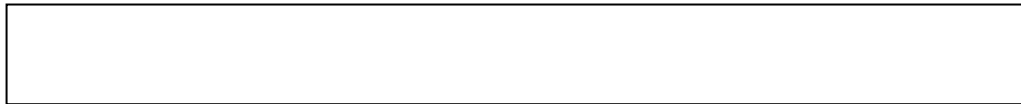


CERN-RRB-2011-028

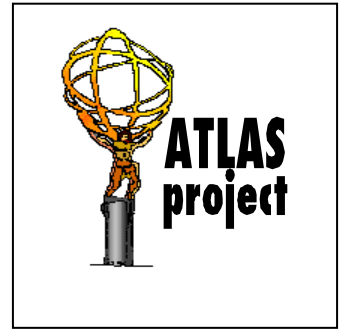
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ATLAS Resources Review Board, April 12, 2011



**2010 and 2012 ATLAS M&O Budgets**





CERN-RRB-2011-028

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ATLAS Resources Review Board, April 12, 2011

For RRB approval

## **Part 1**




# **Closing Report for 2010 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 2010.*

The RRB approved the year 2010 Maintenance and Operation (M&O) budget in November 2009 (CERN-RRB-2009-106) for 16 660 kCHF (Category-A), including cost of energy of 2 820 kCHF, and 5 500 kCHF (Category-B), respectively.

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M & O B U D G E T
REPORT ELEMENTS
 Payment Summary
 Activity Description
 Table References

## 1. M&O Budgets for 2010

The final M&O payments in 2010 amounted to 14 757 kCHF in Category-A (including energy for the CERN NMS-part) and 5 700 kCHF in Category-B. The remaining open commitments amounted to 2 323kCHF in total (A+B). The total payments were 166 kCHF above the budgeted total income (i.e. invoices sent out) due to past commitments.

In 2010, 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 (6.1 MCHF) as well as operating the cryogenic plants at Point 1 (2.4 MCHF) and operating the TDAQ system (3.1 MCHF). Core computing infrastructure services were also provided for and this amounted to 2.1 MCHF.

The CERN member state share of the energy cost for 2010 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 2010 amounted to 0.9 MCHF (non-member state part).

In Category B, the main costs were related to operation of the electronics systems as well as carrying out repairs in-situ in the ATLAS cavern. The above activities included related mechanics (0.3 MCHF), electronics replacements and pool rentals (1.7 MCHF) and area operation and purchasing of store items (0.5 MCHF). Sub-detector spares were purchased worth 1.8 MCHF, including 191 kCHF for the IBL. The hired technical manpower supported all these activities (1.4 MCHF).

The value of in-kind contributions in Category-A amounted to 1.5 MCHF and 68 kCHF made in Category-B in 2010.

As a consequence of the 2010 payments and amortization of the remaining open commitments from the past, the cumulative budget balance (i.e. the approved budgets less executed payments and remaining open commitments) amounts to - 23 kCHF in Category-A and -254 kCHF for Category-B. Due contributions in 2010 amounted to 0.8 MCHF in Category-A and 0.2 MCHF in Category-B.

For Category-A, the status of contributions (sent invoices less received contributions) are shown in the document "Financial Report" (CERN-RRB-2011-046).

**Table 1** summarizes the 2010 M&O payments per system. The participating institutes provided, as part of their detector operation tasks (OTP) obligations, 384 man-years for expert-related activities (excluding shift work), of which 127 man-years in core computing tasks. Table 1 includes also payments made to IBL (more details are provided in CERN-RRB-2011-026).

