



# LHC Computing Grid

## Status of Resources and Financial Plan

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11th November 2008



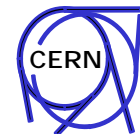


# Agenda

- Progress in signing the WLCG MoU
- Funding and expenditure for WLCG at CERN
  - 2005-2008
  - 2009-2012
- Resource usage accounting
  - for external Tier-1s and CERN
  - for Tier-2s
- Computing Resource Pledges
  - Reminder of Responsibilities
  - 2009 including split across experiments
  - 2010-2013 summary
- Conclusions

Supporting information can be found in:

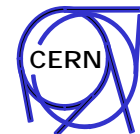
- Written report (CERN-RRB-2008-104)
- WLCG web pages: [Lcg.web.cern.ch/LCG](http://Lcg.web.cern.ch/LCG)





# WLCG MoU Signature Status

- Since the April 2008 C-RRB the Czech Republic has signed the WLCG MoU as a Tier-2 supporting ALICE and ATLAS
- All Tier-1s have now signed
- All of the Tier-2s have signed except Austria
  - Signature expected before mid November 2008
- A new MoU will be signed on 11/11/08 with Korea as a Tier-2 supporting CMS
- Brazil is still planning to sign the MoU as a Tier-2 supporting all 4 experiments
  - Letter sent by J. Engelen in June 2008
  - WLCG MoU wording and future commitment being examined by their legal experts





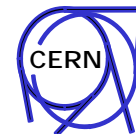
# Funding and Expenditure for WLCG at CERN





# WLCG Budget Estimates in MCHF 2005-2008

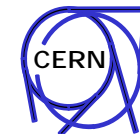
	2005	2006	2007	2008	TOTAL
<b>Funding</b>					
- Personnel	1.5	19.8	21.1	20.0	62.4
- Materials	1.8	21.3	18.6	27.6	69.3
<b>Total Funding</b>	<b>3.3</b>	<b>41.1</b>	<b>39.7</b>	<b>47.5</b>	<b>131.7</b>
<b>Expenditure</b>					
- Personnel **	1.5	19.8	21.1	19.8	62.3
- Materials	1.8	21.3	18.6	26.3	68.0
- <i>Physics Operations</i>		5.0	5.1	4.7	14.9
- <i>Tier 0 and CERN Analysis Facility</i>	1.8	16.3	13.5	21.6	53.1
<b>Total Planned Expenditure</b>	<b>3.3</b>	<b>41.1</b>	<b>39.7</b>	<b>46.1</b>	<b>130.3</b>
<b>Balance Personnel</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.1</b>	<b>0.1</b>
<b>Balance Materials</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>1.2</b>	<b>1.3</b>
<b>Balance</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>1.3</b>	<b>1.4</b>





# WLCG Budget Estimates in MCHF 2009-2012

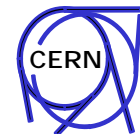
	2009	2010	2011	2012	TOTAL
<b>Funding</b>					
- Personnel	14.8	15.6	13.9	13.8	58.1
- Materials	23.8	22.5	22.5	22.5	91.3
<b>Total Funding</b>	<b>38.6</b>	<b>38.1</b>	<b>36.4</b>	<b>36.3</b>	<b>149.4</b>
<b>Expenditure</b>					
- Personnel **	15.6	15.6	14.2	13.7	59.1
- Materials	23.7	22.1	22.7	21.6	90.1
<b>Total Planned Expenditure</b>	<b>39.2</b>	<b>37.7</b>	<b>36.9</b>	<b>35.3</b>	<b>149.2</b>
<b>Balance Personnel</b>	<b>-0.8</b>	<b>0.0</b>	<b>-0.4</b>	<b>0.1</b>	<b>-1.0</b>
<b>Balance Materials</b>	<b>0.1</b>	<b>0.4</b>	<b>-0.2</b>	<b>0.9</b>	<b>1.3</b>
<b>Balance</b>	<b>-0.6</b>	<b>0.4</b>	<b>-0.5</b>	<b>1.0</b>	<b>0.2</b>





# WLCG Budget Estimates 2005-2012

- Slides 5 & 6 show CERN funding and planned expenditure for 2005-2008 (WLCG Phase 2) and 2009-2012 of the WLCG project at CERN in MCHF
- EGEE3 (May 2008 to end April 2010 ) funds personnel (14 FTE) working on Grid Deployment activities
- The current estimate at the end of Phase 2 is 1.4 MCHF. The final figure will be confirmed at the April C-RRB after 2008 bookclosing
- The future estimated materials expenditure includes:
  - Procurements to satisfy the requirements data from the experiments up to 2012
  - an allowance for adapting the CERN infrastructure to the power and cooling requirements





