

CERN-RRB-2007-019

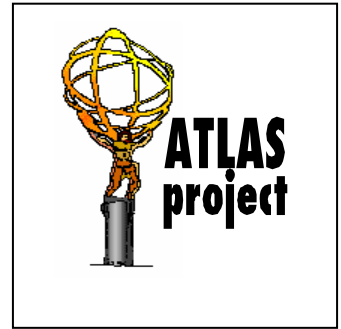
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ATLAS Resources Review Board, April 24, 2007



**2006 and 2008 ATLAS M&O Budgets**





CERN-RRB-2007-019

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ATLAS Resources Review Board, April 24, 2007

For RRB approval

## **Part 1**

# **Closing Report for 2006 ATLAS M&O Budgets**

# Introduction

*The ATLAS management, supported by the ATLAS Executive and Collaboration Boards, kindly invites the RRB to approve the final M&O payments for 2006.*

The RRB approved the year 2006 Maintenance and Operation (M&O) budget in October 2005 (CERN-RRB-2005-101) for 9395 kCHF (Category-A), including cost of energy of 1030 kCHF, and 4370 kCHF (Category-B), respectively.

M & O B U D G E T	
R E P O R T E L E M E N T S	
<u>Folder</u> Payment Summary	1. M&O Budgets for 2006
<u>Folder</u> Activity Description	The final M&O payments in 2006 amounted to 8975 kCHF in Category-A (including energy) and 3524 kCHF in Category-B. The remaining open commitments amounted to 1080 kCHF in total (A+B). The total payments were 630 kCHF less than the budgeted income (i.e. invoices sent out) due to delayed payments in Category-B for technical services.
<u>Folder</u> Table References	

In 2006, the Category-A costs covered various technical services invoiced by CERN such as access and cranes operation, site management, providing gases and coolants, running the cooling and ventilation plants (4.0 MCHF) as well as operating the cryogenic plants at Point 1 (2.2 MCHF) and operating the TDAQ system set up for the detector systems (1.0 MCHF). Core computing infrastructure services were also provided for and this amounted to 1.4 MCHF.

The CERN member state share of the energy cost for 2006 was paid by CERN in full and partially for those non-member states contributing to the machine construction outside the M&O budget. The cost of energy consumption for 2006 amounted to 0.4 MCHF (non-member state part).

In Category B, the main costs were related to system tests and electronics repairs in-situ in the ATLAS cavern. The Inner Detector extended from its operations of the SR1-building to start the operation of the sub-systems in the cavern itself. The Liquid Argon (LAr) system continued operating the barrel and end cap detectors in the ATLAS cavern. The Tile Calorimeter continued operating its electronic systems and the Muons system its system tests for the chambers. The above activities included consumables and store items (0.9 MCHF), the use of gases and coolants and related

mechanics (0.7 MCHF), electronics replacements and pool rentals (0.4 MCHF). The hired technical manpower supported all these activities (1.5 MCHF).

The value of in-kind contributions in Category-A amounted to 1.0 MCHF and to 25 kCHF in Category-B.

As a consequence of the 2006 payments and amortization of the remaining open commitments from the past, the cumulative budget balance (i.e. difference between the approved budgets and executed payments and open commitments from the past) amounts to +30 kCHF in Category-A and +5 kCHF for Category-B. Due contributions amounted to 1.3 MCHF.

For Category-A, the status of contributions (sent invoices less received contributions) are shown in the document "Financial Report", page 9 (CERN-RRB-2007-008).

**Table 1** summarizes the 2006 M&O payments per system. The participating institutes provided, as part of their deliverable obligations, 49 man-years for detector-related activities and 81 man-years in core computing tasks.

**Table 2** shows the 2006 M&O contributions made for 2006 by the Funding Agencies for each system.

In October 2001, the RRB agreed to the need for payment advances for certain critical spares which needed to be purchased before 2005 because of availability and cost. The cost of the spares will be amortized between 2007 - 2010. In 2006, no new contribution advancements were made.

