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)

	F	
	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	,
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	
Korea	21	1.5%
Mexico	11	0.8%
New Zealand	2	0.3%
Pakistan	2	0.1%
Poland	15	1.1%
	-	
Portugal	7	0.5%
RDMS-DMS	21 61	1.5%
RDMS-Russia		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	Category A	Catagory R	Total	Total
Agency	Category A	Category B	Category A+B	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	13.0	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	007.0	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)

Group	Maintenanc	re & Oper	rations (kCHF)	Year
Group	Description	Ref.	Details	2011
		A.1.01	Magnet	30
Group		A.1.02	Magnet controls	142
		A.1.03	Magnet power supply	4
		A.1.04	Gas systems	26
		A.1.05	Gas consumption	55
		A.1.06	Cooling systems	33
		A.1.07	Cooling fluids(above –50°C)	22
	Detector related	A.1.08	External cryogenics	37.
	costs	A.1.09	Cryogenic fluids (below -50°C)	4
	COSES	A.1.10	Moving/hydraulic systems	19
		A.1.11	Detector safety systems, BCM/BRM	29
		A.1.12	Shutdown activities	67
		A.1.13	General Technical support	64
		A.1.14	UPS maintenance	8
		A.1.16	Beam pipe & vacuum	18
		A.1.17	Counting & control rooms	15
		A.1.18	Safety	10
		Detector	r related costs Total	4,31
		A.2.01	Secretarial assistance	23:
	Secretariat	A.2.02	Economat	1.
		A.2.04	Printing and publication	5
		Se	cretariat Total	29
	c · ··	A.3.01	GSM phones; on-call service	2
	Communications	A.3.02	Collaborative tools	26
			nunications Total	28
		A.4.01	System management	
	On-line	A.4.02	Data storage, (temporary on disk)	938
	computing	A.4.03	Detector controls	13
	computing	A.4.04	Computers/processors/LANs	1,31
		A.4.05	Software licenses	1,01
			e computing Total	2,84
Maintenance &		On mi	computing rotar	2,04
Operations	Test beams, calibration facilities	A.5.01	General operation	
•			_	4
		A.5.02	Common electronics	15
		A.5.03	Electronics pool rentals	20
		A.5.04	Gas systems	1
		A.5.05	Gas consumption	1
	Test		Gas consumption alibration facilities Total	
			alibration facilities Total	9
	Laboratory	A.6.01	Assembly areas, clean rooms	9
		beams, c	alibration facilities Total	60
	Laboratory	A.6.01 A.6.02	Assembly areas, clean rooms Workshops ory operations Total	19 60 29 89
	Laboratory	A.6.01 A.6.02	Assembly areas, clean rooms Workshops ory operations Total	90 600 290 890
	Laboratory	A.6.01 A.6.02 Laborato	Assembly areas, clean rooms Workshops ory operations Total Cooling & ventilation	90 600 290 890 590
	Laboratory	A.6.01 A.6.02 Laborato A.7.01	Assembly areas, clean rooms Workshops ory operations Total Cooling & ventilation Power distribution system	60
	Laboratory	A.6.01 A.6.02 Laborato A.7.01 A.7.03	Assembly areas, clean rooms Workshops ory operations Total Cooling & ventilation	90 600 293 893 593
	Laboratory operations	A.6.01 A.6.02 Laborato A.7.01 A.7.03 A.7.04	Alibration facilities Total Assembly areas, clean rooms Workshops ory operations Total Cooling & ventilation Power distribution system Heavy transport	9 60 29 89 59 6 35
	Laboratory	A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06	Assembly areas, clean rooms Workshops Ory operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars	9 60 29 89 59 6 35 5 4
	Laboratory operations	A.6.01 A.6.02 Laborato A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.08	Assembly areas, clean rooms Workshops Ory operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey	9 60 29 89 59 6 35 5 4
	Laboratory operations	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.08 A.7.09	Assembly areas, clean rooms Workshops bry operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space	9 60 29 89 59 6 35 5 4 9
	Laboratory operations	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.08 A.7.09 A.7.10	Assembly areas, clean rooms Workshops Ory operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure	9 60 29 89 59 6 35 5 4 9 5
	Laboratory operations	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.09 A.7.10 A.7.11	Assembly areas, clean rooms Workshops Ory operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering	9 60 29 89 59 6 35 5 4 9 5 4
	Laboratory operations	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.08 A.7.00 A.7.10 A.7.11 A.7.12	Assembly areas, clean rooms Workshops Ory operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering Outreach	9 60 29 89 59 6 35 5 4 9 5 4 35
	Laboratory operations	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.08 A.7.00 A.7.10 A.7.11 A.7.12	Assembly areas, clean rooms Workshops Ory operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering	9 60 29 89 59 6 35 5 4 9 5 4 35
	Laboratory operations	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.08 A.7.00 A.7.10 A.7.11 A.7.12	Assembly areas, clean rooms Workshops Ory operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering Outreach	9 60 29 89 59 6 35 5 4 9 5 4 35 22 1,87
	Laboratory operations General services	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.08 A.7.09 A.7.11 A.7.12 Gene	Assembly areas, clean rooms Workshops Ory operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering Outreach ral services Total Central computing environment	9 60 29 89 59 6 35 5 5 5 5 4 4 4 35 22 22 1,87
