

# Draft Budget for CMS Maintenance & Operations in the Year 2010

## INTRODUCTION

This document summarizes the funding requirements for the payments that the CMS Collaboration plans to make in the year 2010 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 2009 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 2010" 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

With respect to the forecast for the year 2010 in the M&O Preliminary Draft Budget for the year 2010 (cf. CERN-RRB-2009-065) the present budget request has been reduced by 409 kCHF and amounts to a total of 13'711 kCHF.

A.3.02, Collaborative Tools, has been increased for the year 2010 and onwards by 250 kCHF to cover the operations costs of the EVO system or an alternative collaborative tool solution. EVO development has been funded by DOE and NSF. Its operation and maintenance shall now be funded by its users, mainly the LHC experiments.

A.4.01, System Management, has been re-profiled for the years 2010 and 2011 resulting in a budget decrease of 50 kCHF in 2010.

A.4.02, Data Storage, has been re-profiled resulting in a budget decrease of 93 kCHF in 2010.

A.4.04, Computers/Processors/LANs has been re-profiled by delaying CPU purchases. This has decreased the budget estimate for this item by 1'296 kCHF in 2010.

A.6.01, Assembly Areas, Clean Rooms, has been increased by 580 kCHF foreseen for costs related to surface facilities at Point 5 and in Building 904 in Preveessin (Engineering Integration Centre and Electronics and Electrical Integration Centre) aimed at concentrating all services for the operation of CMS in a minimum number of locations. The M&O-A budget increase is just part of the overall cost of this venture which would be financed in part by CERN as host lab, a few collaborating institutes and by M&O-B.

A.7.11, Reviewing & Engineering, has been increased by 200 kCHF following the recognized need for a DAQ-equipped Electronics and Electrical Integration Centre, which is part of the project mentioned above (under A.6.01).

The estimated manpower cost for A.9, Core Computing, in the year 2010 totals some 1'645 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.

For comparison, the M&O-A 2009 Budget was 12'208 kCHF (cf. CERN-RRB-2008-099).

Annex I.A gives the projected costs for M&O-A until 2013.

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

## **M&O CATEGORY B**

With respect to the forecast for the year 2010 in the Preliminary Draft Budget for M&O presented at the April 2009 RRB (cf. CERN-RRB-2009-065), the present budget request has increased from 5'910 kCHF to 6'027 kCHF, concentrated in the Muon RPC and HCAL areas.

HCAL has reviewed its foreseen expenses and includes for the first time M&O-B participation by the ZDC group. The material resources budget for 2010 totals 482 kCHF exclusive of budget for possible HO HPD and HF PMT replacements. Additional budget will be needed if it is decided to proceed with transducer replacements. All participating Funding Agencies contribute effort toward maintenance and operation of the detector as described in the Memoranda of Agreements (MoAs). Item B.2.01, Technical Manpower at CERN, is omitted from the HCAL M&O-B as this effort is included in the MoAs.

Annex I.B gives the projected costs for M&O-B until 2013.

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 2010 by responsibility for all subsystems.

### *Technical manpower*

The technical manpower required at CERN from the Institutes (item B.2.01 in Annex B.1) will be shared by responsibility for all subsystems.

## SUMMARY

The numbers given in this document are summarized in **Annex 2**. It should be noted that funds paid in 2010, which will not have been committed during 2010, will be reported to the April 2011 RRB and will be carried forward.

