



WLCG Status Report

CERN-RRB-2008-102

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Computing Resource
Review Board

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Agenda

- WLCG service status and CCRC'08
- Planning for shutdown
- Applications Area status
- Procurement issues
- Planning for 2010 (EGI etc)
- Planning for CERN infrastructure

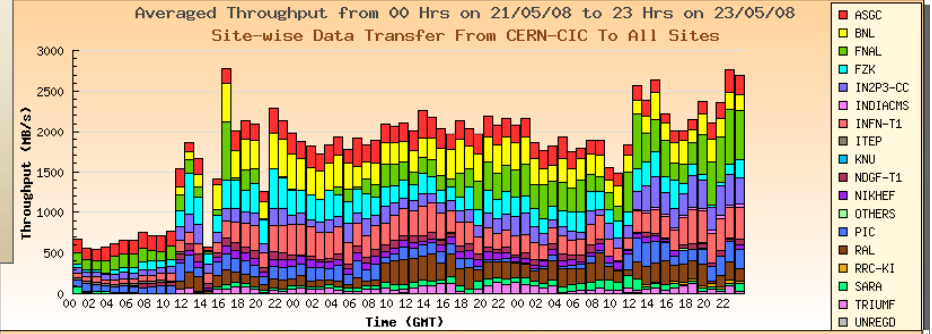
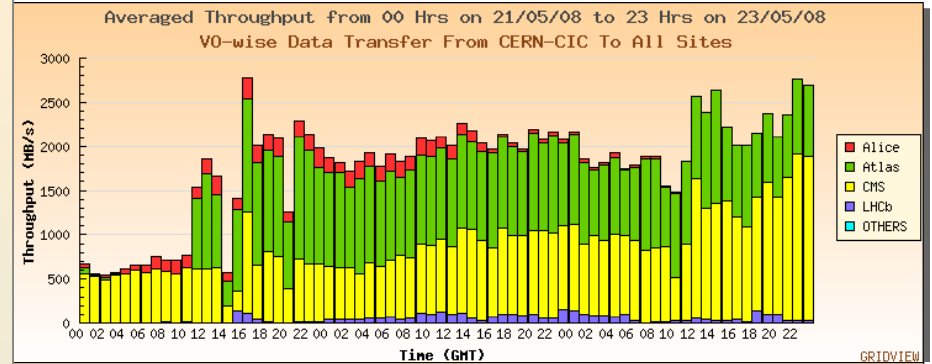
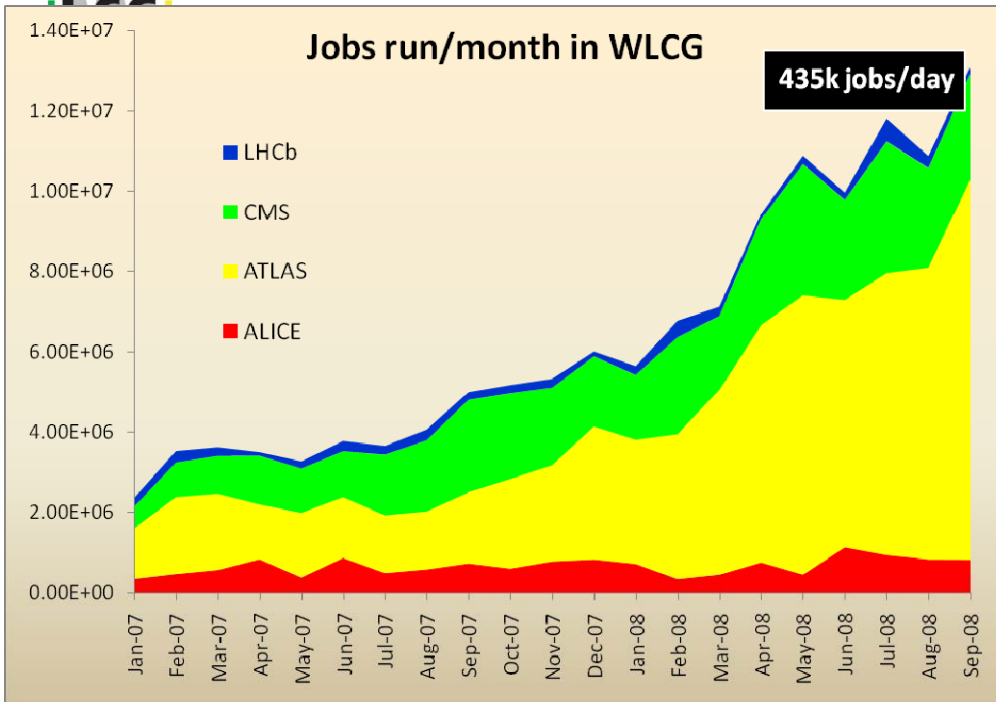


