Ian Bird

LHCC Referees Meeting

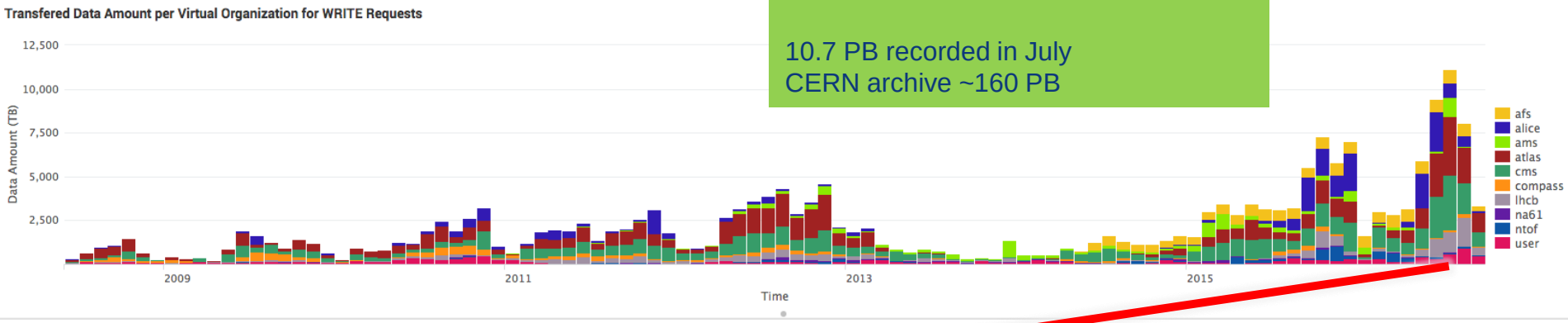
CERN, 20th September 2016

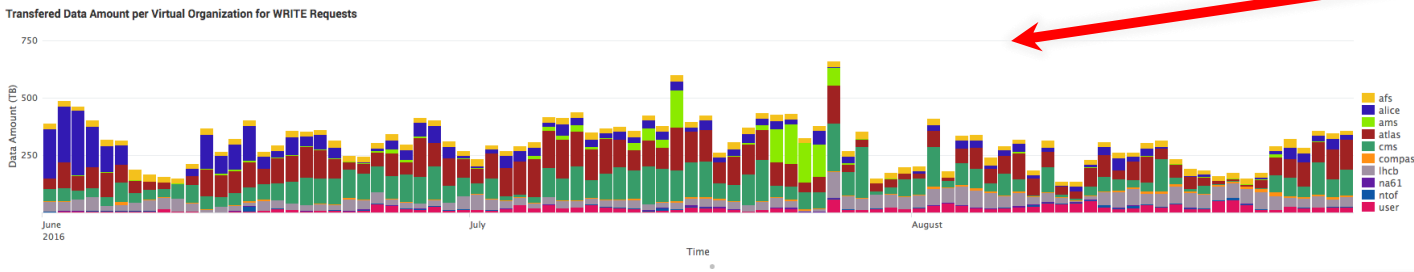
WLCG Status Report
Computing in Run 2

2016 data

LHC data – Continue to break records:

