.1.2 M&O Cat. A requests

Regarding the positions to be supported though the Cat. A M&O budget, the SG asked the collaborations to define the professional profiles associated with the tasks and to provide a common basis of estimate for the associated costs. The following table shows the final breakdown which led to the evaluation of the average costs reported in the preliminary budgets. The costs include overhead for travelling and normal office support and will be used for evaluating in-kind contributions.

Personnel role	Salary + benefits	Overhead	Total cost
Computing technician / data aid	65	6	71
Computing engineer / programmer	80	8	88
Computing architect /lead engineer	110	12	122
Weighted average	**80**	**8**	**88**

Table 3 – Roles and associated costs of personnel in Cat. A (kCHF)

The SG asked for clear definitions of Core Computing M&O. In particular the SG was concerned that the inclusion of routine tasks, might lead to the future addition in the Cat. A M&O of shift work or other tasks perceived to lack sufficient appeal in terms of visibility and career prospect for physicists. The SG received assurance that the experiments have carefully considered the possibility of "mission creep" and exactly for this reason all the eligible categories of Core Computing tasks were defined in the MoU.

The following table reports the number of positions proposed for 2006 by the four experiments that, to a large extent, the experiments expect to be filled through in-kind contributions.

Experiment	ALICE	ATLAS	CMS	LHCb
Central Computing Environment		2.6	6	
User Support		3.7	3	
Software Process Service	1	6.1	3	
Common support for production operations	0.5	4	3	
Computing and offline coordination	0.5			
Total	2	16.4	15	0

Table 2 – Cat. A Core Computing FTE proposed for 2006

Two ingredients contribute to form the basis of the FTE estimates:

1. **the lists of tasks to be included under the Cat. A budget.**
   The understanding of the SG is that such lists were prepared by the Computing MoU Task Force and approved as Addenda to the experiment MoUs by the each experiment's RRB in April 2005. The SG took note and assumed that no specific comment was at this point requested. The main rationale for inclusion of tasks in Cat. A is the difficulty of finding candidates within the collaborations since, by their nature, these tasks require technical knowledge and do not entail professional appeal or significant visibility. The SG noted that there were important differences between the experiments, ranging from the most extensive lists presented by ATLAS and CMS to the extreme case of LHCb, who expressed for the moment no need to propose Cat. A tasks. These differences were explained by the fact that each collaboration had developed the MoU according to its own structure, computing strategy and plausible level of expertise available among the collaborators.

2. the number of FTEs needed for each task.

The SG was informed that an evaluation of manpower for Core Computing was included in the work of the present on-going "LHCC Review of the Computing Technical Design Reports", chaired by Patty McBride. The SG felt it was therefore not appropriate to comment now on this aspect and intends to re-examine the estimates when a final report by the review committee becomes available.

The SG is convinced that the sharing of Core Computing costs among Cat. A and Cat. B as proposed by the experiments is in general well motivated, although it may require further refinements in the light of experience. The SG was also concerned by the considerable impact created by the large number of positions requested by ATLAS and CMS on the Cat. A budgets. As a general approach the SG would recommend that the collaborations look very carefully for alternative solutions to hiring staff under Cat. A in the future, including the possibility of requesting new collaborating groups to make contributions in the Core Computing areas.

2.2 Invoicing of CERN services

In 2004 the SG proposed a service agreement model for sharing the costs related to maintenance and operation of the Power Distribution and of the Cooling and Ventilations Systems. The collaborations asked for projections of such costs over the coming years which the TS department has delivered at the end of August 2005. Meetings to explain the details of the algorithms used in deriving the costs still had to take place. Invoices were also issued for the year 2004.

In general TS projections have turned out to be similar to the estimates presented in the M&O budgets, with some exceptions that need further clarification. The SG expects that this determination of the costs for CERN services will be finalized in the near future, so that the relevant M&O line items can in the future be based on firm costs.

2.3 Collaborative tools

Frequent communications on a large variety of topics are critical to the operation and physics productivity of large international collaborations. Given that only a fraction of the members of these collaboration can be at CERN for extended periods of time, video and audio communication, remote access to documentation and tutorials, remote observation and control of equipment will be required, starting from now on.