**Table 2** shows the M&O contributions made for 2010 or earlier by the Funding Agencies for each system.

It should be noted that in order for ATLAS to pay for the 2010 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 2010 (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 Cryogenics operations Detector operations	4,860			279	7		20	11			317	Mechanics & Cooling & Cryogenics
Secretariat 2 FTE charged to ATLAS Publications, consumables	344	431	370	128	98	344	168	152			1,691	Standard electronics Crates, electronics pool rentals
Collaborative tools GSM phones Computer network connections Videoconferencing, archiving	403					2	8	19			29	Detector controls
Core computing (infrastr. & services) Software process service Central production & operation	2,129											
On-line computing Detector controls Software licences	2,737	30	39	30	293	7	5				404	Areas SR1-operations (ID), system tests, lab oper.
Test beams, facilities Testing equipment (DCS) Consolidation	1,955	5	5	2	9	28	4	9			62	Communications
Laboratory operations Assembly areas, workshops TDAQ laboratory equipment	165	10	32	10	8	8	4	15			87	Store items
General services Heavy handling Technical support, storage Survey Outreach Energy	2,164	878				608	263				1,749	Sub-detector spares (including 191 kCHF for IBL)
<b>TOTAL</b>	<b>14,757</b>	<b>1,354</b>	<b>446</b>	<b>449</b>	<b>415</b>	<b>997</b>	<b>472</b>	<b>206</b>	<b>0</b>	<b>4,339</b>	<b>(Excluding hired manpower for Category B)</b>	
Hired manpower at CERN (in kCHF)	incl. above	60	249	77	235	334	191	215			1,361	
Institute manpower (in FTE), excl. shifts (*)	0	24	24	26	29	41	28	85	127		384	Class 3 expert tasks (OTP)
<b>TOTAL M&amp;O FOR A</b>	<b>14,757</b>	<b>1,414</b>	<b>695</b>	<b>526</b>	<b>650</b>	<b>1,331</b>	<b>663</b>	<b>421</b>	<b>0</b>	<b>5,700</b>	<b>TOTAL M&amp;O FOR B</b>	

Notes

(\*) It is acknowledged that Russia has contributed 150 kCHF as part of its FTE effort in cash

**M+O Contributions (cash and in-kind)  
for ATLAS in 2010 by Funding Agency (kCHF)**

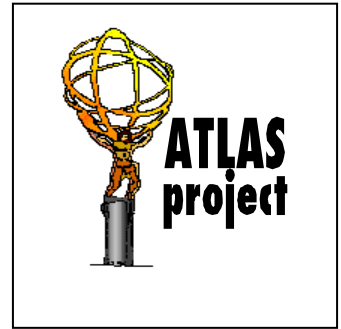
3/30/2011

Funding Agency	Cat.A items*	Category-B item contributions						Total Cat. B	Total A + B	Core comp. Categ.B (FTE)	
		Pixel	SCT	TRT	IDGen	LAr	TileC				Muon
Argentina	27						1	1	28	0	
Armenia	16					6		6	22	1	
Australia	73	17		11				28	101	1	
Austria	38		6		3	6	3	18	56	0	
Azerbaijan	27				1			1	28	0	
Belarus	186							0	186	0	
Brazil	60					6		6	66	0	
Canada	584				232			232	816	4	
Chile	27						2	2	29	0	
China NSFC+MSTC								0	0	0	
Colombia	27						1	1	28	0	
Czech Republic	239	6	1	2			11	20	259	2	
Denmark	60		22	6				28	88	0	
France IN2P3	837	99		14	220	56		389	1226	8	
France CEA	181				62		22	84	265	2	
Georgia	45						1	1	46	0	
Germany BMBF	1184	312	52	78	63		46	551	1735	10	
Germany DESY	173				41		40	81	254	7	
Germany MPI	226	31		20	38		17	106	332	1	
Greece								0	0	0	
Israel	186						10	10	196	1	
Italy	1260	237		51	70	52	155	565	1825	5	
Japan	621	88		57			101	246	867	2	
Morocco								0	0	0	
Netherlands	226	24		18			64	106	332	2	
Norway	121	32		24				56	177	1	
Poland	147	2	4	2				8	155	2	
Portugal						6		6	6	0	
Romania	227						11	11	238	0	
Russia	463		7	4	8	5	5	29	492	4	
JINR	160							0	160	1	
Serbia	54				3			3	57	0	
Slovak Republic	75				5			5	80	0	
Slovenia	64	2		1				3	67	2	
Spain	41						45	45	86	3	
Sweden	196	12	31	16	14	18		91	287	1	
Switzerland	166	40		26	10			76	242	0	
Taipei	82	2		1	1			4	86	0	
Turkey	145				4		3	7	152	0	
United Kingdom	1433	313		353				666	2099	17	
US DOE + NSF	3644	292		272	416	287	193	1460	5104	31	
CERN	905	21	1	181	29	99	73	421	1326	16	
<b>total contributions</b>	<b>14,226</b>	<b>969</b>	<b>615</b>	<b>523</b>	<b>713</b>	<b>1,290</b>	<b>581</b>	<b>681</b>	<b>5,372</b>	<b>19,598</b>	<b>127</b>
<b>total payments</b>	<b>14,757</b>	<b>1414</b>	<b>695</b>	<b>526</b>	<b>650</b>	<b>1331</b>	<b>663</b>	<b>421</b>	<b>5,700</b>	<b>20,457</b>	

