Draft Budget for CMS Maintenance & Operations in the Year 2011

INTRODUCTION

This document summarizes the funding requirements for the payments that the CMS Collaboration plans to make in the year 2011 in order to maintain and operate the already constructed detectors and Collaboration-wide facilities (M&O Cat. A).

In addition we present also estimates for the subdetectors maintenance and operations expenses (M&O Cat. B).

Both M&O Cat. A and Cat. B costs have been last scrutinized by the RRB Scrutiny Group for M&O before the October 2010 RRB. The Annexes presented here are based on the latest available figures.

The Cat. A costs are invoiced by CERN on behalf of the CMS Collaboration.

The Cat. B costs will be invoiced only upon request of each sub-detector and only for a small fraction of the total presented here.

The figures shown as "Payments expected in the year 2011" in the Summary Table (**Annex 2**) have been reviewed by the RRB Scrutiny Group and are based on the updated PhD count.

Timely and early payments for this budget are necessary due to the operational nature of the costs presented here.

M&O CATEGORY A

The total estimated cost for M&O-A in 2011 is 14'353 kCHF (12'553 kCHF excluding power costs). For comparison, the total M&O-A 2010 Budget was 13'711 kCHF (11'911 excluding power costs).

This request represents a decrease of 2'767 kCHF as compared to the 2011 Preliminary Draft Budget request presented at the April 2010 RRB where the proposed total amount was 17'120 kCHF. This reduction was achieved as a result of reviewing expenditures related to the modified running schedule of the LHC, reducing the allocation for Collaborative Tools, reducing requests for additional manpower in Computing and the postponing of expenditures in Online hardware.

As reported in the April 2010 RRB, additional costs have been incurred by the CMS Collaboration related to the emergency repair of the detector cooling system in order to avoid the risk of leaks, which has been carried out during the period between Christmas 2009 and February 2010. The cost of this operation amounts to 1'121 kCHF. In agreement with the RRB Scrutiny Group, these costs are added to the 2011 M&O-A budget. They are included in the various budget lines concerned in A.1. Detector Related Costs and in A.7. General Services (A.1.06, A.1.10, A.1.11, A.1.12, A.1.13, A.6.02, A.7.04, A.7.05 A.7.06 and A.7.08).

Applying the newly established Operational Model that differentiates costs between periods of running and shutdown an overall reduction of 585 kCHF will be applied in the 2011 budget. This concerns the following budget lines: A.1.05 Gas Consumption, A.1.12 Shutdown Activities, A.1.13 General technical Support, A.1.16 Beampipe and Vacuum, A.1.17 Counting and Control Rooms, A.6.02 Workshops and A.7.04 Heavy Transport.

Over the past years no indexation has been applied on manpower costs despite a 3% increase. This is now requested for the 2011 budget to be applied to all 'operation' budget lines with the exception of those related to Service Level Agreements.

A.1.18, following discussions with the RRB Scrutiny Group, and as implemented for other LHC Experiments, an additional budget line for 'Safety' is added with an allocation of 100 kCHF. The objective of this is to separate detector-related safety costs from those related to personnel protection.

A.3.02, Collaborative Tools, has been reduced by 50% to 162 kCHF in accordance with the recommendation of the RRB Scrutiny Group.

A.4.04, a reduction of 1'933 kCHF is obtained in the allocation for Online hardware by postponing replacement of DAQ equipment to the years 2012 and 2013 in line with the revised LHC schedule.

A.9.01, A.9.02, A.9.04, an increase of three FTEs corresponding to new positions for Core Computing Infrastructure Services necessary to cope with the current computing plan and the requirements of the 2011-12 run.

The estimated manpower cost for A.9, Core Computing, in the year 2011 totals some 1'964 kCHF. For this particular category and as for the current year, the CMS Collaboration strongly prefers to receive contributions directly from the Institutes/Funding Agencies rather than hiring personnel.

Annex I.A gives the projected costs for M&O-A until 2014.

This updated budget request has been discussed with the RRB Scrutiny Group.

M&O CATEGORY B

With respect to the forecast for the year 2011 in the Preliminary Draft Budget for M&O presented at the April 2010 RRB (cf. CERN-RRB-2010-031), the present budget request has changed in the HCAL and Muon areas. Item B.2.01, Technical Manpower at CERN, is omitted from the HCAL, ECAL, Tracker and Muon M&O-B as this effort is included in the ESP (ex-MoAs).

The Muon budget request has increased from 1'254 kCHF to 1'951 kCHF. The HCAL budget request has decreased slightly from 912 kCHF to 902 kCHF.

