



LHCb status

(The Restaurant at the end of the Universe)

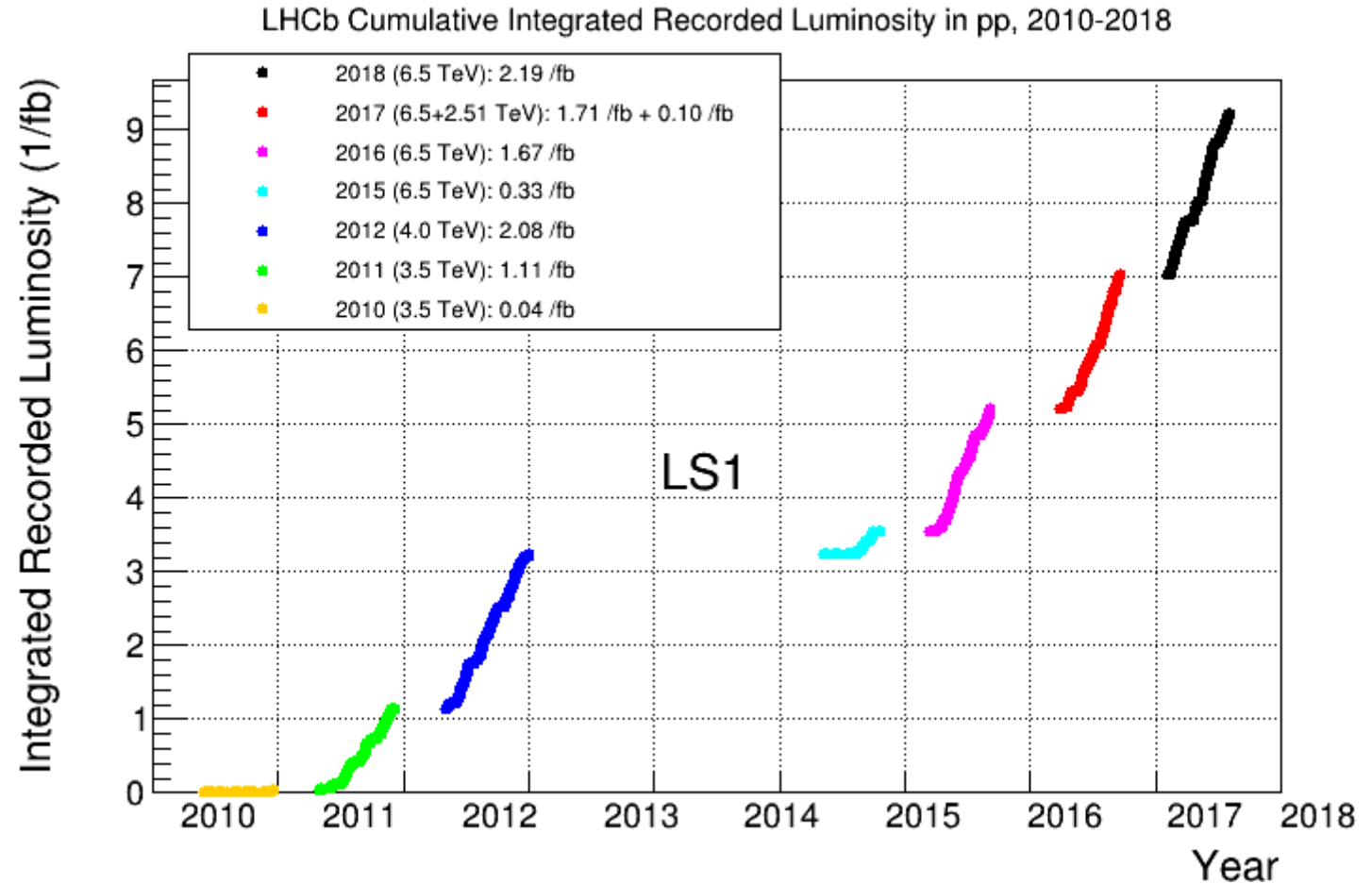
Raja Nandakumar
GridPP 42



- LHCb summary
 - ➔ Ongoing work
- LHCb in the UK
 - ➔ Physics in the UK
 - ➔ Computing in the UK
 - Tier-2 sites
 - Tier-1 usage

