

The LHC Computing Grid Project

Status of Phase 2 Planning & MoU

GDB – Barcelona - 18 May 2004

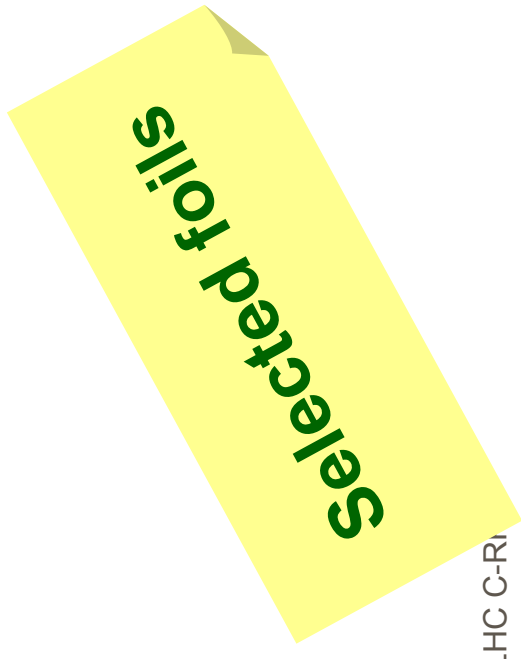
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Computing MoUs Taskforce First Report

**presented to
the LHC Computing Resource Review Board
27th April 2004**

**David Jacobs
Taskforce Chair**



2004 10:03

CERN - Computing ChallengesDJ: C-MoUs to LHC C-R
CERN-C-RRB-2004-07

Computing MoU Task Force

- Subject introduced at RRB 17 in Oct. 2003
 - in the Plenary and
 - in the C-RRB session
- Taskforce called into existence on 23/1/2004
 - Mandate to draft LCG MoU and one MoU for each of the four major LHC experiments
 - The mandate also included general guidance on the aspects to be addressed in these documents



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Taskforce Membership

Experiments

ALICE: Y. Schutz
ATLAS: T. Akesson
CMS: I. Willers
LHCb: N. Brook

Countries

FR: G. Wormser
DE: M. Kunze
IT: F. Ruggieri
UK: N. Geddes
ES: M. Delfino*
US: I. Gaines

LCG

C. Eck
L. Robertson

Chair D. Jacobs

Present: H. Hoffmann (=>April 04), J. Engelen

* *Also represents Other European Countries*

*and would appreciate guidance from the C-
RRB as to how he can best achieve this*



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CERN-C-RRB-200407

Foreseen Schedule

- Substantially complete draft texts of LHC MoU and experiment dependent documents (addenda to experiment MoUs or separate MoUs, as decided) for October 2004 C-RRB
- C-RRB comment and advancement of the experiments' Computing Model should then allow submission for April 2005 of “final” drafts for RRB approval prior to signature



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Overall Emphasis of LCG MoU

- Emphasise a uniform and shared approach that will aid realisation of the efficiency promised by Grid technology



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Scope

- MoU defines a Collaboration amongst those responsible for the CERN Tier0+Tier1 centre, the other Tier1 centres and the qualifying Tier2 centres (or federations of Tier2 centres)
- Qualification for inclusion:
 - Long-term commitment in terms of service levels and response times, not just funding
 - Threshold size
- Smaller or less committed centres will be used by the experiments as available, without any specific MoU agreement



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Signature

- Follow the principle established for the LHC experiment Construction MoUs:
 - Multiple identical documents, each with -
 - On the one side, CERN as Host Laboratory and provider of the CERN Tier0+Tier1 Centre
 - On the other side, an Institution/Funding Agency (as appropriate) of a Tier1 Centre or qualifying Tier2 Centre (or federation of Tier2 Centres)



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Pledges of Resources

- Each signatory pledges resources in MoU Annexes (updated annually). Elements of the pledges are being refined – could include e.g.:
 - Service levels (e.g. 7*24 operation)
 - Response times
 - Storage (with e.g. accessibility, redundancy and retention)
 - Processing capacity (e.g. in SPECint)
- Pledges may be “prioritised” according to experiment