CCRC'08 & the WLCG Service

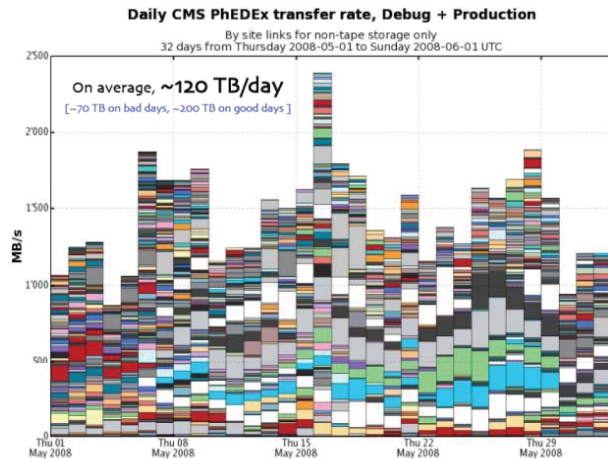
- CCRC'08:
 - Was run as planned in May; not all resources were in place
 - Experiments and WLCG service met or exceeded most of the targets
 - Not tape recall/re-processing for >1 experiment at Tier 1s
 - Analysis not at a scale of 100's of users
 - Effort was sustainable (and is sustained), daily operations meeting, post mortems
 - Sites have response/alarm procedures in place (outstanding milestone on 24x7 support now completed)
 - Software process shown to work well – deployment of security and other patches as part of usual process

- After May:
 - Service continues as standard production service
 - Continually increasing workloads – simulations, cosmic data, functional tests of all aspects