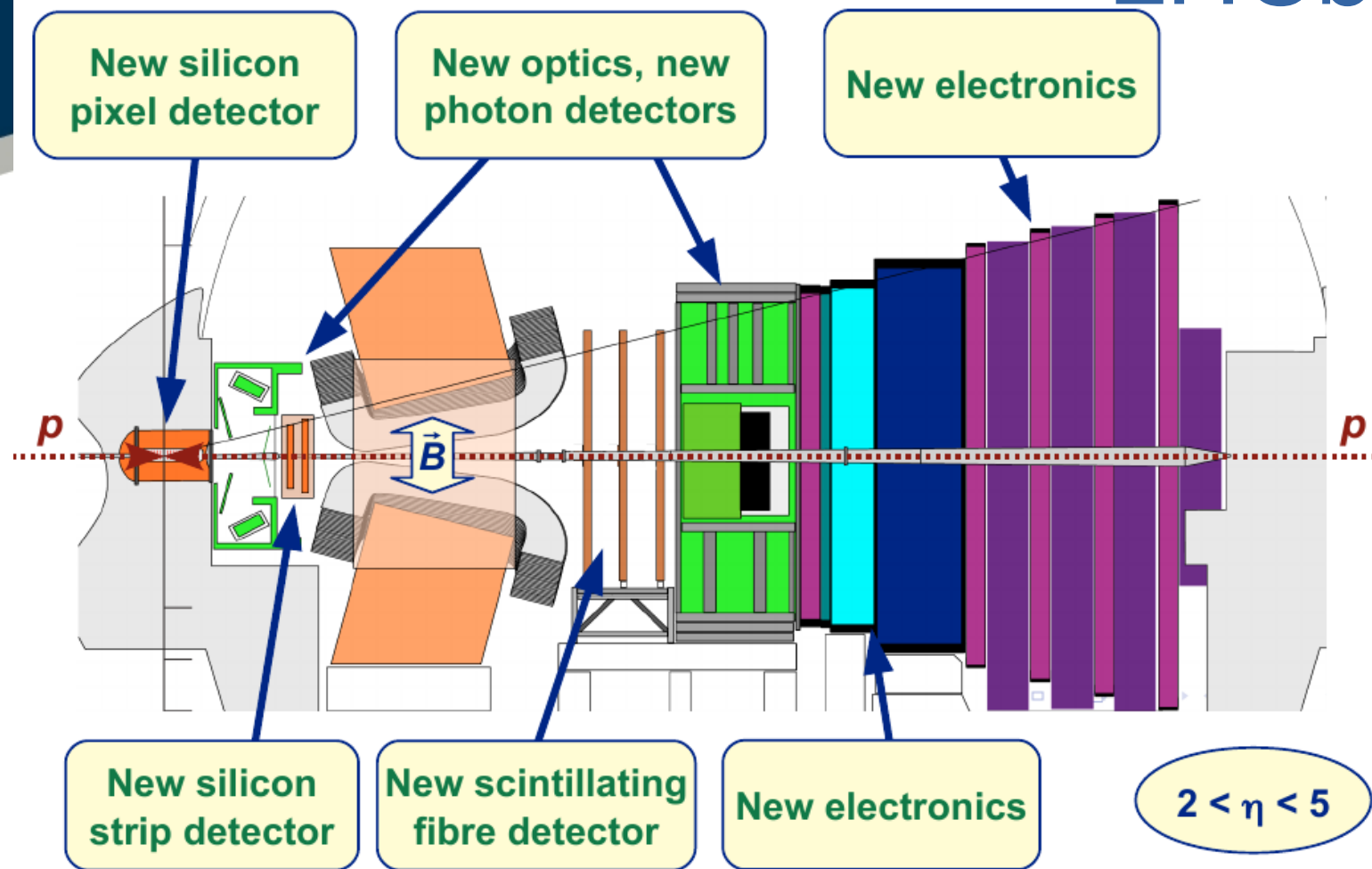


- b-physics at the LHC
- 9.18 fb⁻¹ recorded so far in p-p collisions
- Many interesting discoveries
 - ➔ New particles like pentaquarks, ...
 - ➔ Rare decay modes
 - $B_s \rightarrow \mu^+ \mu^-$
 - ➔ Precision studies
 - R_K , P_5' , ...