	Laboratory operations General services Core Computing	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.06 A.7.06 A.7.09 A.7.10 A.7.11 A.7.12 Gene	Assembly areas, clean rooms Workshops Dry operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering Outreach ral services Total	9 60 29 89 59 6 35 5 4 9 5
	Laboratory operations General services Core Computing Infrastructure &	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.09 A.7.10 A.7.11 A.7.12 Gene A.9.01 A.9.02	Assembly areas, clean rooms Workshops bry operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering Outreach ral services Total Central computing environment Software process service	9 60 29 89 59 6 35 5 5 5 5 4 4 4 35 22 22 1,87
	Laboratory operations General services Core Computing	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.08 A.7.09 A.7.11 A.7.12 Gene	Assembly areas, clean rooms Workshops Ory operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering Outreach ral services Total Central computing environment	9 60 29 89 59 6 35 5 5 5 4 4 35 22 1,87
	Laboratory operations General services Core Computing Infrastructure &	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.08 A.7.10 A.7.11 A.7.12 Gene A.9.01 A.9.02 A.9.03	Assembly areas, clean rooms Workshops Ory operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering Outreach ral services Total Central computing environment Software process service User support	9 60 299 899 66 355 55 44 99 55 222 1,87
	Laboratory operations General services Core Computing Infrastructure &	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.05 A.7.06 A.7.08 A.7.09 A.7.11 A.7.12 Gene A.9.01 A.9.02 A.9.03	Assembly areas, clean rooms Workshops Dry operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering Outreach ral services Total Central computing environment Software process service User support Central production operations	9 60 299 899 6 355 5 5 5 4 4 4 4 4 35 22 22 1,87
	Laboratory operations General services Core Computing Infrastructure & Services	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.09 A.7.10 A.7.11 A.7.12 Gene A.9.01 A.9.02 A.9.03 A.9.04 A.9.05	Assembly areas, clean rooms Workshops bry operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering Outreach ral services Total Central computing environment Software process service User support Central production operations Hardware	9 60 29 89 59 6 35 5 5 4 4 35 22 1,87 5 6 6 3 3 5 3 5 3 5 3 5 3 5 5 3 5 5 3 5 5 3 5 5 3 5 5 3 5 5 3 5 5 3 5 5 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
	Laboratory operations General services Core Computing Infrastructure & Services Core Core Core Core	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.09 A.7.10 A.7.11 A.7.12 Gene A.9.01 A.9.02 A.9.03 A.9.04 A.9.05 putting I	Assembly areas, clean rooms Workshops Dry operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering Outreach ral services Total Central computing environment Software process service User support Central production operations Hardware Infrastructure & Services Total	9 60 29 89 59 6 355 5 4 4 9 9 9 5 5 2 2 2 1,87 2 3 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2
	Core Computing Infrastructure & Services Core Core Computing Infrastructure of Services	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.08 A.7.09 A.7.10 A.7.11 A.7.12 Gene A.9.01 A.9.02 A.9.03 A.9.04 A.9.04 A.9.05 Doubling Ince & Op	Assembly areas, clean rooms Workshops Dry operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering Outreach ral services Total Central computing environment Software process service User support Central production operations Hardware Infrastructure & Services Total erations Total	9 60 29 89 59 6 35 5 4 4 35 22 1,87 5 6 31 20 80 7 1,96 12,55
Power	Laboratory operations General services Core Computing Infrastructure & Services Core Core Core Core	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.10 A.7.11 A.7.12 Gene A.9.01 A.9.02 A.9.03 A.9.04 A.9.05 Dece & Opp A.8.01	Assembly areas, clean rooms Workshops Ory operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering Outreach ral services Total Central computing environment Software process service User support Central production operations Hardware Infrastructure & Services Total erations Total Power Consumption	9 60 29 89 59 6 35 5 4 35 22 21,87 56 31 20 80 7 1,96 12,55; 1,80
Power	Core Computing Infrastructure & Services Core Com Maintenar Electricity	beams, c A.6.01 A.6.02 Laborate A.7.01 A.7.03 A.7.04 A.7.05 A.7.06 A.7.10 A.7.11 A.7.12 Gene A.9.01 A.9.02 A.9.03 A.9.04 A.9.05 Dece & Opp A.8.01	Assembly areas, clean rooms Workshops Dry operations Total Cooling & ventilation Power distribution system Heavy transport Cranes Cars Survey Storage space Common desktop infrastructure Reviewing & engineering Outreach ral services Total Central computing environment Software process service User support Central production operations Hardware Infrastructure & Services Total erations Total Power Consumption ectricity Total	99 600 299 899 60 355 55 44 99 355 222 1,87 566 31 200 800 71,966 12,555