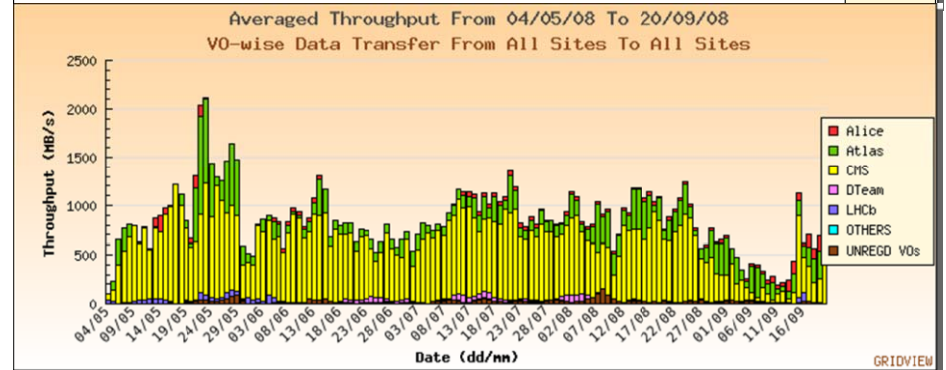
CCRC'08 and beyond

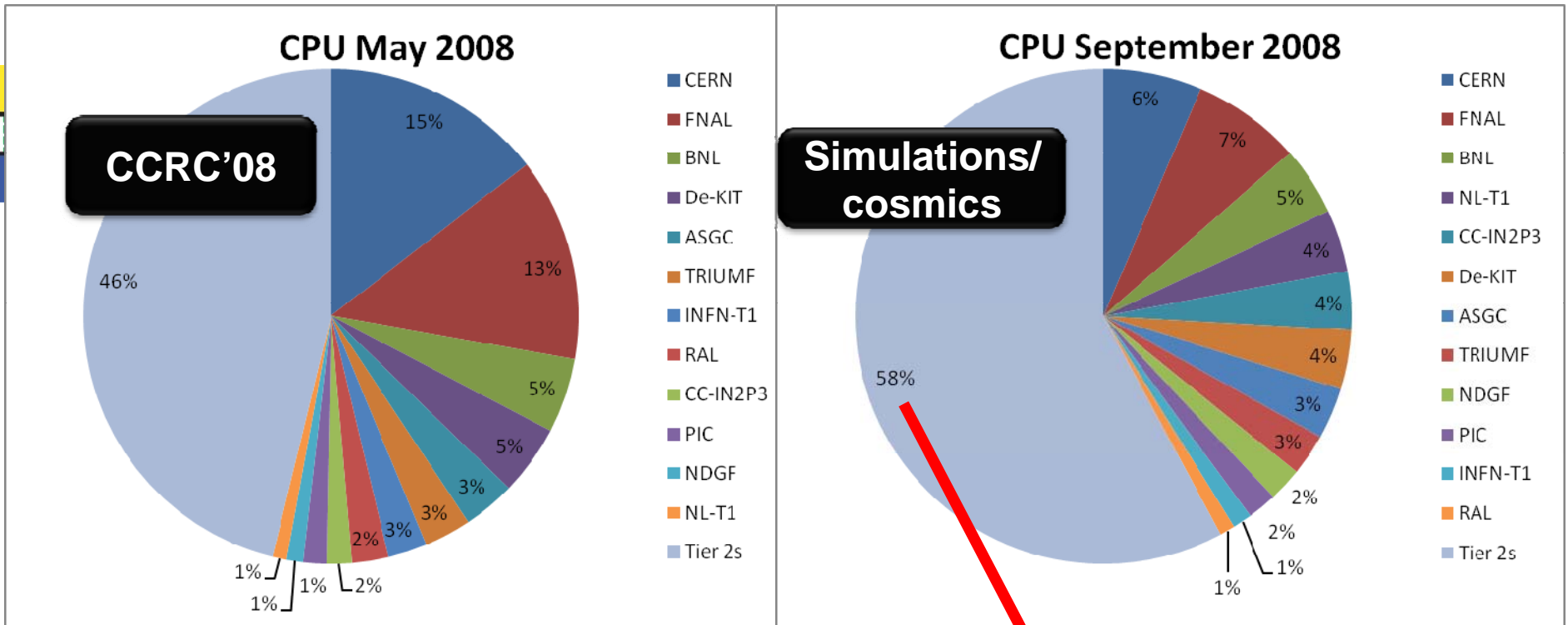


