

CERN-RRB-2005-101

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ATLAS Resources Review Board, October 17, 2005

For RRB to approve

***Request for 2006 ATLAS M&O Budget***




# Introduction

***The ATLAS management, supported by the ATLAS Executive and Collaboration Boards, kindly invites the RRB to approve the M&O budget for 2006 as well as proposed new in-kind contributions in Category-A.***

The ATLAS M&O (A and B) budget request for 2005 amounts to 13.8 MCHF in payments. Preliminary M&O budget estimates for 2006 were presented to the RRB in April 2005 (CERN-RRB-2005-019). The present budget follows from an internal update of 2005-2006 work program planning and from interactions with the RRB Scrutiny Group (CERN-RRB-2005-084).

In 2006, Point 1 with its underground caverns and surface halls and buildings is the centre stage of related ATLAS M&O activities in 2006. The cryogenics and supporting technical infrastructure are in place and are running in operation mode. The detectors are being commissioned in Point 1 and their functionalities will be constantly checked and monitored.

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| M & O B U D G E T  |
| R E P O R T E L E M E N T S  |
|  Budget summary       |
|  Activity Description |
|  Table References     |

## 1. M&O Budget Request for 2006

The 2005 M&O payments for Category-A items are planned at 9.4 MCHF (including power) and 4.4 MCHF for Category-B items. The Category-A activities continue increasing strongly in 2006. The main reasons for the higher payments in Category-A w.r.t. the 2005 budget are as follows:

- Operation of the cryogenics plant at Point 1 for the magnet and LAr systems requires larger operation teams and more technical support;
- Technical crews managed by the Technical Coordination are needed to operate the site (detector access, cranes, heavy handling etc.);
- Inclusion of core (off-line) computing infrastructure and services activities into M&O-A (CERN-RRB-2005-008);

- Cost updates related to services produced by CERN (secretariat, technical crews);
- Request for collaborative tools (videoconferencing, archiving).

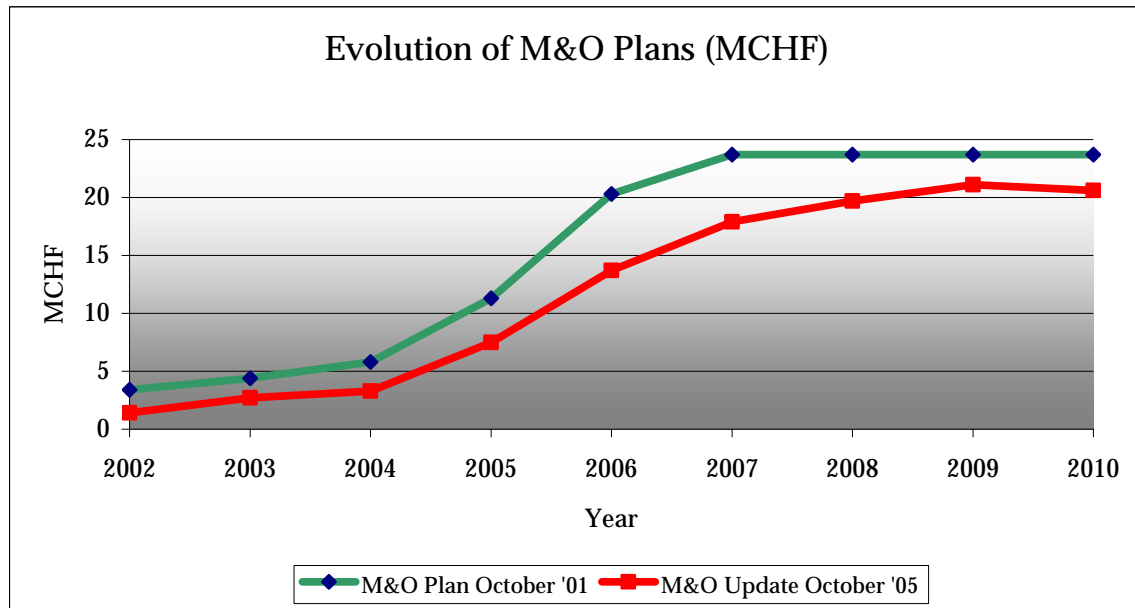
In Category-B, a large fraction of the systems are being installed and operated. The dominant cost driver is the operation of the specially equipped SR1-building which is dedicated to installing the Inner Detector. In addition, a special crew of engineers is needed to operate the LAr-detector modules as well as the Detector Control System. Electronics replacements are made in several sub-systems.