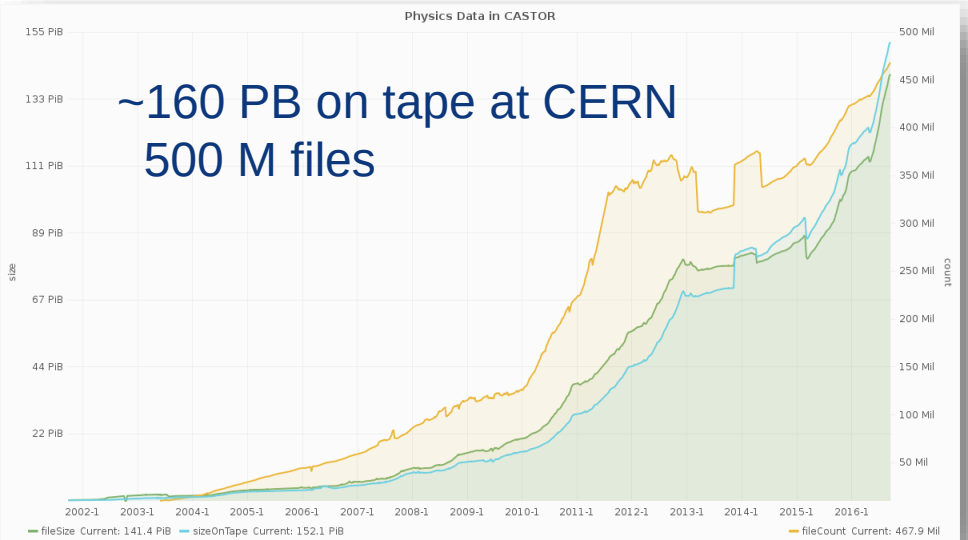
10.7 PB recorded in July
CERN archive ~160 PB





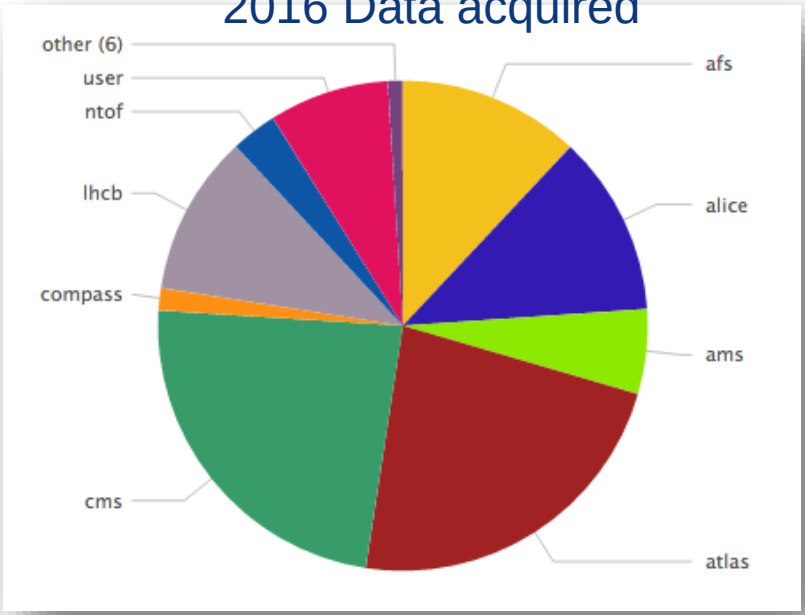
June-Aug 2016
>500 TB / day
(Run 1 peak for HI was 220 TB)

2016 to date: 35 PB LHC data:
ALICE 6, ATLAS 11.6, CMS 11.9, LHCb 5.4)



