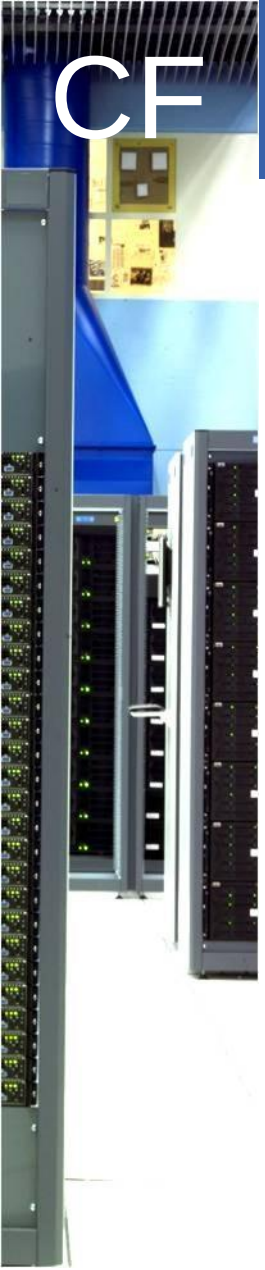

Remote Hosting Project

LHCOPN Meeting May 2012

David Foster

Material from Wayne Salter

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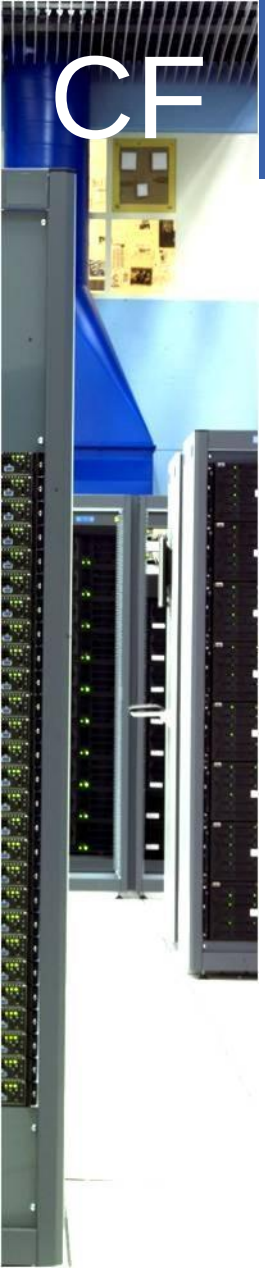
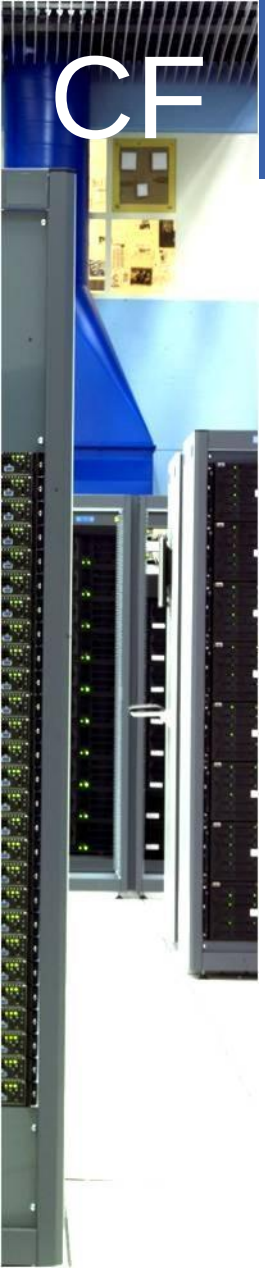


Some History - I

- How to provide resources once the CERN CC is “full”? (Lack of power)
- Studies for a new CC on Prévessin site
  - Four conceptual designs (2008/2009)
  - Lack of on site experience
  - Expensive! (Major capex investment)
- Interest from Norway to provide a remote hosting facility
  - Some interesting ideas.
  - Slow moving politics.
- Call for tender from all member states