**Table 1** gives the breakdown of the M&O (Categories A and B) budget for 2006. The dominant part of the cost in category-A is associated with the cost of operating the overall cryogenics plants and gas systems (3.7 MCHF) as well as providing general technical services (2.8 MCHF, including electricity). In Category-B the cost drivers are technical services (2.0 MCHF), gases and replacement of electronics (1.0 MCHF) and area operation activities (0.6 MCHF).

**Table 2** shows the expected contributions for 2006 for each Funding Agency and system (Categories A and B). The Category-A contributions are split into two columns; the second column “budgeted” shows the cost sharing including electricity costs and the first column “invoiced” shows the amount to be invoiced to the Funding Agencies, taking into account the energy cost adjustments.

**Figure 1** provides a summary of actual payments up to 2004 and a forward look to M&O budget estimates up to 2010 (lower curve). It also provides a comparison with respect to the original M&O budget plans in 2001 (upper curve) and shows a cumulative reduction of 32 MCHF up to 2010 w.r.t. original plans. It should be noted that, in parity with CMS, the Category-B projections now also include the replacement of the Pixel b-layer from 2007 at an annual expenditure of 1.2 MCHF.

**Figure 1. Evolution of M&O Budget up to 2010 (MCHF)**



**Figure 2. Evolution of the M&O budget up to 2010 (MCHF)**

|                          | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Total |
|--------------------------|------|------|------|------|------|------|------|------|------|-------|
| M&O Plan (October '01)   | 3.4  | 4.4  | 5.8  | 11.3 | 20.3 | 23.7 | 23.7 | 23.7 | 23.7 | 140   |
| M&O Update (October '05) | 1.4  | 2.7  | 3.3  | 7.5  | 13.8 | 17.9 | 19.7 | 21.1 | 20.6 | 108   |

**Table 3** shows the status of the M&O MoU signatures on September 20, 2005. The Funding Agencies who have not yet signed the Agreement are: Brazil, Russia and Switzerland.

## 2. New In-Kind Contributions (Category –A)

According to paragraph 9.3 in the ATLAS M&O MoU (CERN-RRB-2002-035), the RRB needs to agree to possible in-kind contributions made to Category-A (Annex 9).

### ***1. Offers being finalized (Action: RRB to approve)***

#### ***1.1 Core computing tasks (infrastructure and services); 785 kCHF, from multiple Funding Agencies***

The addendum for core computing Category-A M&O-A (CERN-RRB-2005-008) describes the computing tasks related to infrastructure and services. The following Funding Agencies offer in-kind contributions for these tasks: IN2P3 (2.6 FTE), BMBF (0.1 FTE), MPI (0.1 FTE), Italy (0.2 FTE), Russia (0.4 FTE), JINR (0.5 FTE), Taipei (0.3 FTE), UK (2.4 FTE), US (2.3 FTE). The average cost is 88 kCHF/FTE. The sent invoices will be reduced accordingly; however, the final financial values for each task will be settled once the achieved work packages have been completed and verified. Additional in-kind contributions are still expected for 2006; these will then be proposed for the April 2006 RRB.

