

Ian Bird, CERN

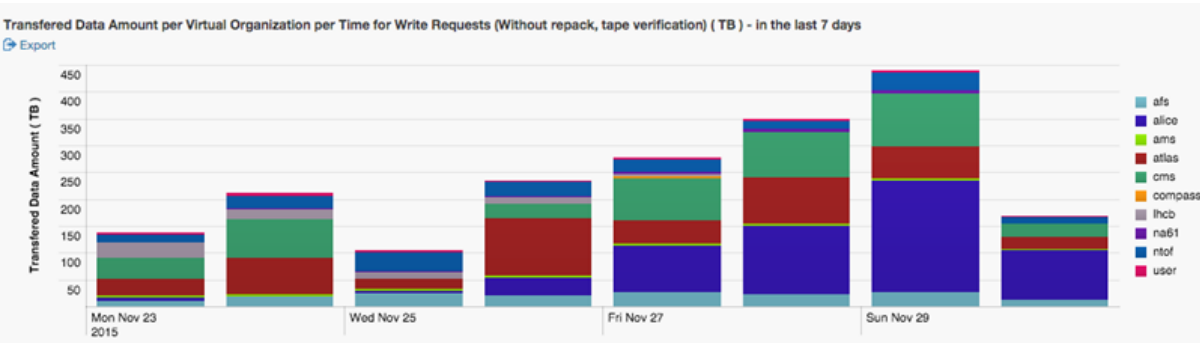
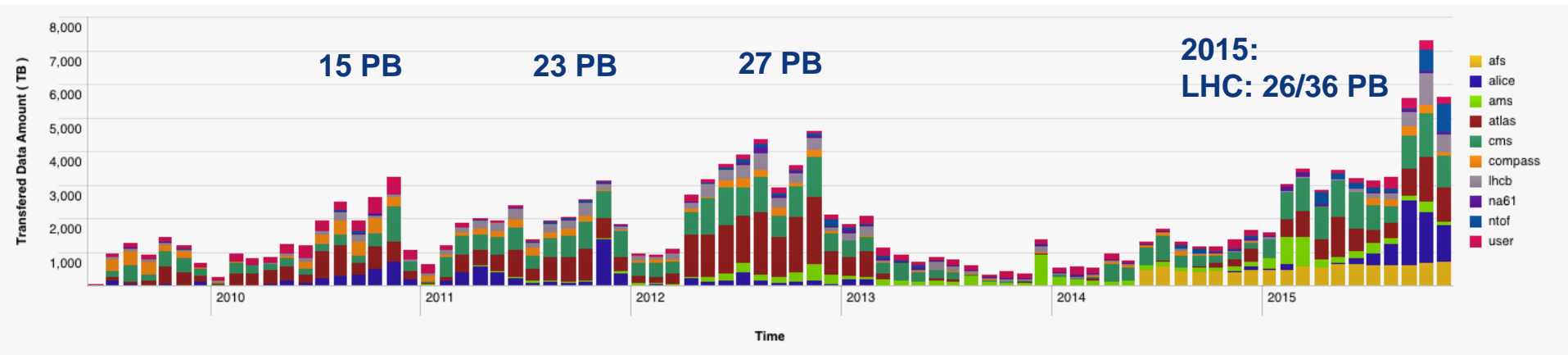
WLCG LHCC Referee Meeting

1<sup>st</sup> December 2015

# WLCG Status Report



# 2015 data in Tier 0



HI data:  
up to 450 TB/day this weekend  
(previous max was ~220 TB/day)

HI data:  
Data rates ~8 GB/s sustained for 8 h  
(peaks ~10.5 GB/s)

