



Possible New Data Centre in Préveessin and Other Computing Facility Changes

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Overview

- 2nd Network Hub
- 2nd DC project
- Other enhancements



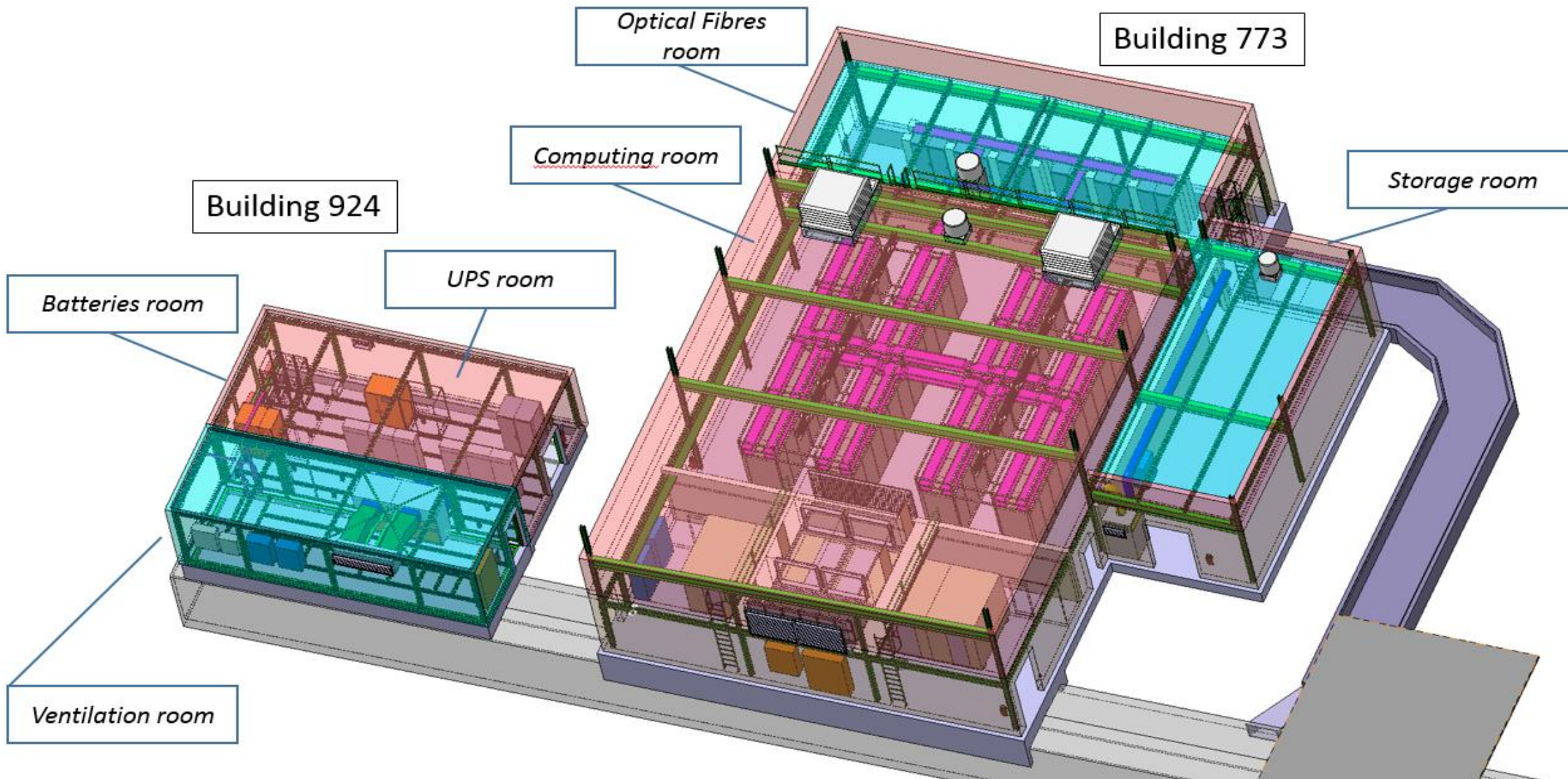
Second Network Hub Project

- Why?
 - To provide a second location for core network equipment to guarantee connectivity across the site and to the rest of the world in the event of a major incident in the CERN Main Data Centre.
- What?
 - Will have efficient air cooling and be sized for 48 racks in 4 rows with 120kW for IT equipment. Inlet temperature 32 degrees.
 - All IT load and cooling infrastructure will be on by UPS.
- Where?
 - Currently being built on the CERN Prévessin site close to an electrical substation.
- When?
 - Due to be ready in summer 2017.