It should be noted that in order for ATLAS to pay for the 2006 expenses as well as for the past open commitments, permission was given by the CERN Management at the very end of the year to exceptionally overdraft on the M&O-A accounts while waiting for due contributions.

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

Item & Cost Driver (by RRB SG Headings)	Cat. A									Cat. B	Item & Cost Driver (by RRB SG Headings)	
	M&O	Pixel	SCT	TRT	IDGen	LAr	TileC	Muon	Comp.	M&O		
Detector related costs Cooling systems, power supplies	3,863			200	324	3		159			686	Mechanics & Gas & Cooling & Cryogenics Gases (ID, Tiles, Muons)
Secretariat 0.7 FTE charged to ATLAS Publications, consumables	240	5	2	75	15	176	88	20			381	Standard electronics Crates, electronics pool rentals
Collaborative tools GSM phones Computer network connections	70				22	3	6				31	Detector controls
Core computing Services	1,445			10	44		5				59	Areas Test-beam activities, system tests (ID)
On-line computing Detector controls Software licences	795				3	2	3				8	Communications
Test beams Magnet Cryo Op. in B180 On-line computing support TDAQ common electronics	315	304	165	90	48	80	31	186			904	Store items
Laboratory operations Assembly areas, workshops TDAQ laboratory equipment	90										0	Sub-detector spares (amortization of critical spares)
General services Heavy handling Technical support, storage Survey Outreach Energy	2,157											
<b>TOTAL</b>	<b>8,975</b>	<b>309</b>	<b>167</b>	<b>375</b>	<b>456</b>	<b>264</b>	<b>133</b>	<b>365</b>	<b>0</b>	<b>2,069</b>	<b>(Excluding hired manpower for Category B)</b>	
Hired manpower at CERN (in kCHF)	incl. above	120	210	85	536	198	226	80			1,455	
Institute manpower (in FTE)	0	6	9	3	2	5	1	23	81	130		
<b>TOTAL M&amp;O FOR A</b>	<b>8,975</b>	<b>429</b>	<b>377</b>	<b>460</b>	<b>992</b>	<b>462</b>	<b>359</b>	<b>445</b>	<b>0</b>	<b>3,524</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.

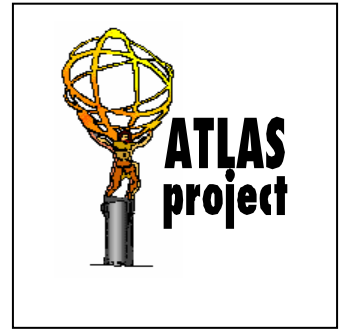
**M+O Contributions (cash and in-kind)  
for ATLAS in 2006 by Funding Agency (kCHF)**

3/29/2007

Funding Agency	Cat. A items*	Category B item contributions						Total Cat. B	Total A+B	Core comp. Categ.B (FTE)	Critical spares+	
		Pixel	SCT	TRT	IDGen	LAr	TileC					Muon
Argentina							0	0				
Armenia							0	0				
Australia	50	17		20			37	87	0			
Austria	38						0	38				
Azerbaijan	50						0	50				
Belarus							0	0				
Brazil	36					2	2	38	0			
Canada	247			1	81		82	329	3			
China NSFC+MSTC	18						0	18	0			
Czech Republic	197	5	4		7		11	27	224	0		
Denmark	38			28	13			41	79			
France IN2P3	477	54			31	172	47	304	781	7		
France CEA	121					55		32	87	208	1	
Georgia								0	0			
Germany BMBF	470	114	42		115	30		38	339	809	2	
Germany DESY									0	0	0	
Germany MPI	134		21		25	17		12	75	209	0	
Greece	153								0	153		
Israel	105						37		37	142	0	
Italy	851	126			74	36	29	135	400	1251	6	
Japan	382		84		100			99	283	665	0	
Morocco	57								0	57		
Netherlands	108		16		22			44	82	190	2	
Norway	64		25		34				59	123	2	
Poland	64		2	6	6				14	78	0	
Portugal									0	0		
Romania									0	0		
Russia	22								0	22	0	
JINR	195			8					8	203	0	
Serbia	28								0	28		
Slovak Republic	51					3			3	54		
Slovenia	43		10		12				22	65		
Spain	242		15		18	22	43		98	340	2	
Sweden	134		18	48	45	15	20		146	280		
Switzerland	121		61		72	10			143	264		
Taipei	57	13	6		15	7			41	98	3	
Turkey	57								0	57		
United Kingdom	769		153		192				345	1114	10	
US DOE + NSF	1731	83	62	114	175	162	80	128	804	2535	33	
CERN	795		19	206	131	83	66	22	527	1322	15	
<b>total contributions</b>	<b>7,905</b>	<b>395</b>	<b>555</b>	<b>410</b>	<b>1108</b>	<b>693</b>	<b>298</b>	<b>547</b>	<b>4,006</b>	<b>11,911</b>	<b>86</b>	<b>0</b>
<b>total payments</b>	<b>8,975</b>	<b>429</b>	<b>377</b>	<b>460</b>	<b>992</b>	<b>462</b>	<b>359</b>	<b>445</b>	<b>3,524</b>	<b>12,499</b>		