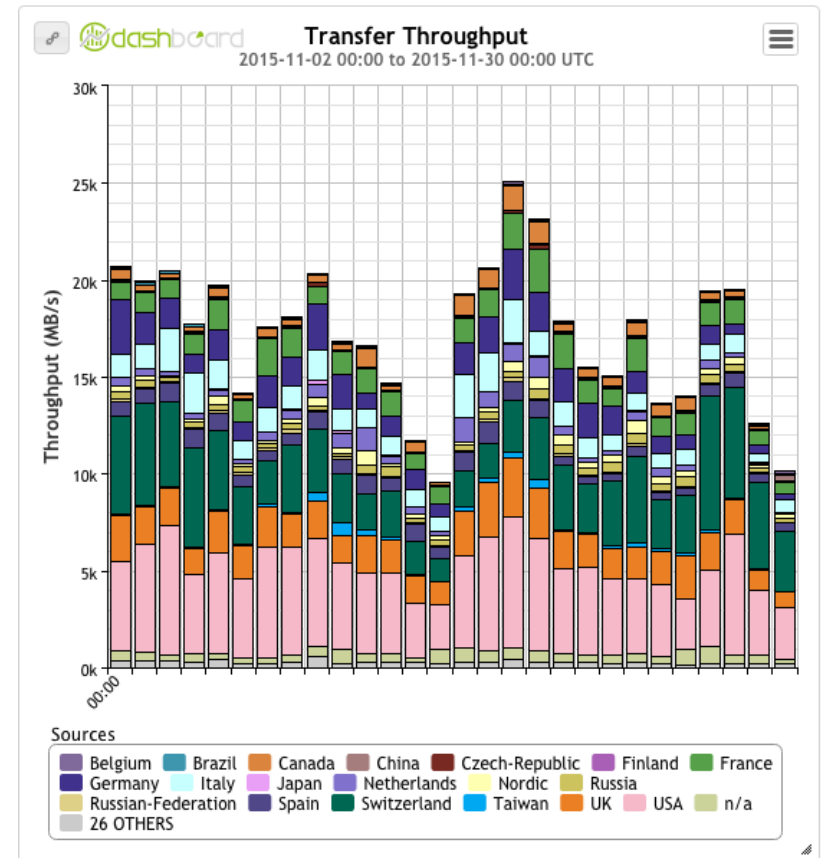
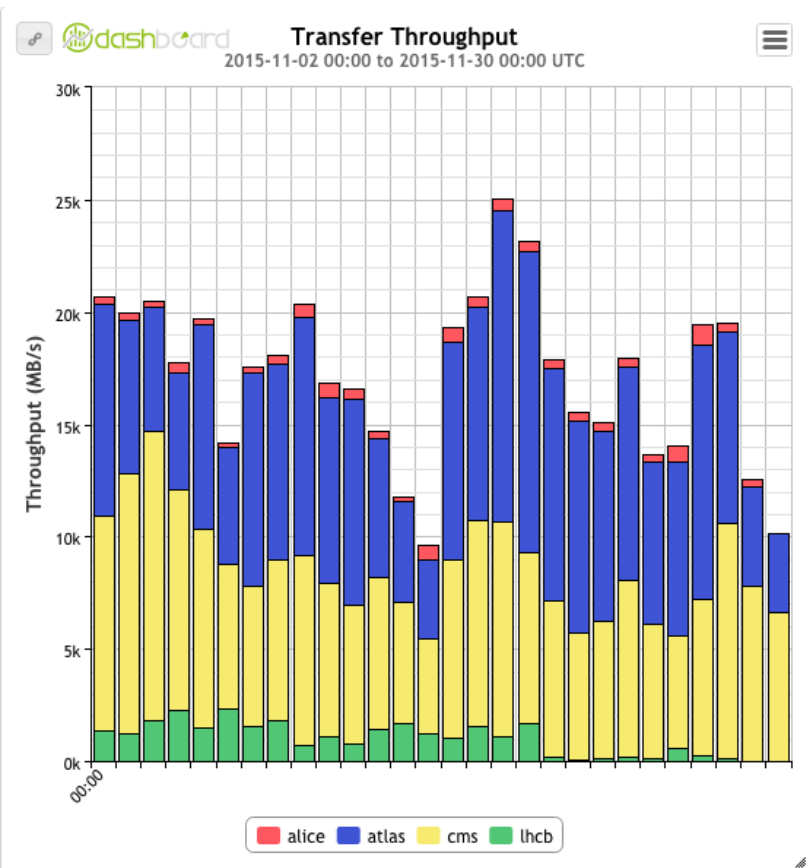
## TAPE SERVER NETWORK THROUGHPUT / S

● IN ● OUT per 5m | (49948 hits)