ANNEX A.2

M & O Cat. A by Funding Agency

All Figures in kCHF

	Category A	Power	
	without	Billed	Category A
Funding Agency	Power Bill	Diffed	
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
	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
Material Resources	B.1.07	Standard electronics, Crates		40	56	46			142
(kCHF)	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
Mat	erial Res	sources (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
(FIE)	B.2.02	Core Computing Manpower @CMS						8	8
Hi	uman Re	sources (FTE) Total	0	0	0	0	8	8	16

ANNEX B.2

M&O Cat. B Cost Sharing by Funding Agency and Subsystem

Funding Agency	Tracker	ECAL	HCAL	Muon	Trigger
Austria	1.6%				10.5%
Belgium-FNRS	5.0%				
Belgium-FWO	5.0%		7.8%	1.7%	
Brazil					
Bulgaria				2.1%	
CERN	12.7%	21.9%		4.8%	6.4%
China				0.3%	
Colombia				0.3%	
Croatia		2.0%			
Cyprus		1.7%			
Egypt				0.5%	
Estonia					
Finland	4.5%				
France-CEA	,-	6.6%			
France-IN2P3	7.7%	10.1%			
Germany-BMBF	10.9%	, , ,		6.0%	
Germany-DESY	, , ,		3.3%		
Greece		4.4%	3.3%		
Hungary		,-	, .		
India		4.4%		0.7%	
Iran				, , ,	
Ireland					
Italy	22.0%	11.1%		19.6%	0.9%
Korea	,			2.1%	011 / 0
Mexico				,0	
New Zealand					
Pakistan				1.0%	
Poland				2.070	26.4%
Portugal		1.8%			2.2%
RDMS-DMS		1.070		1.0%	2.2/0
RDMS-Russia		2.7%		10.3%	
Serbia		1.3%		10.070	
Spain		1.070		6.2%	0.9%
Switzerland-ETHZ	1.3%	5.1%		0.270	0.570
Switzerland-PSI	3.3%	0.4%			
Switzerland-UNIV	2.3%	0.470			
Taipei	2.5/0	3.5%			
Turkey		3.370			
United Kingdom	5.8%	8.9%			8.6%
USA-DOE	13.6%	10.7%	60.6%	27.9%	32.7%
USA-DOE-NP	15.0/0	10.7 /0	5.9%	21.9/0	32.7 /0
USA-NSF	4.3%	3.4%	19.1%	15.5%	11.5%
USA-NSF-NP	4.3%	3.4/0	19.170	15.5%	11.5/0
	100.004	100.004	100.004	100.004	100.00
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%

All subsystems sharing by responsibility

ANNEX B.3

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

Estimated Costs Incurred in 2011 (kCHF)