Notes:

- \*Following invoices sent to FAs; includes energy cost adjustments
- +Contributions to critical spares approved by the RRB (LAr FEBs)



CERN-RRB-2007-019

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ATLAS Resources Review Board, April 24, 2007

For RRB to take note

## Part 2

# Preliminary 2008 ATLAS M&O Budget Estimates






# Introduction

*The ATLAS management, supported by the ATLAS Executive and Collaboration Boards, kindly invites the RRB to take note of the preliminary M&O budget estimates for 2008.*

The first M&O budget estimates for the ATLAS detector in 2008 amount to 20.2 MCHF in payments. Before mid-2008, the entire ATLAS detector will be in full operation mode at Point 1, its performance being closely monitored and its functionalities constantly checked and maintained. The supporting technical infrastructure will also be fully operational (e.g. cryogenics, gases, coolants, access operations, cooling and ventilation plant).

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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. Preliminary M&O Budget Estimate for 2008

The preliminary 2008 M&O payments for Category-A items are 13.8 MCHF (including energy) and 6.4 MCHF for Category-B items. The Category-A activities continue to increase in 2008. The main reasons for the increased payments in Category-A w.r.t. the 2007 figures are as follows:

- Increasing use of detector gases, coolants, fluids and other related consumables ;
- Operation of the TDAQ system and replacement of installed components (networking equipment, processors)

The dominant part of the cost in Category-A is providing the required technical services (e.g. detector access, gas systems, heavy handling, crane operations, cooling and ventilation maintenance services, electricity; amounting to 6.8 MCHF). Another cost driver is the operation of the LAr and magnet system at an annual level of 2.8 MCHF. The general support for running the TDAQ system and replacement of equipment is 2.7 MCHF.

Category-A also includes a specific core computing component, comprising infrastructure & services (central computing environment, user support, software process services) and central production & operations. For 2008, the level of effort is currently being assessed by ATLAS but for the time being, 16 Full-time-equivalents (FTEs) are planned for the above-mentioned activities, some 10 FTEs of which is

expected to be obtained as in-kind contributions. Applying an average cost of 88 kCHF/FTE/year, the activities are budgeted at 1.5 MCHF, also including server replacements.

In Category-B, an increase in maintenance activities is planned as the detector systems reach full operation status.

The main Category-B cost driver is the related to running the detector modules and related electronics (replacements, repairs, charges for the electronic pool rentals) as well as running system tests for all the systems (2.0 MCHF). In addition to LAr, critical spares are also obtained by the Inner Detector (TRT) for which a payment advancement has been arranged internally within ATLAS. These payments amount to 0.9 MCHF. The cost of hired technical manpower to run the facilities is estimated at 2.3 MCHF.