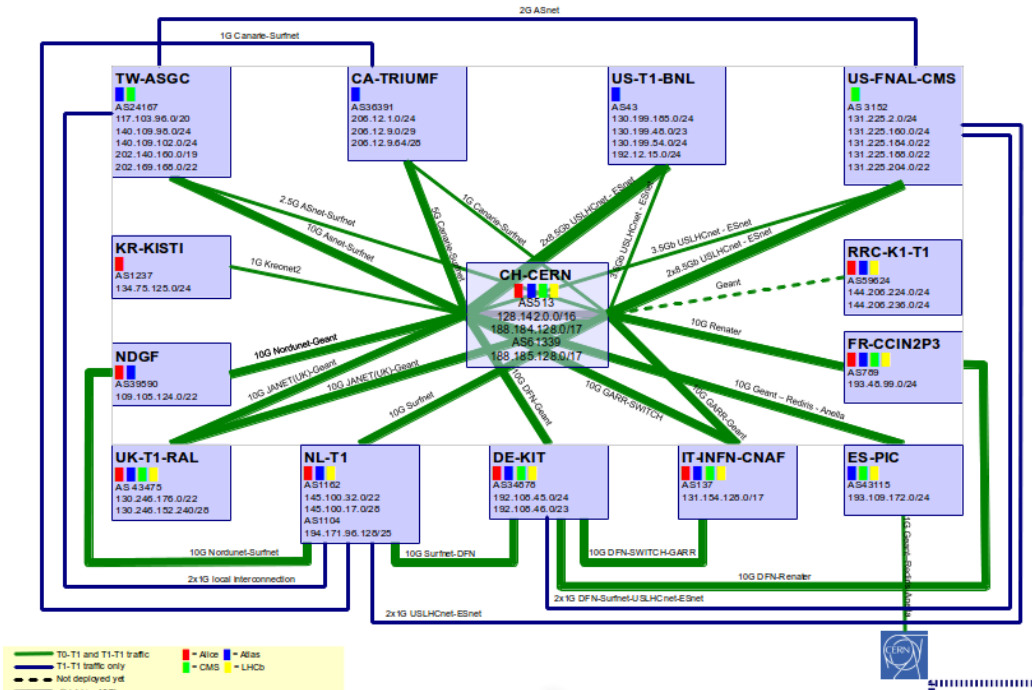
~160 PB on tape at CERN
500 M files

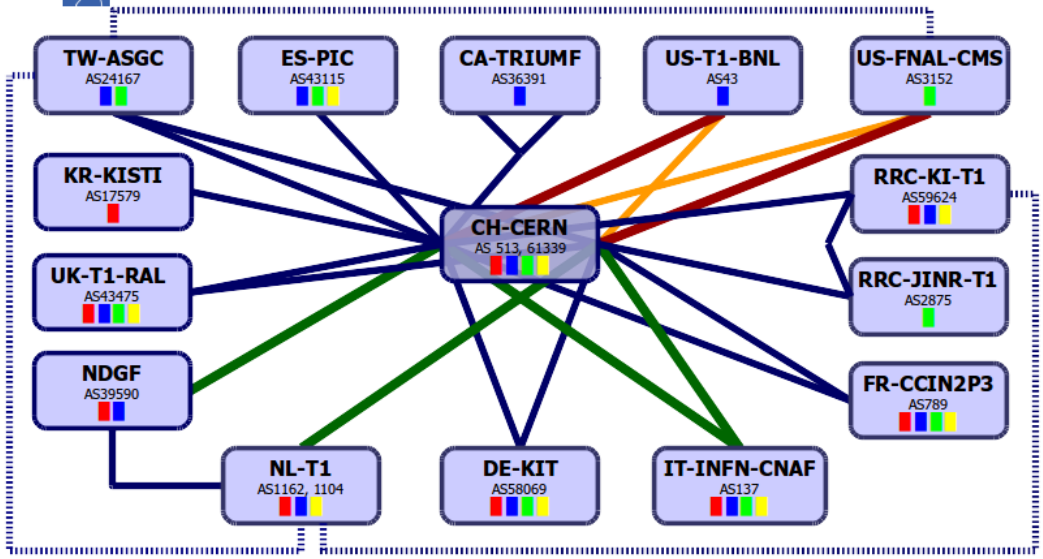
2016 Data acquired



LHCOPN

- Optical Private Network
- Support T0 – T1 transfers
- Some T1 – T1 traffic
- Managed by LHC Tier 0 and Tier 1 sites