Brazil 40.4 40.4 40.4 CERN 220.7 250.0 93.0 44.4 608.1 China 6.7 6.7 6.7 Colombia 6.7 6.7 6.7 Croatia 23.3 23.3 23.3 Cyprus 19.9 19.9 19.9 Egypt 10.1 10.1 10.1 Estonia 77.7 77.7 77.7 France-CEA 74.8 74.8 74.8 France-IN2P3 133.3 115.6 248.9	Funding Agency	Tracker	ECAL	HCAL	Muon	Trigger	Total
Belgium-FWO Brazil 87.4 70.0 33.6 191.0 Brazil 40.4 40.4 40.4 40.4 CERN 220.7 250.0 93.0 44.4 608.1 China 6.7 6.7 6.7 6.7 Colombia 6.7 6.7 6.7 6.7 Croatia 23.3 23.3 23.3 23.3 Cyprus 19.9 10.1 10.1 19.9 Egypt 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 <		28.3					
Brazil Bulgaria	Belgium-FNRS	87.4					87.4
Bulgaria 220.7 250.0 93.0 44.4 608.1 China 6.7 6.7 6.7 Colombia 23.3 23.3 23.3 Cyprus 19.9 10.1 10.1 Estonia 77.7 77.7 77.7 Finland 77.7 77.7 77.7 France-CEA 74.8 74.8 74.8 France-IN2P3 133.3 115.6 248.9 30.0 Germany-BMBF 189.8 116.2 306.0 30.0 Germany-DESY 30.0 13.5 63.5 Greece 49.8 30.0 79.8 Hungary 110.1 40.4 40.4 Italia 50.0 13.5 63.5 Iran 1181.3 5.9 896.0 Korea 40.4 40.4 40.4 Mexico 40.4 40.4 40.4 Poland 20.2 20.2 20.2 Poland 20.1 20	Belgium-FWO	87.4		70.0	33.6		191.0
CERN 220.7 250.0 93.0 44.4 608.1 China 6.7 6.7 6.7 6.7 Colombia 6.7 6.7 6.7 6.7 Croatia 23.3 23.3 23.3 23.3 Cyprus 19.9 10.1 10.1 10.1 Estonia 75.7 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 </td <td>Brazil</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Brazil						
China 6.7 6.7 6.7 Colombia 23.3 6.7 6.7 Croatia 23.3 19.9 19.9 19.9 Egypt 10.1 10.1 10.1 19.9 Estonia 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 77.7 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8	Bulgaria				40.4		40.4
Colombia 23.3 6.7 6.7 Croatia 23.3 19.9 19.9 Egypt 10.1 10.1 10.1 Estonia 77.7 74.8 74.8 74.8 Finland 77.7 74.8 74.8 74.8 France-CEA 74.8 116.2 306.0 306.0 Germany-BMBF 189.8 30.0 30.0 306.0 306.0 Germany-DESY 30.0 30.0 79.8 79.8 79.8 Hungary India 13.5 63.5 63.5 13.5 63.5 Iran Ireland 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3	CERN	220.7	250.0		93.0	44.4	608.1
Croatia Cyprus	China				6.7		6.7
Cyprus 19.9 10.1 19.9 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1 <	Colombia				6.7		6.7
Egypt	Croatia		23.3				23.3
Estonia Finland Finland Finland France-CEA France-IN2P3 Germany-BMBF Germany-DESY Greece Hungary India Iran Ireland Italy Mexico New Zealand Pakistan Poland Poland Portugal RDMS-DMS RDMS-Russia Serbia Serbia Spain Switzerland-ETHZ Switzerland-PSI Switzerland-UNIV System Syst	Cyprus		19.9				19.9
Finland 77.7 74.8 74.8 77.7 74.8 74.8 74.8 77.7 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 74.8 7	Egypt				10.1		10.1
France-CEA 74.8 74.8 74.8 248.9 France-IN2P3 133.3 115.6 30.0 30.0 30.0 30.0 30.0 30.0 30.0 79.8 30.0 79.8 74.8 74.8 74.8 248.9 30.0 30.0 30.0 30.0 30.0 30.0 30.0 79.8 30.0 79.8 74.8 30.0 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.0 79.2 79.2 79.2 79.2 79.2 79.2 79.2 79.2 79.2 79.2 79.2 79.2 </td <td>Estonia</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Estonia						
France-IN2P3 133.3 115.6 116.2 306.0 Germany-BMBF 189.8 30.0 30.0 30.0 Greece 49.8 30.0 79.8 Hungary India 50.0 13.5 63.5 Iran Ireland Italy 380.9 126.2 383.1 5.9 896.0 Korea 40.4 40.4 40.4 40.4 Mexico New Zealand 20.2 20.2 20.2 Poland 20.9 15.1 36.0 36.0 RDMS-DMS 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1	Finland	77.7					77.7
Germany-BMBF 189.8 30.0 306.0 306.0 30.0 30.0 30.0 30.0 30.0 79.8 30.0 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.8 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0 79.0	France-CEA		74.8				74.8