**Planned ATLAS M+O (A) and (B) Payments in 2006 (kCHF)**

| Item & Cost Driver<br>(by RRB SG Headings)   | Cat. A             |            |            |            |              |            |            |            |          | Cat. B       | Item & Cost Driver<br>(by RRB SG Headings)                            |
|--|--------------------|------------|------------|------------|--------------|------------|------------|------------|----------|--------------|---|
|  | M&O                | Pixel      | SCT        | TRT        | IDGen        | LAr        | TileC      | Muon       | Comp.    | M&O          |   |
| Detector related costs<br><i>Cryogenics operations</i><br><i>Detector operations</i>   | 3,738              | 200        | 210        | 265        | 166          | 105        | 40         | 380        |          | 1,366        | Mechanics & Gas & Cooling & Cryogenics<br>Gases (ID, Tiles, Muons)    |
| Secretariat<br><i>1.5 FTE charged to ATLAS</i><br><i>Publications, consumables</i>   | 240                | 70         | 309        | 105        |              | 130        | 165        | 70         |          | 849          | Standard electronics<br><i>Crates, electronics pool rentals</i>       |
| Communications<br><i>GSM phones</i><br><i>Computer network connections</i><br><i>Collaborative tools</i>                       | 70                 |            |            |            |              | 20         | 10         |            |          | 30           | Detector controls   |
| Core computing (infrastr. & services)<br><i>Software process service</i><br><i>Central production &amp; operation</i>          | 1,445              |            |            |            |              |            |            |            |          |              |   |
| On-line computing<br><i>Detector controls</i><br><i>Software licences</i>  | 810                | 100        |            | 100        | 860          | 30         | 20         |            |          | 1,110        | Areas<br><i>Test-beam activities, system tests (ID)</i>               |
| Test beams, facilities<br><i>Magnet Cryo Op. in B180</i><br><i>On-line computing support</i><br><i>TDAQ common electronics</i> | 250                |            |            |            | 5            | 5          | 5          |            |          | 15           | Communications  |
| Laboratory operations<br><i>Assembly areas, workshops</i><br><i>TDAQ laboratory equipment</i>                                  | 75                 | 25         | 40         | 30         | 75           | 50         | 25         |            |          | 245          | Store items   |
| General services<br><i>Heavy handling</i><br><i>Technical support, storage</i><br><i>Survey</i><br><i>Outreach</i>             | 2,767              |            |            |            | 60           |            |            |            |          | 60           | Sub-detector spares<br><i>(Critical spares dealt with separately)</i> |
| <b>TOTAL</b>   | <b>9,395</b>       | <b>395</b> | <b>559</b> | <b>500</b> | <b>1,166</b> | <b>340</b> | <b>265</b> | <b>450</b> | <b>0</b> | <b>3,675</b> | <b>(Excluding hired manpower for Category B)</b>                      |
| Hired manpower at CERN (in kCHF)   | <i>incl. above</i> |            |            |            |              | 410        | 105        | 180        |          | 695          |   |
| Institute manpower (in FTE)  | 0                  |            |            |            | 20           | 10         | 5          | 10         | 63       | 108          |   |
| <b>TOTAL M&amp;O FOR A</b>   | <b>9,395</b>       | <b>395</b> | <b>559</b> | <b>500</b> | <b>1,166</b> | <b>750</b> | <b>370</b> | <b>630</b> | <b>0</b> | <b>4,370</b> | <b>TOTAL M&amp;O FOR B</b>  |

**Notes:**

1. Category A are common items charged based on the number of authors holding a PhD or equivalent. Category B is system-specific and is based on CORE sharing.

