



GridPP

UK Computing for Particle Physics



UNIVERSITY
of
GLASGOW

GridPP Status

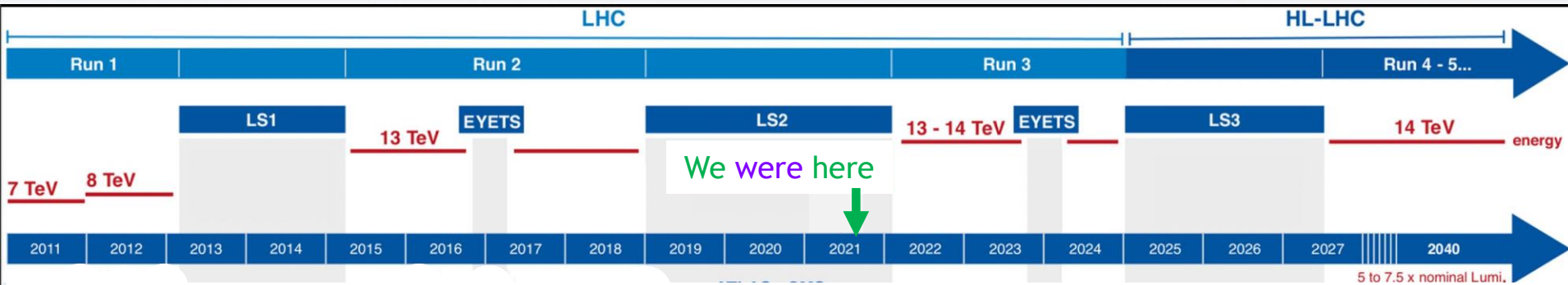
GridPP47

23rd March 2022

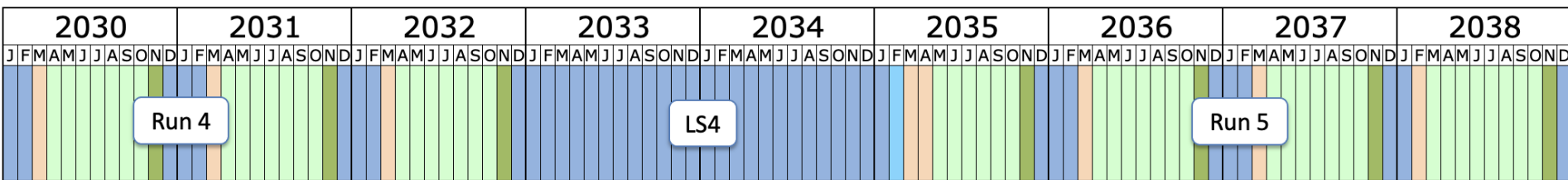
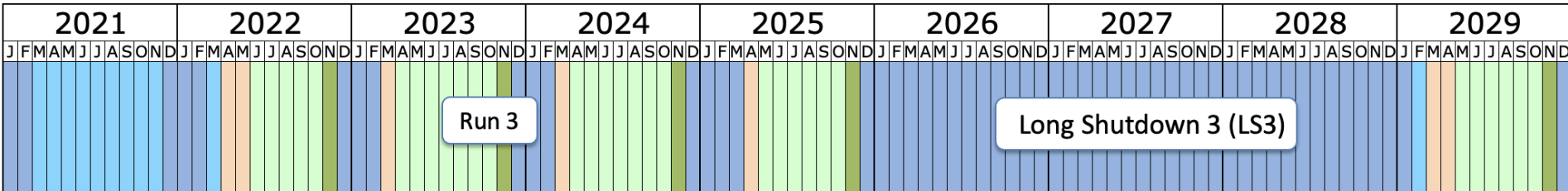
Prof. David Britton
GridPP Project leader
University of Glasgow



Timelines



In January 2022, the schedule was updated with long shutdown 3 (LS3) to start in 2026 and to last for 3 years.



Last updated: January 2022

- Shutdown/Technical stop
- Protons physics
- Ions
- Commissioning with beam
- Hardware commissioning/magnet training



Latest progress of [training](#):

Main dipole training

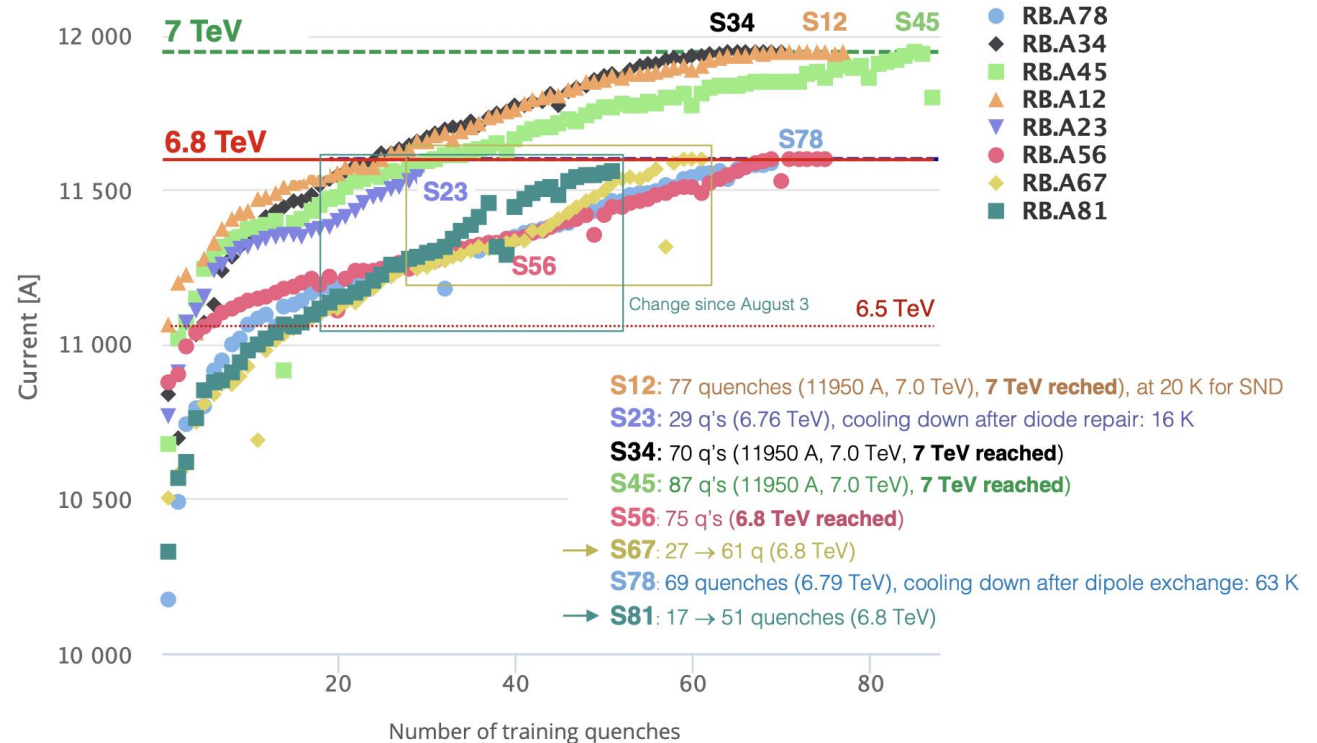
status (154 dipoles per LHC sector, 8 sectors)