Tier-x to Tier-x in CCRC'o8/phase-2



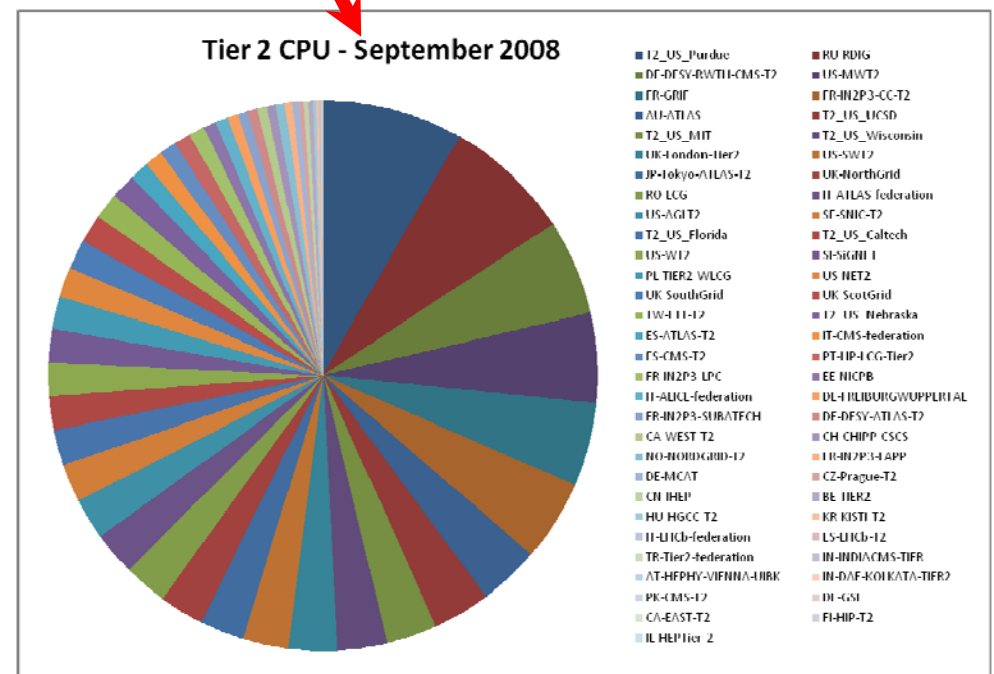
Impressive list of few hundreds of links...