Germany-DESY Greece Hungary India Iral Ireland Italy Solution New Zealand Pakistan Poland Poland Portugal RDMS-DMS RUSA-BOEL Switzerland-PSI Switzerland-UNIV Taipei Turkey United Kingdom USA-DOE USA-DOE USA-DOE USA-NSF 1030.0 30.0 79.8 30.0 79.8 30.0 79.8 30.0 79.8 30.0 79.8 30.0 79.8 30.0 79.8 30.0 79.8 30.0 79.8 30.0 79.8 30.0 79.8 30.0 79.8 30.0 79.8 30.0 13.5 63.5 13.5 63.5 15.9 896.0 40.4 40.4 40.4 40.4 40.4 40.4 40.4 4		133.3	115.6				248.9
Greece Hungary India 50.0 13.5 63.5 Iran Ireland Italy 380.9 126.2 383.1 5.9 896.0 Korea 40.4 Mexico New Zealand Pakistan 20.9 Poland 20.1 RDMS-DMS RDMS-Russia 30.3 20.2 RDMS-Russia 30.3 200.2 Serbia Spain Switzerland-PSI 56.5 5.0 Switzerland-PSI 56.5 5.0 Switzerland-PSI 56.5 5.0 Switzerland-PSI 56.5 5.0 Switzerland-UNIV 39.8 Taipei 40.3 Turkey United Kingdom 100.6 101.0 USA-DOE USA-DOE 102.0 140.5 150.0 Sa.0 USA-DOE 103.0 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0	Germany-BMBF	189.8			116.2		306.0
Hungary India							
India 50.0 13.5 63.5 Iran 380.9 126.2 383.1 5.9 896.0 Korea 40.4 40.4 40.4 Mexico New Zealand 20.2 20.2 20.2 Poland 20.9 15.1 36.0 36.0 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.			49.8	30.0			79.8
Iran Ireland 380.9 126.2 383.1 5.9 896.0 Korea 40.4 40.4 40.4 Mexico 40.4 40.4 40.4 New Zealand 20.2 20.2 20.2 Poland 20.9 182.3 182.3 Portugal 20.9 20.1 20.1 RDMS-DMS 20.1 20.1 20.1 RDMS-Russia 30.3 200.2 230.5 Serbia 15.0 121.3 5.9 127.2 Switzerland-ETHZ 21.8 57.9 79.7 61.5 Switzerland-PSI 56.5 5.0 121.3 5.9 127.2 Switzerland-UNIV 39.8 39.8 39.8 39.8 Taipei 40.3 40.3 40.3 40.3 Turkey United Kingdom 100.6 101.0 59.2 260.8 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0							
Ireland Italy 380.9 126.2 383.1 5.9 896.0			50.0		13.5		63.5
Italy 380.9 126.2 383.1 5.9 896.0 Korea 40.4 40.4 40.4 Mexico 182.3 182.3 182.3 New Zealand 20.2 20.2 20.2 Poland 182.3 182.3 182.3 Portugal 20.9 15.1 36.0 RDMS-DMS 20.1 20.1 20.1 RDMS-Russia 30.3 200.2 230.5 Serbia 15.0 121.3 5.9 127.2 Switzerland-ETHZ 21.8 57.9 79.7 79.7 Switzerland-PSI 56.5 5.0 61.5 Switzerland-UNIV 39.8 39.8 40.3 Taipei 40.3 40.3 40.3 Turkey 101.0 59.2 260.8 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0	-						
Korea 40.4 40.4 40.4 Mexico 20.2 20.2 New Zealand 20.2 20.2 Poland 20.9 182.3 182.3 Portugal 20.9 15.1 36.0 RDMS-DMS 20.1 20.1 20.1 RDMS-Russia 30.3 200.2 230.5 Serbia 15.0 15.0 15.0 Spain 121.3 5.9 127.2 Switzerland-ETHZ 21.8 57.9 79.7 Switzerland-PSI 56.5 5.0 61.5 Switzerland-UNIV 39.8 39.8 Taipei 40.3 40.3 Turkey 59.2 260.8 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-DOE-NP 53.0 53.0 53.0 53.0 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0							
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New Zealand 20.2 20.2 Poland 20.9 182.3 182.3 Portugal 20.9 20.1 20.1 36.0 RDMS-DMS 20.1 20.1 20.1 20.1 RDMS-Russia 30.3 200.2 230.5 230.5 Serbia 15.0 15.0 15.0 15.0 Spain 57.9 79.7 79.7 Switzerland-ETHZ 21.8 57.9 79.7 Switzerland-PSI 56.5 5.0 61.5 Switzerland-UNIV 39.8 39.8 Taipei 40.3 40.3 Turkey 59.2 260.8 United Kingdom 100.6 101.0 59.2 260.8 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0					40.4		40.4
Pakistan 20.2 20.2 Poland 182.3 182.3 Portugal 20.9 15.1 36.0 RDMS-DMS 20.1 20.1 20.1 RDMS-Russia 30.3 200.2 230.5 Serbia 15.0 15.0 15.0 Spain 121.3 5.9 127.2 Switzerland-ETHZ 21.8 57.9 79.7 Switzerland-PSI 56.5 5.0 61.5 Switzerland-UNIV 39.8 39.8 Taipei 40.3 40.3 Turkey 59.2 260.8 United Kingdom 100.6 101.0 59.2 260.8 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0							
Poland 20.9 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 182.3 16.0 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.1 20.2 230.5 230.5 15.0 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5							