Currents to reach + margin

- 7.0 TeV = 11,850 A + 100 A
- 6.8 TeV = 11,500 A + 100 A
- 6.5 TeV = 10,980 A + 100 A

Total number of quenches: 519
(71 since August 3)

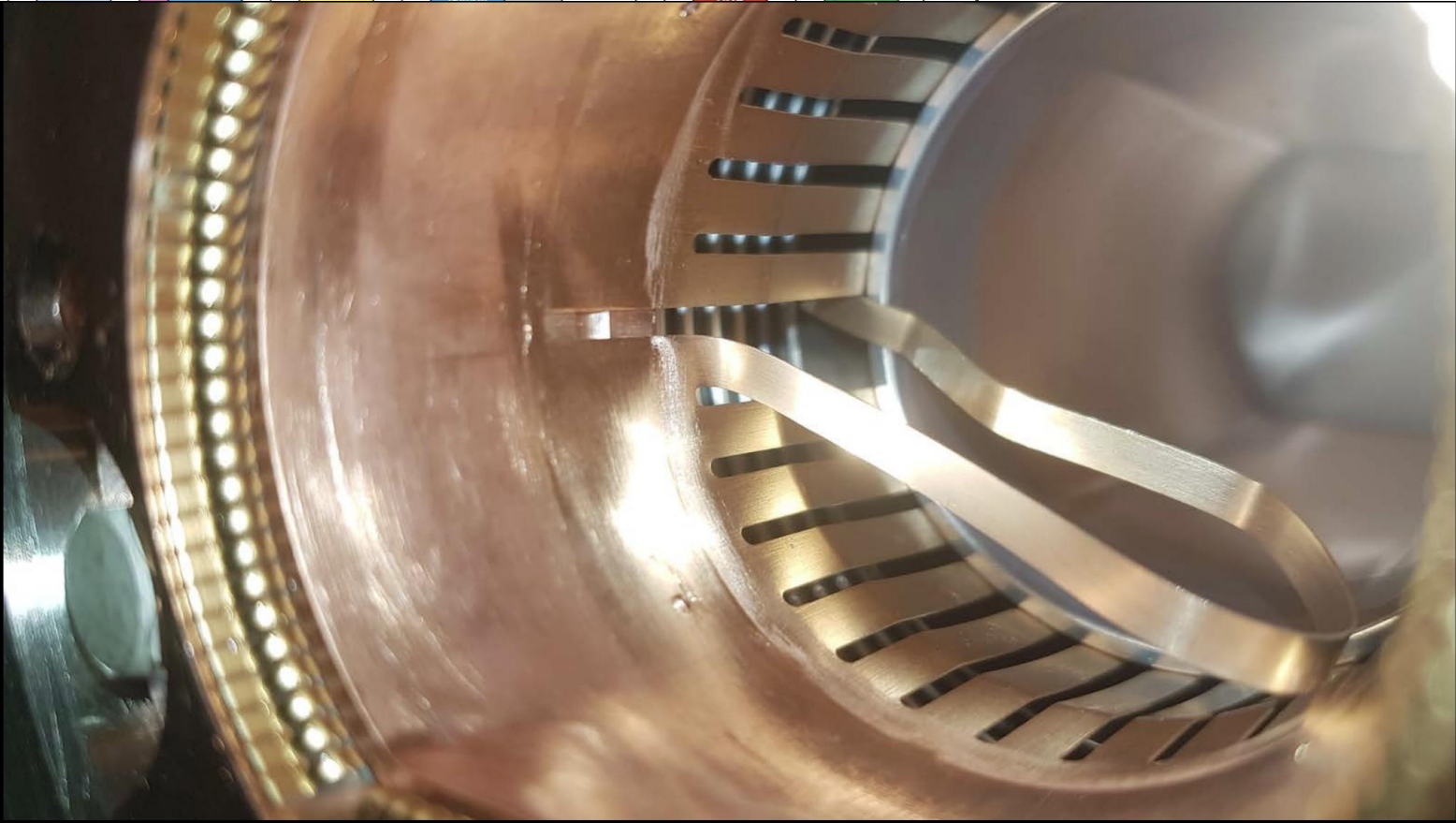
All **quadrupole circuits** have been successfully powered and trained to target currents (S23 and S78 to be redone)