**Proposed Sharing of M+O Contributions  
for ATLAS in 2006 by Funding Agency (kCHF)**

9/27/2005

| Funding Agency  | Category-A items |              | Category-B items budgeted    |     |     |       |     |       | Budget       | Core comp.<br>Categ.B (FTE) |           |
|-----------------|------------------|--------------|------------------------------|-----|-----|-------|-----|-------|--------------|-----------------------------|-----------|
|                 | Invoiced*        | Budgeted     | Pixel                        | SCT | TRT | IDGen | LAr | TileC | Muon         |                             | Total     |
| Armenia         | 14               | 14           | 0                            | 0   | 0   | 0     | 0   | 2     | 0            | 16                          |           |
| Australia       | 50               | 50           | 0                            | 17  | 0   | 20    | 0   | 0     | 0            | 87                          | 2         |
| Austria         | 38               | 43           | 0                            | 0   | 0   | 0     | 0   | 0     | 0            | 43                          | 1         |
| Azerbaijan      | 50               | 50           | 0                            | 0   | 0   | 0     | 0   | 0     | 0            | 50                          |           |
| Belarus         | 43               | 43           | 0                            | 0   | 0   | 0     | 0   | 0     | 0            | 43                          |           |
| Brazil          | 36               | 36           | 0                            | 0   | 0   | 0     | 0   | 2     | 0            | 37                          | 0         |
| Canada          | 247              | 249          | 0                            | 0   | 0   | 1     | 81  | 0     | 0            | 331                         | 0         |
| China NSFC+MSTC | 100              | 100          | 0                            | 0   | 0   | 0     | 3   | 0     | 4            | 107                         |           |
| Czech Republic  | 197              | 221          | 5                            | 4   | 0   | 7     | 0   | 11    | 0            | 248                         | 0         |
| Denmark         | 38               | 43           | 0                            | 0   | 28  | 13    | 0   | 0     | 0            | 83                          | 1         |
| France IN2P3    | 477              | 534          | 54                           | 0   | 0   | 31    | 172 | 47    | 0            | 838                         | 5         |
| France CEA      | 121              | 135          | 0                            | 0   | 0   | 0     | 55  | 0     | 32           | 222                         | 1         |
| Georgia         | 28               | 28           | 0                            | 0   | 0   | 0     | 0   | 0     | 0            | 28                          |           |
| Germany BMBF    | 470              | 527          | 114                          | 42  | 0   | 115   | 30  | 0     | 38           | 866                         | 2         |
| Germany MPI     | 134              | 149          | 0                            | 21  | 0   | 25    | 17  | 0     | 12           | 224                         |           |
| Greece          | 153              | 171          | 0                            | 0   | 0   | 0     | 0   | 0     | 14           | 185                         |           |
| Israel          | 105              | 107          | 0                            | 0   | 0   | 0     | 0   | 0     | 37           | 144                         | 1         |
| Italy           | 922              | 1032         | 126                          | 0   | 0   | 74    | 36  | 29    | 135          | 1431                        | 5         |
| Japan           | 382              | 384          | 0                            | 84  | 0   | 100   | 0   | 0     | 99           | 667                         |           |
| Morocco         | 57               | 57           | 0                            | 0   | 0   | 0     | 2   | 0     | 0            | 59                          |           |
| Netherlands     | 108              | 121          | 0                            | 16  | 0   | 22    | 0   | 0     | 44           | 204                         | 1         |
| Norway          | 64               | 71           | 0                            | 25  | 0   | 34    | 0   | 0     | 0            | 130                         | 1         |
| Poland          | 64               | 71           | 0                            | 2   | 6   | 6     | 0   | 0     | 0            | 86                          |           |
| Portugal        | 83               | 93           | 0                            | 0   | 0   | 0     | 0   | 22    | 0            | 115                         | 1         |
| Romania         | 85               | 85           | 0                            | 0   | 0   | 0     | 0   | 7     | 0            | 92                          |           |
| Russia          | 455              | 484          | 0                            | 2   | 89  | 49    | 38  | 24    | 39           | 726                         | 0         |
| JINR            | 214              | 214          | 0                            | 0   | 8   | 8     | 14  | 17    | 26           | 287                         |           |
| Serbia          | 28               | 28           | 0                            | 0   | 0   | 0     | 0   | 0     | 0            | 28                          |           |
| Slovak Republic | 51               | 57           | 0                            | 0   | 0   | 0     | 3   | 0     | 0            | 60                          |           |
| Slovenia        | 43               | 43           | 0                            | 10  | 0   | 12    | 0   | 0     | 0            | 65                          |           |
| Spain           | 242              | 270          | 0                            | 15  | 0   | 18    | 22  | 43    | 0            | 369                         | 1         |
| Sweden          | 134              | 149          | 0                            | 18  | 48  | 45    | 15  | 20    | 0            | 296                         | 1         |
| Switzerland     | 121              | 135          | 0                            | 61  | 0   | 72    | 10  | 0     | 0            | 279                         |           |
| Taipei          | 57               | 57           | 13                           | 6   | 0   | 15    | 7   | 0     | 0            | 97                          | 0         |
| Turkey          | 57               | 57           | 0                            | 0   | 0   | 0     | 0   | 0     | 0            | 57                          |           |
| United Kingdom  | 769              | 861          | 0                            | 153 | 0   | 192   | 0   | 0     | 0            | 1206                        | 5         |
| US DOE + NSF    | 1731             | 1737         | 83                           | 62  | 114 | 175   | 162 | 80    | 128          | 2541                        | 24        |
| CERN            | 795              | 890          | 0                            | 19  | 206 | 131   | 83  | 66    | 22           | 1417                        | 12        |
| <b>total</b>    | 8,763            | <b>9,395</b> | 395                          | 559 | 500 | 1166  | 750 | 370   | 630          | <b>13,765</b>               | <b>63</b> |
|                 |                  |              | <b>System-specific items</b> |     |     |       |     |       | <b>4,370</b> |                             |           |

**Notes:**

\*Invoiced to FAs; includes energy cost adjustments

Updated list of qualified authors with PhD or equivalent (September 26, 2005) used for Category-A

