



LHC Computing Grid

Status of Resources and Financial Plan

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Introduction

- This report discusses:
 - The common resources of LCG at CERN
 - For Phase 1 and 2
 - And a summary of computing capacities in WLCG Tier1s and Tier2s
- Details can be looked up in:
 - The written report (CERN-C-RRB-2005-105)
 - In Annex 6 of the WLCG MoU (CERN-C-RRB-2005-001/Rev.)
- Here I will concentrate on a few key numbers and the proposed materials budget for 2006





Phase 1 Contributions

Externally Funded LCG Personnel at CERN

Source of Funding	Personnel in FTE				SUM FTE	Cost kCHF	C-RRB7 SUM FTE
	2002	2003	2004	2005			
LCG Assoc. ¹	2.2	3.0	3.9	6.4	15.4	1560	12.9
France	2.6	5.9	5.4	4.5	18.4	2106	18.5
Germany ²	0.3	2.5	3.8	5.4	12.0	1466	10.9
Hungary	0.4	1.6	1.0	1.6	4.6	295	4.4
India ²				0.7	0.7	84	
Israel	2.0	2.2	2.3	0.8	7.3	575	7.4
Italy-INFN ²	1.4	6.8	8.4	13.0	29.5	3233	28.8
Portugal ²		2.1	0.9	1.6	4.6	455	3.6
Russia		1.9	3.0	4.4	9.3	1112	8.3
Spain	1.6	2.5	1.9	0.6	6.7	665	7.5
Sweden	0.6	1.1	1.5	0.7	3.9	257	4.4
Switzerland	0.5	1.8	1.6	1.2	5.1	612	5.1
Taipei ²	0.3	2.6	3.2	3.4	9.5	1135	8.6
UK-EPSC	0.8	1.0	0.2		2.0	227	2.0
UK-PPARC	10.9	24.0	22.6	13.9	71.4	9945	71.4
UK-EXP	1.7	1.7	0.5	0.1	4.0	482	4.1
USA	5.1	5.2	5.0	3.6	18.9	2266	20.0
SUM	30.3	65.7	65.2	61.9	223.1	26476	217.9

India ³	0.6	8.0	10.0	7.0	25.6
Russia ⁴		3.0	6.0	6.0	15.0



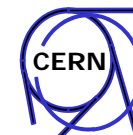


Phase 1 Contributions

Summary of External Funding - Materials at CERN

15/09/2005

Source of Funding	Materials in kCHF				SUM of Materials	Type of Funding ¹	C-RRB7 SUM Materials
	2002	2003	2004	2005			
Belgium		200	100	100	400	cash	400
Finland		50	50		100	cash	100
Germany	3742				3742	computing	3742
Italy-INFN		642	489	456	1587	cash	1537
Japan		190	101	100	391	in kind comp.	391
Spain		450	0	150	600	cash	600
Sweden		109	52		160	cash	160
Taipei		30			30	in kind comp.	30
UK-PPARC		1584		1271	2855	computing	2855
US-LHC			323		323	in kind comp.	323
Enterasys ²		85			85	in kind comp.	85
SUM comm.	3742	3340	1115	2077	10273		10223





Phase 1 Contributions

- Contributions of personnel to LCG Phase 1 at CERN finally reached 223 FTE-years, valued at 26.5 MCHF.
 - This is 33% of the total manpower for LCG-1 at CERN!
- Contributions to the LCG-1 materials at CERN summed up to 10.3 MCHF.
 - This corresponds to nearly half the materials expenditure for LCG-1 at CERN!
- Given these two impressive results, one can only conclude that the call for voluntary contributions for LCG Phase 1 was a full success.
 - The more so, as these contributions came on top of the large effort required to prepare the WLCG regional centres.

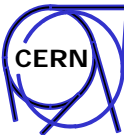
Many Thanks!





Financial Status at the End of Phase1

- LCG Phase 1 at CERN ends with a balanced budget, as already predicted in April.
- Details can be found in the written report.





Phase 2 Resources

- Since the last C-RRB a new Annex 6.6 has been added to the WLCG MoU:
 - Pledges by Funding Agencies for Common WLCG Resources at CERN
- Funding Agencies from Germany, India, Italy, Portugal and Taipei are at the moment listed in Annex 6.6 with resource pledges.
- Many thanks to these five! Funding Agencies not yet included in this list are encouraged to join!
- Latest news: Russia (FASI & JINR) is ready to pledge 3 FTE-years per year.





Regional Centre Capacities

- The next slide shows a summary of the current capacity planning of external Tier1s and Tier2s.
- Details for each contributing centre or federation and the numbers for Tier0 and CERN Analysis Facility are listed in Annex 6 of the MoU.
- The comparison between offered and required capacity is done for the year 2008, the first full year of LHC running.
- Requirements are taken from the Computing TDRs of the experiments.