2nd Data Centre Project



Background - I

- LHCb and ALICE will be moving to SW triggers for RUN3 and this requires increased computing capacity for their HLTFs
 - Probably also for ATLAS and CMS for RUN4
- LHCb/ALICE are looking at installing container-based DCs at their pits
 - MS has been completed
 - IT results expected mid-October
 - Both around 2 MW
- Wigner contract finishes at the end of 2019
 - Re-tendering for a follow on would be required to start very soon
- Increased Tier0 capacity will be required for RUN3 and beyond
 - In fact, already required due to excellent performance of the LHC
- Other large computing needs are coming up, e.g. ProtoDune
- Commercial cloud computing does not yet seem to be suitable to cover these needs



Background - II

- Based on the points in the previous slide the CERN Director of Research and Computing suggested that a new DC on the Prévessin site might be a better solution than multiple smaller DCs, and other alternatives for additional capacity
- A study group, led by IT, was setup to look at the feasibility; technical, cost and schedule as very high bandwidth would be required from pits to new DC (ALICE ~500GB/s and LHCb ~4TB/s)
 - Starting point to be a copy/paste of the GreenITCube design
 - Preliminary report requested mid-June
 - Final report requested end July
 - Essentially a positive recommendation on feasibility, although significant costs for networking



What is the GreenITCube?

- *A new DC recently built at GSI in preparation for the FAIR project needs*
- *6 story steel frame building (27x30x22m) with space for 128 racks per floor*
- *Separate building for cooling infrastructure and cooling towers*
- *2N power distribution up to 12 MW*
- *Primary and secondary cooling circuits with N+1 redundancy*
- *Passive water cooled racks for up to 35 kW/rack*
- *Design of cooling and power distribution for pairs of floors, i.e. for 4 MW*
- *Recovered heat used for heating of an adjacent building*
- *Construction started in December 2014 and open ceremony in January 2016 with first servers running in March 2016*
- *Is being built in other locations*



Why is it an interesting option?

- PUE is extremely good
 - < 1.1 (1.05 achieved during commissioning)
- Cost
 - Currently equipped for 4 MW at a cost of 12 ME and foreseen cost of 16 ME for full 12 MW
- Timescale
 - As noted in the previous slide the full construction took just over 1 year!
- Potential capacity
 - 12 MW is > 3 times what we have in the CERN DC
 - Capacity increase available in steps of 4MW



What would need to be different?

- Mid-range voltage at CERN would be different (18kV)
- The GreenITCube does not have UPS nor diesel BU
 - But would we need this?
- Building regulations in France are different from Germany
 - What would be the impact?
- Maybe the safety regulations at CERN are different?
 - In any case would need to follow French regulations
- Material costs – apparently more expensive in France!
- Do the CERN technical groups need to be *heavily* involved?
- Would really need a detailed design study to identify all differences and their impact on cost/schedule



What is the future planning - I?

- Informal cost estimate has been requested for building the GreenITCube at CERN
 - Has been received and is being analysed
 - Several questions for clarification sent
- ALICE/LHCb container tender results should be known in October
- Decision to go ahead based on the results of the two bullets above
 - Process being driven by the CERN Director of Research and Computing



What is the future planning - II?