LHCC; 1st

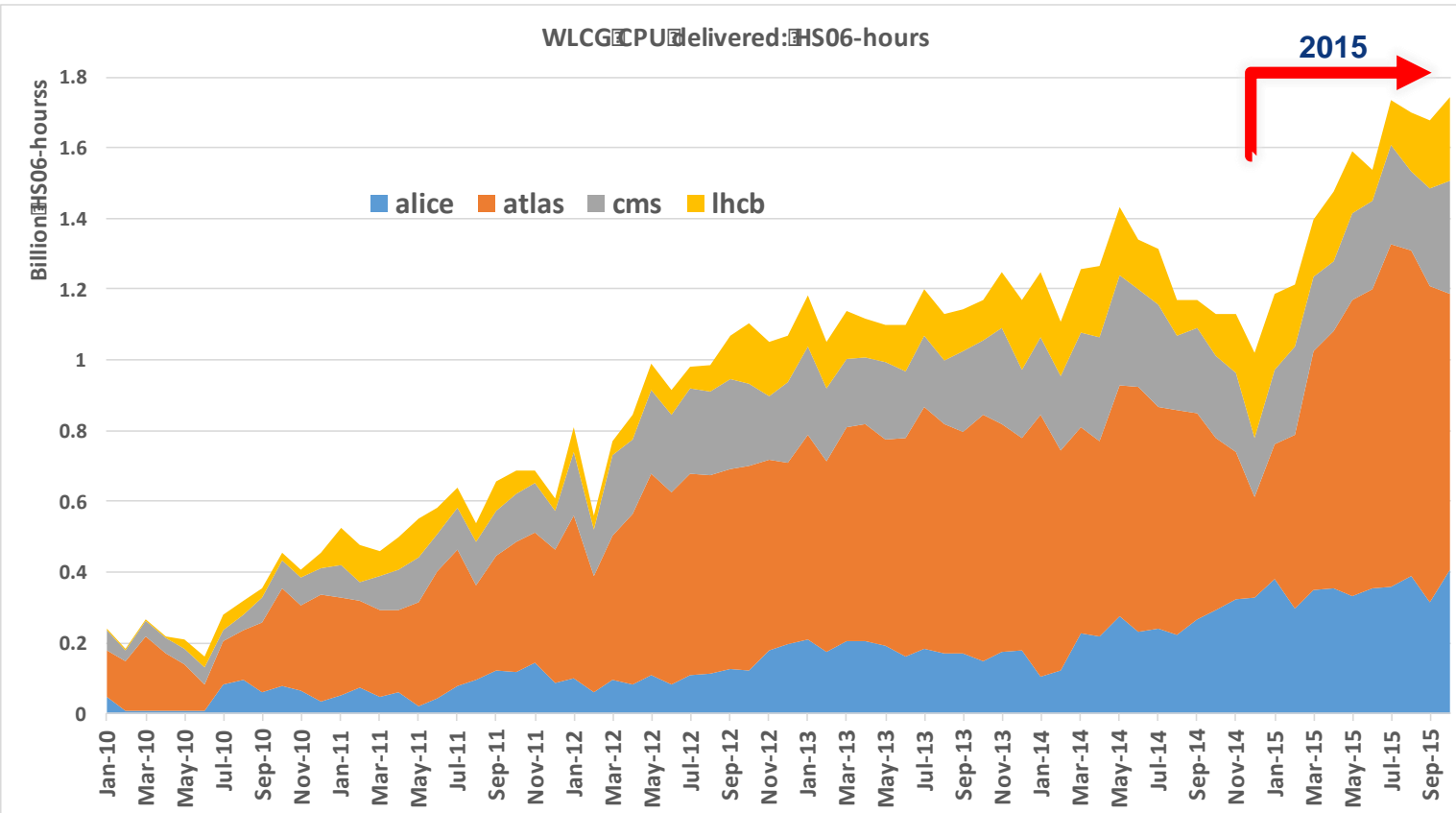
# Transfers



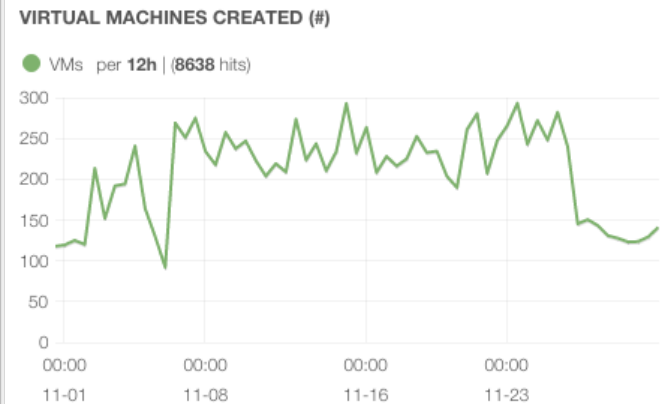
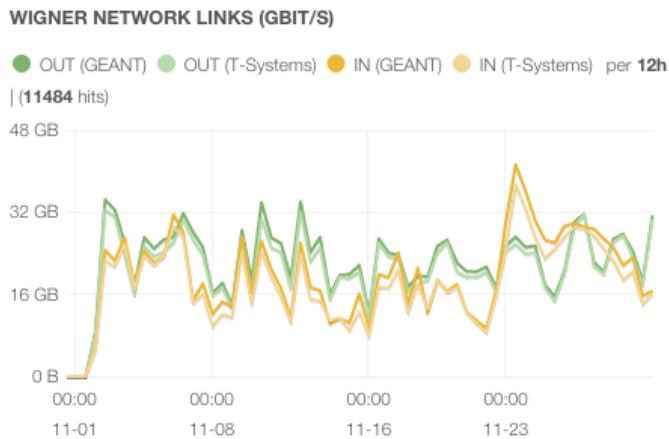
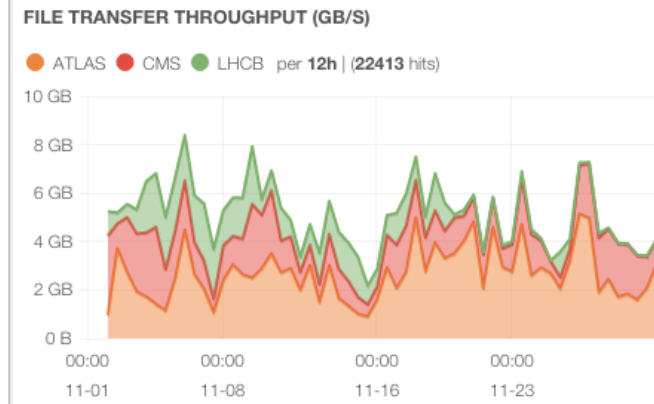
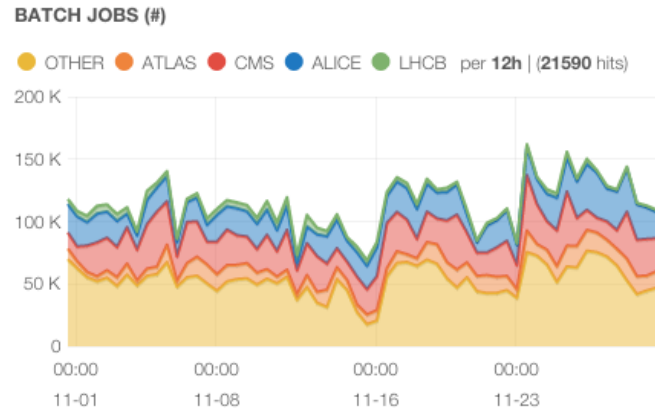
Transfer rates also already above those in Run 1: 20-25 GB/s global

ATLAS & CMS have each transferred ~20 PB in last month

# Ramp-up of CPU



# Tier 0



## MEYRIN DATA CENTRE

	last_value
● Number of Cores in Meyrin	121,575
● Number of Drives in Meyrin	70,887
● Number of 10G NIC in Meyrin	5,627
● Number of 1G NIC in Meyrin	21,707
● Number of Processors in Meyrin	21,573
● Number of Servers in Meyrin	11,618
● Total Disk Space in Meyrin (TB)	122,938
● Total Memory Capacity in Meyrin (TB)	482

## WIGNER DATA CENTRE

	last_value
● Number of Cores in Wigner	43,360
● Number of Drives in Wigner	23,184
● Number of 10G NIC in Wigner	1,399
● Number of 1G NIC in Wigner	5,071
● Number of Processors in Wigner	5,422
● Number of Servers in Wigner	2,714
● Total Disk Space in Wigner (TB)	71,745
● Total Memory Capacity in Wigner (TB)	172