(2021) LHC Machine Schedule

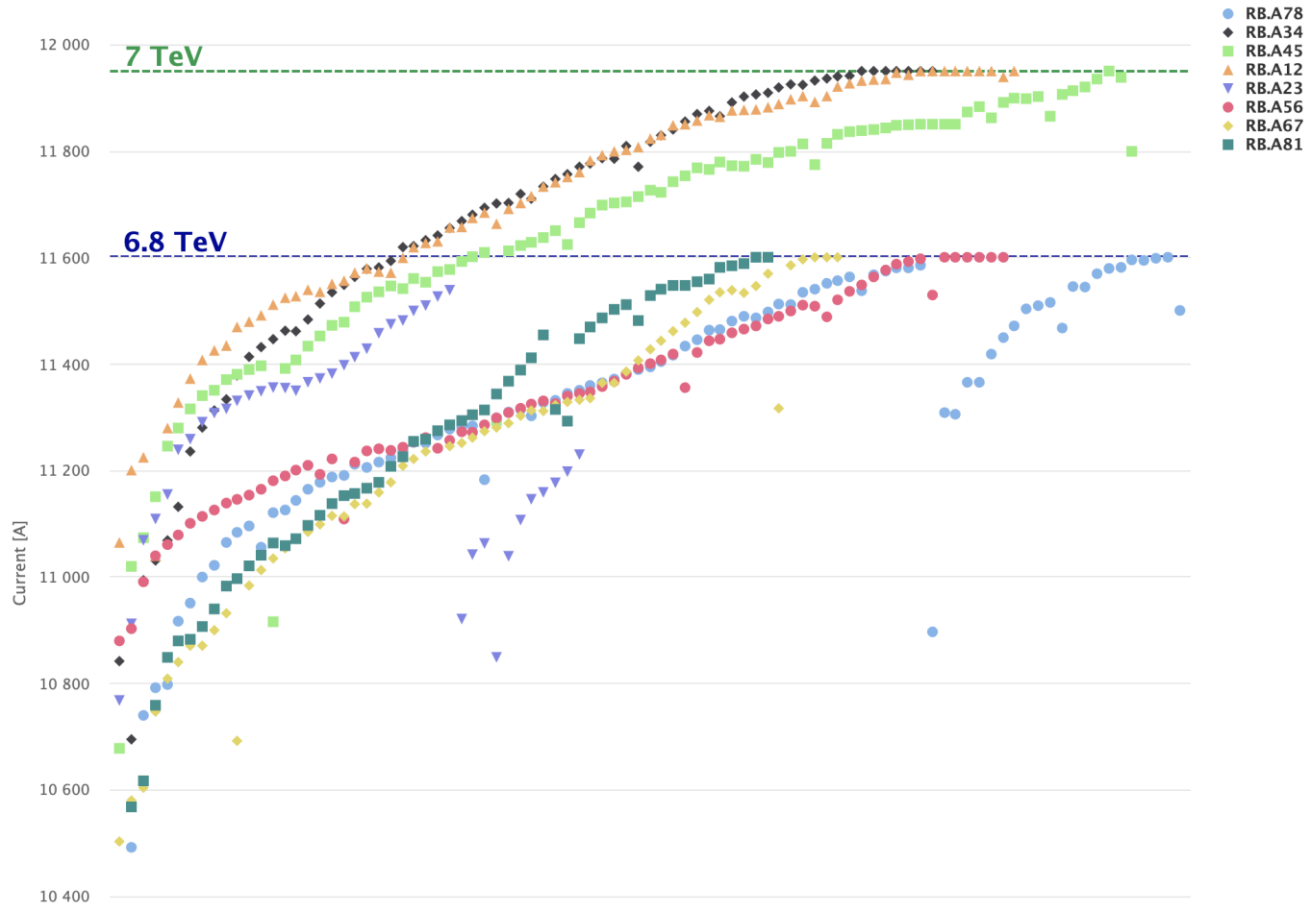
	Week	S12	S23	S34	S45	S56	S67	S78	S81	Week
Dec	7		T12	geo	EIQA	geo	EIQA	Boil-off	Warmup	49
	50								FAS	50
	51					UPR		SVC SVC	com	51
	52									52
	53									53
Jan	4						LEDS rem.			1
	1				QPS-IST	Boil-off	EIQA			2
	2									
	3									
	4									
Feb	1		Boil-off							
	5									
	6	geo								
	7									
	8									
Mar	1									
	9	EIQA								
	10									
	11	QPS-IST								
	12	Phase I								
April	5									
	14	Phase I								
	15	Phase II								
	16									
	17									
May	3									
	18	Phase II								
	19	Training								
	20									
	21									
June	7	low								
	23	Warmup								
	24	K								
	25	low								
	26									
July	5									
	27									
	28	ZDC								
	29									
	30	SND								
Aug	2									
	31									
	32									
	33									
	34	RP								
Sep	6									
	36	Cooldown								
	37									
	38									
	39									
Oct	4									
	40									
	41									
	42									
	43									
Nov	1									
	44									
	45									
	46									
	47									
Dec	6									
	48									
	49									48
	50									49
	51									50
	52									51
										52





post-LS2 ▾

RB training quenches





LHC Powering Tests

Meetings

		POWERING TEST PLAN			POWERING TEST ADVANCEMENT			RB TRAINING			RQ TRAINING				
	Week	S12	S23	S34	S45	S56	S67	S78	S81					Week	
		Beam test													
Oct	4	Beam test													
		YETS													
Nov	1	YETS													
Dec	6	YETS													
Jan	3														
Feb	7	Phase1			Phase1	Phase1									
		Phase2		Phase2	Phase2	Phase2		Phase2	Phase2		Phase2		Phase2		
			EIQA												
			Phase2												
Mar	7														
		Stand-by		Stand-by	Stand-by	Stand-by		Stand-by	Stand-by		Stand-by		Stand-by		
			Training												
Apr	4	Machine Check-out													
		Machine Check-out													
		Machine Check-out													
May	2	Beam commissioning													
		Beam commissioning													
		Beam commissioning													
		Beam commissioning													
		Beam commissioning													



Since Last Time

- GridPP6 Oversight Committee
- Final GridPP6 Tier-2 Hardware Funds
- That time already?



- Met in October 2021
- Positive and supportive; but numerous actions requested:

ACTION: Collaboration to produce a Gantt Chart or equivalent scheduling the deployment of procured hardware, including both Tier-1 and Tier-2 sites, for the next OsC meeting.