- If yes (**Possible strategies still under discussion**)
 - Negotiate an non-competitive tender with the GreenITCube engineering company to:
 - Produce detailed technical specifications for:
 - Civil engineering works
 - Electrical works
 - HVAC works
 - Oversee the works
 - Or for a complete turnkey solution
 - Execute a tender for a consortium to build a new DC with a similar high level specification as the GreenITCube
- Building to be ready, at the latest, at the beginning of 2020

• Long discussions on operational model are expected

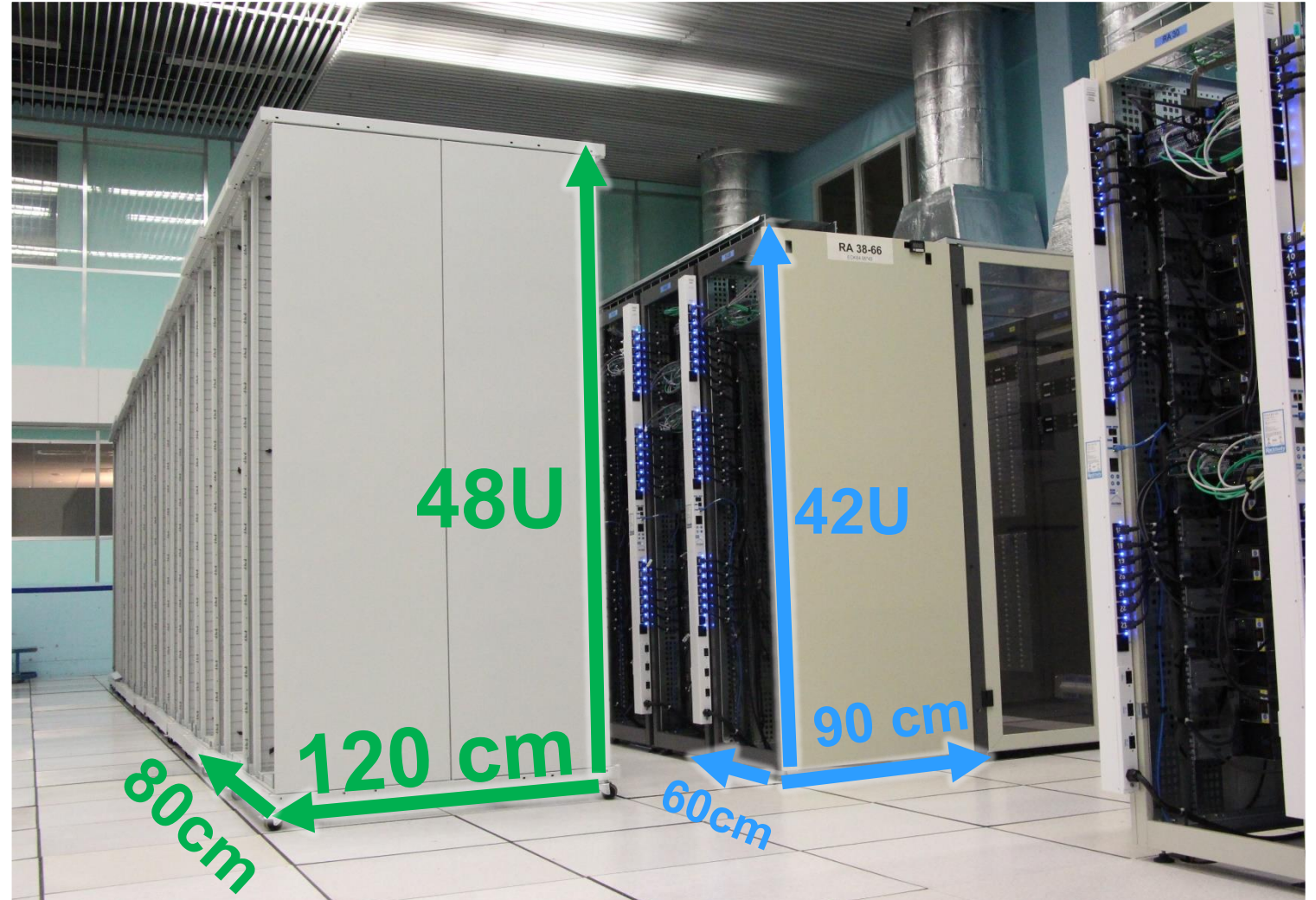




MAIN ROOM REORGANISATION

CHANGING RACKS

- Higher power density
- Follow technology new requirements
- Ease of working behind racks
- Better flow of hot air





- Questions + Video





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