Usage Patterns

- Can change significantly e.g. between CCRC'08 in May and cosmics/simulations in September
- Tier 2s consistently deliver ~50% of total





Outstanding service issues

- Levels of support at many sites – especially during the summer
 - It is not yet clear that there are sufficient staff in place to support the level of service needed
- Continued rate of significant downtimes e.g. that trigger a “post-mortem” (Service Incident Review)
 - More than 1 per week and is not improving
 - Many are due to power/cooling issues (and recovery process!)
 - Many are due to issues with storage services – but some are surely lack of adequate service resources or support
- Main management focus is now on
 - Trying to improve service deployments
 - Understanding why we have so many incidents
 - This is not a “grid” issue, it is really a traditional service management issue
 - Absolutely essential that resolving these issues are seen as priorities by site management

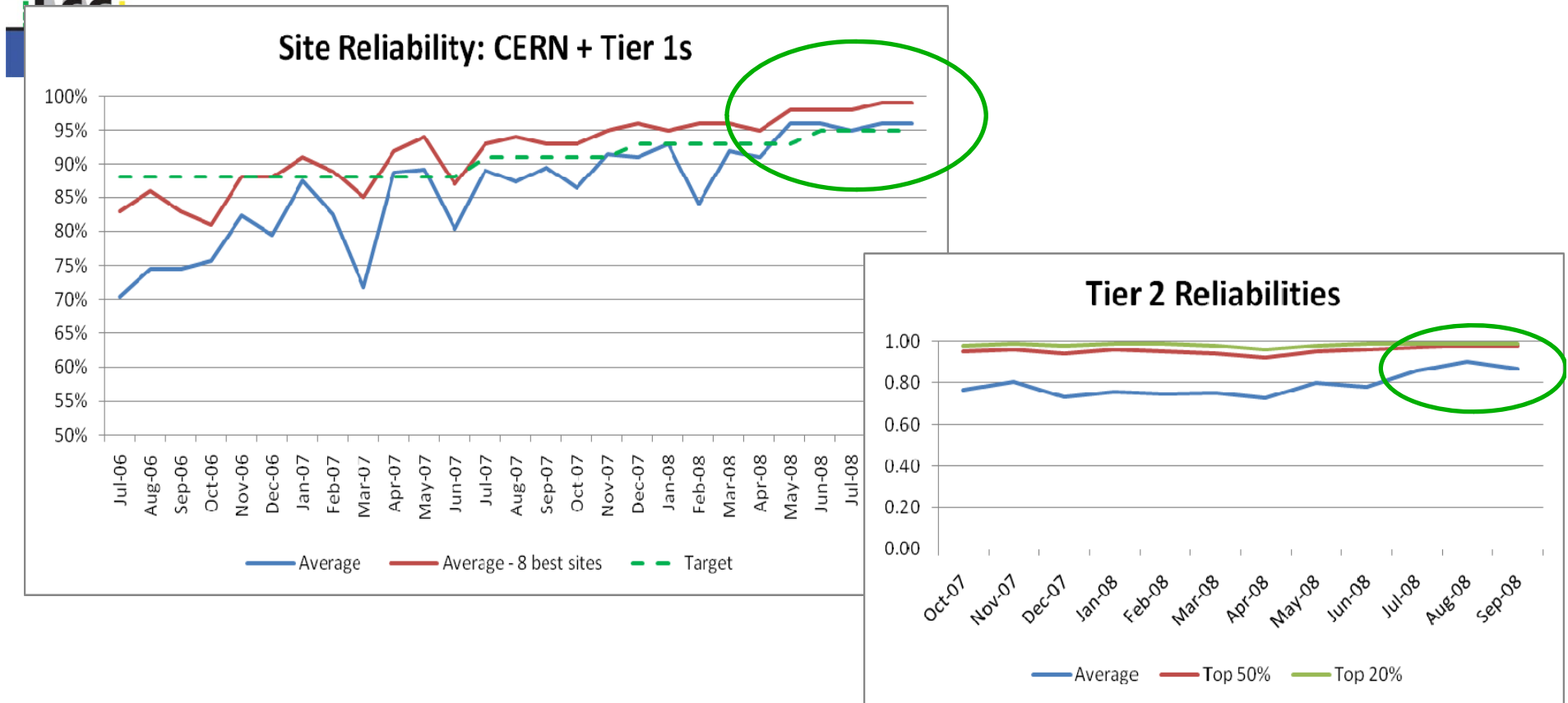


Service incidents - since May

Type of problem	#	<impact time>
Storage	8	4 days
Electrical	3	4.5 days
Cooling	2	4 days
Hardware	2	3 days
Database	2	3 days
Middleware	1	4 hours

- ~ 1 major incident per week
 - not improving
- <impact time> ~ 3.5 days!
 - this is worse now than it was
- 7/20 are hardware (electrical, cooling, network, etc)
 - May be mostly unavoidable, but recovery must be rapid and tested!
 - Power and cooling expectations
 - 1 per site per year ⇒ 1 /month at a Tier 1 !

Reliabilities



Improvement during CCRC and later is encouraging

- Tests do not show full picture – e.g. Hide experiment-specific issues,
- “OR” of service instances probably too simplistic

- publish VO-specific tests regularly;
- rethink algorithm for combining service instances



Tier-2 Availability and Reliability Report

Federation Summary - Sorted by Reliability

September 2008

Critical SAM Tests - <http://sam-docs.web.cern.ch/sam-docs/docs/htmldocs/MANUserManual/node22.html>

Availability = % of successful tests

Reliability = Availability / Scheduled Availability

Reliability and Availability for federation - average of all sites in the federation