The need for significant upgrades and new installations to serve these needs has been spelled out clearly in recent months, specifically in an excellent report by the RTAG-12 committee[3]. The installations are referred to as collaborative tools. The RTAG report clearly recommended that CERN established and maintain a Collaborative Tool Service,

1. to establish an industry standard, complementary to VRVS
2. to provide user support for video and phone conferencing
3. to equip and maintain auditoria and conference rooms for video and/or phone conferencing
4. to extend current webcasting and web archiving services

The SG supports these recommendations and recognizes that the provision of these tools is the responsibility of the host laboratory. The tools should be shared among all CERN users. The SG is concerned that the cost of a full and generalised implementation of the facilities outlined by RTAG would be very high, if not prohibitive, and the time-scale currently proposed by the IT Division for planning and preparation of such work would lead to significant delays and thus would not meet the current needs of the collaborations.

The SG recommends that a more focussed and prompt approach is appropriate. It further recommends that that the collaborations clearly assess their current and future needs in terms of the number of rooms and facilities, and the frequency of use, and services required to operate and

[3] CERN-LCG-PEB-2005-07, RTAG12 status report, Chairman: Steve Goldfarb

maintain them. This information would be critical for the development of an implementation plan addressing the most urgent needs, jointly with the IT Division.

The SG judges that some of the experiment-specific maintenance and operations cost may be shared between the host laboratory and the Collaborations' M&O funds. However, it is hoped that operation will be automated to reduce staffing.

2.4 Secretariat costs

The SG noted the increased salaries for secretaries in the 2006 budgets. The Resource Coordinators explained that certain variations were due to new estimates of the actual costs that CERN applies to the collaborations. This provided also a justification for the differences of the cost per FTE among the experiments.

2.5 Discussion with ATLAS

Category A: ATLAS requested and was granted permission by the RRB to spend an additional 335kCHF for crane operation and muon chamber storage in 2004. At the end of 2004, the Cat A balance, i.e. the difference between the budgeted costs and the actual costs plus commitments, amounted to 1%. Crane operation turned out to be more demanding than expected also in 2005. The collaboration informed the SG that projections showed the need for additional funding at the level of approximately 120 kCHF that could be recovered from expected savings. The SG found the motivations for the proposed change well founded. In 2006, the crane operation costs are estimated to be 650 kCHF; this will be reduced in the following two years and reach a constant level of 160 KCHF in 2009.

The preliminary 2006 budget estimates exceed previous projections because of operation of the cryogenics plant for the magnets and the LAr cryostat, and the support staff for the detector systems in operation. Additional increases for core computing services and infrastructure and the secretariat have been discussed above.

The significant increases for outreach activities are due to support of video recording of the ATLAS detector installation as well as the installation of facilities for visitors. These costs are higher than for the other experiments and motivated by the particular location of the experiment close to the CERN entrance and visitors centre. Of the 60 kCHF requested for video recording, only the material of 10 kCHF are recommended to be included in the M&O budget.

In recognizing the urgency of the need for improved facilities, the SG endorses the proposal by ATLAS of reserving 50 kCHF in the 2006 M&O budget for improvements to one medium size conference room. The detailed execution plan and the associated costs will be re-discussed with the SG next year, once the details of the global host laboratory effort for improving the CERN remote conferencing infrastructure are clearly defined.

Category B: Since April 2005, ATLAS has performed a major revision of the Cat. B budget, taking into account significant changes in individual areas: (e.g. increase in cooling costs and savings in electronics). This resulted in total savings of 0.5MCHF. The preliminary budget for 2006 reflects the increased amount of maintenance activities for the detector systems foreseen to be installed and in operational mode at that time.

2.6 Discussion with CMS

Category A: The underspending in 2004 was still noticeable (13% not taking into account the power bill). Contributions from F.A. covered 91% of the invoiced amounts. The SG acknowledged the fact that the situation with missing payments was gradually improving.