LHCb and Run3



- Goal : Search for BSM physics
 - ➔ Without waiting for 15 years
- \mathcal{L} up by x5
 - ➔ Abolish hardware trigger
 - 40 MHz readout
- Tracking improvements are critical

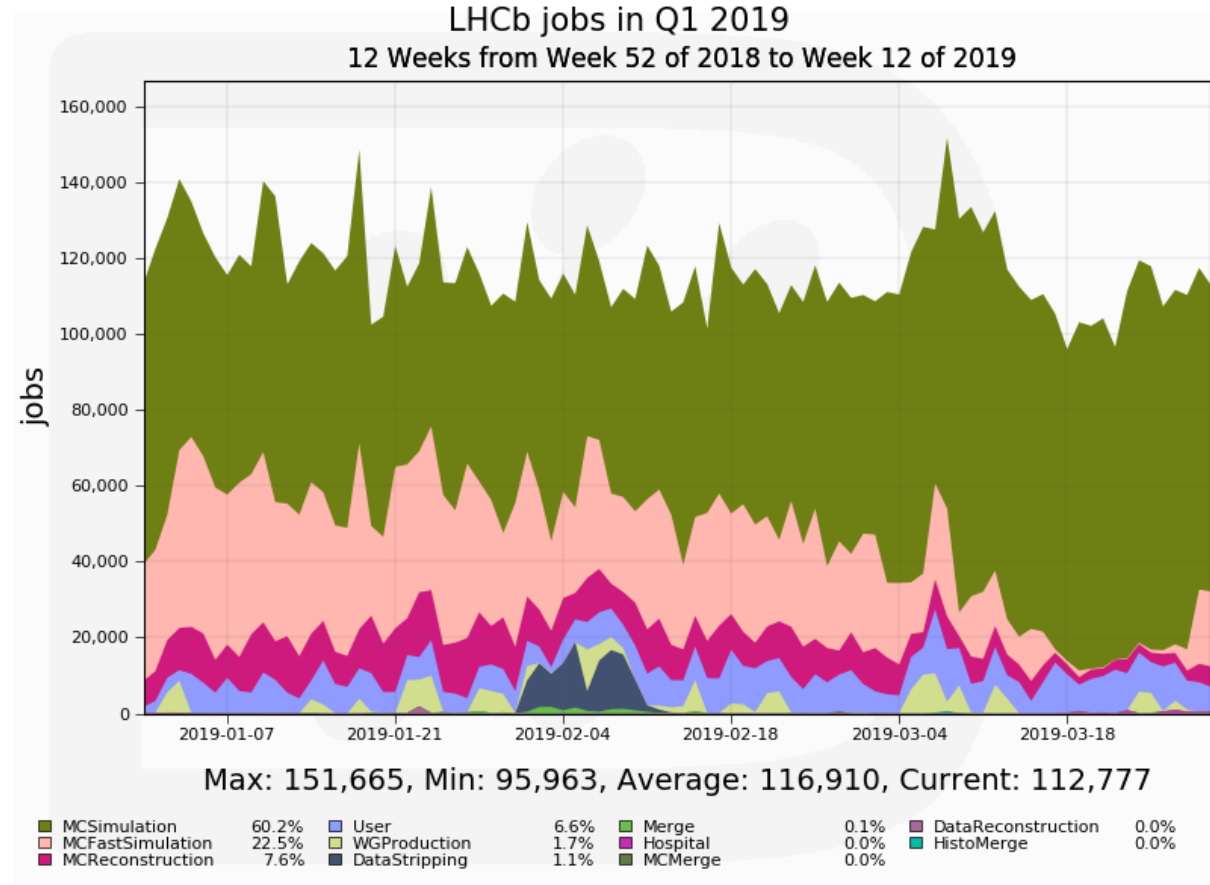
- 8 Tier-1 sites + CERN for LHCb
 - ➔ + HLT farm at the pit
 - ➔ 15 Tier-2D sites (6 in the UK)
 - ➔ All other Tier-2 sites used opportunistically
- UK About 1/3 of LHCb by author membership
 - ➔ Distributed all over the UK
- DIRAC used by LHCb for grid submission
 - ➔ Fully dual stacked
 - ➔ And you know the rest of the story



LHCb Computing – 2

➤ Ongoing activities

- ➔ Complete reprocessing of Run1 and Run2 data
 - Staging of a lot of data and running over it
- ➔ MC simulation
 - Lots of ongoing work with the data so far



