



LHC Computing Grid

Status of Resources and Financial Plan

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Introduction

- This report presents:
 - The progress in signing the WLCG MoU
 - Funding and expenditure for WLCG at CERN
 - With an outlook until 2011
 - Resource usage accounting for external Tier-1s and CERN
 - A summary of the revised computing capacity pledges
- Details can be looked up in:
 - The written report (CERN-RRB-2007-050)
 - In the WLCG MoU (CERN-C-RRB-2005-001/Rev.)
 - The LCG planning web pages:
<http://lcg.web.cern.ch/LCG/planning/planning.html>
 - Under: Current WLCG MoU Documents





Signing the WLCG MoU (1)

- Since October 2006 Tier-2 federations from Austria, Norway and Sweden have entered the MoU tables.
 - And the Italian federation is now split into 4, one for each experiment.
- Poland has signed the MoU and the Swiss signature should arrive any day now.
- Most of the remaining 6 signatures to be collected from member states are planned to be available soon, definitively before the October 2007 RRB.
 - These will include the signatures of the remaining two Tier-1s





Signing the WLCG MoU (2)

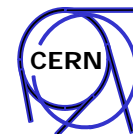
- Amongst the non-member states the SiGNET Tier-2 from Slovenia entered the MoU.
- Additional newcomers are the US Tier-2s SLAC and Great Lakes.
- The Slovenian and Australian signature are announced to arrive now. Signatures from JINR and Russia are then still missing.



Additional Tier-2 Centres

- The centres in the following table are planning to join the WLCG collaboration.
 - Austria and Slovenia moved into the MoU since Oct. 2006
 - And Korea joined the table with a Tier-2 for ALICE.
- Discussions are under way with a number of additional countries/funding-agencies: WLCG will continue to grow!

<i>Institution</i>	<i>Experiments served with priority</i>			
	<i>ALICE</i>	<i>ATLAS</i>	<i>CMS</i>	<i>LHCb</i>
Brazil, Brazilian Tier-2 Federation - CBPF - UERJ - UFRJ - UNESP	X	X	X	X
Canada, Canada East Tier-2 Federation		X		
Canada, Canada West Tier-2 Federation		X		
Estonia, NICPB, Tallinn			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		
Korea, KISTI, Daejeon	X			





LCG Phase 2 Budget at CERN

- The next slide shows funding and planned expenditure for Phase 2 of the LCG project at CERN in MCHF.
- The updated planning after the book closing of 2006 arrives now at an overall positive materials balance for LCG Phase 2 at CERN.
- It should be noted that the LCG personnel planning at CERN assumes that a successor project to EGEE II delivers 14 FTE to Grid Deployment.



	2005	2006	2007	2008	TOTAL
Total					
- Personnel	1.519	19.832	22.545	19.615	63.511
- Materials	1.752	21.315	15.401	30.155	68.623
Total Funding	3.271	41.147	37.946	49.770	132.134

Expenditure					
- Personnel **	1.519	19.832	22.545	19.615	63.511
- Materials	1.752	21.315	15.627	29.240	67.934
- Physics Operations		5.009	4.877	5.040	14.926
- Tier 0 and CERN Analysis Facility	1.752	16.306	10.750	24.200	53.008
Total Planned Expenditure	3.271	41.147	38.172	48.855	131.445

Balance Personnel	0.000	0.000	0.000	0.000	0.000
Balance Materials	0.000	0.000	-0.226	0.915	0.689
Balance	0.000	0.000	-0.226	0.915	0.689





LCG Budget Estimates '09-'11

- The next slide shows funding and planned expenditure for the first three years of M&O of WLCG at CERN in MCHF.
- In 2010 a negative materials balance will lead to a small (~6%) cut in CERN's resource pledges.
- The overall materials balance from 2009 to 2011 is expected to be around -8% of the materials requirements in this period.
- It should be noted again that the LCG personnel planning at CERN assumes that external funding of ~14 FTE for Grid Deployment will be obtained.
 - The current assumption is that this will be contributed by the European Grid Initiative.