Category-B is based on CORE contributions

Core computing in Category B expressed in Full-Time-Equivalents (FTE). Figure 0 refers to an effort smaller than 0.5 FTE

## **ATLAS M+O MoU Signatures**

**(Status September 20, 2005)**

| <b>Funding Agency</b>  | <b>Signed Date</b> | <b>Signed by</b>         |
|------------------------|--------------------|--------------------------|
| <i>Armenia</i>         | <i>02.09.2002</i>  | <i>H. Asatryan</i>       |
| <i>Australia</i>       | <i>17.10.2003</i>  | <i>A. Williams</i>       |
| <i>Austria</i>         | <i>02.10.2002</i>  | <i>R. Kneucker</i>       |
| <i>Azerbaijan</i>      | <i>20.03.2003</i>  | <i>N.A.K. Guliyev</i>    |
| <i>Belarus</i>         | <i>25.03.2005</i>  | <i>Y. Pleskachevsky</i>  |
| <i>Brazil</i>          |                    |                          |
| <i>Canada</i>          | <i>09.09.2002</i>  | <i>I. Blain</i>          |
| <i>China NSFC+MSTC</i> | <i>02.08.2002</i>  | <i>Wang Naiyan</i>       |
| <i>Czech Republic</i>  | <i>20.01.2003</i>  | <i>J. Niederle</i>       |
| <i>Denmark</i>         | <i>18.08.2004</i>  | <i>J.R. Hansen</i>       |
| <i>France CEA</i>      | <i>04.09.2002</i>  | <i>F. Gounand</i>        |
| <i>France IN2P3</i>    | <i>25.09.2002</i>  | <i>J.J. Aubert</i>       |
| <i>Georgia</i>         | <i>22.08.2002</i>  | <i>A.N. Tavkhelidze</i>  |
| <i>Germany BMBF</i>    | <i>12.09.2002</i>  | <i>R. Koepke</i>         |
| <i>Germany MPI</i>     | <i>28.06.2002</i>  | <i>S. Bethke</i>         |
| <i>Greece</i>          | <i>20.09.2005</i>  | <i>I.Tsoukalas</i>       |
| <i>Israel</i>          | <i>23.08.2002</i>  | <i>D. Horn</i>           |
| <i>Italy</i>           | <i>25.11.2002</i>  | <i>E. Iarocci</i>        |
| <i>Japan</i>           | <i>31.03.2003</i>  | <i>H. Sugawara</i>       |
| <i>Morocco</i>         | <i>04.02.2004</i>  | <i>S. Belcadi</i>        |
| <i>Netherlands</i>     | <i>14.11.2002</i>  | <i>J. Engelen</i>        |
| <i>Norway</i>          | <i>04.09.2002</i>  | <i>O.H. Ellestad</i>     |
| <i>Poland</i>          | <i>18.10.2004</i>  | <i>J.K Frackowiak</i>    |
| <i>Portugal</i>        | <i>26.06.2002</i>  | <i>A. Trigo de Abreu</i> |
| <i>Romania</i>         | <i>21.04.2004</i>  | <i>G. Popa</i>           |
| <i>Russia</i>          |                    |                          |
| <i>JINR</i>            | <i>07.08.2002</i>  | <i>A.N. Sissakian</i>    |
| <i>Serbia</i>          | <i>12.08.2005</i>  | <i>A. Popovic</i>        |
| <i>Slovak Republic</i> | <i>26.11.2002</i>  | <i>M. Fronc</i>          |
| <i>Slovenia</i>        | <i>22.04.2003</i>  | <i>Z. Stančič</i>        |
| <i>Spain</i>           | <i>19.02.2003</i>  | <i>P. Morenés</i>        |
| <i>Sweden</i>          | <i>25.11.2002</i>  | <i>K. Bremer</i>         |
| <i>Switzerland</i>     |                    |                          |
| <i>Taipei</i>          | <i>12.07.2002</i>  | <i>C.J. Chen</i>         |
| <i>Turkey</i>          | <i>12.03.2003</i>  | <i>N.K. Pak</i>          |
| <i>United Kingdom</i>  | <i>24.09.2002</i>  | <i>J.F. Down</i>         |
| <i>US DOE + NSF</i>    | <i>18.10.2002</i>  | <i>T.B.W. Kirk</i>       |
| <i>CERN</i>            | <i>04.12.2002</i>  | <i>D. Schlatter</i>      |