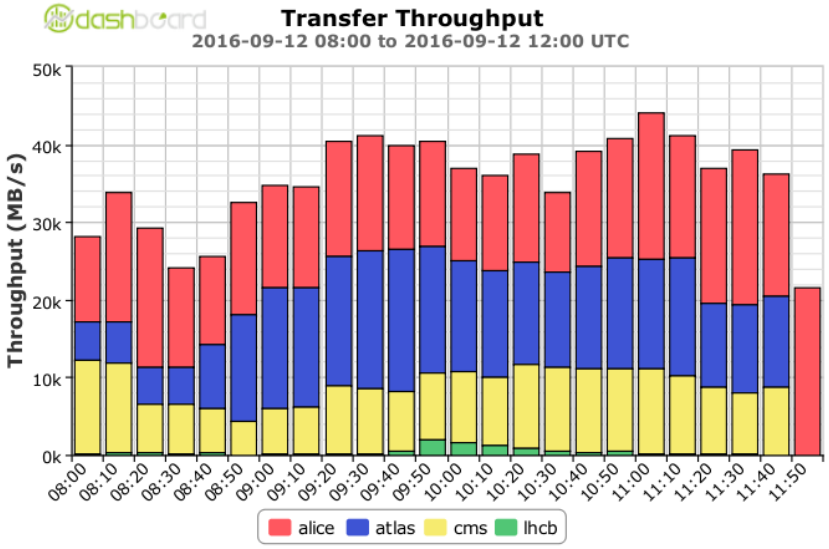




T0-T1 and T1-T1 traffic
T1-T1 traffic only
= Alice = Atlas = CMS = LHCb
edoardo.martelli@cern.ch 20160912
10Gbps
20Gbps
40Gbps
100Gbps

Data distribution

- Global transfer rates increased to > 40 GB/s (=2 x Run1)



Monthly traffic growth on LHCONE

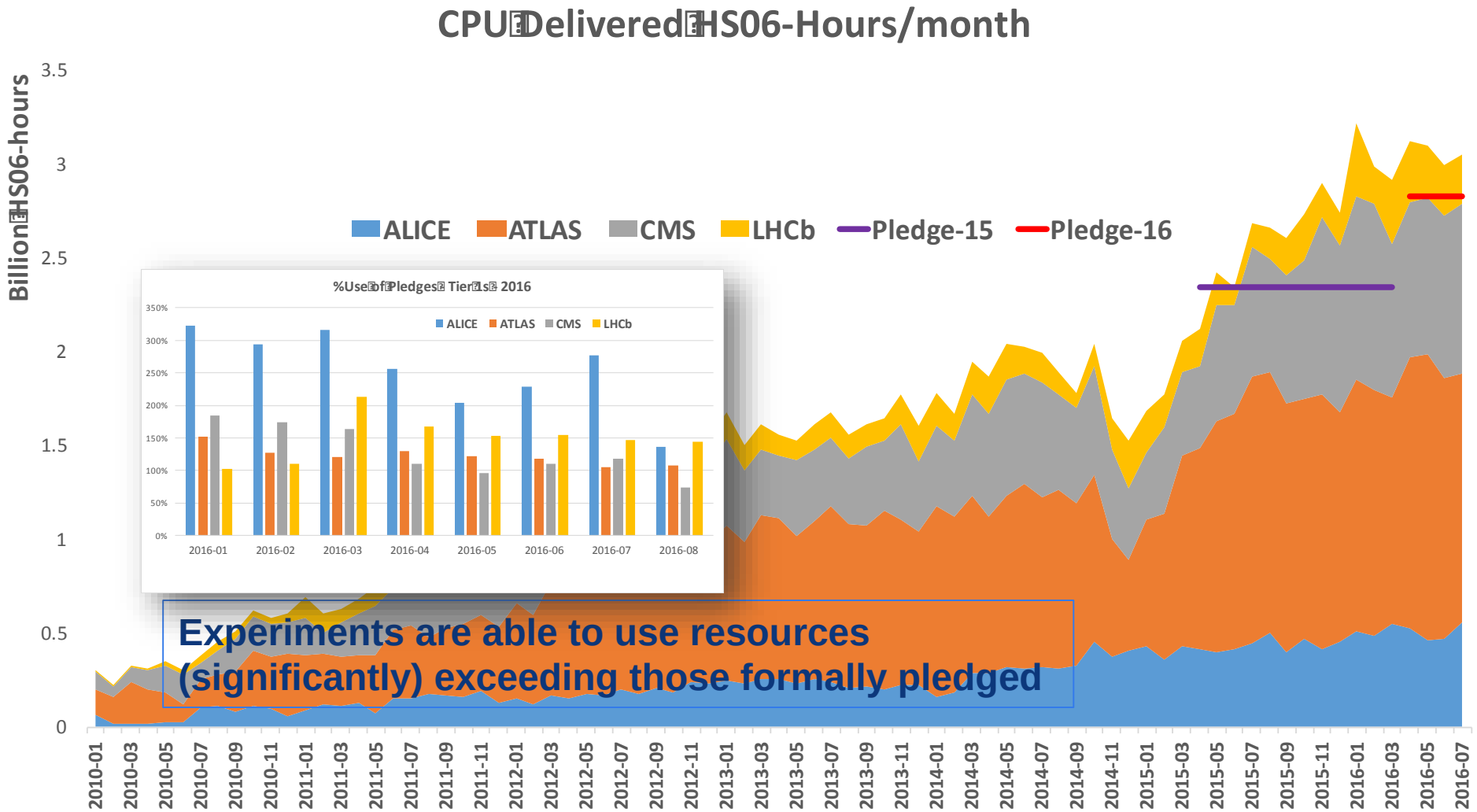
Increased performance everywhere:

- Data acquisition >10PB / month
- Data transfer rates > 40 GB/s globally

Several Tier 1s have increased network bandwidth to CERN to manage new data rates;
GEANT has deployed additional capacity for LHC

Regular transfers of 80 PB/month with 100 PB/month during July-Aug (many billions of files)

CPU delivered



Resource requirement evolution

Evolution of requirements

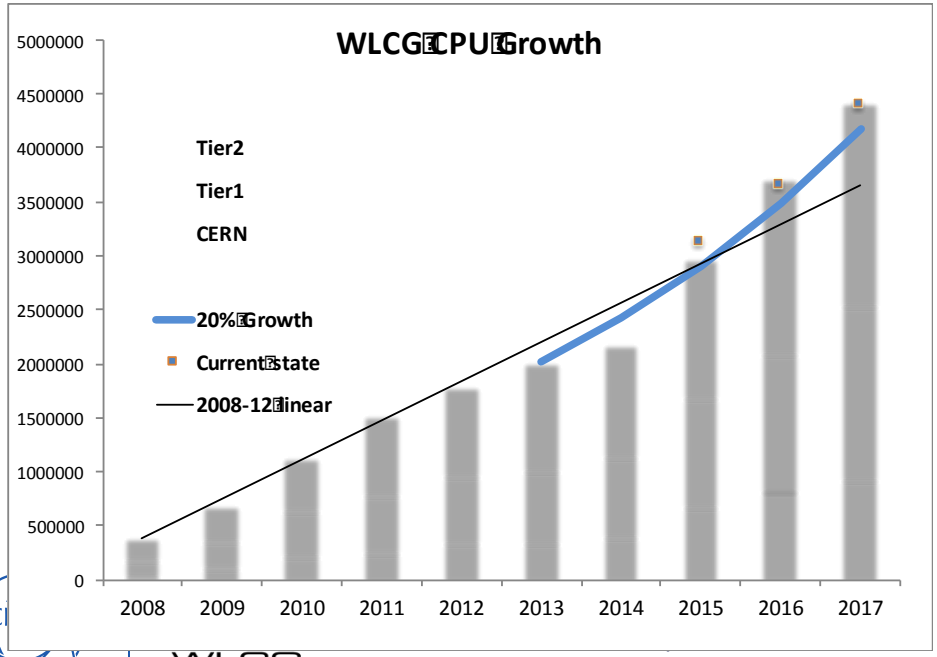
The reliability of resource predictions is continually improving, the largest uncertainties being the LHC running conditions.

