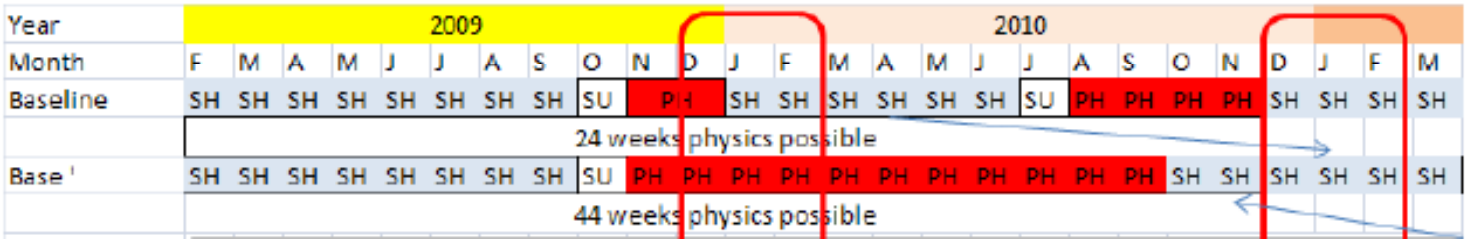
Updated resource requirements

- Based on the presently understood LHC schedule



- For planning purposes we assume
  - 2 resource periods (although no break between them)
    - "2009" Oct'09 → March'10
    - "2010" April'10 → March'11 (as before)
  - For data taking:
    - Apr'09 – Sep'09: no LHC (simulation and cosmics)
    - Oct'09 – Mar'10: 1.7x10^6 sec of physics
    - Apr'10 – Oct'10: 4.3x10^6 sec of physics
    - Nov'10 – Mar'11: LHC shutdown (simulation, reprocessing, etc)
  - Energy is limited to 5+5 TeV
  - There will be a heavy-ion run at the end of 2010

General comments

- Overall there is significantly less LHC data anticipated in this period than was planned for in 2009+2010
- However,
  - We must ensure that the computing is not a limiting factor when data comes
    - See LHCC conclusions of WLCG mini-review in February
  - Significant effort is going into detector understanding now using cosmic ray data
- Early in 2009 we relaxed the requirement to have the 2009 resources in place by April
  - Although many of the (Tier 1) resources are actually in place now
  - In some cases this allows delayed procurement for better equipment
- Will now need to install new resources while data taking
- Intend to eventually provide a profile of ramp-up of resources (quarterly?) – but for this discussion present only the total needs for the 2 resource periods
  - Helps with installation schedules

Comparisons

- For each experiment (following tables):
  - Updated requirement for 2009 and 2010 compared with existing 2009 pledge and old 2010 requirement (since we do not have the split between experiments for pledges after 2009)
- Overall
  - Compare 2009, 2010 new requirements with existing pledges
- Uncertainties are at least at the 10% level
- The new requirements have not been reviewed by either the C-RSG nor the LHCC
  - RSG meeting before the RRB ????
- The pledges do not take into account:
  - Change in INFN planning, nor delay at NL-T1, and others where 2008 pledges not fully installed

ATLAS

ATLAS	2009 req	2009 pledge	2010 req	Old 2010 req
CERN CPU	57	26.5 (53.6)	67	43
CERN disk	3.7	2.075 (3.95)	5.1	3.67
CERN tape	7.8	6.21 (9.69)	9.9	13
T1 CPU	90	120.9	227	198.3
T1 disk	24	19.86	36.7	40.35
T1 tape	11.3	14.72	14.8	29.9
T2 CPU	108	114	240	206
T2 disk	13.3	11.2	24.8	22.32

- Cosmic ray data in Q309 will produce 1.2PB (same as Aug-Nov 08)
- In 6x10^6 sec will collect 1.2x10^9 events ➔ 2PB raw
- Raw stored on disk at T1s for a few weeks
- Plan for 990M full sim events and 2200M fast sim events
- CERN request was updated last Aug and was seen by RSG

- New requirements <= old requirements (except at CERN)
- Provide resource needs profile by quarter (see document)
- NB. The August 2008 request for 2009 – increase at CERN - while agreed by the RSG has never been validated by LHCC

CMS

CMS	2009 req	2009 pledge	2010 req	Old 2010 req
CERN CPU	48.1	54.8	112.9	115.2
CERN disk	1.9	2.5	4.6	3.8
CERN tape	9.5	9.3	15.3	14.3
T1 CPU	53.5	63.7	119	139
T1 disk	6.5	8.4	14.1	15.4
T1 tape	10.5	16	21.6	23.2
T2 CPU	54.1	116	209.6	306
T2 disk	5	8.4	11.3	7.6