# Comments from RRB



# General CRSG comments

- ❑ 2017; LHC machine planning:
  - No HI run
  - Shorter pp live time (compared to our earlier expectations) → but this seems unrealistically low in the light of 2015 experience in last months and compared to 2011-12 experience
- ❑ CRSG have made reductions according to these new live times – may not be appropriate
  - LHCb had themselves adapted their request
- ❑ CRSG have also made cuts to encourage more use of HLT between fills
  - Again – unrealistic if short turn around?
- ❑ ATLAS and CMS resource needs for Phase 2 upgrade studies
  - Included in CMS request (10% of CPU, 5PB disk)
  - Not included in ATLAS request (could be ~20%)
- ❑ Data preservation needs:
  - Ability of experiments to re-analyse data vs making data open access
  - Former is part of RSG process (and funding), latter is not – but has impact on resources and effort
- ❑ Tendency overall for requirements to exceed flat budgets further into Run 2

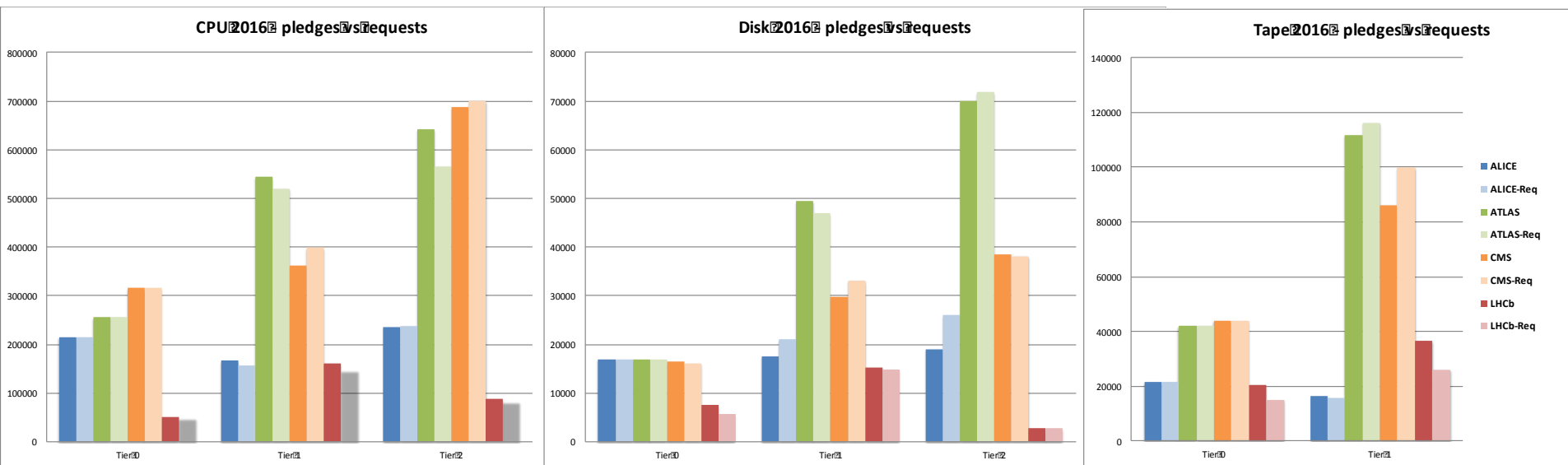
# Specific CRSG comments

- ❑ ALICE:
  - No HI run in 2017, but no change in ALICE requests
  - → needs justification
  - CRSG reduced T1, T2 CPU to account for use of HLT now
- ❑ ATLAS:
  - Reliance on beyond-pledge CPU esp for MC leads to extra tape needs
- ❑ CMS:
  - Deficits in pledges for 2015 and 2016, and potentially 2017 (but too early to be sure)
  - Significant jump in requirements for 2017
- ❑ LHCb:
  - Reduced tape needs: no 2<sup>nd</sup> copy of derived data
  - LHCb reduced 2016 requirements: 6% for CPU, disk, 30% for tape
    - Results in a bigger jump for 2017
  - More simulation done in advance for 2016 and 2017