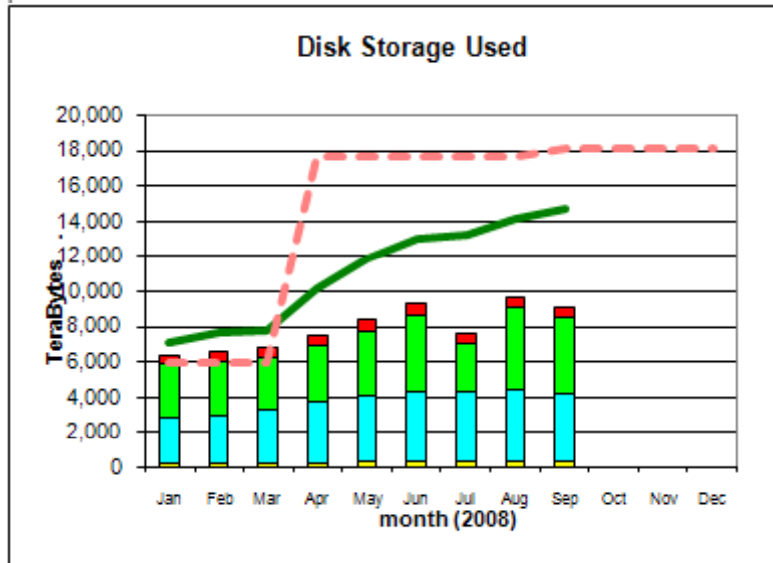
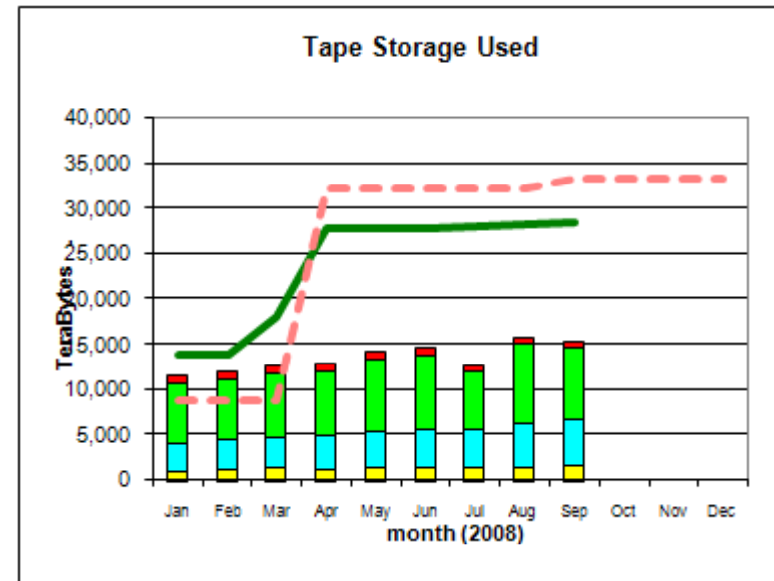
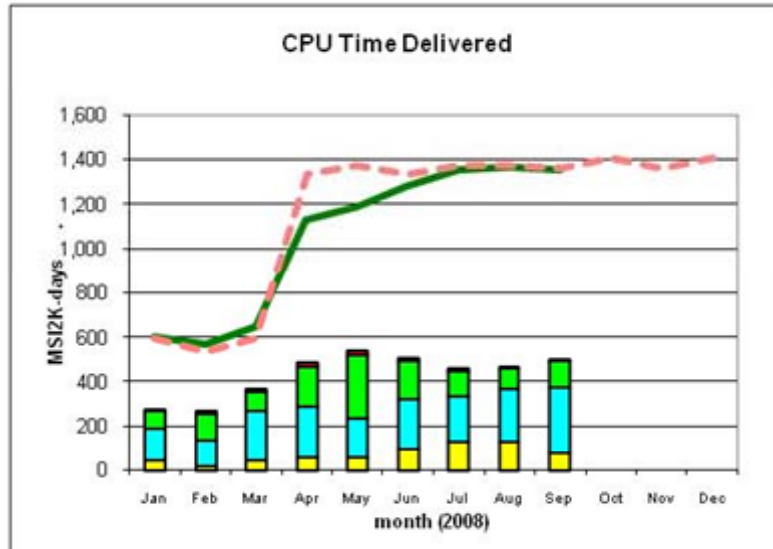
# Tier-1 and Tier-2 Resource Accounting