	2009	2010	2011	TOTAL
Total				
- Personnel	16.2	16.4	15.1	47.6
- Materials	23.3	22.7	22.7	68.6
Total Funding	39.5	39.0	37.8	116.3

Expenditure				
- Personnel	16.2	16.4	15.1	47.6
- Materials	21.8	27.5	25.4	74.7
Total Planned Expenditure	38.0	43.9	40.5	122.3

Balance Personnel	0.0	0.0	0.0	0.0
Balance Materials	1.5	-4.9	-2.8	-6.1
Balance	1.5	-4.9	-2.8	-6.1



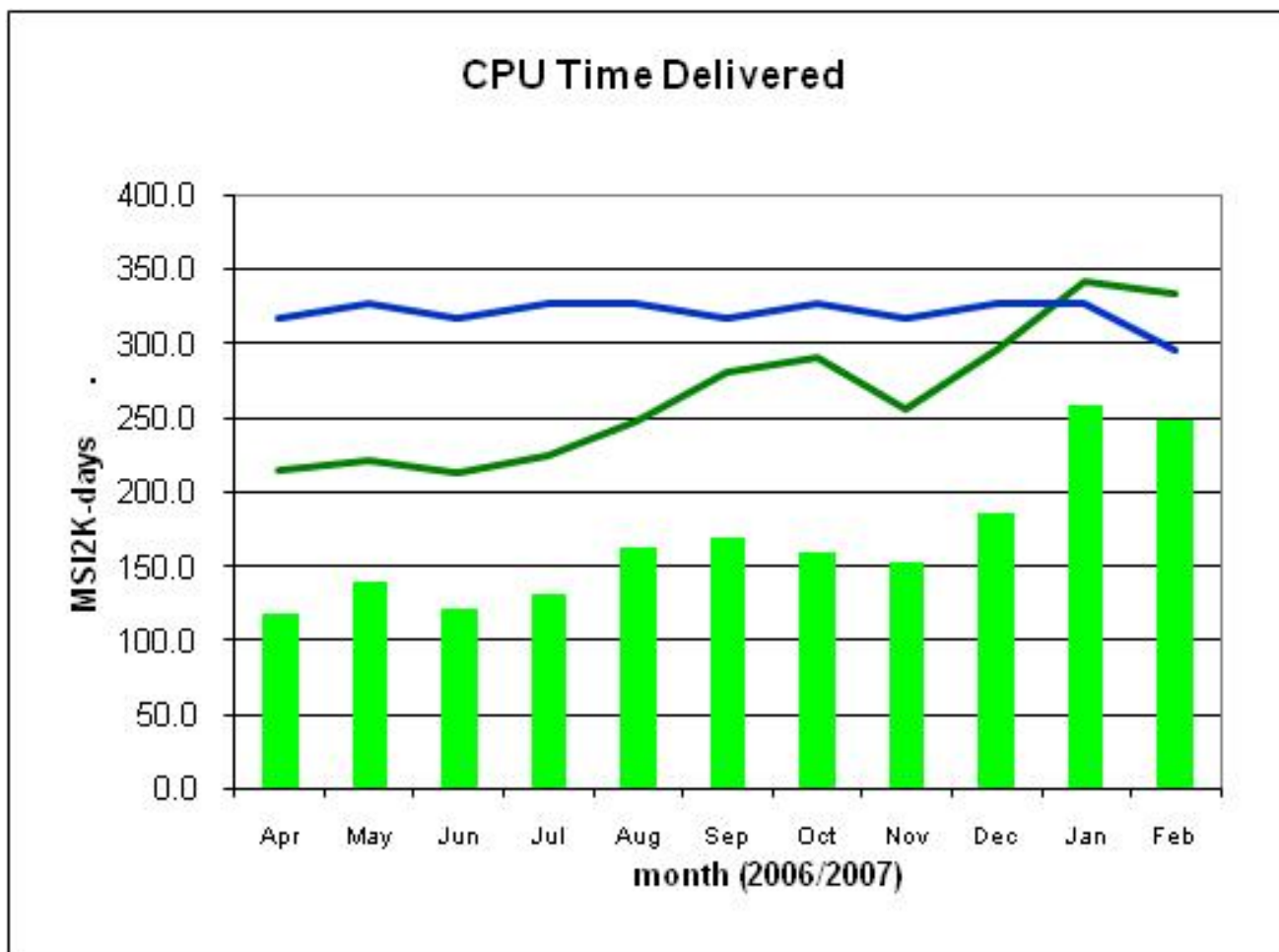
Accounting for Tier-1s and CERN

- The graphs on the following slides show a summary of CPU Time, Disk and Tape Storage accounting from April 2006 to February 2007.
 - Summing up all external Tier-1s and CERN.
- The green lines give the installed capacity, the blue ones the pledged capacities.
- The green bars show the usage of the resource, summing up all four experiments.
- Tier-2 accounting is planned to be reported for the first time to the October 2007 C-RRB.





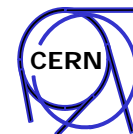
CPU Time Delivered

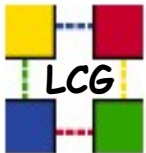


installed capacity (inc. efficiency factor)