Colour coding : N/A < 30% < 60% < 90% >= 90%

Federation	Reliability	Availability	Federation	Reliability	Availability
US-SWT2	100 %	100 %	IT-ALICE-federation	92 %	88 %
T2_US_Wisconsin	100 %	100 %	IT-ATLAS-federation	92 %	88 %
FR-GRIF	100 %	99 %	IT-CMS-federation	92 %	88 %
AT-HEPHY-VIENNA-UIBK	100 %	100 %	IT-LHCb-federation	92 %	88 %
US-MWT2	100 %	100 %	CZ-Prague-T2	91 %	91 %
FI-HIP-T2	100 %	99 %	BE-TIER2	91 %	67 %
CN-IHEP	99 %	99 %	ES-CMS-T2	91 %	89 %
FR-IN2P3-SUBATECH	99 %	99 %	DE-FREIBURG WUPPERTAL	91 %	91 %
T2_US_UCSD	99 %	99 %	T2_US_Nebraska	91 %	93 %
US-NET2	99 %	99 %	CA-WEST-T2	90 %	87 %
UK-NorthGrid	98 %	98 %	KR-KISTI-T2	89 %	66 %
T2_US_Purdue	98 %	98 %	US-WT2	88 %	91 %
FR-IN2P3-LPC	98 %	97 %	UK-London-Tier2	88 %	74 %
FR-IN2P3-CC-T2	97 %	97 %	RO-LCG	87 %	83 %
TW-FTT-T2	97 %	97 %	FR-IN2P3-LAPP	86 %	82 %
JP-Tokyo-ATLAS-T2	97 %	95 %	ES-LHCb-T2	85 %	85 %
DE-DESY-ATLAS-T2	97 %	90 %	T2_US_Caltech	83 %	86 %
PT-LIP-LCG-Tier2	96 %	48 %	IL-RDIG	81 %	81 %
T2_US_Florida	96 %	97 %	IL-HEPTier-2	78 %	50 %
DE-MCAT	96 %	81 %	SE-NORDS	67 %	68 %
UK-ScotGrid	96 %	93 %	TR-Tier2-federation	66 %	65 %
CH-CHIPP-CSCS	96 %	93 %	PK-CMS-T2	62 %	26 %
US-AGLT2	96 %	96 %	AU-ATLAS	51 %	48 %
PL-TIER2-WLCG	95 %	94 %	IN-INDIA-CMS-TIFR	46 %	42 %
HU-HGCC-T2	95 %	95 %	IN-DIXE-KOLKATA-TIER2	1 %	1 %
CA-EAST-T2	95 %	95 %	DE-GSI	0 %	0 %
SI-SIGNET	95 %	94 %	NO-NORDGRID-T2	N/A	0 %
ES-ATLAS-T2	93 %	91 %	SE-SNIC-T2	N/A	N/A
DE-DESY-RWTH-CMS-T2	93 %	93 %	UA-	N/A	N/A
UK-SouthGrid	93 %	88 %			
T2_US_MIT	92 %	93 %			

Tier 2 reliabilities

- Big improvement
- Federation average will be (soon) weighted by #CPU
- Would like to fix target at 95%
 - Should be achievable

■ e.g. of extended scheduled downtimes (availability << reliability)

■ Federations still not reporting



VO-specific testing ...

VO-wise Availability and Reliability for WLCG Tier-1s + CERN

August 2008

Reliability = $\text{time_site_is_available} / (\text{total_time} - \text{time_site_is_scheduled_down})$

Availability = $\text{time_site_is_available} / \text{total_time}$

Reliability

Site	ALICE	ATLAS	CMS	LHCb	OPS
CA-TRIUMF	N/A	95 %	N/A	N/A	N/A
CERN	99 %	99 %	100 %	30 %	N/A
DE-KIT	100 %	98 %	100 %	68 %	99 %
ES-PIC	N/A	98 %	99 %	52 %	99 %
FR-CCIN2P3	94 %	81 %	99 %	88 %	95 %
IT-INFN-CNAF	100 %	100 %	100 %	80 %	99 %
NDGF	100 %	86 %	N/A	N/A	43 %
NL-T1	99 %	87 %	N/A	0 %	96 %
TW-ASGC	N/A	99 %	98 %	N/A	100 %
UK-T1-RAL	100 %	63 %	97 %	88 %	100 %
US-FNAL-CMS	N/A	N/A	100 %	N/A	99 %
US-T1-BNL	N/A	N/A	N/A	N/A	95 %

>= 95%

>= 85.5%

< 85.5%

- Validation process in progress



Consequences of LHC shutdown

- The present shutdown of the LHC has a number of consequences for the planning of WLCG:
 - Capacities and Procurements for 2009
 - Software and service upgrades during the shutdown
 - (Re-)Validation of services for 2009 following changes



Capacities and procurements

- The WLCG MB has agreed that with the information currently available to us and the present understanding of the accelerator schedule for 2009:
 - The amount of data gathered in 2009 is likely to be at least at the level originally planned, with pressure to run for as long a period as possible this may be close to or exceed the amount originally anticipated in 2008 + 2009 together
 - The original planning meant that the capacity to be installed in 2009 was still close to x2 with respect to 2008 as part of the initial ramp up of WLCG capacity
 - Many procurement and acceptance problems arose in 2008 which meant that the 2008 capacities were very late in being installed; there is a grave concern that such problems will continue with the 2009 procurements
 - The 2009 procurement processes should have been well advanced by the time of the LHC problem in September
- The WLCG MB thus does not regard the present situation as a reason to delay the 2009 procurements, and we urge the sites and funding agencies to proceed as planned. It is essential that adequate resources are available to support the first years of LHC data taking.