Category-B also includes core computing tasks such as core computing management, software project management, data management and computer operations (Grid, DC). An estimated manpower effort of 98 FTEs is planned to be provided in full as in-kind contributions, details yet to be confirmed.

Following the recommendation of an internal ATLAS working group on sharing of operation tasks in the future, the cost of gases, coolants and fluids are moved from Category-B to Category-A. In 2008, the estimated cost is 0.7 MCHF and is being currently updated.

**Figure 1** provides a summary of actual payments up to end of 2006 and a forward look to M&O budget estimates up to 2010. The breakdown between Categories A and B are provided in **Table 3**. The Category-B costs include also the replacement of the Pixel b-layer, currently planned to be installed in 2012.

**Table 4** gives the breakdown of the M&O (Categories A and B) budget estimates for 2008.

**Table 5** shows the expected contributions for 2008 for each Funding Agency and system (Categories A and B). The Category-A contributions are based on authors and 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.

For Category-B, ATLAS proposes changing the present sharing determined only by CORE contributions to a scheme also based on authors but modulated by CORE, in order to have also new Institutions contributing.

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

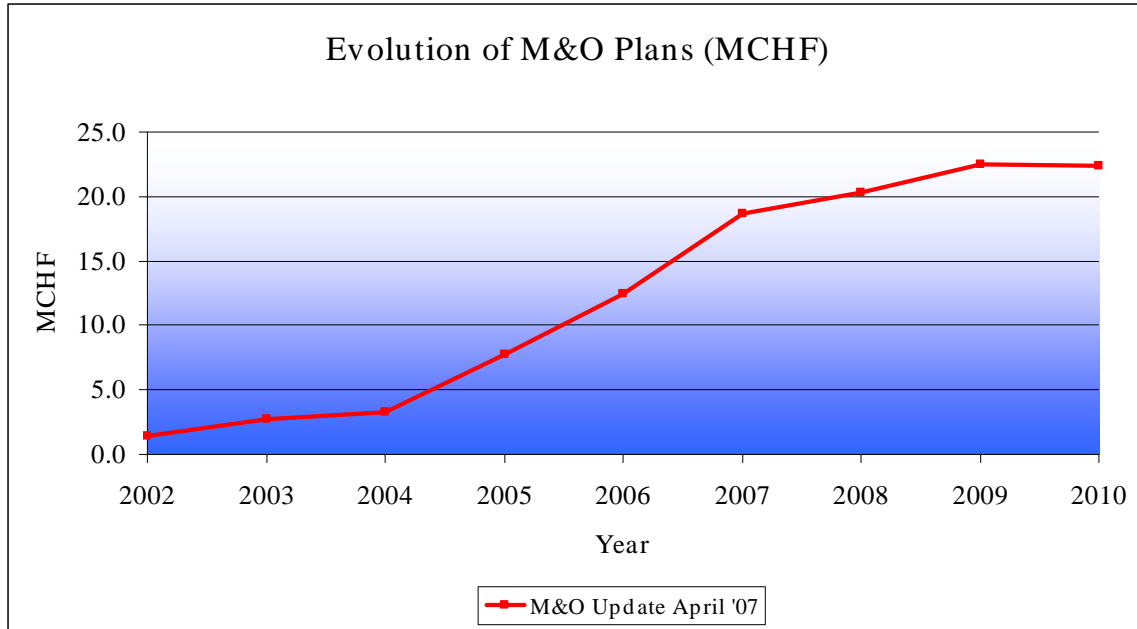


Table 3. Evolution of M&O Budget up to 2010 (MCHF)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Category A	1.0	1.6	2.6	5.6	9.0	11.7	13.8	15.1	15.1	75.5
Category B	0.4	1.1	0.7	2.2	3.5	7.0	6.4	7.4	7.3	36.0
<b>Total (A+B)</b>	<b>1.4</b>	<b>2.7</b>	<b>3.3</b>	<b>7.8</b>	<b>12.5</b>	<b>18.7</b>	<b>20.2</b>	<b>22.5</b>	<b>22.4</b>	<b>111.5</b>

The status (February 28, 2007) of the signatures for the M&O MoU is given in **Table 6**. The Funding Agencies who have not yet signed the Agreement are: Argentina, Brazil and Switzerland.