Fairly
seamless





LHCb and RAL

➤ Storage

- ➔ dCache until 2007
 - ads for tape
- ➔ Then moved to Castor in (starting in 2006)
 - Disk and tape
- ➔ Now ECHO for disk (partly)
 - Castor continues for tape

➤ CPU (not only at RAL)

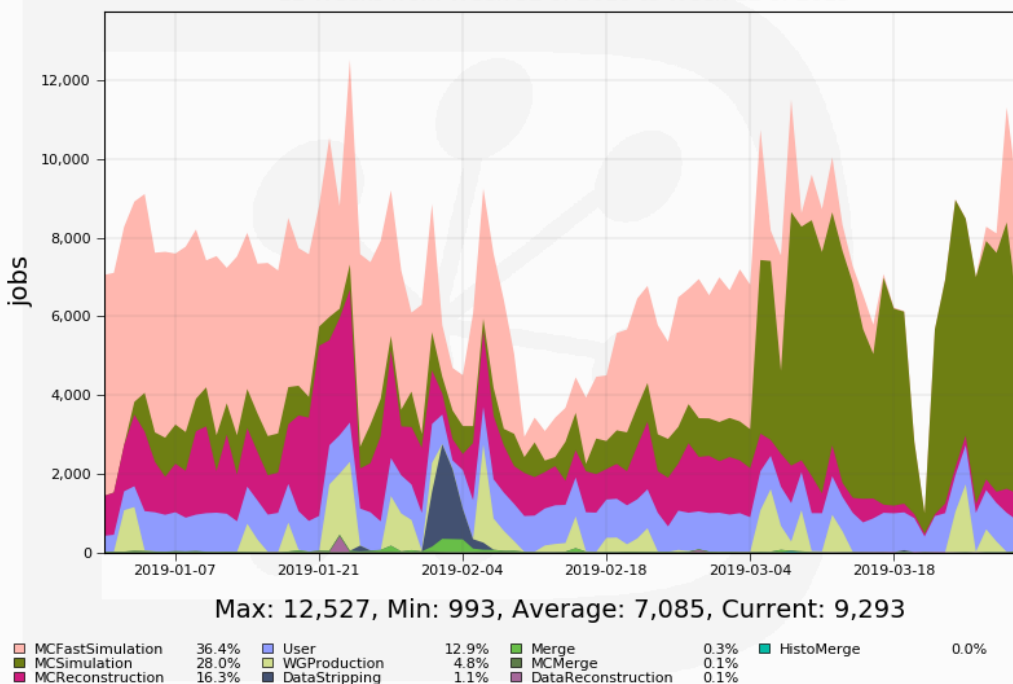
- ➔ sl3, ...
- ➔ LHCb HLT code for Run1 needs sl5
 - Forever

➤ Other services

- ➔ Still using vo-box
 - Critical redundancy
- ➔ No longer used
 - LFC, conditions dB