**Notes:**

\*Following invoices sent to Funding Agencies; including energy cost adjustments

Final Pixel 2010 budget corrected at 969 kCHF, following INFN request to treat their IBL share separately



CERN-RRB-2011-028

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ATLAS Resources Review Board, April 12, 2012

For RRB to take note

## Part 2

# Preliminary 2012 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 2012.*

The first M&O budget estimates for the ATLAS detector in 2012 amount to 26.2 MCHF in payments. The supporting technical infrastructure remains to be fully operational (e.g. cryogenics, gases, coolants, access operations, cooling and ventilation plant). Its performance is being closely monitored and its functionalities constantly checked and maintained.

M & O B U D G E T	<h2>1. Preliminary M&amp;O Budget Estimate for 2012</h2>
R E P O R T E L E M E N T S	The preliminary 2012 M&O payments for Category-A items are 20.1 MCHF (including energy) and 6.1 MCHF for Category-B items.
📁 Budget summary	The dominant part of the cost in Category-A is providing the required technical services (e.g. detector access, safety systems, gas systems, heavy handling, crane operations, cooling and ventilation maintenance services, electricity; amounting to 10.3 MCHF). Another cost driver is the operation of the LAr and magnet system at an annual level of 2.3 MCHF. The general support for running the TDAQ system and replacement of equipment is 5.4 MCHF, more than half of which is foreseen for high-level trigger processor replacements, following the planned three full years of operation. Core computing (infrastructure) services are planned at 2.1 MCHF.
📁 Activity Description	In the light of the recent changes announced in the machine schedule calling for an extended, full year of running in 2012 instead of a long shutdown originally planned, and while needing to update some of the information requested by the Scrutiny Group (CERN-RRB-2010-070), the preliminary budget estimates are expected to change before submitting the final 2012 budget in October. These changes are expected to be within 10%, most likely reducing the expenditures.
📁 Table References	In Category-B, the maintenance activities start reaching a nominal level, as the detector systems now reach full operation status and become more stable.

The main Category-B cost driver is related to running the detector modules and related electronics (1.8 MCHF). Sub-detector spares amortization is planned at 1.4 MCHF, including payments for parts of the IBL as well as previous payment advancements that were arranged internally within ATLAS. Scheduled maintenance work of detector structures and mechanics, including the use of store items and areas activities, amount to 0.9 MCHF. The cost of hired technical manpower to run the facilities is estimated at 1.9 MCHF.

The manpower required from institutes for operation expert tasks (OTP), excluding shifts, amounts to 444 man-years. Category-B also includes core computing tasks such as core computing management, software project management, data management and computer operations. An estimated manpower effort of 138 man-years is planned to be provided in full as in-kind contributions.

**Figure 1** provides a summary of actual payments up to end of 2010 and a forward look to M&O budget estimates up to 2015, including the full cost of energy and defined parts of the IBL (CERN-RRB-2010-118 Annex 1). The breakdown between Categories A and B is provided in **Table 3**.

**Table 4** gives the breakdown of the M&O (Categories A and B) budget estimates for 2012.

**Table 5** shows the expected contributions for 2012 for each Funding Agency and system (Categories A and B). The Category-A contributions are based on authors holding a PhD or equivalent 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.