**Planned ATLAS M+O (A) and (B) Payments in 2008 (kCHF)**

Item & Cost Driver (by RRB SG Headings)	Cat. A									Cat. B	Item & Cost Driver (by RRB SG Headings)	
	M&O	Pixel	SCT	TRT	IDGen	LAr	TileC	Muon	Comp.	M&O		
Detector related costs Cooling systems, power supplies	5,838		200		45	90	15	175			525	Mechanics & Gas & Cooling & Cryogenics Gases (ID, Tiles, Muons)
Secretariat 0.7 FTE charged to ATLAS Publications, consumables	295	200	240	100	45	350	120	200			1,255	Standard electronics Crates, electronics pool rentals
Collaborative tools GSM phones Computer network connections	120		20	20	5	30	15	5			95	Detector controls
Core computing Services	1,475	85	100	100	320	50	110				765	Areas Test-beam activities, system tests (ID)
On-line computing Detector controls Software licences	2,475				5	5	5	30			45	Communications
Test beams Magnet Cryo Op. in B180 On-line computing support TDAQ common electronics	90	100	100	110	40	50	25	110			535	Store items
Laboratory operations Assembly areas, workshops TDAQ laboratory equipment	75	200		300		350					850	Sub-detector spares (amortization of critical spares)
General services Heavy handling Technical support, storage Survey Outreach Energy	3,470											
<b>TOTAL</b>	<b>13,838</b>	<b>585</b>	<b>660</b>	<b>630</b>	<b>460</b>	<b>925</b>	<b>290</b>	<b>520</b>			<b>4,070</b>	(Excluding hired manpower for Category B)
Hired manpower at CERN (in kCHF)	incl. above	350	211	180	445	600	205.4	330.4			2,322	
Institute manpower (in FTE)	0	5	5	5	11	0	6	13	98		143	
<b>TOTAL M&amp;O FOR A</b>	<b>13,838</b>	<b>935</b>	<b>871</b>	<b>810</b>	<b>905</b>	<b>1,525</b>	<b>495</b>	<b>850</b>			<b>6,392</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.
2. Category B is proposed to be shared based on authors but modulated by CORE.