Use of Remote Hosting

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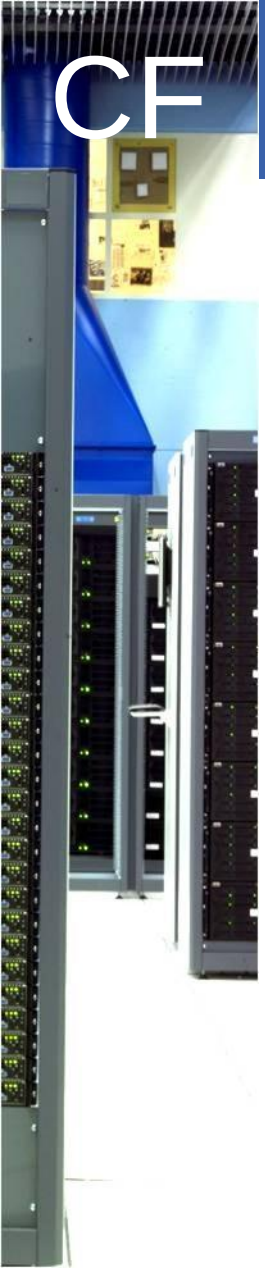
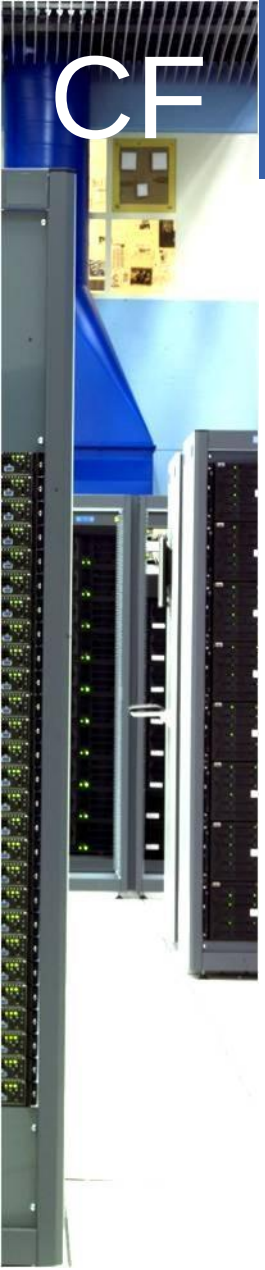
- Logical extension of physics data processing
  - Batch and disk storage split across the two sites
- Business continuity
  - Benefit from the remote hosting site to implement a more complete business continuity strategy for IT services



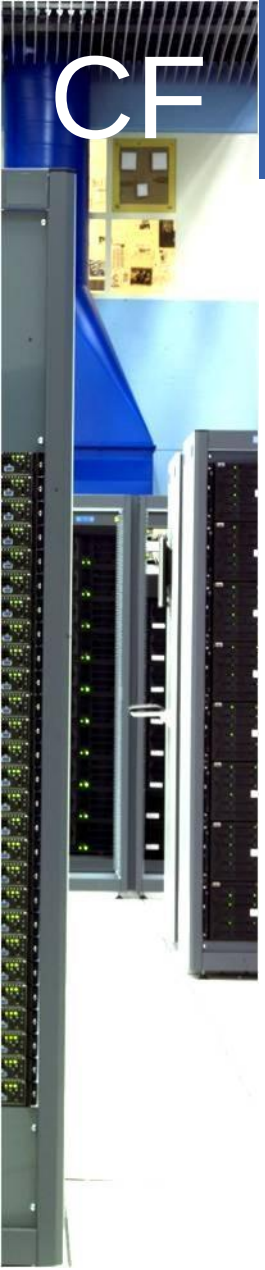
Some History - II

- Small scale local hosting in Geneva to gain experience
  - Lack of critical power / gain experience
  - Price enquiry for local hosting capacity
  - 17 racks and up to 100kW
  - Running successfully since summer 2010
- Call for interest at FC June 2010
  - How much facility for 4MCHF/year?
  - Is such an approach technically feasible?
  - Is such an approach financially interesting?
  - Deadline end of November 2010
- Response
  - Surprising level of interest – 23+ proposals
  - Wide variation of solutions and capacity offered
  - Many offering > 2MW (one even > 5MW)
  - Assumptions and offers not always clearly understood
  - Wide variation in electricity tariffs (factor of 8!)



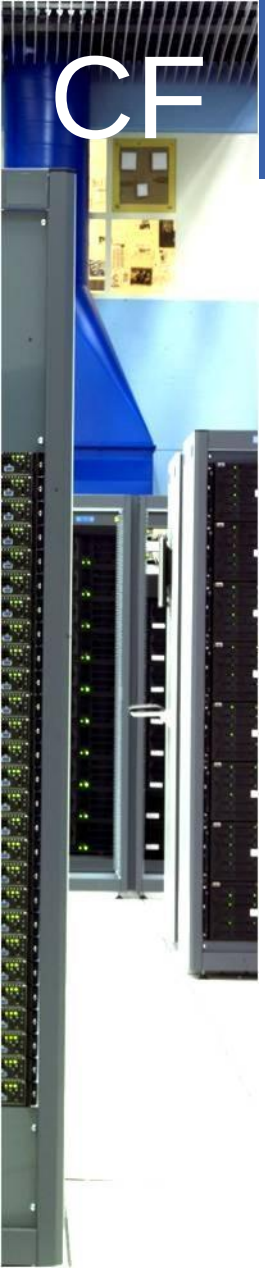
Some History - III

- Many visits and discussions in 2010/2011
- Official decision to go ahead taken in spring 2011 and all potential bidders informed
- Several new consortia expressed interest
- Call for tender
  - Sent out on 12th Sept
  - Specification with as few constraints as possible
  - Draft SLA included
  - A number of questions for clarification were received and answered (did people actually read the documents?)
  - Replies were due by 7th Nov