Upgrade plans

- Since several software upgrades were postponed in anticipation of LHC start-up, we propose that the following changes are addressed in the coming months:
 - SRM – agreed list of “short term” changes; available by end 2008
 - FTS on SL4 (+available for SL5?) – deployment was postponed
 - WN on SL5 to be available for deployment
 - glexec/SCAS to support pilot jobs with identity changing
 - CREAM CE – make available in parallel to existing CE which is known to have scaling issues when there are many different users;
 - needs Condor_g client
 - WMS: must be able to submit to CREAM
- + a few other smaller changes ...

- Many of the above are deployments in parallel to existing production services and so non-disruptive



Re-validation of the service

- All experiments are continually running simulations, cosmics, specific tests (and have been since CCRC'08) at high workload levels – this will continue
- A full CCRC'09 in the same mode as 2008 is not regarded as useful
- But, we will perform specific tests/validations:
 - Service validation if software is changed/updated
 - Specific tests (e.g. throughput) to ensure that no problems have been introduced
 - Tests of functions not yet tested (e.g. Reprocessing/data recall at Tier 1s)
- Details of the test programme will be discussed and agreed in the workshop already planned for November



Applications Area Status

- No major releases of the AA software during last quarter
 - Experiments preparing for beam did not want major changes
 - Substantial progress on porting the complete software stack to other platforms such as gcc 4.3 and VC9.
- Preparing 'production' versions for ROOT and Geant4
 - ROOT 5.22 will include the new CINT based on Reflex and the support for the new 'data model schema evolution'
 - Geant4 9.2 will include the improvements in the FTF (Fritiof) hadronic model for pion incident interactions; alternative multiple-scattering models, and the first implementation of a GDML writer.
 - New version of HepMC (2.04.00) was released last summer and adopted by all experiments
- Release schedule adapted to new LHC schedule
 - ROOT and Geant4 releases for mid-December
 - The rest of the software stack should be ready by mid-January
 - Experiments will start integrating their applications immediately after



Applications Area Status (2)

- The LCG-AA nightly build and test system fully operational
 - Several configurations in parallel for all supported platforms (including MacOSX and Windows)
 - Geant4 builds and tests are also integrated
 - LHCb has cloned the system for their software
- Continuous Software Integration and Testing
 - Allow us to release new software versions (with new functionality or bug fixes) on demand from the experiments with relatively short notice (1-2 days)
- The two Theme 3 PH-R&D projects monitored by the AF
 - Virtualization: The first release of the CernVM virtual appliance to provide a portable environment for analysis is ready
 - Multi-core: Exploring in collaboration with experiments and IT (openlab) a number of possibilities to exploit multi-core architectures with the current software frameworks



Procurement Issues

- 2008 resources were not in place by April; and in some cases still not now:

CPU (100% of total pledge installed)		
ASGC	72%	Due October
NL-T1	88%	Not before mid-2009:

Disk (80% of total pledge installed)		
ASGC	300 TB missing	Installation now?
BNL	1 PB missing	Was expected November
IN2P3	700 TB missing	Ongoing, with 50% of 2009
CNAF	750 TB missing	Installation ongoing
NDGF	200 TB missing	Procurement complete
NL-T1	1400 TB missing (50%)	Power/cooling; not before mid-2009

- Many procurement issues: delays, faulty equipment, vendor failures.
- No indication that this will be any better in future years – must take into account in the procurement process
 - For 2009 have added checkpoint milestones to follow up on process
 - Little margin for error for April schedule
 - Future years (>2009) anticipate splitting disk installations into 2 – first for April, second for end of Summer (details to be discussed and agreed)