Sharing to Experiments

- Resource Allocation Committee
 - Independent & unbiased, competent in physics and technical matters
 - Appointed by LHCC (?) and makes proposals annually to C-RRB for approval
 - Gathers justified requests from the experiments
 - Proposes overall sharing of pledged resources, taking into account any prioritisation
 - Each experiment must work out its detailed

usage plan within this share

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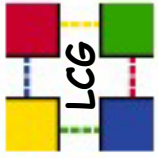


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Initial Planning for Phase 2

- Common facilities and services at CERN
 - Facility capacity, costs, technology - June 2003
 - Human resources for services at CERN - October 2003
 - Acquisition plan - March 2004
- Long-term human resources for Applications Support
 - Planning under way - target to complete in June 2004
- Review of requirements for Phase 2 in Tier-1s, Tier-2s
 - Basic computing models, resources → MoU Task Force - April 2004



desktops
portables

small
centres

Tier-2

Tier-1

LHC Computing Model (simplified!!)

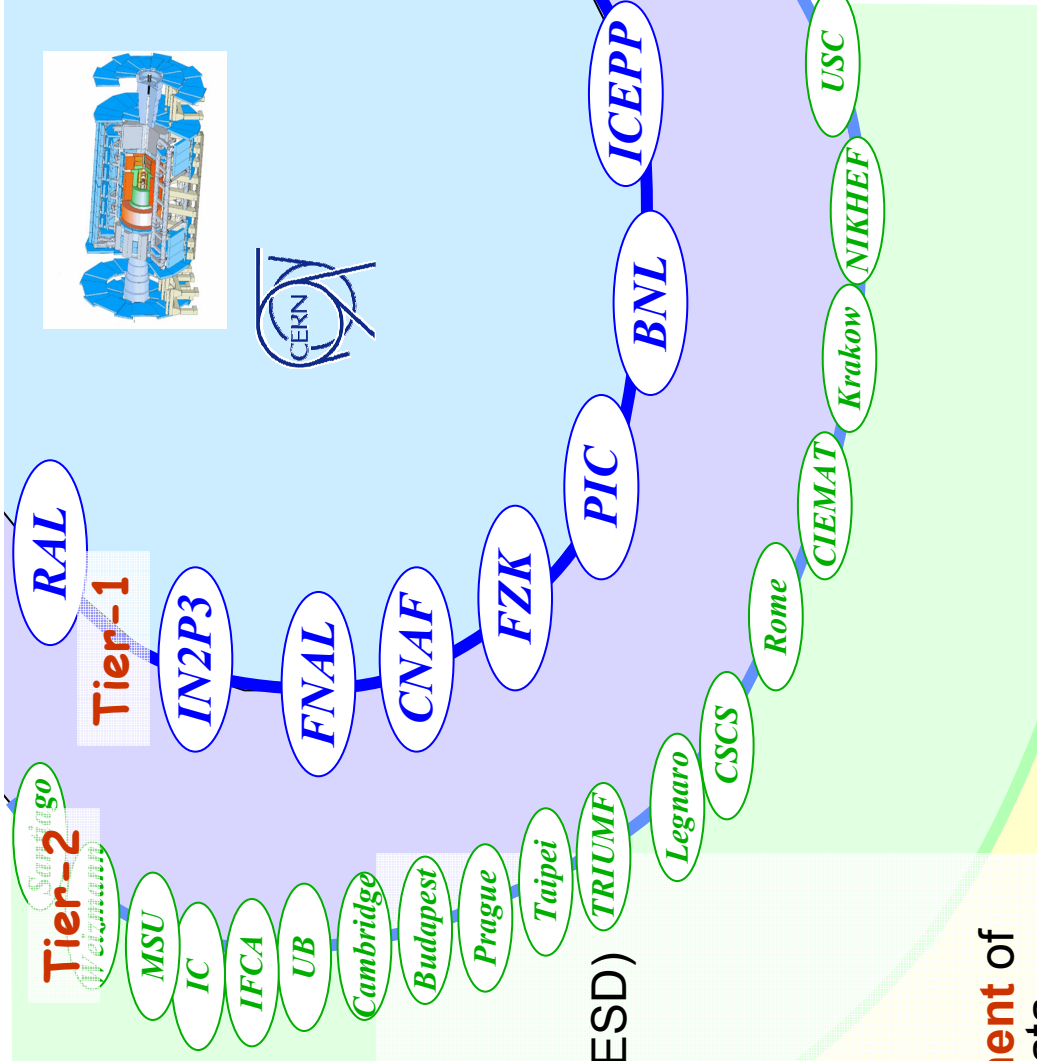
- Tier-0 - the accelerator centre
 - Filter → raw data
 - Reconstruction → summary data (ESD)
 - Record raw data and ESD
 - Distribute raw and ESD to Tier-1