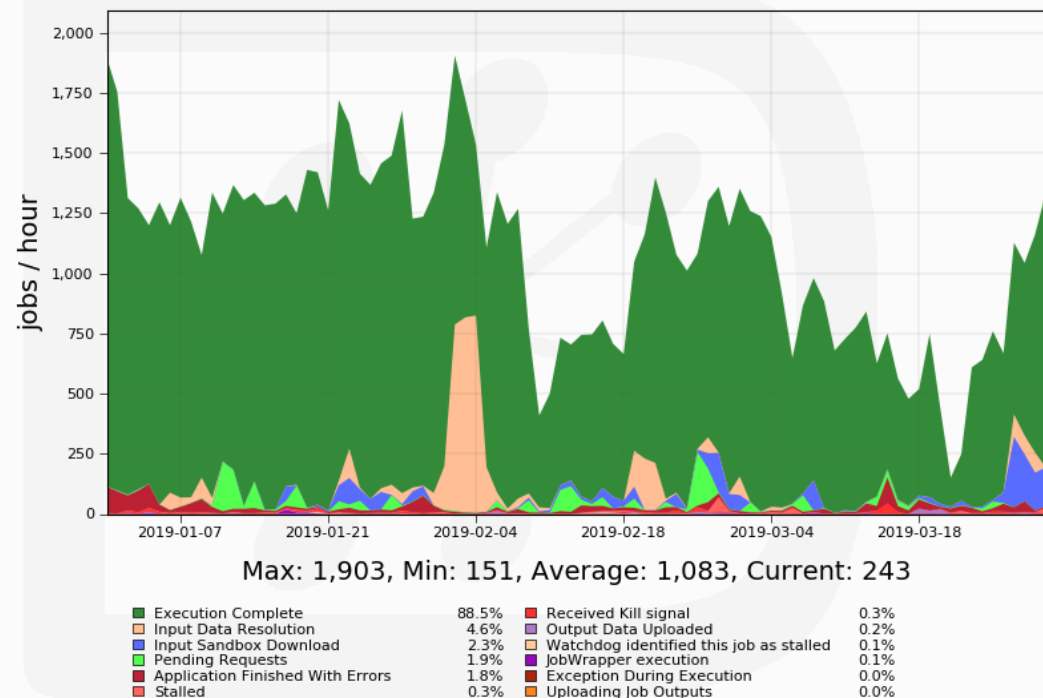


LHCb jobs at RAL in Q1 2019
12 Weeks from Week 52 of 2018 to Week 12 of 2019



Generated on 2019-04-25 09:02:58 UTC

Jobs by Final Minor Status at RAL
12 Weeks from Week 52 of 2018 to Week 12 of 2019

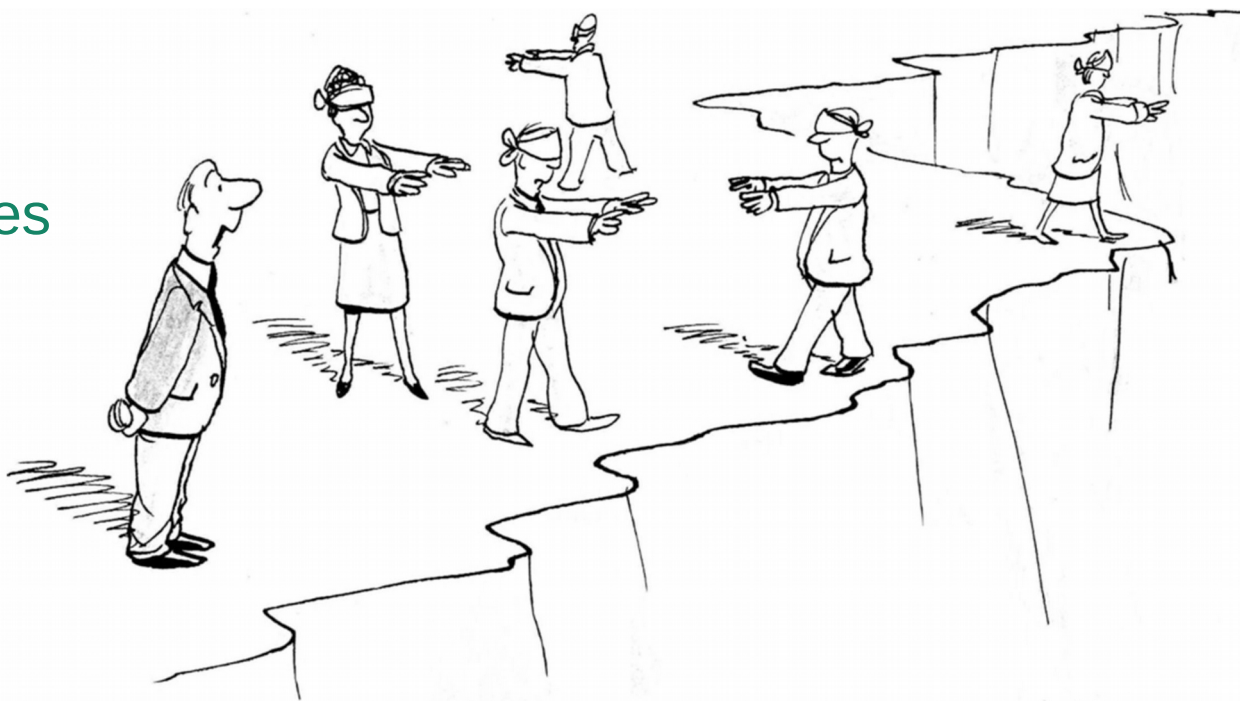


Generated on 2019-04-25 09:04:56 UTC



CEPH migration

- Down to the wire
- Combination of circumstances
 - ➔ ECHO not fully ready
 - ➔ Among others
 - DIRAC not fully ready
 - FTS glitches
 - Paternity leave
- Push in April 2018
 - ➔ Oct 2018 announced as deadline for castor to become read-only for LHCb