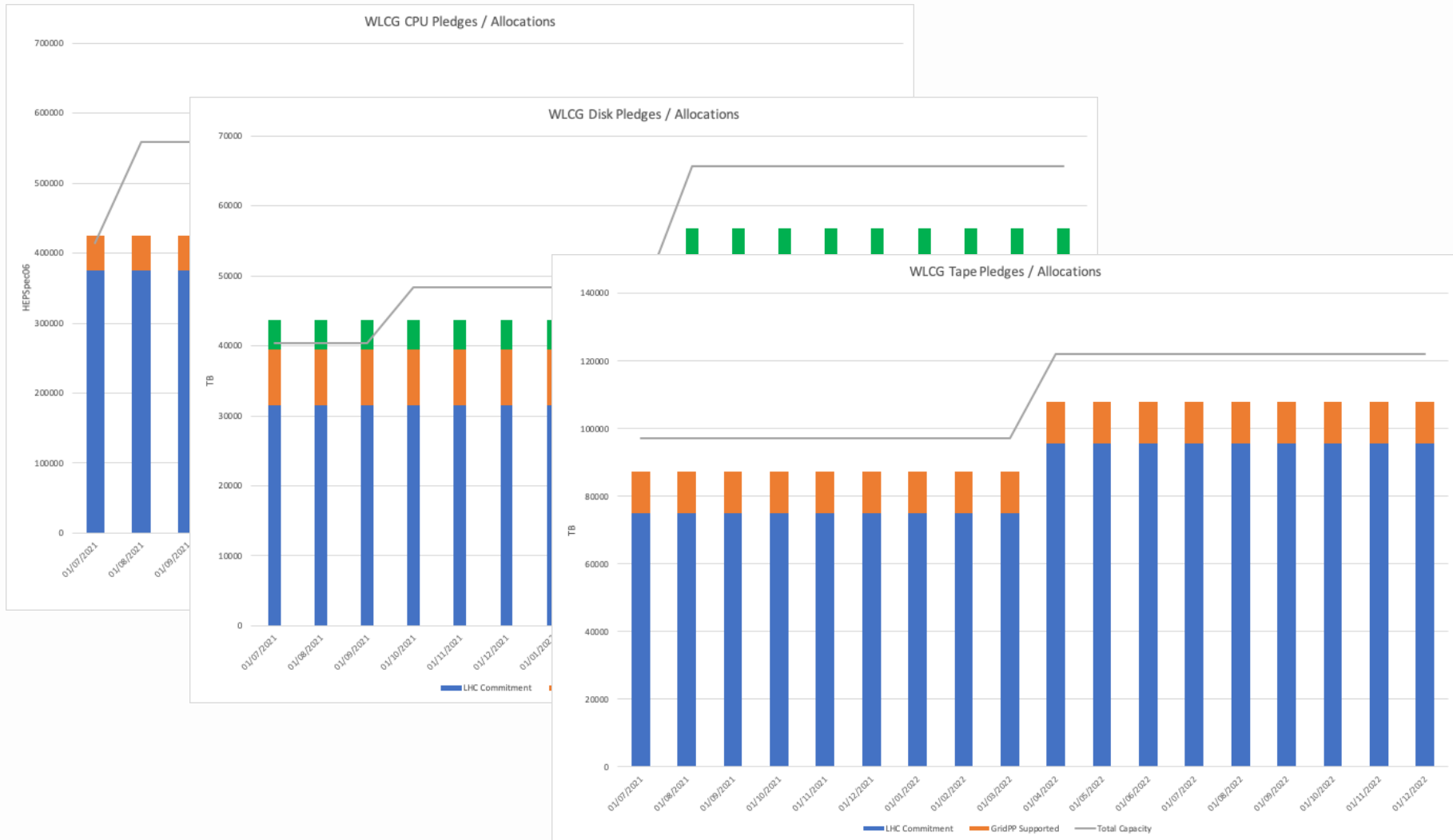
ACTION: Collaboration to update financial tables and provide a list of equipment/hardware items, up to the value of £1M, for the end of October that could be awarded in the case of a capital underspend, as soon as possible within reason

ACTION: Collaboration to provide information on WLCG's own thoughts on how the PUEs of datacentres should be (i) defined and (ii) what values are deemed to be acceptable. In addition, any data on the power use and floating-point efficiency of the main codes/applications that GridPP runs on its systems should be presented for discussion.

ACTION: Collaboration to tabulate the funding that GridPP receives outside of the STFC grant including the additional lines of funding and capacity for the next OsC meeting.