The increases in the Muon area are due principally to accounting of manpower in monetary (CHF) rather than FTE terms, as reported below.

Annex I.B gives the projected costs for M&O-B until 2014.

The updated budget request has been presented to the RRB Scrutiny Group.

M&O CATEGORY B SHARING

Material Resources

The CMS Collaboration will continue to share its M&O Cat. B costs for the year 2011 by responsibility for all subsystems.

As reported at the April 2010 RRB, a Task Force has carried out an in-depth analysis of the currently applied schemes in the different CMS sub-systems. This Task Force has made several recommendations, endorsed by the CMS Finance Board, to ensure an efficient and equitable system in which all CMS Funding Agencies participate in a fair way in the costs of sub-detector maintenance and operation.

One of the recommendations of the Task Force, which has been implemented by most sub-systems was to assign a uniform monetary value and report FTEs in Swiss Francs under B.1.14 Hired Manpower @ CERN rather than under B.2.01 Technical Manpower @ CERN.

Technical manpower

One of the main objectives of the above-mentioned Task Force was to ensure common guidelines for the accounting of manpower in the different subsystems. A thorough review was carried out of all manpower. Consequently, budget line B.2.01 Technical Manpower @ CERN, was reduced from 19 FTEs to 8 FTEs and budget line B.2.02 Core Computing Manpower @ CMS was revised from 96 FTEs to 7.5 FTEs. The latter is a result of eliminating service work included under Experiment Services and Pledges (ESP, ex-MoA) and retaining only personnel present at CERN and hired to execute tasks not accounted for elsewhere.

Furthermore, it was proposed to give appropriate recognition to Funding Agencies, which contribute manpower, hitherto unreported in either M&O category A or B. In line with the above, it was agreed that the contribution of 5 FTEs by the US in the DAQ area should be recognized as equivalent to a cash payment of 400 kCHF. Consequently it is proposed to introduce the DAQ as an additional sub-system category in the M&O-B budget.

The implementation of these measures constitutes a change in the accounting and reporting mechanism of sub-system expenditures, however, it has no effect on the actual contributions of Funding Agencies. These remain unchanged and continue to be decided in the framework of the Institution Board of each sub-system.

SUMMARY

The numbers given in this document are summarized in **Annex 2**. It should be noted that funds paid in 2011, which will not have been committed during 2011, will be reported to the April 2012 RRB and will be carried forward.

ANNEXES

Budget Requirements for M&O in 2011

Annex 1 : PhD Scientists per Funding Agency

Annex 2 : M&O Cat. A and B Costs by Funding Agency

Annex A.1 : M&O Cat. A Budget Request 2011

Annex A.2 : M&O Cat. A by Funding Agency

Annex B.1 : M&O Cat. B Budget Request 2011

Annex B.2 : M&O Cat. B Budget Sharing 2011 by Funding Agency and Subsystem

Annex B.3 : M&O Cat. B Estimated Costs Incurred in 2011 by Funding Agency and Subsystem

Annex I.A : Foreseen Cat. A Costs 2011-2014

Annex I.B : Foreseen Cat. B Costs 2011-2014

ANNEX 1

PhD Scientists per Funding Agency Based on the Annually Revised Annex 13 of the M&O MoU

The List of Names is Available at http://cms.cern.ch/iCMS/jsp/page.jsp?mode=cms&action=url&urlkey=CMS_DOCOFF (Count closed on September 29, 2010)

	Data	
Institute FA	PhD #	PhD %
Austria	22	1.6%
Belgium-FNRS	16	1.2%
Belgium-FWO	16	1.2%
Brazil	17	1.2%
Bulgaria	8	0.6%
CERN	80	5.8%
China	10	0.7%
Colombia	3	0.2%
Croatia	7	0.5%
Cyprus	5	0.4%
Egypt	3	0.2%
Estonia	4	0.3%
Finland	14	1.0%
France-CEA	15	1.1%
France-IN2P3	53	3.8%
Germany-BMBF	60	4.3%
Germany-DESY	39	2.8%
Greece	15	1.1%
Hungary	10	0.7%
India	29	2.1%
Iran	6	0.4%
Ireland		0.0%
Italy	173	12.5%
Korea	21	1.5%
Mexico	11	0.8%
New Zealand	2	0.1%
Pakistan	2	0.1%
Poland	15	1.1%
Portugal	7	0.5%
RDMS-DMS	21	1.5%
RDMS-Russia	61	4.4%
Serbia	3	0.2%
Spain	49	3.5%
Switzerland-ETHZ	19	1.4%
Switzerland-PSI	10	0.7%
Switzerland-UNIV	9	0.6%
Taipei	15	1.1%
Turkey	18	1.3%
United Kingdom	56	4.0%
USA-DOE	355	25.6%
USA-DOE-NP	22	1.6%
USA-NSF	83	6.0%
USA-NSF-NP	2	0.1%
Grand Total	1,386	100.0%