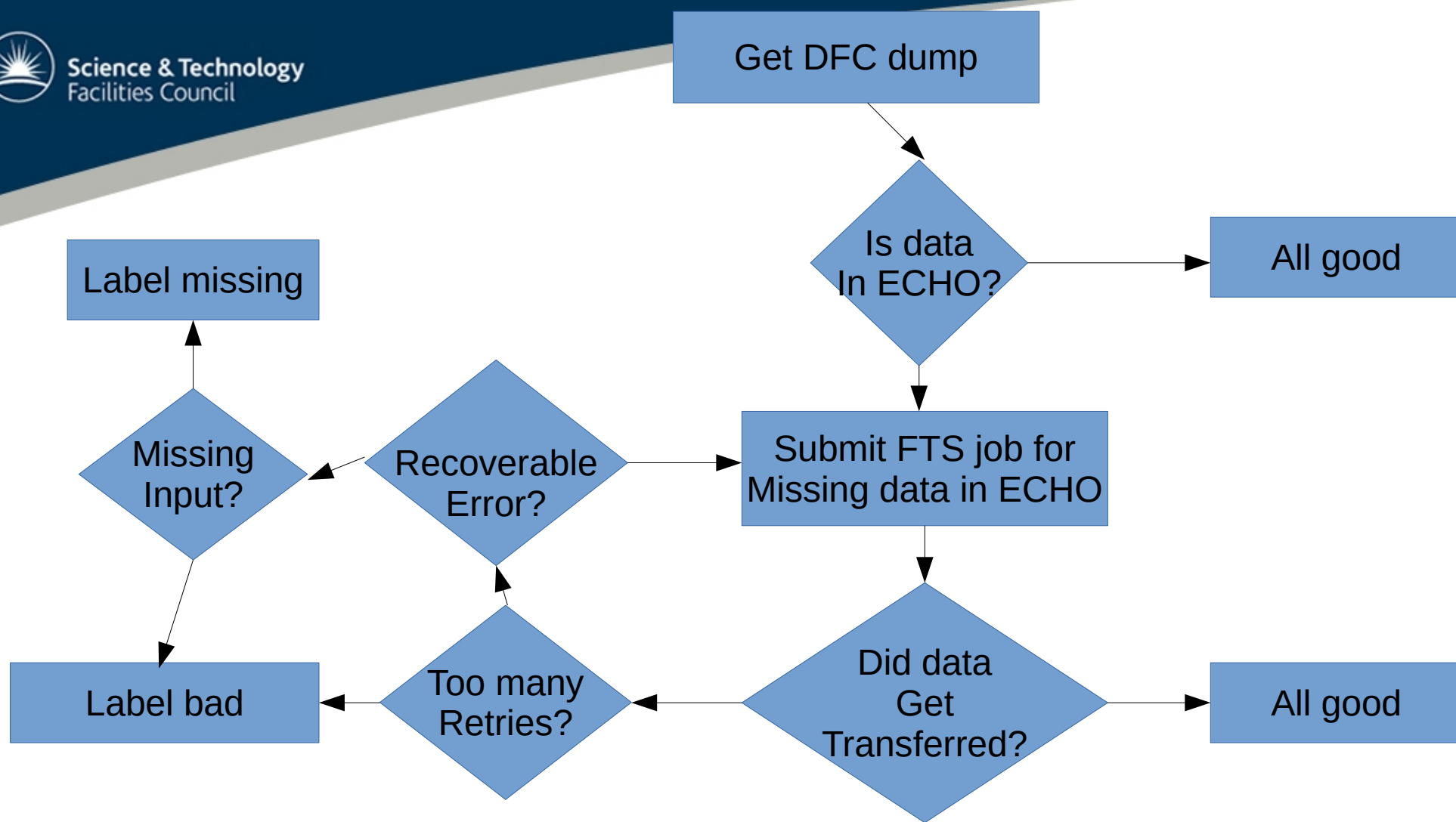


“The theme of this year’s team meeting is,
‘Take it right to the edge’.”



