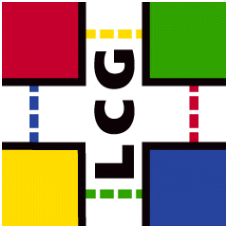


# CERN resource situation



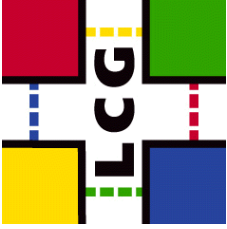
# Disk Space



some history :

- Nov/Dec 2003 negotiation with Elonex about the high rate of disk server problems
- Jan 2004 IT re-organization of the storage responsibilities
- Feb 2004 Delivery of 63 TB of new disk space (Elonex), ( the ordering process for this started in September)
- Feb/Mar 2004 heavy testing of the new nodes, to verify stability
- Mar 2004 Elonex agrees to repair (replace WD disks, cages, etc.) for 55 servers  
→ this happens in bunches of nodes (all of them in production), heavy service procedure (exchange disk servers in production, test the returned ones, etc.), needs extra ~ 10 TB intermediate cache, still ongoing
- April 2004 The 15 TB on the LCG prototype became unavailable, because of the computer center refurbishment (back in 2 weeks), they were used for intermediate storage and the tape repack procedures
- new tender released for additional ~ 25 TB (→ August delivery)

**During March – May** [distribution of >63 TB disk space to LHC experiments and running fixed target experiments](#)



## Disk space allocations

The disk resource published in the GDB allocation round in September 2003 was ~100 TB for the LHC experiments at CERN  
→ 60 TB new purchase + 25 TB prototype contribution + 15 TB existing space from the experiments  
(installed end 2003 : ALICE (5.6TB), ATLAS (12.6TB), CMS (10TB), LHCb (5.5TB))

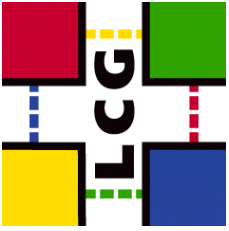
that was too optimistic, due to budget constraints and all the problems in Q1+Q2 2004. I am now assuming a hopefully pessimistic 50 TB for 2004.

### Building the DC disk buffers, current status

March-April : CMS : 23 TB  
ALICE : 25 TB

May : LHCb : 6 TB  
ATLAS : 6 TB → 10 TB (end May)  
CMS : 8 TB (reduced from 23)  
ALICE : 25 TB

June – July : ATLAS : 15 – 20 TB  
LHCb : 6 TB  
CMS : 8 TB  
ALICE : 25 TB



## Issues



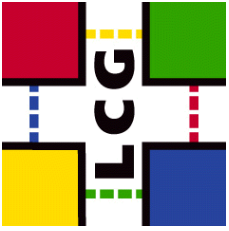
Disk space 're-distribution after the end of this years DCs (summer) ??

→ALICE 8 TB, ATLAS 8 TB, CMS 8 TB, LHCb 6TB + 20 TB tests ???  
e.g. large amount of disk space for the new stager test, the CDR/export  
buffer for 2008 needs to be tested on a large scale  
???? → needs some discussion

The DC mode will change now into a more continuous production and test  
mode

→ dynamic exchange of extra space between experiments will become  
more difficult

by the end of May the disk server replacement procedure will be finished  
and the also the prototype/openlab disk space will be available in a reliable  
manner. → upcoming computing DCs



# CPU server distribution



HE = High-End, LE = Low-End,  
HE = 2 \* LE performance

650 HE  
+ 480 LE nodes

Lxbatch

220 LE nodes

LCG testbeds

120 HE nodes

prototype (WAN tests, ALICE-IT DC, new technology)  
(shared in Lxbatch from time to time)

40 LE nodes

EGEE testbeds

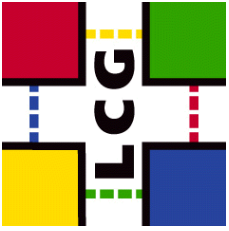
30 HE nodes

GRID services (RLS, SE, UI, GridFTP, etc.)

20 LE nodes

DB and ARDA

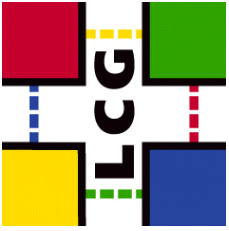
-----  
1560 nodes = 1160 production + 400 testbeds



## CPU resources (I)

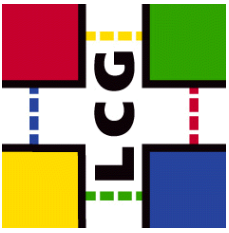


- renumbering process in parallel to production in units of racks  
( = 44 nodes = 70 KSI2000) (outgoing network requirement)
  - drain the LSF queues, re-installation with GRID software packages, renumbering, change of databases and router configurations
- 200 nodes in February, now we have 500 nodes (the most powerful nodes first)
- LCG usage not very high (configuration issues, experiment usage)
  - system is shared between 'standard' Lxbatch and LCG-2
  - 25 nodes always dedicated to LCG-2, plus the rest (total 200) with higher priority for LCG-2 jobs , mostly 'short' jobs from 'standard' Lxbatch