ANNEX 2

M&O Cat. A and B Costs by Funding Agency

Payments expected in the Year 2011 (kCHF)

Funding Agency	Category A	Category B	Total Category A+B	Total Invoiced
Austria	199.3	100.4	299.7	199.3
Belgium-FNRS	144.9	87.4	232.3	144.9
Belgium-FWO	144.9	191.0	335.9	144.9
Brazil	176.0		176.0	176.0
Bulgaria	72.5	40.4	112.8	72.5
CERN	724.5	608.1	1,332.7	724.5
China	103.6	6.7	110.3	103.6
Colombia	31.1	6.7	37.8	31.1
Croatia	72.5	23.3	95.7	72.5
Cyprus	51.8	19.9	71.7	51.8
Egypt	31.1	10.1	41.2	31.1
Estonia	41.4		41.4	41.4
Finland	126.8	77.7	204.5	126.8
France-CEA	135.9	74.8	210.6	135.9
France-IN2P3	480.0	248.9	728.9	480.0
Germany-BMBF	543.4	306.0	849.4	543.4
Germany-DESY	353.2	30.0	383.2	353.2
Greece	135.9	79.8	215.7	135.9
Hungary	90.6		90.6	90.6
India	296.1	63.5	359.6	296.1
Iran	62.1		62.1	62.1
Ireland				
Italy	1,566.8	896.0	2,462.9	1,566.8
Korea	217.5	40.4	257.8	217.5
Mexico	113.9		113.9	113.9
New Zealand	20.7		20.7	20.7
Pakistan	20.7	20.2	40.9	20.7
Poland	135.9	182.3	318.2	135.9
Portugal	63.4	36.0	99.4	63.4
RDMS-DMS	217.5	20.1	237.6	217.5
RDMS-Russia	580.0	230.5	810.5	580.0
Serbia	31.1	15.0	46.0	31.1
Spain	443.8	127.2	571.0	443.8
Switzerland-ETHZ	172.1	79.7	251.8	172.1
Switzerland-PSI	90.6	61.5	152.0	90.6
Switzerland-UNIV	81.5	39.8	121.3	81.5
Taipei	155.3	40.3	195.6	155.3
Turkey	186.4		186.4	186.4
United Kingdom	507.2	260.8	768.0	507.2
USA-DOE	3,645.7	1,673.5	5,319.2	3,645.7
USA-DOE-NP	225.9	53.0	278.9	225.9
USA-NSF	852.4	667.0	1,519.3	852.4
USA-NSF-NP	20.5		20.5	20.5
Grand Total	**13,366**	**6,418**	**19,784**	**13,366**

ANNEX A.1

M & O Cat. A

Budget Request for the Year 2011 (kCHF)

Maintenance & Operations (kCHF)				Year
Group	Description	Ref.	Details	2011
Maintenance & Operations	Detector related costs	A.1.01	Magnet	30
		A.1.02	Magnet controls	142
		A.1.03	Magnet power supply	41
		A.1.04	Gas systems	260
		A.1.05	Gas consumption	550
		A.1.06	Cooling systems	331
		A.1.07	Cooling fluids(above –50°C)	220
		A.1.08	External cryogenics	375
		A.1.09	Cryogenic fluids (below –50°C)	40
		A.1.10	Moving/hydraulic systems	199
		A.1.11	Detector safety systems, BCM/BRM	291
		A.1.12	Shutdown activities	679
		A.1.13	General Technical support	640
		A.1.14	UPS maintenance	80
		A.1.16	Beam pipe & vacuum	181
		A.1.17	Counting & control rooms	152
		A.1.18	Safety	100
	Detector related costs Total			4,310
	Secretariat	A.2.01	Secretarial assistance	232
		A.2.02	Economat	15
		A.2.04	Printing and publication	50
	Secretariat Total			297
	Communications	A.3.01	GSM phones; on-call service	20
		A.3.02	Collaborative tools	262
	Communications Total			282
	On-line computing	A.4.01	System management	938
		A.4.02	Data storage, (temporary on disk)	461
		A.4.03	Detector controls	130
		A.4.04	Computers/processors/LANs	1,314
		A.4.05	Software licenses	0
	On-line computing Total			2,843
	Test beams, calibration facilities	A.5.01	General operation	41
		A.5.02	Common electronics	15
		A.5.03	Electronics pool rentals	20
		A.5.04	Gas systems	10
		A.5.05	Gas consumption	10
	Test beams, calibration facilities Total			96
	Laboratory operations	A.6.01	Assembly areas, clean rooms	600
		A.6.02	Workshops	293
	Laboratory operations Total			893
	General services	A.7.01	Cooling & ventilation	595
		A.7.03	Power distribution system	60
		A.7.04	Heavy transport	356
		A.7.05	Cranes	57
		A.7.06	Cars	41
		A.7.08	Survey	99
		A.7.09	Storage space	50
		A.7.10	Common desktop infrastructure	40
		A.7.11	Reviewing & engineering	350
		A.7.12	Outreach	222
	General services Total			1,870
	Core Computing Infrastructure & Services	A.9.01	Central computing environment	562
		A.9.02	Software process service	317
		A.9.03	User support	208
		A.9.04	Central production operations	806
		A.9.05	Hardware	70
	Core Computing Infrastructure & Services Total			1,964
Maintenance & Operations Total				12,553
Power	Electricity	A.8.01	Power Consumption	1,800
	Electricity Total			1,800
Power Total				1,800
Grand Total				14,353