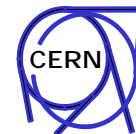




# CERN and Tier-1 Accounting January-September 2008



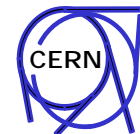
ALICE		CMS	
ATLAS		LHCb	
installed capacity (inc. efficiency factor)			
MoU commitment (inc. efficiency factor)			





# Accounting for and CERN and the Tier-1s

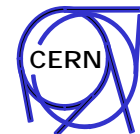
- Tier-1 reporting started in 2006. Monthly & annual reports available on WLCG website
- The graphs on slide 9 show a summary of CPU, Disk and Tape Storage accounting for January - September 2008 for CERN and the Tier-1s
  - green line indicates installed capacity
  - pink dotted line indicates the pledged capacities
  - bars show the usage of the resource, colour-coded for each of the four experiments
- 2008 pledges started in April 2008 explaining the rise in pledge values from April onwards
- In April it was announced that most Tier-1s will have their CPU pledges in place for May 2008, whereas disk and tape pledges will only be available later in the year (delays mainly due to procurement timescale, late delivery or delivery of faulty equipment) - the graphs confirm this





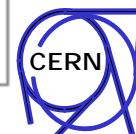
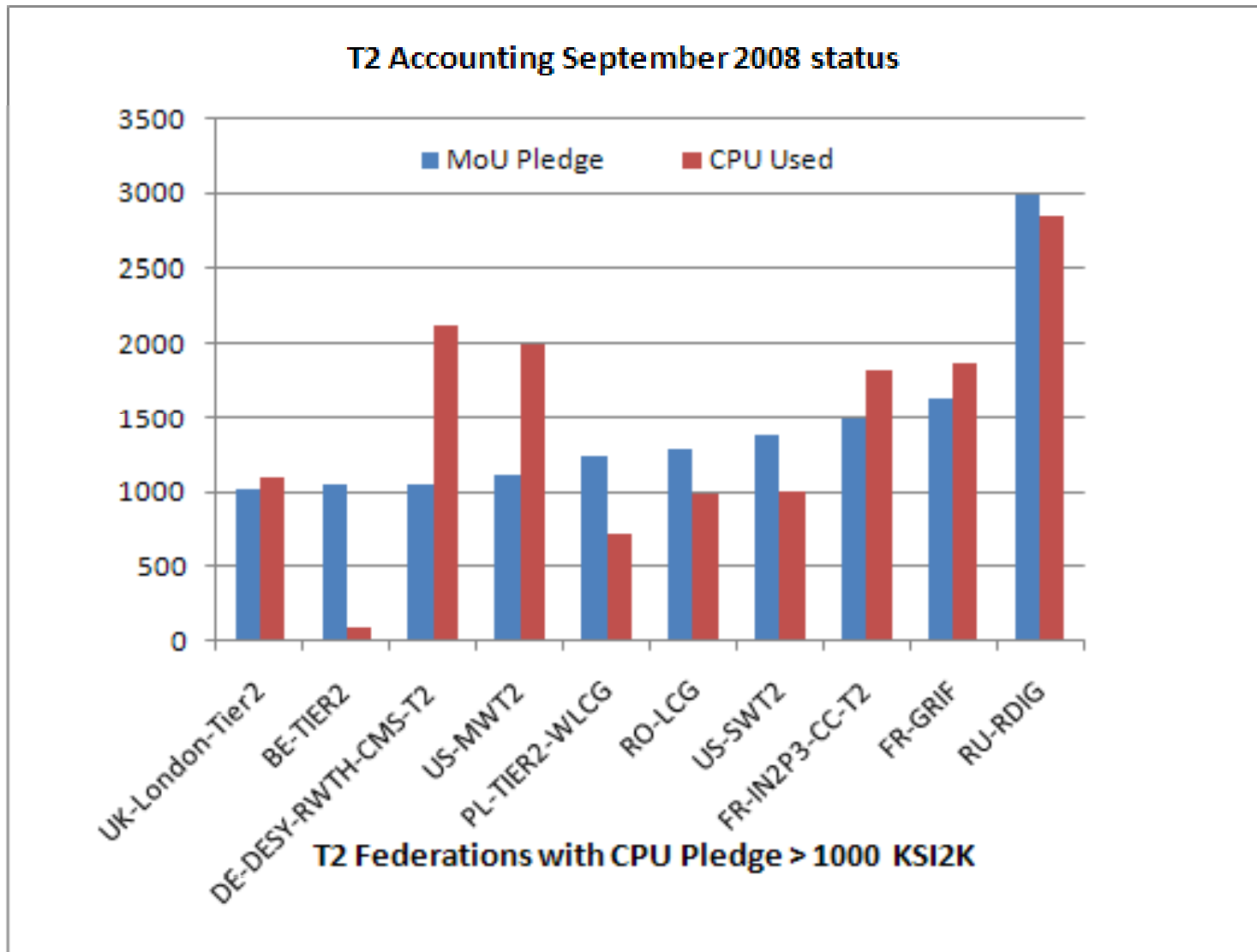
# Accounting for Tier-2s (1)