Tier1/2 Summary Table

Tier-1 Planning for 2008		ALICE	ATLAS	CMS	LHCb	SUM 2008
CPU - MSI2K	Offered	6.7	22.7	12.5	4.4	46.3
	TDR Requirements	12.3	24.0	15.2	4.4	55.9
	Balance	-46%	-5%	-18%	-0%	-17%
Disk - PBytes	Offered	2.8	12.5	5.7	2.2	23.2
	TDR Requirements	7.4	14.4	7.0	2.4	31.2
	Balance	-62%	-13%	-18%	-10%	-25%
Tape - PBytes	Offered	3.2	9.1	8.1	1.9	22.3
	TDR Requirements	6.9	9.0	16.7	2.1	34.7
	Balance	-54%	1%	-51%	-9%	-36%

Includes current planning for all Tier-1 centres

Tier-2 Planning for 2008		ALICE	ATLAS	CMS	LHCb	SUM 2008
CPU - MSI2K	Offered	5.6	20.1	17.4	4.4	47.5
	TDR Requirements	14.4	19.9	19.3	7.7	61.3
	Balance	-61%	1%	-10%	-42%	-22%
Disk - PBytes	Offered	1.5	6.2	4.5	0.8	13
	TDR Requirements	3.5	8.7	4.9	0.023	17.1
	Balance	-58%	-29%	-8%	n/a	-24%
# Tier-2 federations - included(expected)		13 (14)	22 (29)	17 (20)	10 (11)	30 (39)

- 30 Tier2 centres have their data included in above table.
- 9 more centres plan to join as soon as possible.
 - They are listed in Table 6 of the written report.





Additional Tier2 Centres

- Australia and Romania have recently announced pledges.
- They are included in the summary table, but not yet in the MoU.

<i>Institution</i>	<i>Experiments served with priority</i>			
	<i>ALICE</i>	<i>ATLAS</i>	<i>CMS</i>	<i>LHCb</i>
Australia, Univ. of Melbourne		X		
Austria, UIBK, Innsbruck		X		
Belgium, Belgian Tier-2 Federation - UA - UCL - ULB - UMH - VUB			X	
Brazil, Brazilian Tier-2 Federation - CBPF - UERJ - UFRJ - UNESP		X	X	X
Canada, Canada East Tier-2 Federation		X		
Canada, Canada West Tier-2 Federation		X		
Germany, Freiburg Univ.		X		
Germany, Univ. Wuppertal		X		
Hungary, Hungarian Tier-2 Federation - KFKI, Budapest - SZTAKI, Budapest - Eotvos Univ., Budapest - Debrecen Univ.	X		X	
Israel, HEP-IL Federation - Technion, Haifa - Weizmann, Rehovot - Tel Aviv Univ.		X		
Romania, Romanian Tier-2 Federation - NIPNE - PUB - ISS - ICI - IIMT	X	X		





Phase 2 Materials Budget at CERN

- It was decided at the last C-RRB to allocate available funds with priority for personnel.
 - This balanced the LCG Phase 2 personnel budget at CERN.
- Major changes to the Phase 2 materials budget at CERN since April were:
 - Italy has increased its voluntary contribution to common WLCG resources at CERN (43.5 FTE-years during 2006 - 2008), reducing the required personnel costs at CERN by 1 MCHF, which will be available for the materials budget.
 - A shift of 3.7 MCHF materials budget from 2007 to 2006 was done to help the creation of a balanced budget for 2006.
- The next foil shows the proposed budget for 2006 with an outlook until 2008.
 - The 1 MCHF discussed above has not yet been included.





Materials Budget LCG Phase 2 in 2006 and Outlook until 2008

- Infrastructure and Tier0 spending corresponds fully to the original profile.
- CAF spending has been re-profiled by postponing purchases to 2007 and 2008, still leading to full CAF functionality in 2008.
- Cuts elsewhere in IT Dep. will cover the small negative balance in 2006.

Funding	2006	2007	2008	TOTAL
From CERN Budget				
- <i>Materials</i>	24.85	16.10	22.50	63.45
- Physics Operations	4.54	4.40	4.50	13.44
- Tier0 and CERN Analysis Facility	20.31	11.7	18	50.01
Contributions via Team Accounts				
- Material	0.13	0.13		0.26
Total Materials Funding	24.98	16.23	22.50	63.71

Planned Expenditure	2006	2006	2006	2006
- Physics Operations	4.54	4.40	4.50	13.44
- <i>Tier0 and CERN Analysis Facility</i>	20.80	20.90	24.25	65.95
- Basic Infrastructure	6.20	8.40	3.70	18.3
- Tier0	11.10	6.50	13.30	30.9
- CERN Analysis Facility	3.50	6.00	7.25	16.75
Total Materials Expenditure	25.34	25.30	28.75	79.39
Balance	-0.36	-9.07	-6.25	-15.68