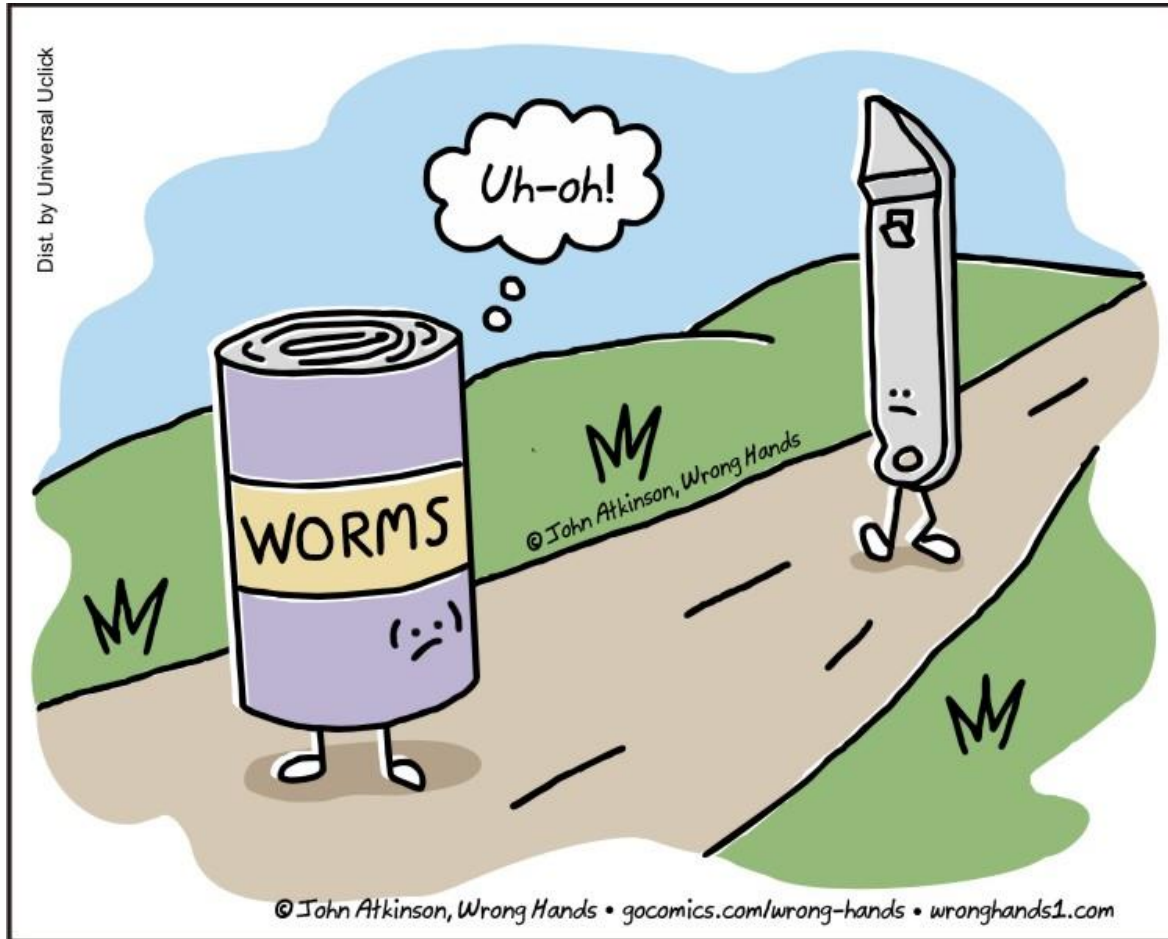


Tier-1 (Gantt Chart or equivalent)





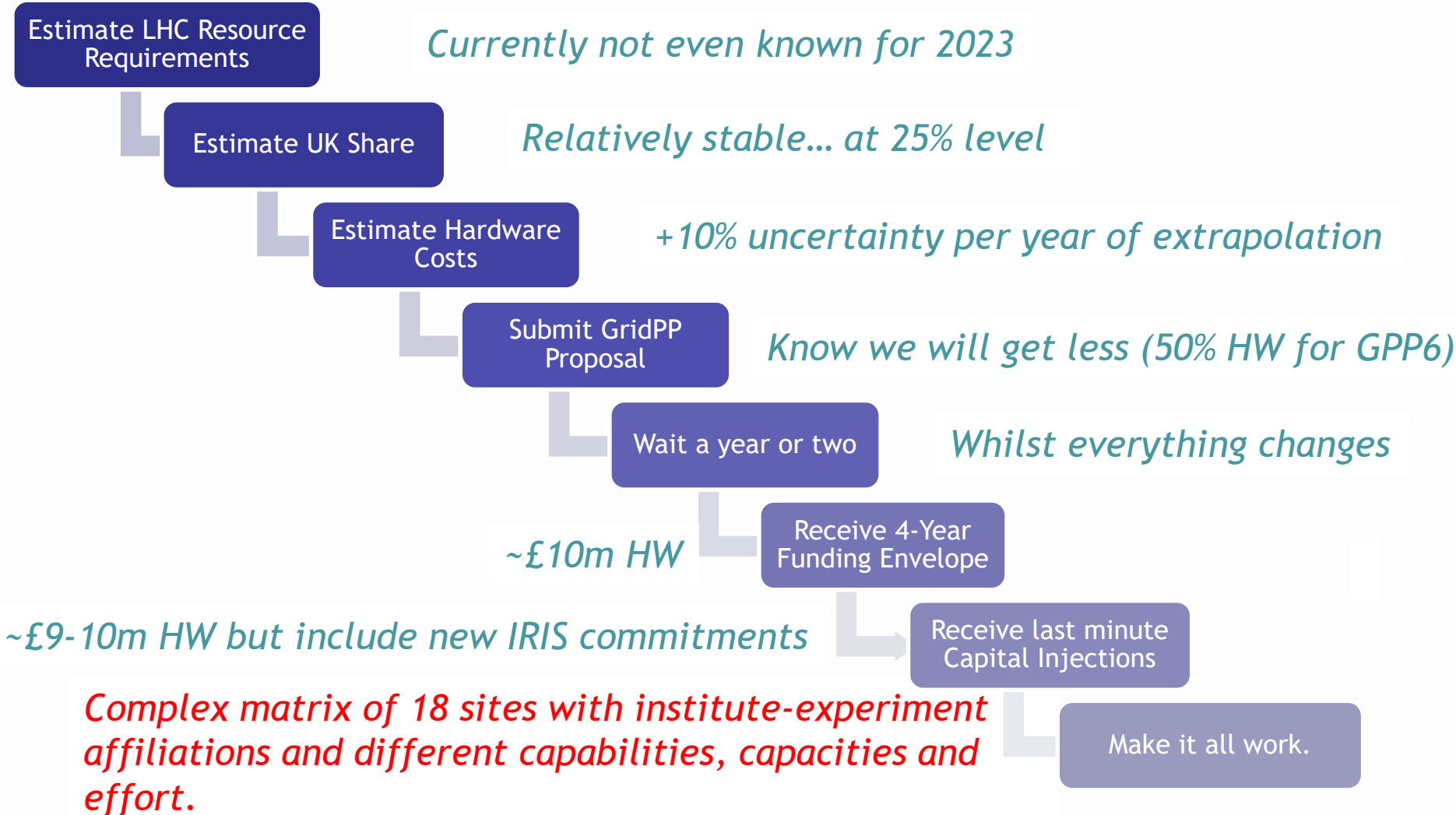
Tier-2 (Gantt Chart or equivalent)



<https://wronghands1.com/about/>



How does it work?





- GridPP provides site funding in return for access to hardware resources.
- GridPP costs hardware on the assumption that it has a ~5 year lifetime.
- Some sites add hardware from additional funding sources.
- Some sites keep GridPP hardware running longer than ~5 years.
- Some sites receive explicit IRIS funding for hardware.