**Proposed Sharing of M+O Contributions  
for ATLAS in 2008 by Funding Agency (kCHF)**

4/4/2007

Funding Agency	Category-A items		Category-B items budgeted							Budget Total	Core comp. Categ.B (FTE)
	Invoiced*	Budgeted	Pixel	SCT	TRT	IDGen	LAr	TileC	Muon		
Argentina	9	9	0	0	0	0	1	0	0	10	0
Armenia	9	9	0	0	0	0	1	0	0	11	
Australia	93	93	0	33	0	20	0	0	0	146	1
Austria	55	65	0	0	17	0	9	11	0	102	1
Azerbaijan	9	9	0	0	0	0	1	0	0	10	
Belarus	56	56	0	0	0	0	0	0	2	58	
Brazil	56	56	0	0	0	0	0	3	0	59	0
Canada	391	400	0	0	0	0	228	0	0	628	3
China NSFC+MSTC	130	130	0	0	0	0	3	0	4	137	1
Czech Republic	274	326	5	2	0	2	0	6	0	342	2
Denmark	78	93	0	0	44	9	0	0	0	146	1
France IN2P3	619	736	105	0	0	20	243	51	0	1155	6
France CEA	188	223	0	0	0	0	94	0	33	351	2
Georgia	47	47	0	0	0	0	1	0	1	49	
Germany BMBF	760	903	258	62	0	86	60	0	49	1418	3
Germany DESY	63	74	0	0	0	0	17	0	25	116	1
Germany MPI	196	233	0	45	0	26	39	0	22	365	1
Greece	321	382	0	0	0	0	0	0	19	401	0
Israel	145	149	0	0	0	0	0	0	7	156	0
Italy	1214	1443	344	0	0	52	79	48	199	2165	8
Japan	502	512	0	112	0	66	0	0	114	804	3
Morocco	74	74	0	0	0	0	4	0	0	78	
Netherocco	164	196	0	27	0	19	0	0	65	307	2
Norway	78	93	0	42	0	31	0	0	0	166	2
Poland	133	158	0	2	4	2	0	0	0	166	0
Portugal	117	140	0	0	0	0	0	7	0	147	0
Romania	112	112	0	0	0	0	0	6	0	117	0
Russia	486	587	0	0	10	4	8	3	5	616	2
JINR	279	279	0	0	2	1	4	3	5	293	0
Serbia	37	37	0	0	0	0	2	0	0	39	
Slovak Republic	78	93	0	0	0	0	5	0	0	98	
Slovenia	56	56	0	2	0	1	0	0	0	59	1
Spain	305	363	0	36	0	21	59	90	0	570	3
Sweden	172	205	0	17	49	20	15	16	0	322	0
Switzerland	172	205	0	66	0	39	12	0	0	322	0
Taipei	74	74	2	1	0	1	1	0	0	78	3
Turkey	84	84	0	0	0	0	2	0	2	88	
United Kingdom	1049	1248	0	385	0	325	0	0	0	1958	10
US DOE + NSF	2620	2663	211	0	393	80	477	172	263	4260	30
CERN	1026	1220	0	49	291	90	161	78	26	1916	15
<b>total</b>	12,336	<b>13,838</b>	925	881	810	916	1525	495	840	<b>20,230</b>	<b>98</b>
			<b>System-specific items</b>						<b>6,392</b>		

**Notes:**

\*Invoiced to FAs; includes energy cost adjustments

Updated list of qualified authors with PhD or equivalent (September 30, 2006) used for Category-A

Category-B is based on authors, modulated by 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 March 19, 2007)

Funding Agency	Signed Date	Signed by
Argentina		
Armenia	02.09.2002	H. Asatryan
Australia	17.10.2003	A. Williams
Austria	02.10.2002	R. Kneucker
Azerbaijan	20.03.2003	N.A.K. Guliyev
Belarus	25.03.2005	Y. Pleskachevsky
Brazil		
Canada	09.09.2002	I. Blain
China NSFC+MSTC	02.08.2002	Wang Naiyan
Czech Republic	20.01.2003	J. Niederle
Denmark	18.08.2004	J.R. Hansen
France CEA	04.09.2002	F. Gounand
France IN2P3	25.09.2002	J.J. Aubert
Georgia	22.08.2002	A.N. Tavkhelidze
Germany BMBF	12.09.2002	R. Koepke
Germany DESY	01.11.2006	R.D. Heuer, C. Scherf
Germany MPI	28.06.2002	S. Bethke
Greece	20.09.2005	I.Tsoukalas
Israel	23.08.2002	D. Horn
Italy	25.11.2002	E. Iarocci
Japan	31.03.2003	H. Sugawara
Morocco	04.02.2004	S. Belcadi
Netherlands	14.11.2002	J. Engelen
Norway	04.09.2002	O.H. Ellestad
Poland	18.10.2004	J.K Frackowiak
Portugal	26.06.2002	A. Trigo de Abreu
Romania	21.04.2004	G. Popa
Russia	26.03.2006	A. Fursenko
JINR	07.08.2002	A.N. Sissakian
Serbia	12.08.2005	A. Popovic
Slovak Republic	26.11.2002	M. Fronc
Slovenia	22.04.2003	Z. Stančič
Spain	19.02.2003	P. Morenés
Sweden	25.11.2002	K. Bremer
Switzerland		
Taipei	12.07.2002	C.J. Chen
Turkey	12.03.2003	N.K. Pak
United Kingdom	24.09.2002	J.F. Down
US DOE + NSF	18.10.2002	T.B.W. Kirk
CERN	04.12.2002	D. Schlatter