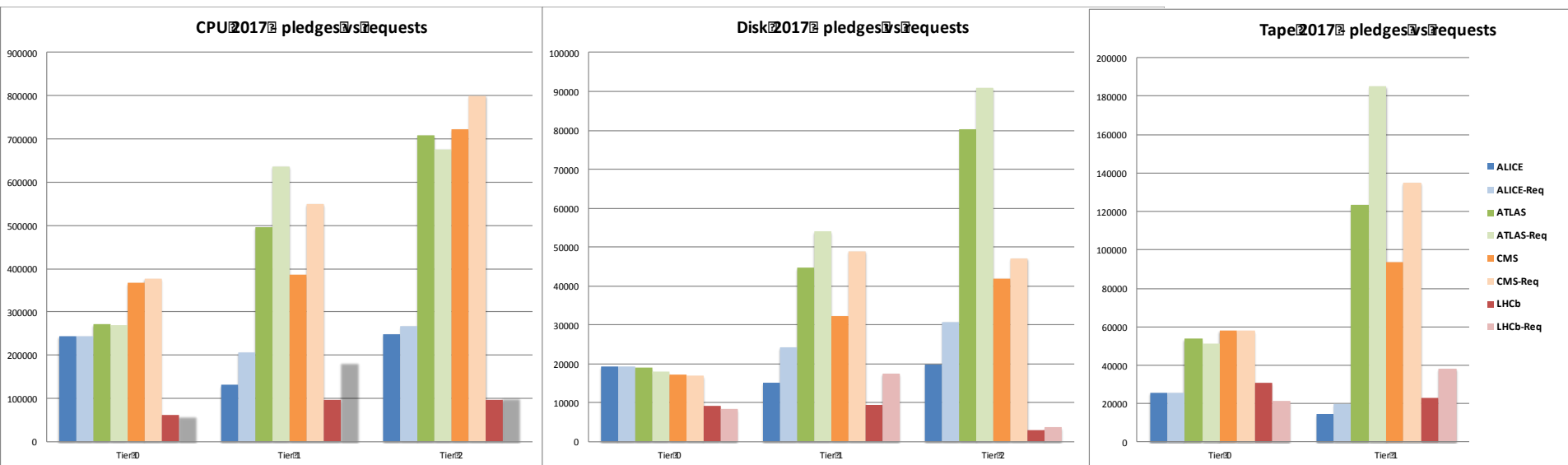
# Final state of 2016 pledges

- Following all updates of pledges for RRB



# First look at 2017 pledges

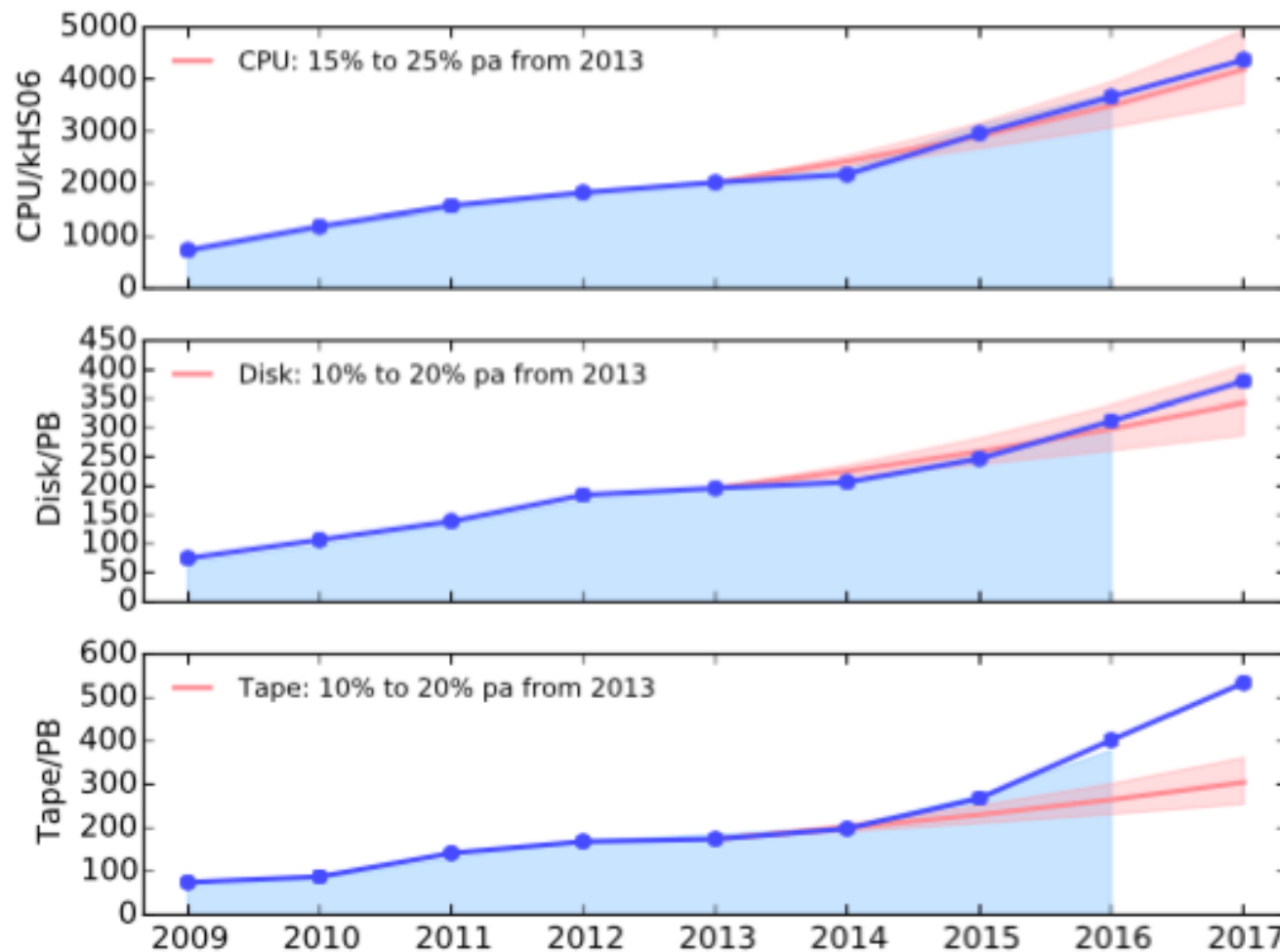
- ❑ RSG input on 2017, current state of input for 2017 (Incomplete at the moment)