- Therefore, sites have a mixture of hardware that can be viewed as:
 - GridPP Hardware (funded directly)
 - Site Hardware (either self-funded or GridPP HW that is beyond ~5yr life)
 - IRIS Hardware (funded via the IRIS project)



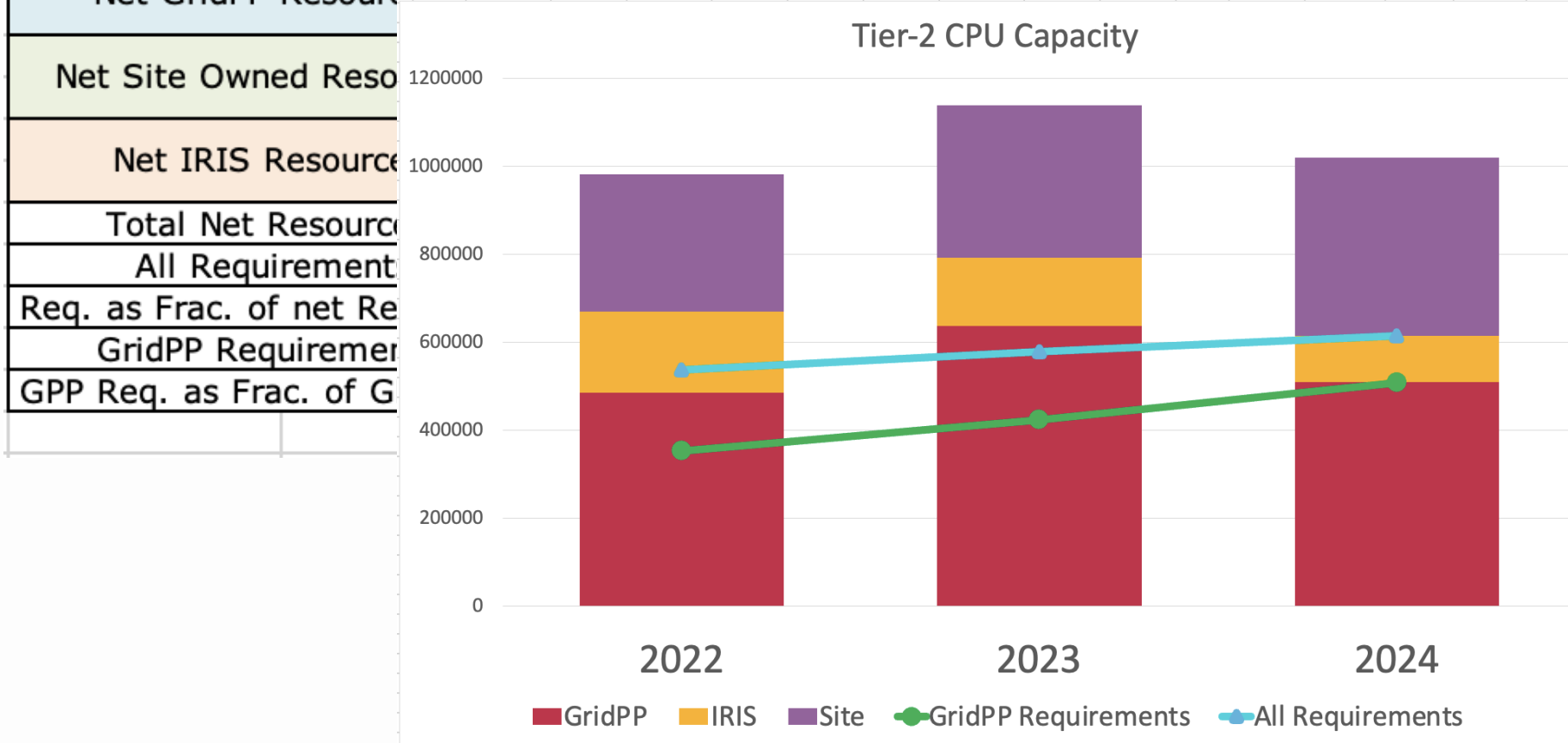
- Total CPU = 155,875 HS06 100%
- IRIS = 34,298 HS06 22%
- GridPP Pledged = 43,111 HS06 28%
- GridPP Non-LHC = 4,311 HS06 3%
- GridPP Unpledged = 19,599 HS06 12%
- Site = 54,556 HS06 35%

Of course, this is just a model!
There is no definitive set of
numbers.



Full Tier2 Estate

Tier-2 HS06 Evolution	2022	2023	2024
Operational Overhead	10%	10%	10%
Net GridPP Resources	485520	638166	510533



Net Site Owned Resources	
Net IRIS Resources	
Total Net Resources	
All Requirements	
Req. as Frac. of net Resources	
GridPP Requirements	
GPP Req. as Frac. of GridPP Resources	

GridPP IRIS Site GridPP Requirements All Requirements



- Requirements, and therefore pledges, are constrained by FAs
- Experiments absolutely rely on addition resources beyond pledges

What HS06 should UK deliver in 2021?				
Tier-1	369250	HS06		
Tier-2	278296	HS06		
Overall	647546	HS06		
What Fraction should UK deliver in 2021 ?				
Tier-1	12.7%			
Tier-2	8.3%			
Overall	10.4%			
What Fraction DID UK deliver in 2021?				
Tier-1	10.6%	Only because other T1s overdelivered.		
Tier-2	13.8%	Our T2 overdelivered, using own resources, more than other T2s overdelivered.		
Overall	12.6%			

Overall, T2s allowed us to deliver 12.6% which is 22% more than 10.4% expected



Tier-2 HW Funding

- All sites received the 2nd Tranche of GridPP6 Tier-2 hardware capital in 2021.
- Needs to be spent by March 2024.
- Assume that at non-core sites this predominantly provides CPU.
- There is no more GridPP6 money!
- There **might** be further Capital Injections (eg via IRIS) but, of course, these tend to come with additional commitments.
- Non-core site share of last GridPP6 funding was increased by 10% to enable (continued) support of IRIS VOs; this was effectively hypothecated against future IRIS funds that would go to core-sites.



That time already?

- We don't know, yet, what happens beyond GridPP6... though we have asked STFC.
- Somehow LHC computing needs to be provided/funded.
- If there were a GridPP7 then we would expect to be asked to prepare proposal for submission in early 2023.