*Figure 1. Evolution of M&O Budget up to 2015 (MCHF)*

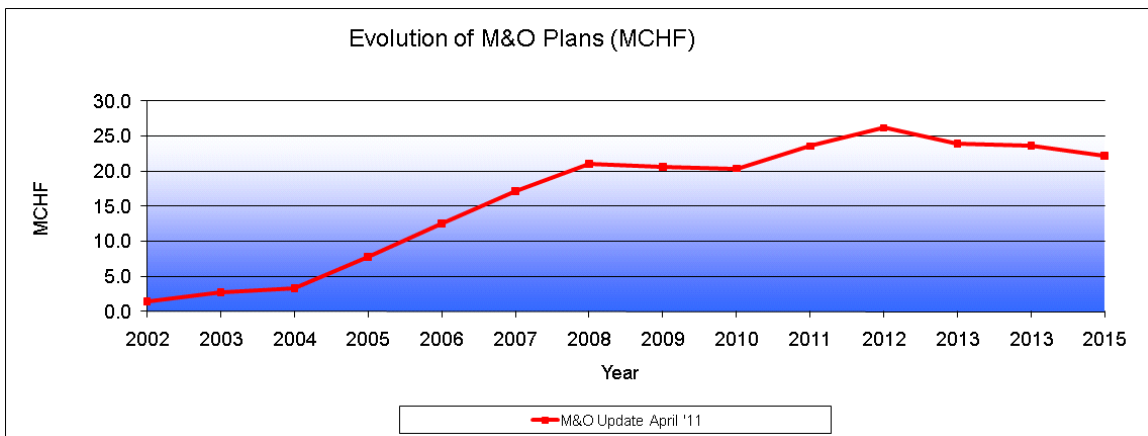


Table 3. Evolution of M&O Budget up to 2015 (MCHF)

M&O BUDGET EVOLUTION (Categories A and B), in MCHF															
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Category A	1.0	1.6	2.6	5.6	9.0	10.5	14.3	14.4	14.8	18.4	20.1	18.4	19.1	18.1	167.9
Category B	0.4	1.1	0.7	2.2	3.5	6.7	6.8	6.2	5.7	5.2	6.1	5.5	4.6	4.1	58.8
<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>17.2</b>	<b>21.1</b>	<b>20.6</b>	<b>20.5</b>	<b>23.6</b>	<b>26.2</b>	<b>23.9</b>	<b>23.7</b>	<b>22.2</b>	<b>226.7</b>

**Planned ATLAS M+O (A) and (B) Payments in 2012 (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 Cryogenics operations Detector operations	6,227			300	10	25	20	55			410	Mechanics & Cooling & Cryogenics
Secretariat 2 FTE charged to ATLAS Publications, consumables	305	300	310	150	100	295	310	210			1,675	Standard electronics Crates, electronics pool rentals
Collaborative tools GSM phones Computer network connections Videoconferencing, archiving	120					40	15	100			155	Detector controls
Core computing (infrastr. & services) Software process service Central production & operation	2,128											
On-line computing Detector controls Software licences	5,035	30	40	40	245	10	20				385	Areas SR1-operations (ID), system tests, lab oper.
Test beams, facilities Testing equipment (DCS) Consolidation	2,440	5	5	5	10	5	5	5			40	Communications
Laboratory operations Assembly areas, workshops TDAQ laboratory equipment	125	10	30	30	10	10	25				115	Store items
General services Heavy handling Technical support, storage Survey Outreach Energy	3,740	1,000				350	30				1,380	Sub-detector spares (including 1000 kCHF for IBL)
<b>TOTAL</b>	<b>20,120</b>	<b>1,345</b>	<b>385</b>	<b>525</b>	<b>375</b>	<b>735</b>	<b>425</b>	<b>370</b>	<b>0</b>	<b>4,160</b>	<b>(Excluding hired manpower for Category B)</b>	
Hired manpower at CERN (in kCHF)	incl. above	185	250	160	300	440	250	350			1,935	
Institute manpower (in FTE), excl. shifts (*)	0	24	24	24	30	67	28	109	138	444	Class 3 expert tasks (OTP)	
<b>TOTAL M&amp;O FOR A</b>	<b>20,120</b>	<b>1,530</b>	<b>635</b>	<b>685</b>	<b>675</b>	<b>1,175</b>	<b>675</b>	<b>720</b>	<b>0</b>	<b>6,095</b>	<b>TOTAL M&amp;O FOR B</b>	