## ANNEXES

### **Budget Requirements for M&O in 2010**

**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 2010

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

**Annex B.1:** M&O Cat. B Budget Request 2010

**Annex B.2:** M&O Cat. B Budget Sharing 2010 by Funding Agency and Subsystem

**Annex B.3:** M&O Cat. B Estimated Costs Incurred in 2010 by Funding Agency and Subsystem

**Annex I.A:** Foreseen Cat. A Costs 2010-2013

**Annex I.B:** Foreseen Cat. B Costs 2010-2013

# 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](http://cms.cern.ch/iCMS/jsp/page.jsp?mode=cms&action=url&urlkey=CMS_DOCOFF)  
 (Count closed on September 30, 2009)

Institute FA	Data	
	PhD #	PhD %
Austria	21	1.5%
Belgium-FNRS	16	1.2%
Belgium-FWO	19	1.4%
Brazil	17	1.2%
Bulgaria	8	0.6%
CERN	75	5.5%
China	9	0.7%
Colombia	3	0.2%
Croatia	7	0.5%
Cyprus	3	0.2%
Estonia	5	0.4%
Finland	16	1.2%
France-CEA	17	1.2%
France-IN2P3	46	3.4%
Germany-BMBF	56	4.1%
Germany-DESY	34	2.5%
Greece	13	1.0%
Hungary	10	0.7%
India	25	1.8%
Iran	5	0.4%
Ireland	1	0.1%
Italy	180	13.2%
Korea	18	1.3%
Mexico	11	0.8%
New Zealand	3	0.2%
Pakistan	3	0.2%
Poland	12	0.9%
Portugal	8	0.6%
RDMS-DMS	20	1.5%
RDMS-Russia	59	4.3%
Serbia	3	0.2%
Spain	40	2.9%
Switzerland-ETHZ	17	1.2%
Switzerland-PSI	11	0.8%
Switzerland-UNIV	7	0.5%
Taipei	15	1.1%
Turkey	17	1.2%
United Kingdom	57	4.2%
USA-DOE	365	26.7%
USA-DOE-NP	20	1.5%
USA-NSF	92	6.7%
USA-NSF-NP	3	0.2%
Grand Total	1,367	100.0%

# ANNEX 2

## M&O Cat. A and B Costs by Funding Agency Payments expected in the Year 2010 (kCHF)

Funding Agency	Category A	Category B	Total Category A+B	Total Invoiced
Austria	183.0	100.8	283.8	183.0
Belgium-FNRS	139.4	88.8	228.2	139.4
Belgium-FWO	165.5	149.8	315.3	165.5
Brazil	170.5		170.5	170.5
Bulgaria	69.7	73.0	142.7	69.7
CERN	653.5	542.6	1,196.0	653.5
China	90.3	31.0	121.3	90.3
Colombia	30.1	21.0	51.1	30.1
Croatia	70.2	37.1	107.3	70.2
Cyprus	30.1	12.4	42.5	30.1
Estonia	50.1		50.1	50.1
Finland	139.4	78.9	218.3	139.4
France-CEA	148.1	105.1	253.2	148.1
France-IN2P3	400.8	246.6	647.4	400.8
Germany-BMBF	487.9	308.9	796.9	487.9
Germany-DESY	296.2	30.0	326.2	296.2
Greece	113.3	91.8	205.1	113.3
Hungary	87.1		87.1	87.1
India	247.1	82.6	329.7	247.1
Iran	50.1		50.1	50.1
Ireland	10.0		10.0	10.0
Italy	1,568.4	1,122.8	2,691.2	1,568.4
Korea	180.5	42.0	222.5	180.5
Mexico	110.3		110.3	110.3
New Zealand	30.1		30.1	30.1
Pakistan	30.1	31.0	61.1	30.1
Poland	104.6	182.3	286.9	104.6
Portugal	69.7	47.6	117.3	69.7
RDMS-DMS	200.6		200.6	200.6
RDMS-Russia	541.1	62.6	603.7	541.1
Serbia	30.1	18.5	48.6	30.1
Spain	348.5	104.2	452.7	348.5
Switzerland-ETHZ	148.1	149.4	297.5	148.1
Switzerland-PSI	95.8	82.3	178.1	95.8
Switzerland-UNIV	61.0	53.6	114.6	61.0
Taipei	150.4	55.6	206.1	150.4
Turkey	170.5		170.5	170.5
United Kingdom	496.6	288.0	784.6	496.6
USA-DOE	3,629.0	1,351.9	4,980.9	3,629.0
USA-DOE-NP	198.9	13.6	212.5	198.9
USA-NSF	914.7	426.9	1,341.6	914.7
USA-NSF-NP	29.8		29.8	29.8
<b>Grand Total</b>	<b>12,742</b>	<b>6,033</b>	<b>18,774</b>	<b>12,742</b>