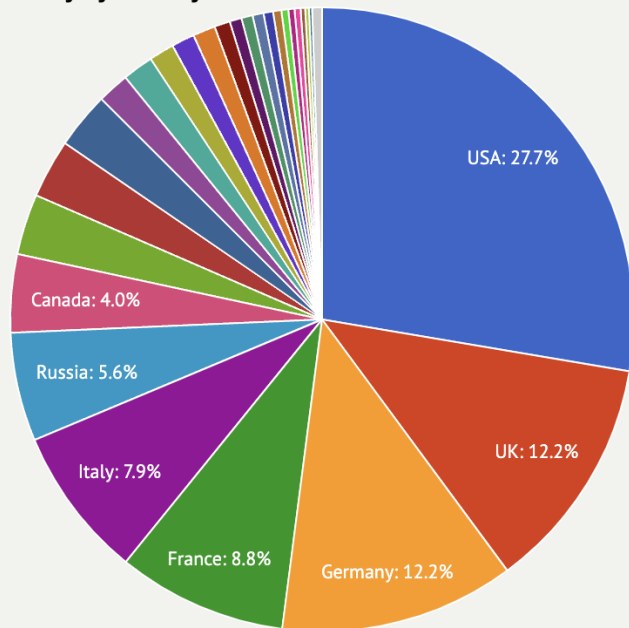
- <https://pprc.qmul.ac.uk/~lloyd/ukmetrics/ukmetrics.php?page=countries>

March 2021 to February 2022

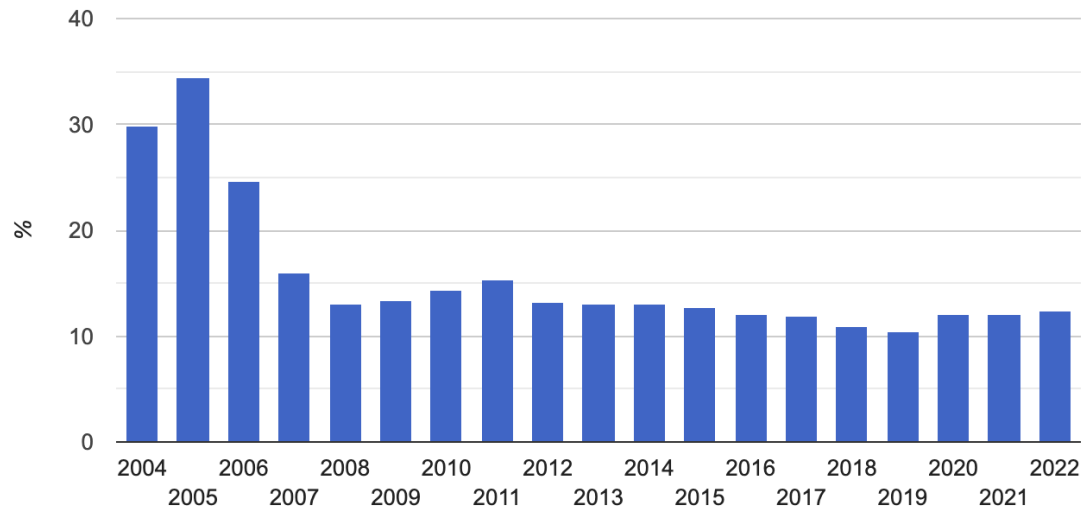
Select year:

The main data are taken from https://accounting.egi.eu/wlwg/countries/normelap_processors/COUNTRY/D
taken from https://accounting.egi.eu/wlwg/country/Switzerland/normelap_processors/SITE/DATE/2021/3/

CPU Delivery by Country



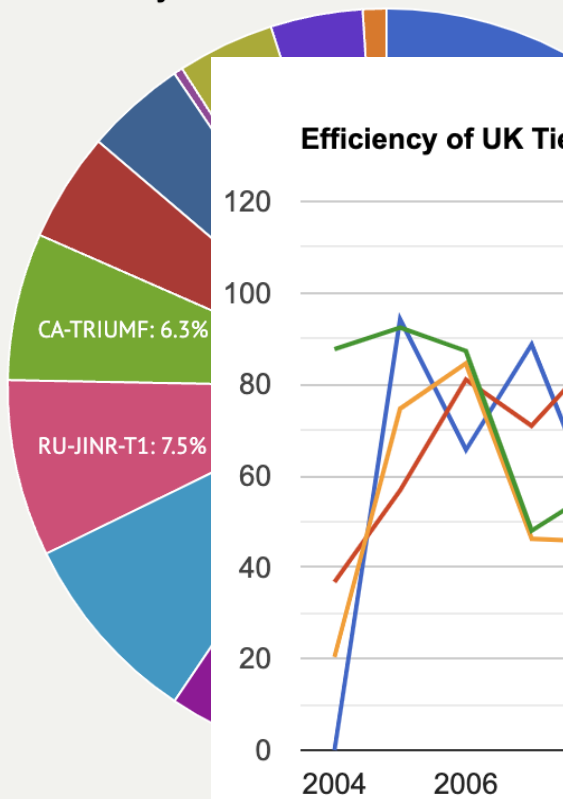
Percentage of CPU Delivered by the UK per Year