**Proposed Sharing of M+O Contributions  
for ATLAS in 2012 by Funding Agency (kCHF)**

3/30/2011

Funding Agency	Category-A items		Category-B items budgeted						Budget	Core comp. Categ.B (FTE)	Authors M&O-A	
	Invoiced*	Budgeted	Pixel	SCT	TRT	IDGen	LAr	TileC	Muon			Total
Argentina	33	33	0	0	0	0	0	0	2	35	0	3
Armenia	11	11	0	0	0	0	1	1	0	13	0	1
Australia	66	66	0	12	0	7	0	0	0	86	0	6
Austria	49	55	0	5	5	0	3	0	3	71	0	5
Azerbaijan	33	33	0	0	0	0	1	0	0	34	0	3
Belarus	66	66	0	0	0	0	0	0	3	69	0	6
Brazil	77	77	0	0	0	0	0	4	0	81	1	7
Canada	607	683	0	0	0	0	203	0	0	885	5	62
Chile	33	33	0	0	0	0	0	0	2	35	0	3
China NSFC+MSTC	121	121	0	0	0	0	3	0	3	127	1	11
Colombia	55	55	0	0	0	0	0	0	3	58	0	5
Czech Republic	333	374	24	2	0	2	0	11	0	413	3	34
Denmark	108	121	0	0	30	6	0	0	0	157	1	11
France IN2P3	1157	1299	63	0	0	16	233	74	0	1685	9	118
France CEA	255	286	0	0	0	0	60	0	25	371	2	26
Georgia	55	55	0	0	0	0	1	0	1	57	0	5
Germany BMBF	1520	1707	692	66	0	93	72	0	60	2691	12	155
Germany DESY	225	253	0	0	0	0	38	0	37	328	2	23
Germany MPI	275	308	0	28	0	17	30	0	16	400	2	28
Greece	216	242	0	0	0	0	0	0	12	254	2	22
Israel	216	220	0	0	0	0	0	0	11	231	2	20
Italy	1569	1762	181	0	0	36	60	58	186	2284	12	160
Japan	769	782	0	73	0	50	0	10	98	1014	5	71
Morocco	88	88	0	0	0	0	4	0	0	93	1	8
Netherlands	294	330	0	22	0	16	0	0	61	428	2	30
Norway	147	165	0	29	0	20	0	0	0	214	1	15
Poland	216	242	0	2	7	3	0	0	0	254	2	22
Portugal	118	132	0	0	0	0	0	7	0	139	1	12
Romania	132	132	0	0	0	0	0	7	0	139	1	12
Russia	665	749	0	0	15	4	7	6	6	786	5	68
JINR	308	308	0	0	2	1	3	5	5	324	2	28
Serbia	99	99	0	0	0	0	5	0	0	104	1	9
Slovak Republic	88	99	0	0	0	0	5	0	0	104	1	9
Slovenia	77	77	0	2	0	1	0	0	0	81	1	7
South Africa	33	33	0	2	0	0	0	0	0	35	0	3
Spain	451	507	0	18	0	11	37	85	0	657	3	46
Sweden	275	308	0	11	35	14	12	19	0	400	2	28
Switzerland	216	242	0	39	0	24	9	0	0	314	2	22
Taipei	88	88	2	1	0	1	1	0	0	93	1	8
Turkey	176	176	0	0	0	0	5	0	4	185	1	16
United Kingdom	1824	2048	0	284	0	324	0	0	0	2656	14	186
US DOE + NSF	4177	4229	568	7	343	20	319	334	165	5984	29	384
CERN	1265	1421	0	30	249	10	62	56	17	1845	10	129
<b>total</b>	<b>18,588</b>	<b>20,120</b>	<b>1530</b>	<b>635</b>	<b>685</b>	<b>675</b>	<b>1175</b>	<b>675</b>	<b>720</b>	<b>26,215</b>	<b>138</b>	<b>1,827</b>
										<b>System-specific items</b>		
										<b>6,095</b>		

**Notes:**

\*Invoiced to FAs; includes energy cost adjustments

List of qualified authors with PhD or equivalent (September 30, 2010) 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