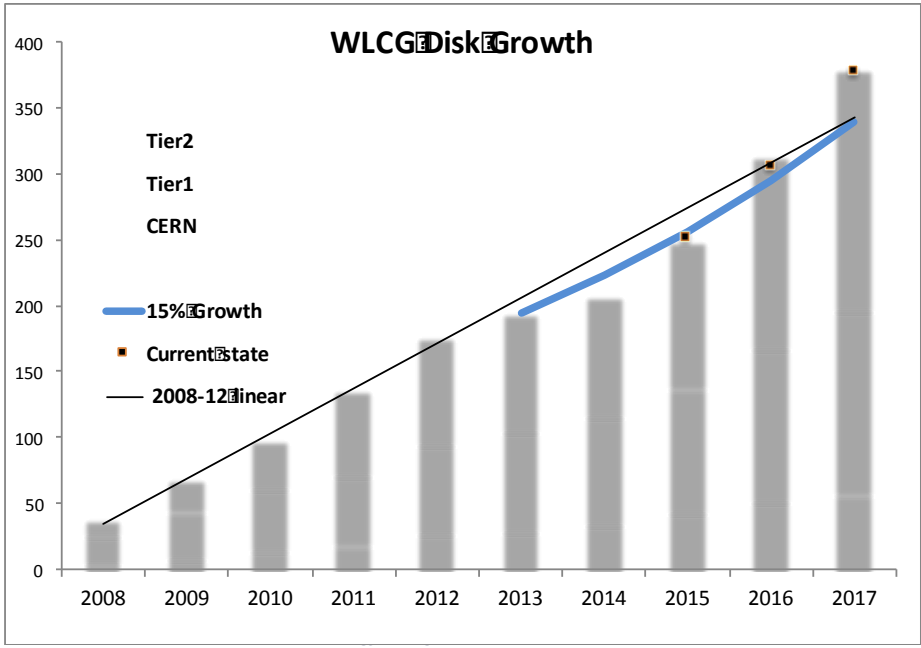
Funding guidance: flat budgets for computing