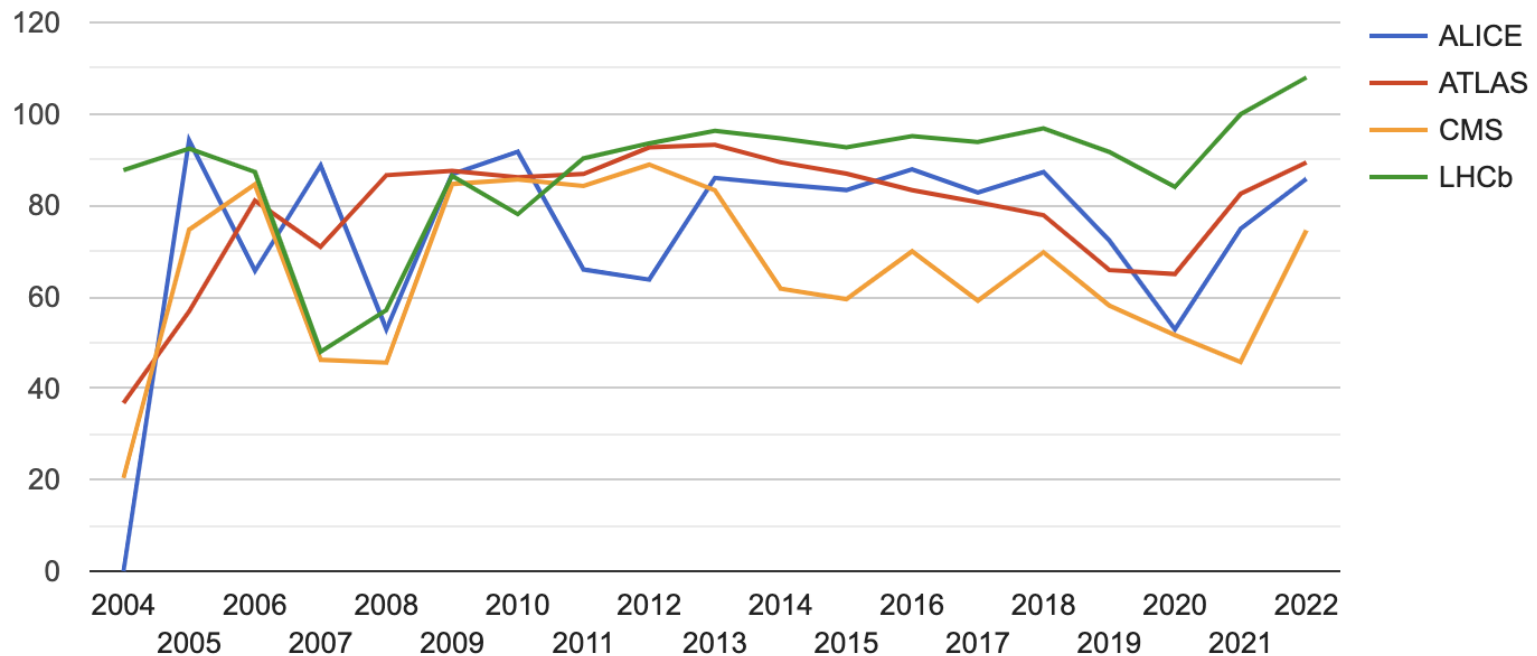
- <https://pprc.qmul.ac.uk/~lloyd/ukmetrics/ukmetrics.php?page=tier1>

Tier-1 CPU Delivery



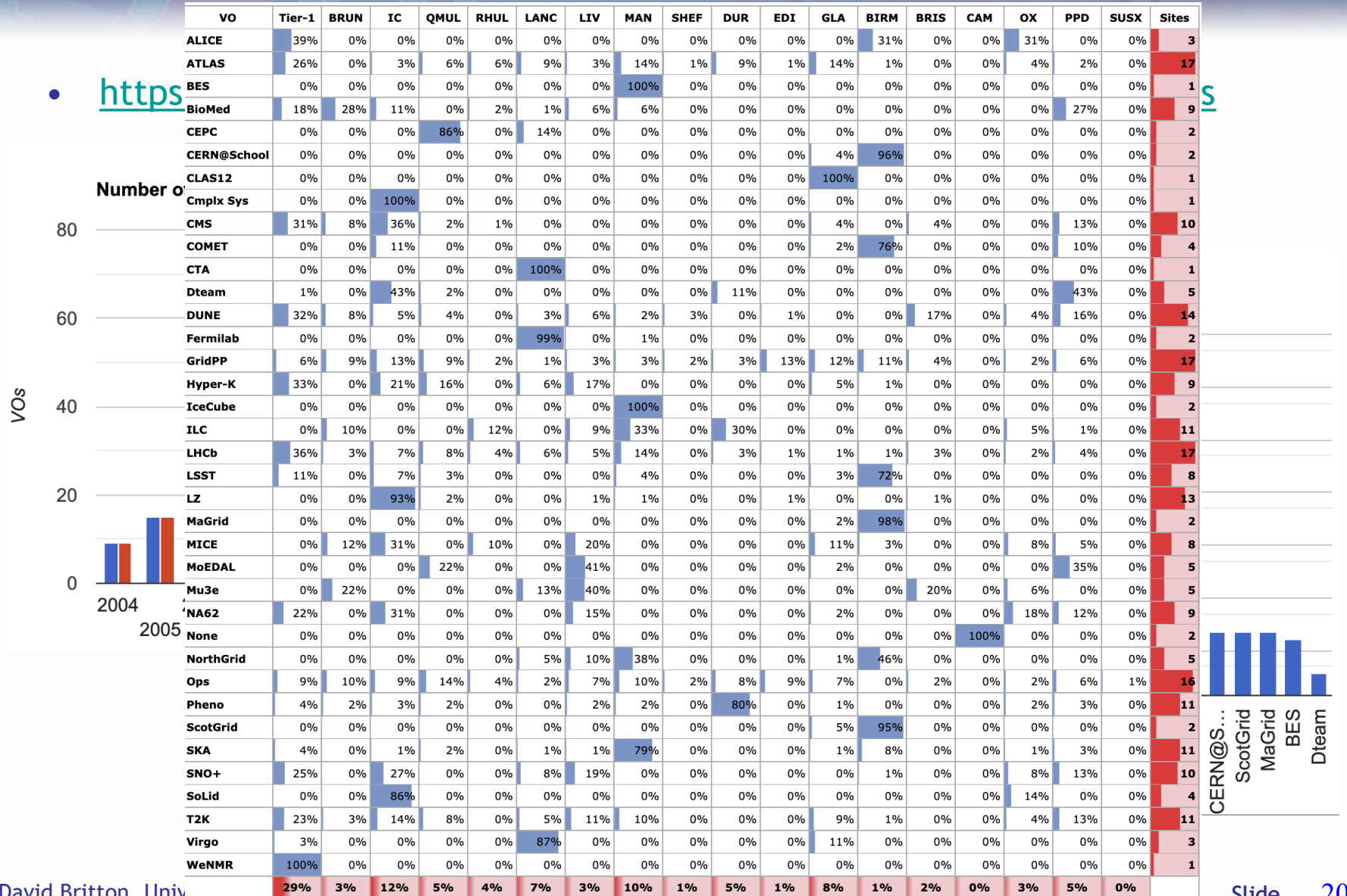
DE-KIT: 17.9%

Efficiency of UK Tier-1 per Year





Steve Lloyd Metrics





Summary

- LHC Run-3 is coming.
- GridPP continues to successfully deliver Tier-1 and Tier-2 resources at the level expected.
- Our new Oversight Committee has renewed interest and vigour...
- ... which gives us interesting things to do.
- Tier-2 hardware funding has been issued...
- ... and we are in good shape till 2024
- We don't know what happens beyond GridPP6, yet...