# Evolution of requests

From Jonathan Flynn – RSG report to RRB Oct 2015

## Global requirements: T0 + T1 + T2



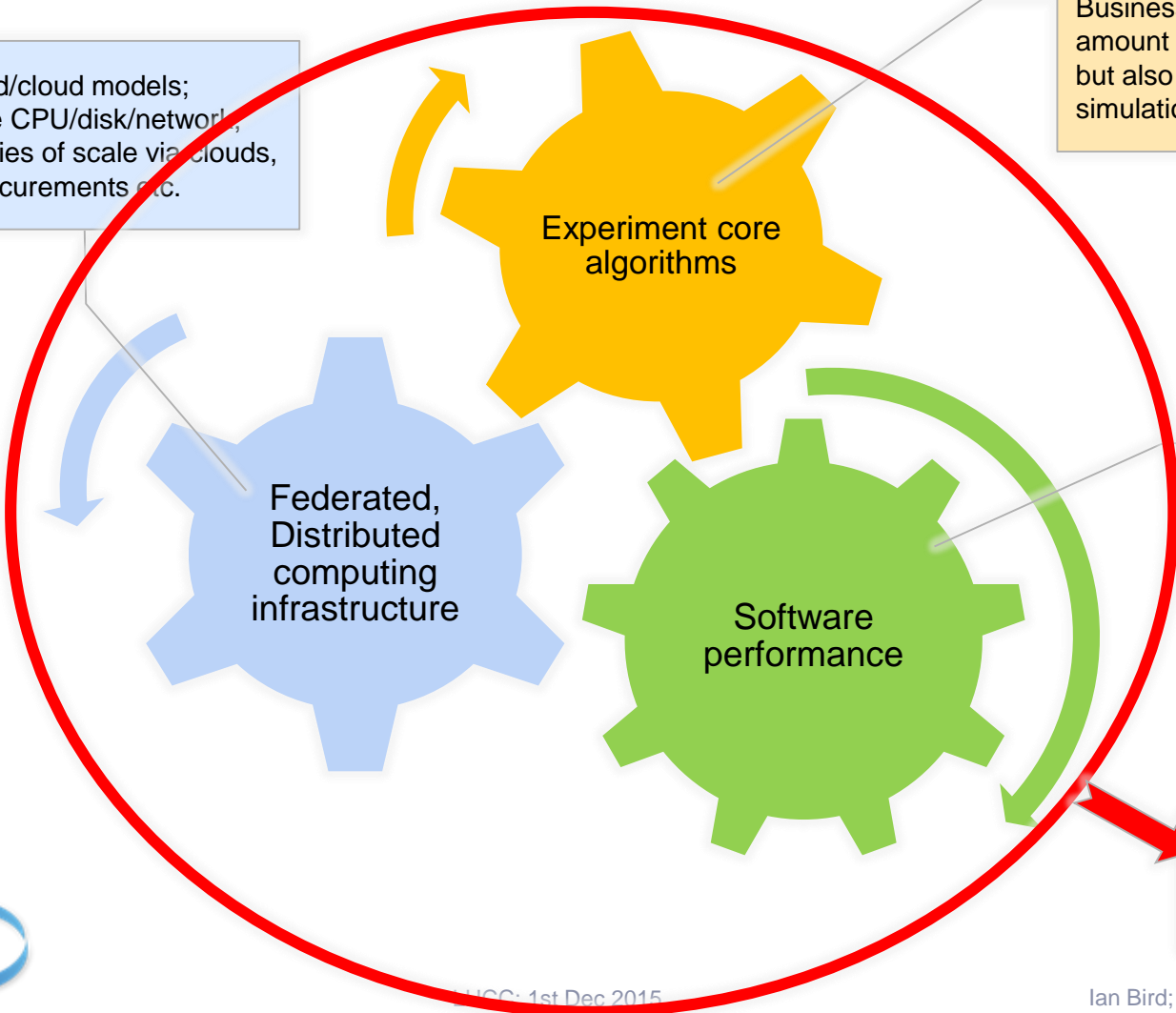


# HL-LHC computing parameters



New grid/cloud models;  
optimize CPU/disk/network;  
economies of scale via clouds,  
joint procurements etc.

Business of the experiments:  
amount of Raw data, thresholds,  
but also reconstruction, and  
simulation algorithms



Performance/architectures/  
memory etc.;;  
Tools to support: automated  
build/validation  
Collaboration with externals  
– via HSF

**COST OF  
COMPUTING**



# Longer term planning

- Putting in place a “WLCG Technical Forum” to explore possible computing models for the HL-LHC era
  - Initial action will be to document some outline ideas for investigation
  - WLCG workshop in Feb 2016 is an opportunity for further input on this
  - In parallel look at a number of evolutionary topics
- 2½ days workshop:
  - Day 1: medium term evolutions
  - Day 2: brainstorming for HL-LHC timescale
  - Set up working groups and define next steps

# HEP Software Foundation (HSF) Status

- Established to foster collaboration and common efforts particularly in the major software reengineering required for new processor architectures
  - Coordinate, prioritize, catalyze common projects, help attract funding
- Six working groups established following priorities identified in two workshops & community consultation, guided by a startup team meeting weekly
- **Software knowledge base** to promote awareness and common solutions
  - Second generation beta just released at <http://hepsoftware.org>
- **Training** drawing on a collaboration with [WikiToLearn](#) to gather and develop materials targeting HEP software training priorities (e.g. concurrency)