Slide from 2014

Estimated evolution of requirements 2015-2017

2008-2013: Actual deployed capacity

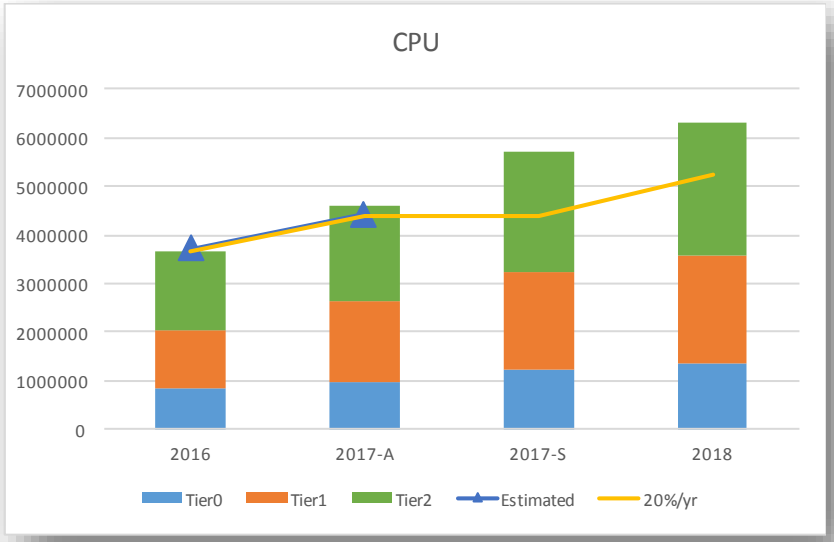


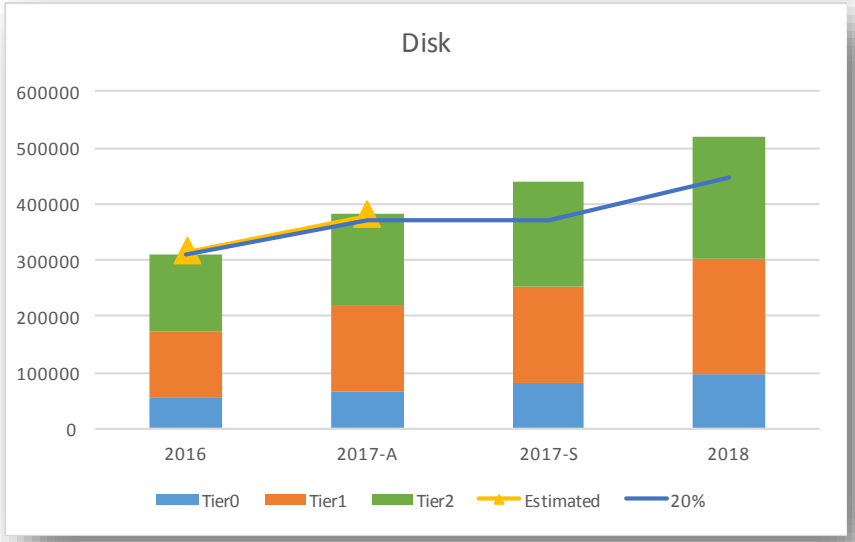


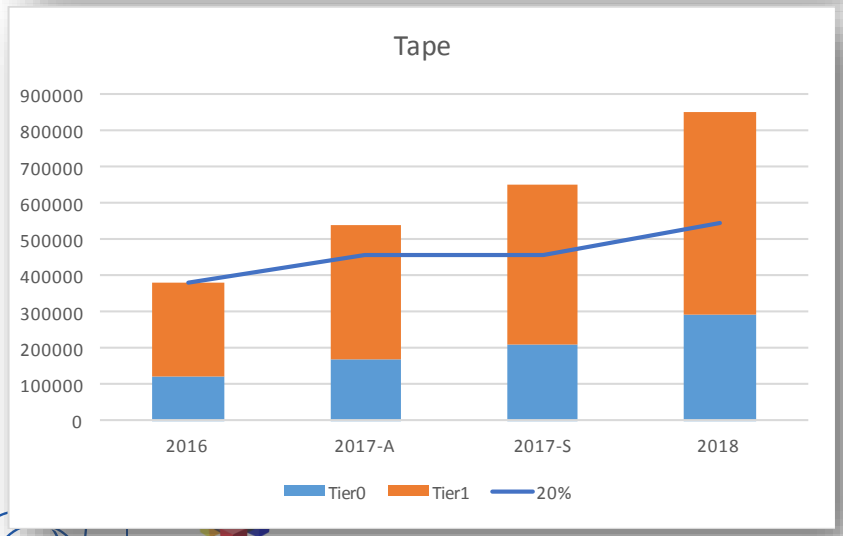
Run2: Increased computing needs

- LHC performance is above expectations
- Computing needs driven by (mainly):
  - LHC live time (37% → > 60%)
  - Luminosity ($1.0x10^{34}$ → $1.2x10^{34}$ or better)
  - Pile-up (CMS, ATLAS) (21 → 33 on average)
- All have increased above anticipated levels
- For 2016, the available resources will be sufficient
  - More tapes at CERN have been bought
- Re-analysis for 2017,18
  - Just done in time for RRB
  - Not yet scrutinized by RSG
  - But: expectations are increased requirement above previous estimates of 15-30%

Re-assessment of needs







Estimated: Estimates made in 2014 for Run 2 up to 2017

20%: Growth of 20%/yr starting in 2016 (“flat budget”)

Strategy?

- Have warned funding agencies about the increase for 2017
- Expect discussion at the RRB (end Oct)
- How should we manage a short fall in resources? Should be prepared for the RRB
  - What are the strategies to be followed?
  - Have already reduced replicas, re-processing, software performance, etc. Hard to find additional savings?
  - Parking data? – Until when?
  - Or?