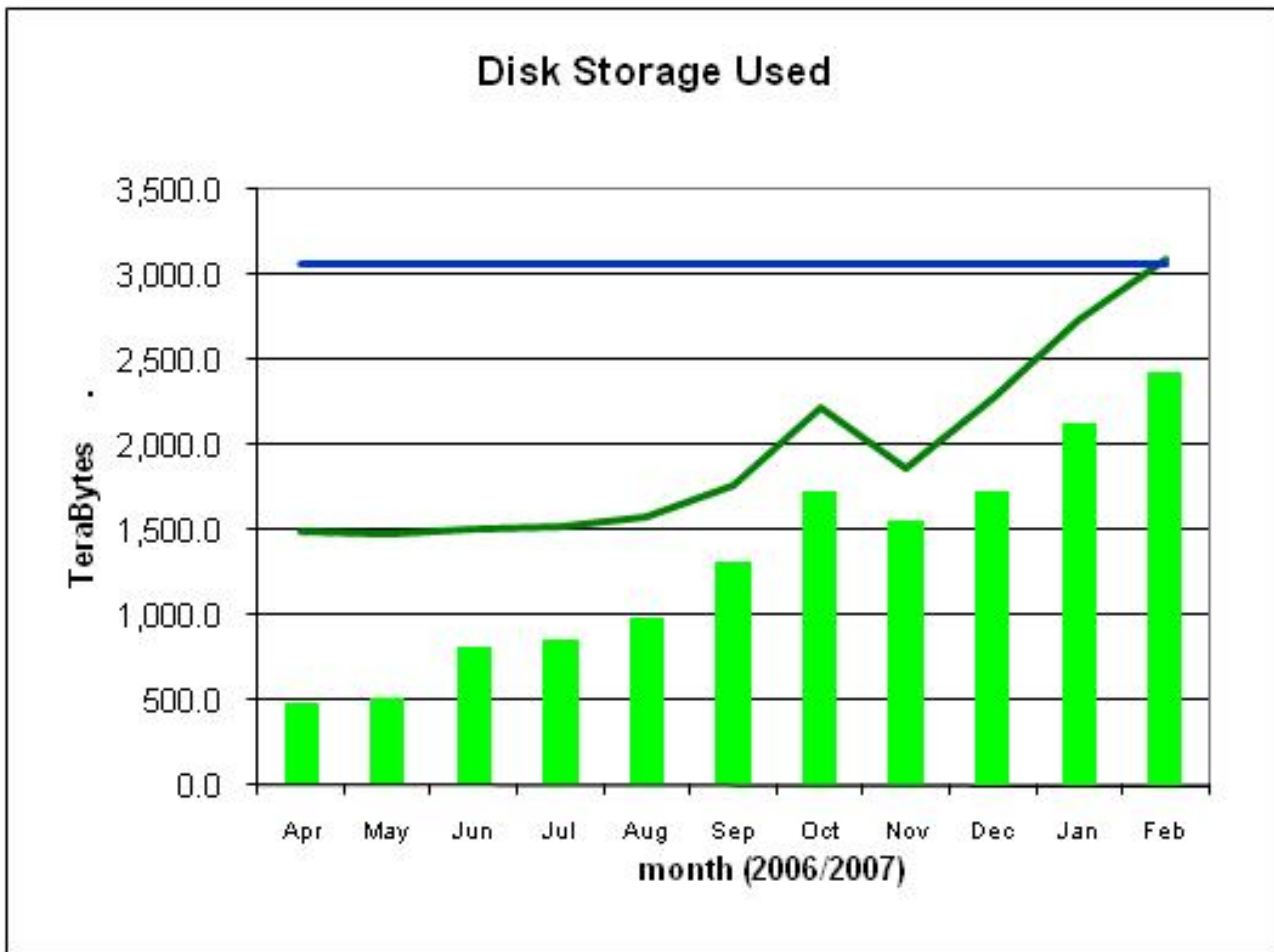


MoU commitment (inc. efficiency factor)





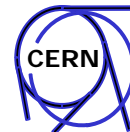
Disk Storage Used



installed capacity (inc. efficiency factor)