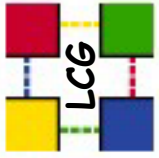
▪ Tier-1 -

- Permanent storage and **management** of raw, ESD, calibration data, meta-data, analysis data and databases → **grid-enabled data service**
 - Data-heavy analysis
 - Re-processing raw → ESD
 - National, regional support

“online” to data acquisition process

- high availability
- managed mass storage
- long-term commitment





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Tier-2

Tier-1

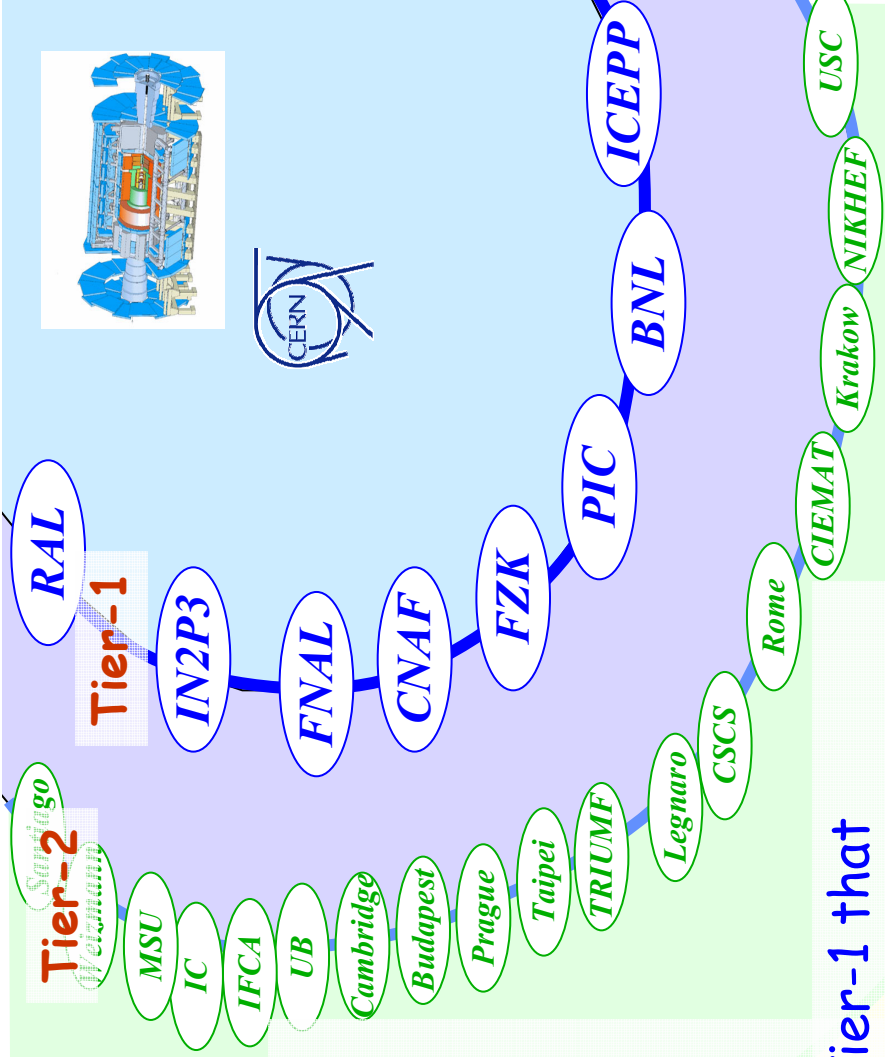
- Tier-2 -

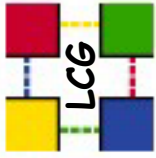
- Well-managed disk storage
 - grid-enabled
- Simulation
- End-user analysis – batch and interactive
- High performance parallel analysis (PROOF?)

- Each Tier-2 is associated with a Tier-1 that

- Serves as the primary data source
- Takes responsibility for long-term storage and management of all of the data generated at the Tier-2 (grid-enables mass storage)
- May also provide other support services (grid expertise, software distribution, maintenance, ...)

- CERN will **not** provide these services for Tier-2s except by special arrangement





Estimated Resources Required by LHC Experiments in 2008

First full year of data - 2008

Resource **Experiment** **Alice** **Atlas** **CMS** **LHCb** **Sum**

CERN Tier 0 + Tier 1						
<i>Disk PetaBytes</i>	0.5	2.0	1.8	0.3	5	
<i>Mass Storage PetaBytes</i>	2.3	7.6	9.2	1.0	20	
<i>Processing M SI2000**</i>	5.6	5.4	5.7	2.7	19	

Sum of resources at all Tier1 centres

<i>Expected number of centres</i>	3	6	6	5	
<i>Disk PetaBytes</i>	3.0	6.8	8.7	1.3	20
<i>Mass Storage PetaBytes</i>	3.6	7.2	6.6	0.4	18
<i>Processing M SI2000**</i>	9.1	13.6	12.6	9.5	45

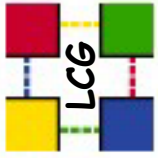