# ANNEX A.1

## M & O Cat. A

### Budget Request for the Year 2010 (kCHF)

Maintenance & Operations (kCHF)				Year	
Group	Description	Ref.	Details	2010	
Maintenance & Operations	Detector related costs	A.1.01	Magnet	30	
		A.1.02	Magnet controls	142	
		A.1.03	Magnet power supply	40	
		A.1.04	Gas systems	260	
		A.1.05	Gas consumption	496	
		A.1.06	Cooling systems	220	
		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	80	
		A.1.11	Detector safety systems, BCM/BRM	180	
		A.1.12	Shutdown activities	410	
		A.1.13	General Technical support	600	
		A.1.14	UPS maintenance	80	
		A.1.16	Beam pipe & vacuum	240	
		A.1.17	Counting & control rooms	220	
		Detector related costs Total			
	Secretariat	A.2.01	Secretarial assistance		225
		A.2.02	Economat		15
		A.2.04	Printing and publication		50
	Secretariat Total				290
	Communications	A.3.01	GSM phones; on-call service		20
		A.3.02	Collaborative tools		350
	Communications Total				370
	On-line computing	A.4.01	System management		846
		A.4.02	Data storage, (temporary on disk)		282
		A.4.03	Detector controls		130
		A.4.04	Computers/processors/LANs		1,985
		A.4.05	Software licenses		0
	On-line computing Total				3,243
	Test beams, calibration facilities	A.5.01	General operation		40
		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				95
	Laboratory operations	A.6.01	Assembly areas, clean rooms		600
		A.6.02	Workshops		250
	Laboratory operations Total				850
	General services	A.7.01	Cooling & ventilation		595
		A.7.03	Power distribution system		60
		A.7.04	Heavy transport		340
		A.7.05	Cranes		35
A.7.06		Cars		30	
A.7.08		Survey		65	
A.7.09		Storage space		50	
A.7.10		Common desktop infrastructure		40	
A.7.11		Reviewing & engineering		350	
A.7.12		Outreach		220	
General services Total				1,785	
Core Computing Infrastructure & Services	A.9.01	Central computing environment		458	
	A.9.02	Software process service		220	
	A.9.03	User support		202	
	A.9.04	Central production operations		695	
	A.9.05	Hardware		70	
Core Computing Infrastructure & Services Total				1,645	
Maintenance & Operations Total				11,911	
Power	Electricity	A.8.01	Power Consumption	1,800	
	Electricity Total			1,800	
Power Total				1,800	
Grand Total				13,711	

# 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	183.0		183.0
Belgium-FNRS	139.4		139.4
Belgium-FWO	165.5		165.5
Brazil	148.1	22.4	170.5
Bulgaria	69.7		69.7
CERN	653.5		653.5
China	78.4	11.9	90.3
Colombia	26.1	4.0	30.1
Croatia	61.0	9.2	70.2
Cyprus	26.1	4.0	30.1
Estonia	43.6	6.6	50.1
Finland	139.4		139.4
France-CEA	148.1		148.1
France-IN2P3	400.8		400.8
Germany-BMBF	487.9		487.9
Germany-DESY	296.2		296.2
Greece	113.3		113.3
Hungary	87.1		87.1
India	217.8	29.3	247.1
Iran	43.6	6.6	50.1
Ireland	8.7	1.3	10.0
Italy	1568.4		1568.4
Korea	156.8	23.7	180.5
Mexico	95.8	14.5	110.3
New Zealand	26.1	4.0	30.1
Pakistan	26.1	4.0	30.1
Poland	104.6		104.6
Portugal	69.7		69.7
RDMS-DMS	174.3	26.3	200.6
RDMS-Russia	514.1	27.0	541.1
Serbia	26.1	4.0	30.1
Spain	348.5		348.5
Switzerland-ETHZ	148.1		148.1
Switzerland-PSI	95.8		95.8
Switzerland-UNIV	61.0		61.0
Taipei	130.7	19.8	150.4
Turkey	148.1	22.4	170.5
United Kingdom	496.6		496.6
USA-DOE	3180.3	448.8	3629.0
USA-DOE-NP	174.3	24.6	198.9
USA-NSF	801.6	113.1	914.7
USA-NSF-NP	26.1	3.7	29.8
<b>Grand Total</b>	<b>11,911</b>	<b>831</b>	<b>12,742</b>