- Test reporting took place in summer 2007 and formal reporting started from September 2007
- Monthly reports are now produced, circulated for comment and published on the LCG Project Planning website
- Currently most of the 60 Tier-2 Federations are reporting accounting data over a total of 112 sites:
  - Changes still being signaled for site names therefore situation not yet fully stable
  - Follow-up required with Ukraine to include them in the accounting reporting
  - Enhancements are currently under discussion to improve and harmonise the accounting reports including automatic installed capacity for Tier-2s
- Slides 12 and 13 show the comparison of MoU pledge with CPU used in September 2008 according to size of pledge as a snapshot of the recent Tier-2 accounting status



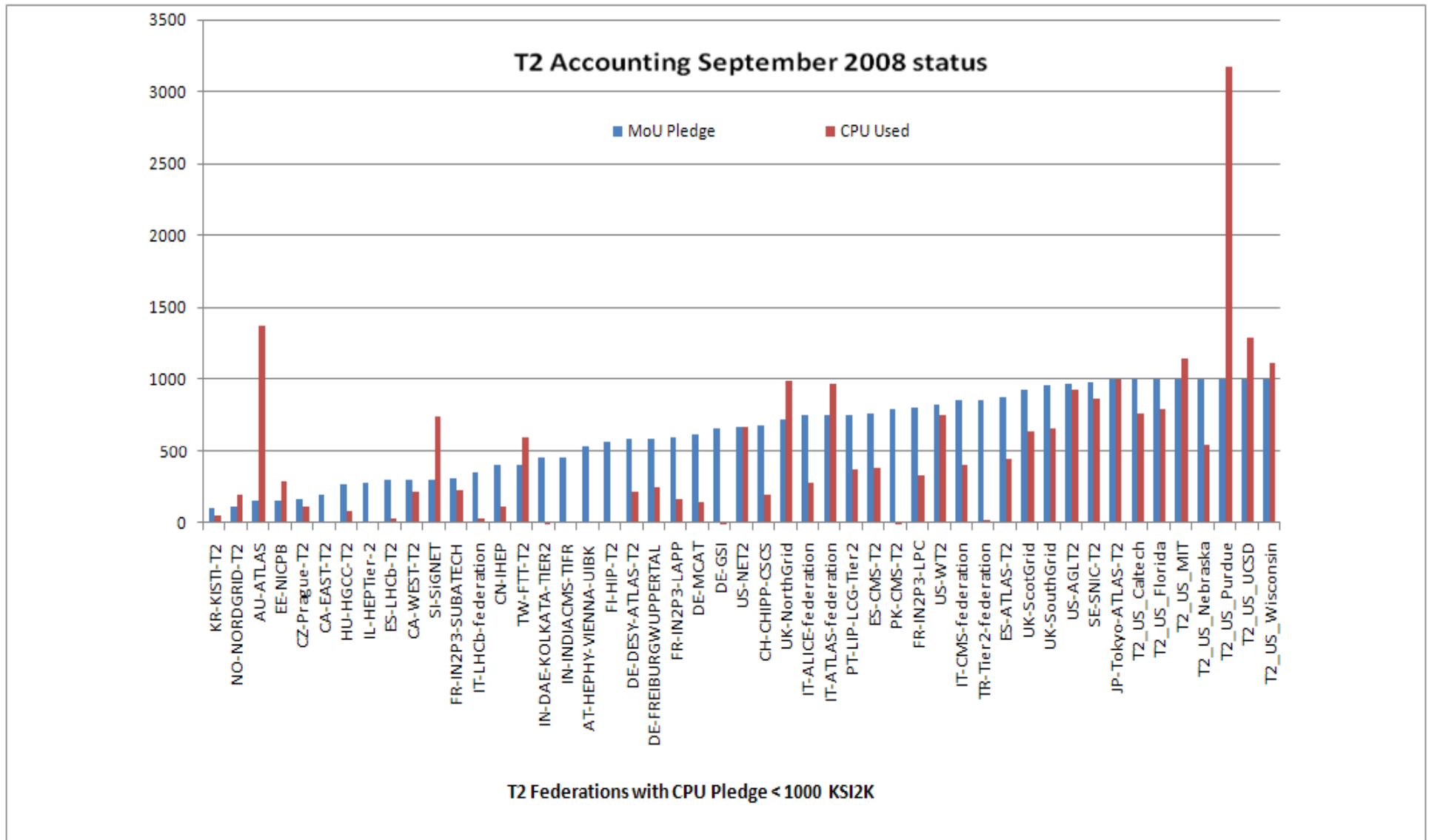


# Accounting for Tier-2s (2)





# Accounting for Tier-2s (3)





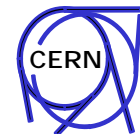
# Computing Resource Pledges





# Computing Resource Pledge Responsibilities (reminder)

- Autumn C-RRB meeting each Federation is expected to provide:
  - Firm commitment to pledge values for the following year
  - Planned pledge values for the subsequent 4 years
- Spring C-RRB meeting each Federation is expected to:
  - Confirm that pledge values for the current year are installed and running a production service, or explain any problems for the current year or changes for future years
- By 27/10/08 the following was requested:
  - Confirmed 2009 pledge values including split across experiments
  - Planned pledge values 2010-2013 inclusive





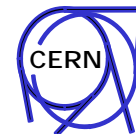
# Pledge Balance in 2009

The table below shows the status at 27/10/08 for 2009 from the responses received from the Tier-1 and Tier-2 sites

- The Total 2009 pledge from Russia is included but not the split across the experiments
- Following a re-organisation of some of the German Federations, pledges for 3 are still to be included
- Pledges for the new French Tier2 IPHC Strasbourg not included

▪ % indicates the balance between offered and required.

	ALICE	ATLAS	CMS	LHCb	Sum 2009
T1 CPU	-49%	6%	-2%	2%	-12%
T1 Disk	-43%	-5%	-13%	-2%	-13%
T1 Tape	-50%	-7%	7%	6%	-13%
T2 CPU	-44%	0%	-8%	-40%	-12%