Sum of resources at all Tier2 centres

<i>Expected number of centres</i>	16	24	25	15	
<i>Disk PetaBytes</i>	3.0	3.8	5.0	0.6	12
<i>Mass Storage PetaBytes</i>	0.0	1.6	2.9	0.0	5
<i>Processing M SI2000**</i>	7.2	8.4	7.5	16.4	40

** Current fast processor ~1K SI2000

Estimates prepared as input to the MoU Task Force
Computing models under active development





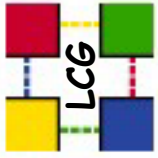
Estimated Network Bandwidth in 2008 between Tier-1s and Tier-0

Gbits/sec	Tier-1 Centre	RAL	Fermilab	Brookhaven	Karlsruhe	IN2P3	CNAF	PIC (Barcelona)	T0 Total
Estimated T1									
Bandwidth Needed**	6.9	1.7	4.2	6.9	6.9	6.9	4.4	10	38
Assumed Bandwidth									
Provisioned	10	10	10	10	10	10	10	10	70

** Does not include traffic between Tier-1s and with Tier-2s

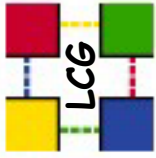
Assumes that all Tier-1s share the load equally





Phase 2 Planning Timetable

- Draft MoU - October 2004 C-RRB
- Experiments decide on initial computing models - end 2004
- Draft TDR - February 2005
 - Jürgen Knobloch appointed as chair of the editorial board
- Final MoU - April 2005 C-RRB
- TDR - end June 2005



Phase 2 planning team

- First version of a plan to back the MoU
 - September 2004 - for October C-RRB
 - Revised version of basic computing models
 - Revised estimates of overall Tier-1, Tier-2 resources
 - Current state of commitments of resources
Regional Centres ↔ Experiments
 - High-level plan for ramping up the Tier-1 and large Tier-2 centres - including summary information for each centre
- Team will consist of -
 - Two people from LCG management team
 - One person per experiment
 - A few people from Regional Centres -
I would like volunteers/proposals