Capacity & Benchmarking

■ Capacity reporting

- In order to fully understand resource availability and usage need to see several pieces of information:
 - Pledge, installed capacity, usage, efficiency, and availability
 - Need also to know whether experiment has tried to fill capacity
- Today installed capacity gathered by hand for Tier 1s (and see mistakes); work in hand on automated means to gather installed capacity for all sites for CPU and storage
 - Validation process needed before this can be published fully

■ Benchmarking

- SI2K is now obsolete, new machines not measured in this unit
- WLCG has agreed on a new unit based on SPEC 2006
- Working group will propose exact recipe for running the benchmark
 - Conversion of pledges and requirements to new units (without change!)



Planning for 2010 (end of EGEE)

- A second draft of the EGI blueprint has been produced
- There are still some serious shortcomings in the process and in the blueprint:
 - It is not clear exactly what is being proposed in terms of the roles and functions of the National and central organisations;
 - Lack of representation of the user communities, and how those communities interact with the infrastructures; (they own many resources)
 - It is not clear how the present operational infrastructure upon which WLCG depends will evolve and appear in the future, e.g.:
 - Insufficient resources for central operations
 - Risk of discontinuation of ROCs
 - User support is being challenged
 - Very few of the NGIs are as yet established, and so how they can support the WLCG sites is not clear, in particular during a transition period;
- Given the state of the current blueprint, it seems unlikely that there will be an organisation in place in time to take over the European grid infrastructure from EGEE in early 2010 with a managed transition process during the preceding year.



WLCG & EGI/NGIs

- The Tier 1 and Tier 2 sites in Europe will rely on National Grid Infrastructures being in place to provide the support and functions today provided by EGEE
 - Important for operations and middleware support (maintenance and distribution)
 - The Tier 1s have provided position statements
 - Still important that WLCG members raise this to the NGI and national funding agencies
- The Tier 0 is probably in a reasonable position – current planning does not rely on external funding; but the capability will be strictly limited to core WLCG Tier 0/CAF tasks
- It seems optimistic that EGI will be in place by the end of EGEE-3, and likely that not all NGIs will be in existence when it does start
- WLCG must have a concrete plan to operate without relying on the European level support, either for an interim period or indefinitely



Planning for EGI

- Agreed in OB that we will now document how each of the core functions that we today rely on will be managed in future
 - Start with the position statements sent by Tier 1 sites
 - Consider each of the major functions:
 - GGUS, operational support, monitoring tools, middleware support, certification, deployment support, service management, etc.
 - Work with EGEE to understand the expected status of each of these in mid-2010
 - Negotiate who will manage /contribute to each function if there is no EGI



Planning for Tier 0 infrastructure

- Capacity in CERN CC will run out in ~2010; electrical capacity cannot be extended above currently foreseen levels
- Strategy:
 - Expand the capacity of the building as far as possible (2.5 → 2.9 MW), addition of water-cooled racks: NB. This leaves no redundancy in the power supply;
 - Aggressive removal & replacement of older equipment with new lower-power units. Replace at end of warranty (3 yrs);
 - Planning for a second centre to be built on Prévessin site;
 - Investigate stop-gap solutions for 1.5 – 2 years between running out of power and having a new building available
- First 2 points + better estimate of power evolution of new systems → sufficient capacity until ~end 2010
- Planning ongoing at the level of conceptual designs
- Stop gap solutions being investigated; commercial solutions very expensive (x10 over CERN cost), some possibilities under discussion with other WLCG sites.



Summary

- CCRC'08 was successful
 - Almost all experiments' and service targets were achieved
 - Exception: user analysis with 100's of users; T1 reprocessing at full scale
- Service has continued to be used at significant levels
 - Main focus is on improving service reliability – especially storage systems
- Important that resource ramp-up for 2009 continues:
 - Must be ready for the accelerator start-up, even if resources are today not saturated
- Resource procurements/installations –
 - Were significantly delayed in 2008
 - Concern that this does not improve in future years
- Planning for future – Tier 0/CAF and European Grid infrastructure