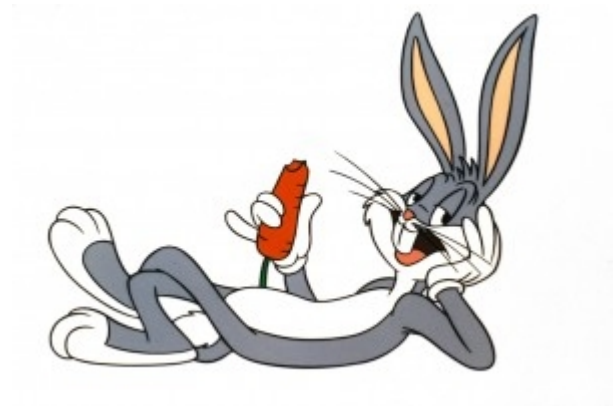
ECHO migration

- May 2018 : agreed on work to be done for migration
 - ➔ RAL (me) : Replicate data on castor to ECHO
 - ➔ CERN (C. Haen) : DIRAC developments to be able to use ECHO
- Replication of data
 - ➔ Use FTS to replicate the data
 - Jobs submitted using my DN
 - ➔ Producer – Consumer – Monitor method
 - ➔ ~2K lines of python code on gitHub
 - Mostly in the Monitor part
 - <https://github.com/rajanandakumar/Castor2Echo>
 - Python API to talk to FTS
 - ➔ Use the weekly ECHO dumps, DFC dumps on demand
 - (LHCb) Dirac File Catalog



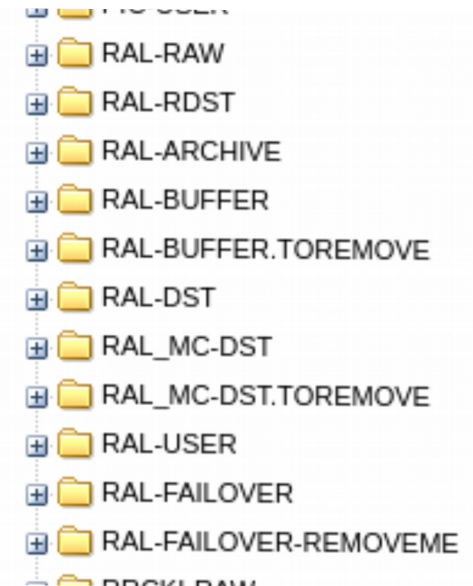
Actual implementation

- Keep FTS job information in sqlite dB
 - ➔ Sqlalchemy in python
 - ➔ Servers at CERN, RAL (prod, test), SARA
- Use cron jobs to submit and monitor jobs
 - ➔ Alternate every hour
 - ➔ Run on lxplus7 (now lxplus)
- Some hand holding
 - ➔ 10 days to develop and test
 - ➔ ~4 hours a week (looking at logs)



- 4 different disk storages to move
 - ➔ lhcb:user (RAL-USER)
 - ➔ lhcb:prod (RAL-DST, RAL_MC-DST)
 - ➔ lhcb:buffer (RAL-BUFFER)
 - ➔ lhcb:failover (RAL-FAILOVER)
- Other storages not directly used by jobs
 - ➔ lhcb:accounting
- RAL-FAILOVER moved in November 2018
 - ➔ Seamless
 - ➔ No need to read from this for jobs
 - ➔ Enough developments in DIRAC already for this

RAL SEs in LHCb DIRAC



- RAL_MC-DST moved in the week of 9 April
 - ➔ Started on Tuesday, finished on Thursday
 - ➔ Fairly seamless
 - ➔ Delay due to broken castor diskserver
- RAL-BUFFER moved last week
 - ➔ Started on 15 April, finished on 17 April
 - ➔ Broken diskserver again
 - ➔ Alarming number of issues
 - Working through them

- Two more DIRAC SEs remaining to be moved
 - ➔ RAL-USER, RAL-DST
- Likely to do them one-a-week
 - ➔ Unlikely to do it before 7 May 2019
- Operational issues on the CEPH end
 - ➔ Deletion of files on CEPH
 - Slow deletion : https://ggus.eu/?mode=ticket_info&ticket_id=140773
 - Errors during deletion : RT ticket 220089
 - ➔ A bit of dark data on ECHO
- Currently using ~ 5PB on ECHO



Summary

- LHCb running fairly smoothly in the UK
 - ➔ Mostly MC simulation
 - ➔ Occasional errors being dealt with using GGUS tickets
- Meanwhile, LHCb upgrades are ongoing
- Migration out of castor into ECHO at RAL is also ongoing
 - ➔ Should be done in ~3 weeks
 - ➔ Doing it with minimal / no impact on users



"I think it's important to note
that we really did try hard."