# ANNEX B.1

## M & O Cat. B

### Budget Request for the Year 2010 (kCHF or FTE)

Year	2010
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Amount (kCHF/FTE)		Detector						Core Computing	Grand Total
Description	Ref.	Details	Tracker	ECAL	HCAL	Muon	Trigger		
Material Resources (kCHF)	B.1.01	Mechanics	30	28	90	10			158
	B.1.02	Gas-system	30	5	2	35			71
	B.1.03	Cryo-system			0				0
	B.1.04	Cooling system	250	35	0	5			290
	B.1.05	FE electronics	0	0	38	16			54
	B.1.06	Standard electronics, PS (LV, HV)	350	215	16	276			857
	B.1.07	Standard electronics, Crates	0	48	37	56			141
	B.1.08	Standard electronics, RO Modules	200	167	6	116	490		979
	B.1.09	Controls, (DCS, DSS)	80	100	27	55			262
	B.1.10	Sub-Detector Spares	0	210	1	25			236
	B.1.11	Areas	200	80	0	71			351
	B.1.12	Communications	25	21	83	15			144
	B.1.13	Store Items	60	60	15	63			197
	B.1.14	Hired Manpower @CERN	600	465	169	861	200		2,295
Material Resources (kCHF) Total			1,825	1,433	482	1,603	690		6,033
Human Resources (FTE)	B.2.01	Technical Manpower @CERN	8	10	0	7	8		33
	B.2.02	Core Computing Manpower @CMS						96	96
Human Resources (FTE) Total			8	10	0	7	8	96	129



# 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	4.9%				
Belgium-FWO	4.9%		6.2%	1.9%	
Brazil					
Bulgaria				4.6%	
CERN	12.3%	17.4%		1.5%	6.4%
China				1.9%	
Colombia				1.3%	
Croatia		2.6%			
Cyprus		0.9%			
Estonia					
Finland	4.3%				
France-CEA		7.3%			
France-IN2P3	7.4%	7.8%			
Germany-BMBF	10.6%			7.2%	
Germany-DESY			6.2%		
Greece		4.3%	6.2%		
Hungary					
India		3.6%		1.9%	
Iran					
Ireland					
Italy	25.6%	11.5%		30.2%	0.9%
Korea				2.6%	
Mexico					
New Zealand					
Pakistan				1.9%	
Poland					26.4%
Portugal		2.3%			2.2%
RDMS-DMS					
RDMS-Russia		4.4%			
Serbia		1.3%			
Spain				6.1%	0.9%
Switzerland-ETHZ	1.6%	8.4%			
Switzerland-PSI	4.2%	0.4%			
Switzerland-UNIV	2.9%				
Taipei		3.9%			
Turkey					
United Kingdom	5.6%	8.8%			8.6%
USA-DOE	10.8%	11.5%	59.7%	29.4%	33.6%
USA-DOE-NP			2.8%		
USA-NSF	3.4%	3.6%	18.8%	9.3%	10.6%
USA-NSF-NP					
<b>Grand Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

All subsystems sharing by responsibility

# ANNEX B.3

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

Estimated Costs Incurred in 2010 (kCHF)