- 300Hz data taking rate
- 3 re-reconstr in each ’09, ‘10
- CPU times assume higher lumi in ‘10
  - recCPU: 100→200 HSO6.s
  - simCPU: 360→540 HSO6.s
- 40% overlap in PD datasets
- Added storage needs for ‘09 cosmics
- T0:
  - Added 1 re-reco in each year
  - Capacity for express stream
  - Reco to finish in 2x runtime
  - Monitoring + commissioning is now 25% of total (was 10%)
- T1:
  - Finish re-reco in 1 month (was spread over full year)
- T2:
  - Require 1.5 more MC events than raw: sw changes and bug fixes
  - MC events produced in 8 months (can only start after Aug’09)

ALICE

ALICE	2009 req	2009 pledge	2010 req	Old 2010 req
CERN CPU	42.8	46.4	46.8	49.4
CERN disk	2.4	4.5	4.5	4.7
CERN tape	3.7	7.3	6.7	11.6
T1 CPU	42.8	40.9	102.4	94
T1 disk	4.3	3.9	9.9	12
T1 tape	5.9	6.2	11.6	19.7
T2 CPU	36	39.9	80.8	100
T2 disk	4.4	2.82	12.4	4.3

- Will collect p-p data at ~maximum rate: 1.5x10^9 events at 300 Hz
  - Initial running will give luminosity required without special machine tuning – cleaner data for many physics topics
  - First pp run energy is important in interpolating results to full PbPb energy
- Thus plan to collect large statistics pp in 2009-10
- Assume 1 month Pb-Pb at end of 2010

- Requests are within (or close to) existing pledges except for Tier 2 disk
- For 2010 – don't know actual pledge for ALICE, but generally pledges are significantly lower than requirement. (so final column should be mostly pink for T1+T2!)

LHCb

LHCb	2009 req	2009 pledge	2010 req	Old 2010 req
CERN CPU	11.4	4.2	19.2	6.12
CERN disk	0.78	0.99	1.47	1.28
CERN tape	1.2	2.27	2.3	4.2
T1 CPU	16	20.2	34	27.36
T1 disk	2.8	2.7	4.4	3.25
T1 tape	1.3	3.2	2.9	5.86
T2 CPU	21.9	35.4	31.5	45.5
T2 disk	0.02	0.37	0.02	0.02

- Uncertainty in running mode (pile up) ➔ add contingency on event sizes and simulation time
- 2009 Simulation with assumed running conditions
- Early data with loose trigger cuts and many reprocessing passes – alignment/calib+early physics
- 2010 – several reprocessing passes and many stripping passes
- Simulation over full period

- CERN increase due to need for fast feedback to detector of alignment/calibration + anticipation of local analysis use
- T1 CPU increase in 2010 due to more reprocessing
- T2 requirements decrease as less overall simulation needed

LHCb ramp-up

- Table above is integrated request; resources requested to be in place are the following at the start of each period

	Site	kSH06	Disk PB	Tape PB
Oct'09	CERN	17	0.78	1.2
	Tier-1	31	2.8	1.3
	Tier-2	30	0.02	0
Apr'10	CERN	25	1.47	1.8
	Tier-1	45	4.4	2.1
	Tier-2	38	0.02	0
Oct'10	CERN	28		
	Tier-1	49		
	Tier-2	40		

My comment: this is an unfair comparison. To be consistent with the other experiments, these numbers are the ones that should be in the previous table as this is the real capacity that is needed in place at the end of each period.

Summary

Summary	2009 req	2009 pledge	2010 req	Old 2010 req	2010 pledge
CERN CPU	159.3	131.9	245.9	213.72	213.6
CERN disk	8.78	10.07	15.67	13.45	13.4
CERN tape	22.2	25.1	34.2	43.1	43.1
T1 CPU	202.3	245.7	482.4	458.66	406.1
T1 disk	37.6	34.9	65.1	71	60.3
T1 tape	29	40.12	50.9	78.66	65.9
T2 CPU	220	305.3	561.9	657.5	475.8
T2 disk	22.72	22.79	48.52	34.24	35.2

Potential comments

- CERN resources
  - With some careful purchasing (ability to buy later), re-adjustment of deployment, etc. can cover most of the updated requests
  - But would like validation of increased requests from LHCC...
  - And this is additional capacity not planned – power budget concerns

WLCG timeline 2009-2010