The 2005 outlook of projected expenditures indicated significant underspending due to slippage of the magnet test schedule. The SG expressed a favourable opinion about the proposed usage of

100 kCHF of underspent budget for the acquisition of an additional scissor lift that the collaboration believes is mandatory for fast and safe access to the Muon spectrometer. CMS proposed also to increase the outreach budget for decorating the cavern end-wall with an artistic fresco. The SG felt it was not really consistent with the expected goals defined for outreach activities (mainly aimed at producing high quality educational materials).

The most significant change in the 2006 preliminary budget with respect to the budget of 2005, apart from the inclusion of Core Computing associated costs, was the increase of costs for technical crews, online system management and heavy transport services. This was expected, as large parts of the CMS detector are being assembled in the cavern and they are gradually reaching the operational state. The SG asked CMS to provide a detailed table describing the profile of investment and M&O costs for the online system. As a result CMS realized that relevant M&O costs had been slightly underestimated and provided new projections at the September SG meeting. The SG noted that the advance budgeting of spares two years ahead of the actual purchase was to be re-examined since it was leading, in the current phase of building up the online system, to large imbalance between actual and budgeted costs. The evolution of this point should be checked with all the experiments next year.

Category B: The SG requested a detailed explanation of the costs associated with advanced spare purchases. A clear identification of these items in the M&O tables was also requested.

2.7 Discussion with ALICE

Issues discussed included expenditure for secretarial support and electronic pool rentals. These were minor issues, and ALICE responded with satisfactory clarifications. It was noted with satisfaction that expenditures for Cooling & Ventilation and the Power Distribution System to be charged by CERN were within expectations. Non-paying funding agencies remain a problem, and the Scrutiny Group encourages ALICE to develop a scheme of sanctions against non-payers, similar to those being discussed by the ATLAS and CMS Collaborations.

2.8 Discussion with LHCb

The expenditures in 2004 exceeded the preliminary budget due to an advance purchase of gas for the RICH detector that had been agreed by the SG. The overspending was made possible by using the part of the cash surplus that the experiment had accumulated in the previous two years.

The Scrutiny Group discussed with LHCb in detail most lines in their M&O Cat A request. Justifications for the amounts were given in all cases. Following these discussions, small reductions were made in some of the lines, and the Scrutiny Group was satisfied that the numbers in the final spreadsheet were justified.

The Scrutiny Group was satisfied that there was likely to be no call in the foreseeable future on Cat A M&O funds for LHCb Core Computing, which appears to be well covered by voluntary contributions.

The spend so far for the current year appears to be in line with the budget figures.

LHCb agreed that they would be prepared to participate in an exercise to agree new templates for reporting data to the Scrutiny Group and the RRB. There is only Category A M&O for now. There is likely to be a modest underspending. There was a brief specific discussion about the use of video- and tele-conferencing at the experimental area, but LHCb have decided that the current needs of LHCb in this area are modest.

3. Year 2006 Category A estimates (without power)

Experiment	RRB Autumn 2004 estimates	Present estimates	of which, Core Computing
ALICE	2580	2672	251
ATLAS	6337	8365	1445
CMS	5405	6691	1417
LHCb	1976	1478	0

Table 4 - Year 2006 estimates (kCHF)

4. Year 2006 Category B estimates

Experiment	RRB Autumn 2004 estimates	Present estimates
ALICE	1040.5	1040.5
ATLAS	4005	4370
CMS	5469	6073

Table 5 - Year 2006 estimates (kCHF)

5. Summary

The SG has looked at the M&O budgets of the four experiments and has examined in detail some of the line items, leading in some cases to refinements of the proposed estimates.

The M&O costs are continuing to ramp up as foreseen, although not as quickly as anticipated in some cases due to installation delays. The most significant changes in the Cat. A costs originate in the inclusion of Core Computing equipment and services, following the approval by the RRBs of the Addenda to the relevant MoUs.

The RRB-SG recommends that the 2006 estimates for the M&O budgets be approved by the RRB.

The SG takes the opportunity to remind the RRB how essential it is 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 end of February and the remaining 50% paid by the end of June).

6. Acknowledgements

Two of the four CERN members (A. Ceccucci and E Tsesmelis) as well as one external member (H Gutbrod) have served now for three years and should normally be replaced by the RRB. Their contributions to the SG work have been very valuable and the group would like to thank them for their dedication to the SG activities demonstrated in these three years.