Funding Agency	Tracker	ECAL	HCAL	Muon	Trigger	Total
Austria	28.7				72.2	100.8
Belgium-FNRS	88.8					88.8
Belgium-FWO	88.8		30.0	31.0		149.8
Brazil						
Bulgaria				73.0		73.0
CERN	224.1	250.0		24.0	44.4	542.6
China				31.0		31.0
Colombia				21.0		21.0
Croatia		37.1				37.1
Cyprus		12.4				12.4
Estonia						
Finland	78.9					78.9
France-CEA		105.1				105.1
France-IN2P3	135.4	111.3				246.6
Germany-BMBF	192.8			116.2		308.9
Germany-DESY			30.0			30.0
Greece		61.8	30.0			91.8
Hungary						
India		51.6		31.0		82.6
Iran						
Ireland						
Italy	468.0	164.3		484.6	5.9	1,122.8
Korea				42.0		42.0
Mexico						
New Zealand						
Pakistan				31.0		31.0
Poland					182.3	182.3
Portugal		32.5			15.1	47.6
RDMS-DMS						
RDMS-Russia		62.6				62.6
Serbia		18.5				18.5
Spain				98.3	5.9	104.2
Switzerland-ETHZ	29.4	120.0				149.4
Switzerland-PSI	76.1	6.2				82.3
Switzerland-UNIV	53.6					53.6
Taipei		55.6				55.6
Turkey						
United Kingdom	102.2	126.5			59.2	288.0
USA-DOE	196.3	165.3	287.4	471.2	231.7	1,351.9
USA-DOE-NP			13.6			13.6
USA-NSF	62.0	52.2	90.7	148.8	73.2	426.9
USA-NSF-NP						
<b>Grand Total</b>	<b>1,825</b>	<b>1,433</b>	<b>482</b>	<b>1,603</b>	<b>690</b>	<b>6,033</b>

# ANNEX I.A

## M & O Cat. A Costs 2010-2013 (All Figures in kCHF)

Group	Description	All Amounts in kCHF			Year			
		Ref.	Details	Type (1)	2010	2011	2012	2013
Maintenance & Operations	Detector related costs	A.1.01	Magnet	C	30	30	30	30
		A.1.02	Magnet controls	O	110	110	110	110
				C	32	32	32	32
		A.1.03	Magnet power supply	O	20	20	20	20
				C	20	20	20	20
		A.1.04	Gas systems	O	210	210	210	210
				C	50	50	50	50
		A.1.05	Gas consumption	C	496	496	496	496
		A.1.06	Cooling systems	O	190	190	190	190
				C	30	30	30	30
		A.1.07	Cooling fluids(above -50°C)	C	220	220	220	220
		A.1.08	External cryogenics	O	345	345	345	345
				C	30	30	30	30
		A.1.09	Cryogenic fluids (below -50°C)	C	40	40	40	40
		A.1.10	Moving/hydraulic systems	O	50	50	50	50
				C	30	30	30	30
		A.1.11	Detector safety systems, BCM/BRM	O	50	50	50	50
			C	130	90	90	90	
	A.1.12	Shutdown activities	O	390	390	390	390	
			C	20	20	20	20	
A.1.13	General Technical support	O	550	550	550	550		
		C	50	50	50	50		
A.1.14	UPS maintenance	C	80	80	80	80		
A.1.16	Beam pipe & vacuum	O	120	120	120	120		
		C	120	120	120	120		
A.1.17	Counting & control rooms	O	120	120	120	120		
		C	100	100	100	100		
Detector related costs Total					3,633	3,593	3,593	3,593
Secretariat	A.2.01	Secretarial assistance	O	225	225	225	225	
	A.2.02	Economat	C	15	15	15	15	
	A.2.04	Printing and publication	C	50	50	50	50	
Secretariat Total					290	290	290	290
Communications	A.3.01	GSM phones; on-call service	C	20	20	20	20	
	A.3.02	Collaborative tools	O	250	250	250	250	
		C	100	100	100	100		
Communications Total					370	370	370	370
On-line computing	A.4.01	System management	O	846	938	980	980	
	A.4.02	Data storage, (temporary on disk)	C	282	461	385	452	
	A.4.03	Detector controls	C	130	130	130	130	
	A.4.04	Computers /processors /LANs	C	1,985	3,262	4,022	3,319	
	A.4.05	Software licenses	C	0	0	0	0	
On-line computing Total					3,243	4,791	5,517	4,881
Test beams, calibration facilities	A.5.01	General operation	O	30	30	30	30	
			C	10	10	10	10	
	A.5.02	Common electronics	C	15	15	15	15	
	A.5.03	Electronics pool rentals	C	20	20	20	20	
	A.5.04	Gas systems	C	10	10	10	10	
		C	10	10	10	10		
Test beams, calibration facilities Total					95	95	95	95
Laboratory operations	A.6.01	Assembly areas, clean rooms	O	500	500	500	500	
			C	100	100	100	100	
	A.6.02	Workshops	O	220	220	220	220	
		C	30	30	30	30		
Laboratory operations Total					850	850	850	850