T2 Disk	-44%	-20%	35%	-	-2%





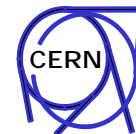


## Pledge Balance 2008-2013

The table below shows the global picture for 2008-2013, status as of 27/10/08. % indicates the balance between offered and required

- Some Federations have recently signalled a change to procurements for 2009, not supported by WLCG Management or Overview Boards
- 2009 resources not installed by April to be signalled at or before the next RRB meeting
- Experiment Requirements mainly date from TDR and will be updated in 2009, also taking Scrutiny Group recommendations into account
- Next exercise for Autumn 2009 - different status?

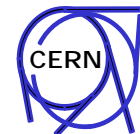
	2008	2009	2010	2011	2012	2013
T1 CPU	-5%	-12%	-11%	-15%	-20%	-26%
T1 Disk	-12%	-13%	-15%	-18%	-24%	-29%
T1 Tape	-13%	-13%	-16%	-22%	-24%	-23%
T2 CPU	-4%	-12%	-32%	-34%	-36%	-42%
T2 Disk	-14%	-2%	1%	-7%	-8%	-22%





# WLCG Pledge Timeframe

- According to WLCG MoU paragraph 4.5 this is defined as +1 year (confirmed pledges), + 4 years (planned pledges)
- Many national funding cycles do not follow such a timeframe
- Pledges are therefore based on planned budget on the short-term (+3 years), but often not beyond
- As a result many collaborators during the recent pledge exercise commented on either the impossibility to provide data for 2102 and 2013 or that the data provided was unreliable
- This leads to a proposal to reduce the timeframe to +1 year (confirmed pledges), +2 years (planned pledges) for discussion at the RRB meeting





# Conclusions

- MoU: The signatures are now well advanced with just Austria & Brazil needing follow-up.
- WLCG Funding & Expenditure: the global situation up to and including 2012 suggests that the project will not run into major financial difficulties
- Tier-1 and Tier-2 accounting reporting has evolved with most sites now reporting. Enhanced reporting under discussion and development
- Pledge Balance: still showing significant shortfall. Experiments requirements and Scrutiny Group recommendations to be fed into the next exercise
- 2009 pledge values not installed to be signaled at or before next RRB meeting
- Proposal to reduce the pledge timeframe from 5 to 3 years - for discussion