ANNEX A.2

M & O Cat. A by Funding Agency

All Figures in kCHF

Funding Agency	Category A without Power Bill	Power Billed	Category A
Austria	199.3		199.3
Belgium-FNRS	144.9		144.9
Belgium-FWO	144.9		144.9
Brazil	154.0	22.1	176.0
Bulgaria	72.5		72.5
CERN	724.5		724.5
China	90.6	13.0	103.6
Colombia	27.2	3.9	31.1
Croatia	63.4	9.1	72.5
Cyprus	45.3	6.5	51.8
Egypt	27.2	3.9	31.1
Estonia	36.2	5.2	41.4
Finland	126.8		126.8
France-CEA	135.9		135.9
France-IN2P3	480.0		480.0
Germany-BMBF	543.4		543.4
Germany-DESY	353.2		353.2
Greece	135.9		135.9
Hungary	90.6		90.6
India	262.6	33.5	296.1
Iran	54.3	7.8	62.1
Ireland			
Italy	1566.8		1566.8
Korea	190.2	27.3	217.5
Mexico	99.6	14.3	113.9
New Zealand	18.1	2.6	20.7
Pakistan	18.1	2.6	20.7
Poland	135.9		135.9
Portugal	63.4		63.4
RDMS-DMS	190.2	27.3	217.5
RDMS-Russia	552.5	27.5	580.0
Serbia	27.2	3.9	31.1
Spain	443.8		443.8
Switzerland-ETHZ	172.1		172.1
Switzerland-PSI	90.6		90.6
Switzerland-UNIV	81.5		81.5
Taipei	135.9	19.5	155.3
Turkey	163.0	23.4	186.4
United Kingdom	507.2		507.2
USA-DOE	3215.2	430.5	3645.7
USA-DOE-NP	199.3	26.7	225.9
USA-NSF	751.7	100.6	852.4
USA-NSF-NP	18.1	2.4	20.5
Grand Total	**12,553**	**813**	**13,366**

ANNEX B.1

M & O Cat. B

Budget Request for the Year 2011 (kCHF or FTE)

Year	2011

Amount (kCHF/FTE)			Detector						
Description	Ref.	Details	Tracker	ECAL	HCAL	Muon	Trigger	Core Computing	Grand Total
Material Resources (kCHF)	B.1.01	Mechanics	40	25	140	10			215
	B.1.02	Gas-system	115	15	0	20			150
	B.1.03	Cryo-system			0	0			0
	B.1.04	Cooling system	250	90	0	0			340
	B.1.05	FE electronics		0	0	64			64
	B.1.06	Standard electronics, PS (LV, HV)	330	100	10	128			568
	B.1.07	Standard electronics, Crates		40	56	46			142
	B.1.08	Standard electronics, RO Modules	90	155	20	126	490		881
	B.1.09	Controls, (DCS, DSS)	110	85	27	35			257
	B.1.10	Sub-Detector Spares	0	0	4	38			42
	B.1.11	Areas	100	100	8	89			297
	B.1.12	Communications	20	10	64	43			137
	B.1.13	Store Items	60	50	16	41			167
	B.1.14	Hired Manpower @CERN	620	470	557	1,311	200		3,158
Material Resources (kCHF) Total			1,735	1,140	902	1,951	690		6,418
Human Resources (FTE)	B.2.01	Technical Manpower @CERN	0	0	0	0	8		8
	B.2.02	Core Computing Manpower @CMS						8	8
Human Resources (FTE) Total			0	0	0	0	8	8	16