All Amounts in kCHF					Year			
Group	Description	Ref.	Details	Type (1)	2010	2011	2012	2013
General services	A.7.01		Cooling & ventilation	O	326	326	326	326
	A.7.03		Power distribution system	C	269	269	269	269
	A.7.04		Heavy transport	O	60	60	60	60
	A.7.05		Cranes	C	280	280	280	280
	A.7.06		Cars	C	60	60	60	60
	A.7.08		Survey	C	35	35	35	35
	A.7.09		Cars	C	30	30	30	30
	A.7.10		Storage space	O	60	60	60	60
	A.7.11		Common desktop infrastructure	C	5	5	5	5
	A.7.12		Reviewing & engineering	O	50	50	50	50
			Outreach	C	170	170	170	170
	General services Total					1,785	1,785	1,785
Core Computing Infrastructure & Services	A.9.01		Central computing environment	O	458	458	458	458
	A.9.02		Software process service	O	220	220	220	220
	A.9.03		User support	O	202	202	202	202
	A.9.04		Central production operations	O	695	695	695	695
	A.9.05		Hardware	C	70	70	70	70
Core Computing Infrastructure & Services Total					1,645	1,645	1,645	1,645
Maintenance & Operations Total					11,911	13,419	14,145	13,509
Power	Electricity				1,800	1,800	1,800	1,800
	Power Total				1,800	1,800	1,800	1,800
Grand Total					13,711	15,219	15,945	15,309

# ANNEX I.B

## M& O Cat. B Costs 2010-2013 for all CMS Subdetectors

(Material Resources in kCHF, Human Resources in FTE)

Amount (kCHF/FTE)			Year				
Description	Detector	Subsystem	2010	2011	2012	2013	
Material Resources	Tracker	Pixel	256	256	256	207	
		SST	1,569	1,569	1,569	1,278	
	Tracker Total		1,825	1,825	1,825	1,485	
	ECAL		1,433	1,343	1,343	1,343	
	HCAL		482	491	411	421	
	Muon	Barrel Alignment	Drift Tubes	24	59	39	39
			EMU	484	484	484	484
			LinkAlignment	620	620	620	620
			RPC	16	39	19	19
				459	328	328	328
Muon Total		1,603	1,530	1,490	1,490		
Trigger		690	690	690	690		
Material Resources Total			6,033	5,880	5,759	5,429	
Human Resources	Tracker	Pixel	2	2	2	2	
		SST	6	6	6	6	
	Tracker Total		8	8	8	8	
	ECAL		10	10	10	10	
	HCAL		0	0	0	0	
	Muon	Barrel Alignment	Drift Tubes	1	1	1	1
			EMU	0	0	0	0
			LinkAlignment	5	5	5	5
			RPC	1	1	1	1
				0	0	0	0
Muon Total		7	7	7	7		
Trigger		8	8	8	8		
Core Computing		96	96	96	96		
Human Resources Total			129	129	129	129	