Portugal RDMS-DMS 20.9 20.1 36.0 RDMS-DMS 20.1 20.1 20.1 RDMS-Russia 30.3 200.2 230.5 Serbia 15.0 15.0 15.0 Spain 121.3 5.9 127.2 Switzerland-ETHZ 21.8 57.9 79.7 Switzerland-PSI 56.5 5.0 61.5 Switzerland-UNIV 39.8 39.8 39.8 Taipei 40.3 40.3 40.3 Turkey United Kingdom 100.6 101.0 59.2 260.8 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0					20.2	400.0	
RDMS-DMS 30.3 20.1 20.1 RDMS-Russia 30.3 200.2 230.5 Serbia 15.0 121.3 5.9 127.2 Spain 121.3 5.9 127.2 79.7 Switzerland-ETHZ 21.8 57.9 79.7 79.7 Switzerland-PSI 56.5 5.0 61.5 39.8 Switzerland-UNIV 39.8 40.3 40.3 40.3 Taipei 40.3 59.2 260.8 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-DOE-NP 53.0 53.0 53.0 53.0 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0			20.0				
RDMS-Russia 30.3 200.2 230.5 Serbia 15.0 121.3 5.9 127.2 Spain 121.3 5.9 127.2 79.7 Switzerland-ETHZ 21.8 57.9 79.7 79.7 Switzerland-PSI 56.5 5.0 61.5 39.8 Switzerland-UNIV 39.8 40.3 40.3 40.3 Taipei 40.3 59.2 260.8 Ush-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-DOE-NP 53.0 53.0 53.0 53.0 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0			20.9		20.1	15.1	
Serbia 15.0 15.0 15.0 Spain 121.3 5.9 127.2 Switzerland-ETHZ 21.8 57.9 79.7 Switzerland-PSI 56.5 5.0 61.5 Switzerland-UNIV 39.8 39.8 Taipei 40.3 40.3 Turkey 59.2 260.8 United Kingdom 100.6 101.0 59.2 260.8 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-DOE-NP 53.0 53.0 53.0 53.0 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0			20.2				
Spain 121.3 5.9 127.2 Switzerland-ETHZ 21.8 57.9 79.7 Switzerland-PSI 56.5 5.0 61.5 Switzerland-UNIV 39.8 40.3 39.8 Taipei 40.3 40.3 40.3 Turkey 59.2 260.8 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-DOE-NP 53.0 53.0 53.0 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0					200.2		
Switzerland-ETHZ 21.8 57.9 79.7 Switzerland-PSI 56.5 5.0 61.5 Switzerland-UNIV 39.8 39.8 39.8 Taipei 40.3 40.3 40.3 Turkey United Kingdom 100.6 101.0 59.2 260.8 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-DOE-NP 53.0 53.0 53.0 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0			15.0		101.0	F 0	
Switzerland-PSI 56.5 5.0 61.5 Switzerland-UNIV 39.8 39.8 Taipei 40.3 40.3 Turkey 100.6 101.0 59.2 260.8 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-DOE-NP 53.0 53.0 53.0 53.0 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0		21.0	E7 0		121.3	5.9	
Switzerland-UNIV 39.8 39.8 Taipei 40.3 40.3 Turkey 59.2 260.8 United Kingdom 100.6 101.0 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-DOE-NP 53.0 53.0 53.0 53.0 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0							
Taipei 40.3 40.3 40.3 40.3 40.3 40.3 Turkey United Kingdom 100.6 101.0 59.2 260.8 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-DOE-NP 53.0 53.0 53.0 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0			5.0				
Turkey 100.6 101.0 59.2 260.8 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-DOE-NP 53.0 53.0 53.0 53.0 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0		39.8	40.2				
United Kingdom 100.6 101.0 59.2 260.8 USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-DOE-NP 53.0 53.0 53.0 53.0 53.0 53.0 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0			40.3				40.3
USA-DOE 236.2 121.8 546.3 543.4 225.9 1,673.5 USA-DOE-NP 53.0 53.0 543.4 USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0		100.4	101.0			50.2	240 0
USA-DOE-NP USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0				546.2	542.4		
USA-NSF 74.6 38.5 172.5 302.3 79.1 667.0		230.2	121.0			223.9	,
		71.6	38 5			70 1	
0.071 1401 141		74.0	36.3	1/2.3	302.3	79.1	007.0
Grand Total 1,735 1,140 902 1,951 690 6,418		1.735	1.140	902	1,951	690	6,418