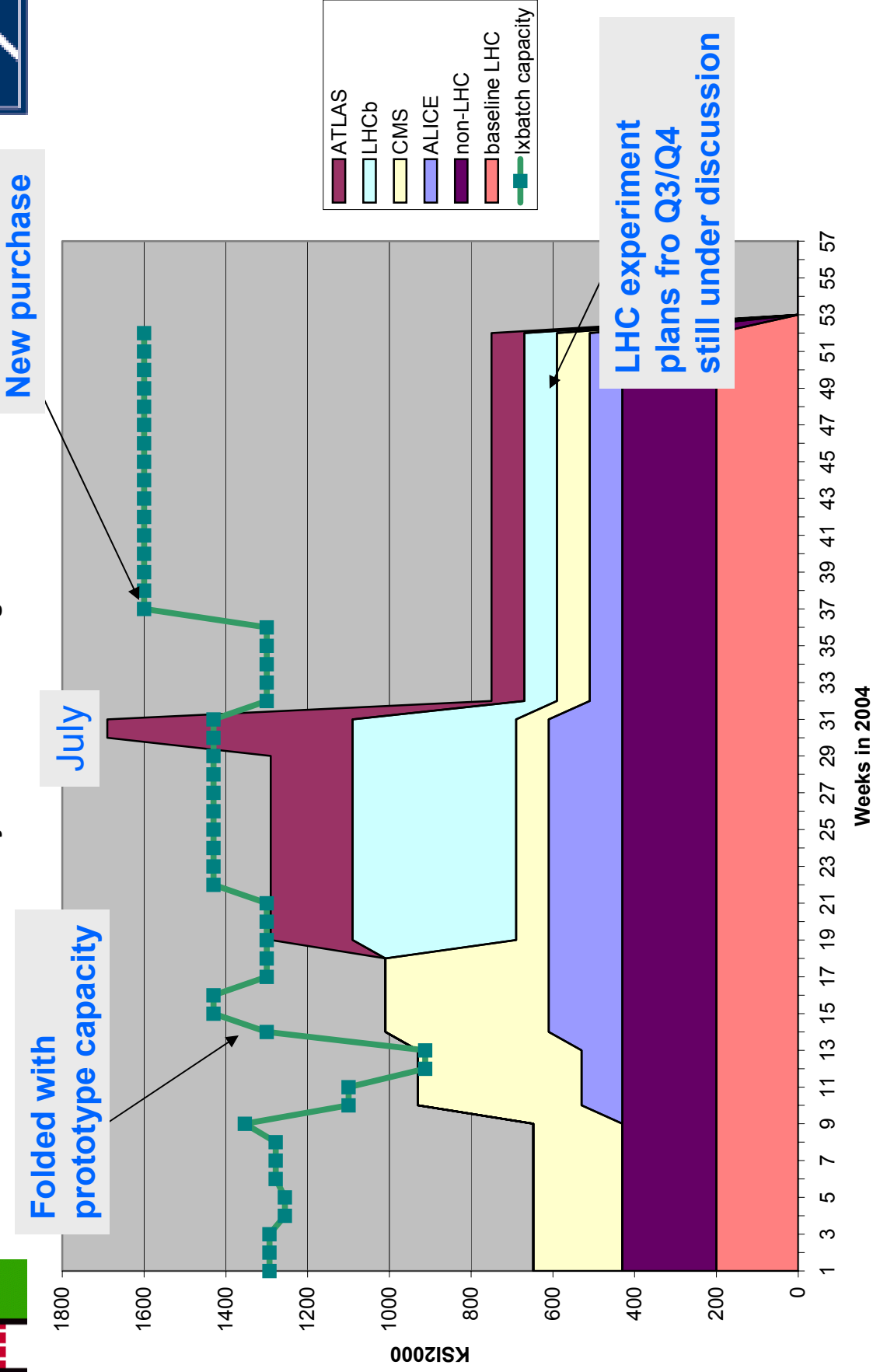
## CPU resources (II)

- **March-April :** 250 nodes ( 400 KSI2000)dedicated to CMS (average efficiency ~ 30 %  
→ dedication was very good for the experiment, fast restart after problem resolution, better suited for DC characteristics but bad for overall IT resource utilization  
shared ↔ dedication adjustment/compromise
- Alice using shared queues (LCG-2 ↔ Lxbatch) ~ 100 nodes equivalent
- 340 nodes fro ATLAS online from low end Lxbatch and prototype  
new CPU server tender 200-400 nodes (→ August delivery)
- **May-July :** LHCb (390 KSI2000), ALICE (180 KSI2000), ATLAS (170 KSI2000) fixed target ( ~230KSI2000), baseline LHC + others (200 KSI2000)  
available = ~ 1300 KSI2000 (efficiency in shared mode = ~ 90 %)  
CERN resources published in the last GDB allocation round = 700 KSI2000

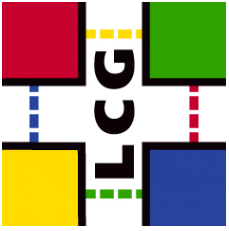


# CPU Resource Usage

Physics Data Challenges 2004







## Issues



- Complicated resource shuffling (changing demands, disk server problems, center refurbishment, budget constraints, delivery schedules, etc.) we are always working under 100% usage conditions, very little room to maneuver
- DCs are becoming productions, also moving into the continuous mode balance of 'physics' needs versus 'computing' needs (tests, architecture, software, etc.)
- Balance between production farm and testbeds (resource distribution)
- Balance between resource dedication and sharing