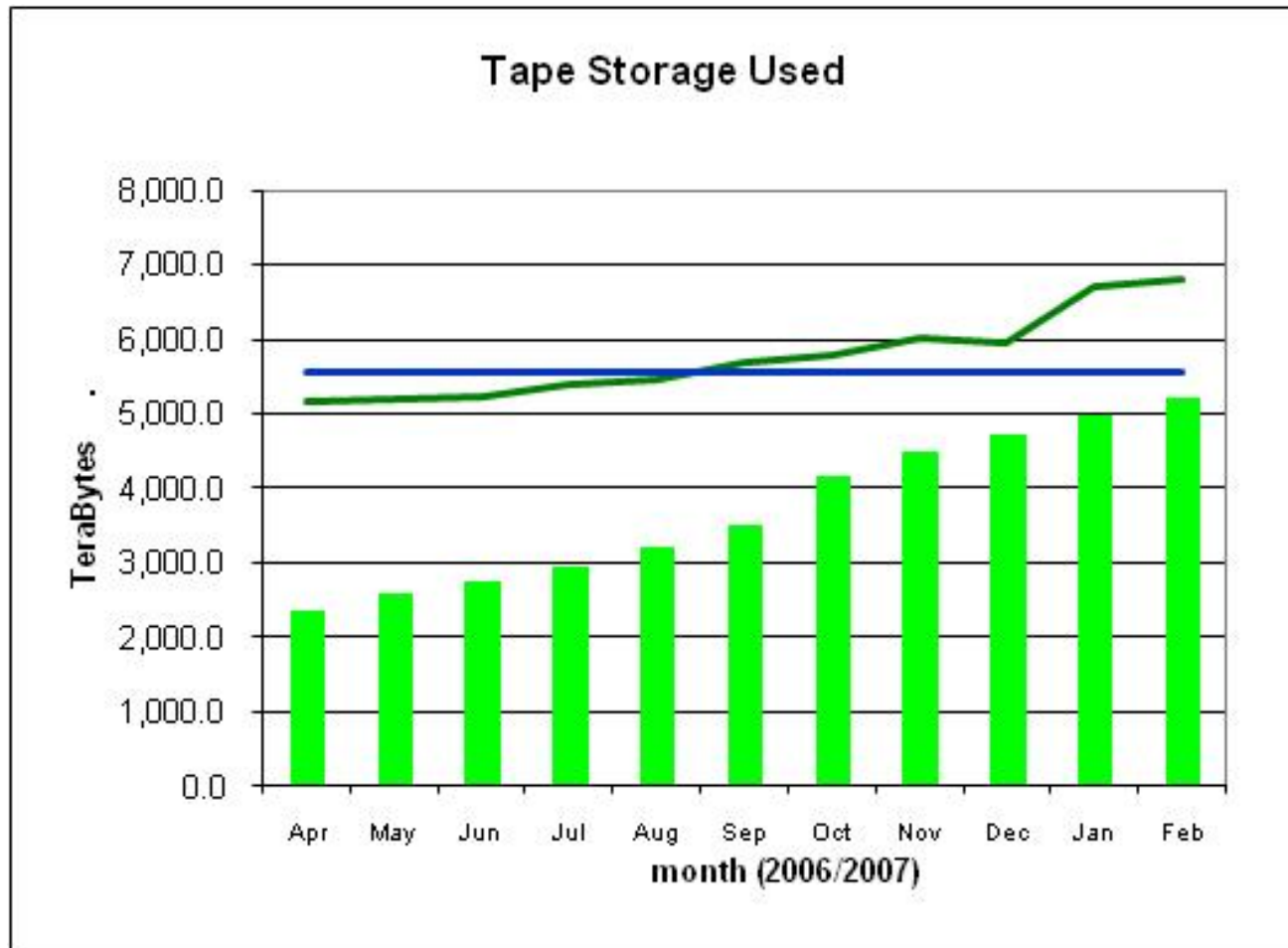


MoU commitment (inc. efficiency factor)

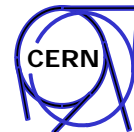




Tape Storage Used



installed capacity (inc. efficiency factor)
MoU commitment (inc. efficiency factor)





Accounting for Tier-1s and CERN

- The graphs show that installed capacities are now reaching or even exceeding the pledge values.
- Overall usage of the resources is rising steadily, attaining ~75% towards the end of the reporting period.
- The dip in installed capacity for CPU and Disk in November 2006 is due to the allocation of a large portion of CERN resources to an ATLAS on-line test for this month.



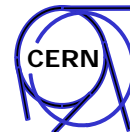


Revised Capacity Pledges

- The October 2006 C-RRB decided that all Funding Agencies should update their pledges for the years 2007 to 2011 in time for the April 2007 C-RRB.
 - Adding a strong plea not to reduce overall investments, but to re-profile them to cover better the experiments' requirements.
- 60 out of 64 centres/federations delivered these updates in time, producing the following result:

Changes Oct. 2006 - Apr. 2007 Tier1s				
	2007	2008	2009	2010
CPU Pledges	-13%	-8%	-7%	0%
Disk Pledges	-12%	-6%	3%	9%
Tape Pledges	-14%	-6%	5%	13%

Changes Oct. 2006 - Apr. 2007 Tier2s				
	2007	2008	2009	2010
CPU Pledges	-11%	-6%	-1%	12%
Disk Pledges	-25%	-5%	7%	20%





Revised Capacity Pledges (2)

- The figures of the last slide give a clear message:
- A big majority of the Funding Agencies have opted for not reducing their overall pledge by shifting what has been reduced in the years 2007 and 2008 into increases in the years 2009 and 2010.