ANNEX I.A

M & O Cat. A Costs 2011-2014 (All Figures in kCHF)

	All Amounts in kCHF							
Group	Description	Ref.	Details	Type (1)	2011	2012	2013	2014
		A.1.01	Magnet	C	30	30	30	30
		A.1.02	Magnet controls	0	110	110	110	110
		A.1.02	Wagnet Controls	C	32	32	32	32
		A.1.03	Magnet power supply	0	21	21	21	21
		21.1.00	Magnet power suppry	С	20	20	20	20
		A.1.04	Gas systems	0	210	210	210	210
			<u> </u>	С	50	50	50	50
		A.1.05	Gas consumption	C	550	200	550	550
		A.1.06	Cooling systems	O C	281	196	196	196
		A.1.07	Cooling fluids(above –50°C)	C	50 220	30 220	30 160	30 160
				0	345	345	345	345
		A.1.08	External cryogenics	C	30	30	30	30
	D	A.1.09	Cryogenic fluids (below –50°C)	C	40	40	40	40
	Detector related costs			O	169	52	52	52
		A.1.10	Moving/hydraulic systems	C	30	30	30	30
		A.1.11	Datastan safatri aviatama PCM/PDM	0	201	52	52	52
		A.1.11	Detector safety systems, BCM/BRM	C	90	90	90	90
		A.1.12	Shutdown activities	0	659	552	258	258
		A.1.12	Stataowitactivities	C	20	20	20	20
		A.1.13	General Technical support	0	590	567	494	494
			**	C	50	50	50	50
		A.1.14	UPS maintenance	С	80	80	80	80
		A.1.16	Beam pipe & vacuum	O C	61	120	30	30
		-	* *	0	120 52	120 124	120 52	120 52
		A.1.17	Counting & control rooms	C	100	100	100	100
		A.1.18	Safety	C	100	100	100	100
	Detector related costs Total				4,310	3,590	3,350	3,350
		A.2.01	Secretarial assistance	0	232	232	232	232
	Secretariat	A.2.02	Economat	C	15	15	15	15
		A.2.04	Printing and publication	С	50	50	50	50
			297	297	297	297		
		A.3.01	GSM phones; on-call service	C	20	20	20	20
	Communications	A.3.02	Collaborative tools	0	162	0	0	0
				C	100	100	100	100
			nunications Total		282	120	120	120
		A.4.01	System management	0	938	980	980	980
Maintenance & Operations	0 1:	A.4.02 A.4.03	Data storage, (temporary on disk)	C	461 130	385 130	452 130	352 130
	On-line computing	A.4.03 A.4.04	Detector controls Computers/processors/LANs	C	1,314	4,396	2,648	1,504
		A.4.04 A.4.05	Software licenses	С			,	
				L	0	0	0	0
		On-line	e computing Total		2,843	5,891	4,210	2,966
		A.5.01	General operation	0	31	31	31	31
			•	С	10	10	10	10
_	Test beams, calibration facilities	A.5.02	Common electronics	С	15	15	15	15
		A.5.03 A.5.04	Electronics pool rentals	C	20 10	20	20 10	20 10
		A.5.04 A.5.05	Gas systems	C	10	10 10	10	10
			Gas consumption alibration facilities Total	L	96	96	96	96
				0	500	500	500	0
		A.6.01	Assembly areas, clean rooms	C	100	100	100	20
	Laboratory operations		•	0	263	277	196	196
		A.6.02	Workshops	C	30	30	30	30
		Laborato	ry operations Total	1	893	907	826	246
			• •		•			,