- **Licensing** recommendations developed in a document shortly to be released
- **Software packaging** actively gathering experience, ideas and contributions towards assembling recommendations and a toolkit
- **Software project incubator** in progress to guide & bootstrap new projects
- **Development tools/services** to make high-value services such as OpenLab test platforms available to the community, agreed but undeveloped thus far
- Establishing documentation and communication channels through an **HSF Technical Note** series, with several notes ready to go, and an **HSF Newsletter** that will launch with their release
- [1<sup>st</sup> Track Reconstruction Software Forum being held this week \(3<sup>rd</sup> December\)](#)
- *Progressing, but slower than we hoped -- more participation is needed!*

# Commercial clouds

## □ CERN tenders:

- First (CERN) tender (CPU only) done (see dashboard)
  - Won by Deutsche Bourse Cloud Exchange (different providers behind)
- 2<sup>nd</sup> (CPU+storage) market survey in progress, tender being written

## □ PCP project starting Jan 2016

- Joint procurement, EC co-funded, 5% scale of WLCG
- Defining use cases



# Commercial Cloud dashboard



# HNSciCloud H2020 PCP Project

The group of buyers have committed

- ~1.6M€ of funds  
(generating ~6M€ total funds)
- Manpower
- Applications & Data
- In-house IT resources

To procure innovative IaaS cloud services integrated into a hybrid cloud model

- Commercial cloud services
- European e-Infrastructures
- In-house IT resources

Procured services will be made available to end-users from many research communities