 - A large number of centres has no new figures for 2011 as most experiments had not given new requirement numbers for 2011 in last October, making it difficult to quote new figures for this year.
- The next slide shows the effect for the reference year 2008 of changing from old requirements and pledges to the new ones.
- The overall improvement is very encouraging, but it is also obvious that not all experiments are now without resource problems.



Summary of Regional Centre Capacities for 2008 Comparison October 2006 - April 2007

Tier-1 Planning for 2008

		ALICE	ATLAS	CMS	LHCb	SUM 2008
CPU - MSI2K	Balance Oct. 2006	-45%	-0%	-21%	13%	-15%
	Balance Apr. 2007	-36%	21%	-6%	115%	3%
Disk - PBytes	Balance Oct. 2006	-63%	-9%	-18%	2%	-23%
	Balance Apr. 2007	-48%	24%	-2%	96%	3%
Tape - PBytes	Balance Oct. 2006	-55%	-0%	-42%	-9%	-32%
	Balance Apr. 2007	-53%	6%	-30%	67%	-23%

Tier-2 Planning for 2008

		ALICE	ATLAS	CMS	LHCb	SUM 2008
CPU - MSI2K	Balance Oct. 2006	-58%	-2%	2%	-51%	-20%
	Balance Apr. 2007	-41%	2%	12%	-21%	-6%
Disk - PBytes	Balance Oct. 2006	-59%	-32%	2%	n/a	-24%
	Balance Apr. 2007	-46%	-26%	1%	n/a	-20%





Revised Capacity Pledges (3)

- Please be aware that we expect updated requirements from the experiments by 1 July 2007.
- These and the "normal" necessity to shift the WLCG pledges forward by one year (firm pledges for 2008, planned pledges until 2012) before the C-RRB of October 2007 will have us restart a new campaign of pledge updates in late summer 2007.