	All Am	ounts in kC	CHF		Year			
Group	Description	Ref.	Details	Type (1)	2011	2012	2013	2014
	-	A.7.01	Cooling & ventilation	0	326	326	326	326
		A.7.01	Cooling & ventulation	C	269	269	269	269
		A.7.03	Power distribution system	C	60	60	60	60
		A.7.04	Heavy transport	О	296	388	206	206
		-	, ,	C	60	60	60	60
		A.7.05	Cranes	C	57	35	35	35
		A.7.06	Cars	C	41	30	30	30
	General services	A.7.08	Survey	О	94	62	62	62
	General services		· · · · · · · · · · · · · · · · · · ·	C	5	5	5	5
		A.7.09	Storage space	C	50	50	50	50
		A.7.10	Common desktop infrastructure	C	40	40	40	40
		A.7.11	Reviewing & engineering	0	350	350	350	350
		A.7.12	Outreach	0	52	52	52	52
				С	170	170	170	170
			ral services Total		1,870	1,896	1,714	1,714
		A.9.01	Central computing environment	0	562	562	562	562
		A.9.02	Software process service	0	317	317	317	317
	ore Computing Infrastructure & Service	A.9.03	User support	0	208	208	208	208
		A.9.04	Central production operations	0	806	806	806	806
		A.9.05	Hardware	C	70	70	70	70
			nfrastructure & Services Total		1,964	1,964	1,964	1,964
	Maintenance & Operations Total 1						12,576	
Power			Electricity		1,800 1,800	1,800 1,800	1,800	1,800
	Power Total						1,800	1,800
	G	rand Total			14,353	16,560	14,376	12,552

O=Operation, manpower intensive C=Consumables (1)

ANNEX I.B

M& O Cat. B Costs 2011-2014 for all CMS Subdetectors

(Material Resources in kCHF, Human Resources in FTE)

A	Year					
Description	Detector	Subsystem	2011	2012	2013	2014
ŗ	Tracker	Pixel	190	190	190	190
	Tracker	SST	1,545	1,545	1,545	1,545
	Tracker '	Total	1,735	1,735	1,735	1,735
	ECA		1,140	1,140	1,140	1,140
	HCA		902	729	729	729
Material Resources		Barrel Alignment	93	73	73	73
Waterial Resources		Drift Tubes	484	484	484	484
	Muon	EMU	1,066	1,066	1,066	1,066
		LinkAlignment	39	19	19	19
		RPC	269	269	269	269
	Muon T	1,951 690	1,911			
	Trigger			690	690	690
M	aterial Resources Total		6,418	6,205	6,205	6,205
	Tracker	Pixel	0	0	0	0
		SST	0	0	0	0
	Tracker '	0	0	0	0	
	ECA		0	0	0	0
	HCA		0	0	0	0
		Barrel Alignment	0	0	0	0
Human Resources		Drift Tubes	0	0	0	0
	Muon	EMU	0	0	0	0
		LinkAlignment	0	0	0	0
		RPC	0	0	0	0
	Muon Total			0	0	0
	Trigge	er	8	8	8	8
	Core Com	puting	8	8	8	8
H	uman Resources Total		16	16	16	16