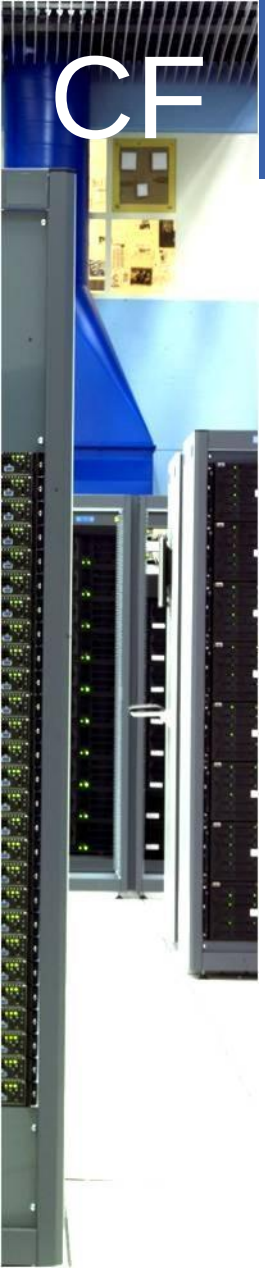
Tender Specification - I

- Contract length 3+1+1+1+1
- Reliable hosting of CERN equipment in a separated area with controlled access
  - Including all infrastructure support and maintenance
- Provision of full configured racks including intelligent PDUs
- Services which cannot be done remotely
  - Reception, unpacking and physical installation of servers
  - All network cabling according to CERN specification
  - Smart 'hands and eyes'
  - Repair operations and stock management
  - Retirement operations



Tender Specification - II

- Real time monitoring info to be provided into CERN monitoring system
- Installation of remote controlled cameras on request
- Equipment for adjudication:
  - 2U CPU servers ~1kW and redundant PSUs
  - 4U disk servers or SAS JBOD with 36 disks of 2TB ~ 450W and redundant PSUs
  - Brocade routers up to 33U with 8 PSUs ~7kW
  - 2U HP switches with redundant PSUs ~400W
  - 1U KVM switches with single PSU
  - 4 disk servers for every 3 CPU servers



Tender Specification - III

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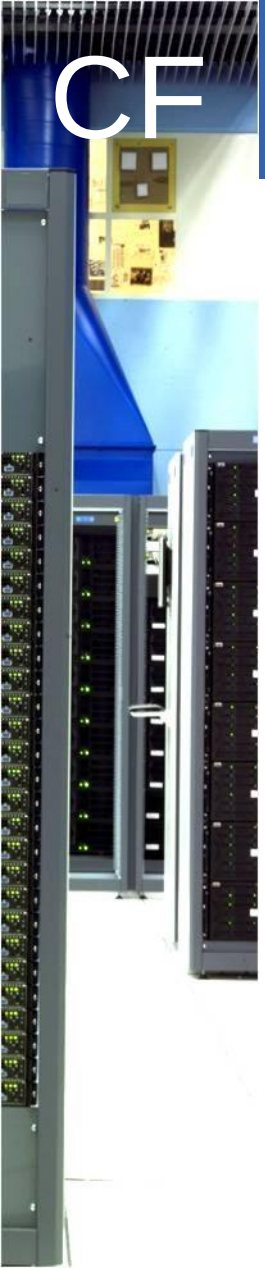
- Central star point:
  - 4 racks for fibre patching
  - 4 racks for UTP patching
  - 2 racks for central switches
  - All necessary racks for routers (see slides on SLA)
- External WAN connectivity:
  - 2x100Gpbs capacity (separate paths) to the most convenient PoP in the GEANT network
  - 100Gbps capacity as 1x100Gbps, or 3x40Gbps or 10x10Gbps



Parameters - I

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Provided for adjudication but will be reworked with contractor.

		2013		2014	2015	2016	2017	2018		2019
		Q1	Q3	Q4	Q4	Q4	Q4	Q1	Q4	Q1
Delivery	Non-critical	50	350	250	250	250	650		500	
	Critical	50	150	50	50	50	250		100	
Retirement	Non-critical							400		250
	Critical							200		50
Total Installed	Non-critical	50	400	650	900	1150	1800	1400	1900	1650
	Critical	50	200	250	300	350	600	400	500	450
	Total	100	600	900	1200	1500	2400	1800	2400	2100

Numbers are KW

The equipment shall be installed and operational within the racks within two working weeks of each delivery.

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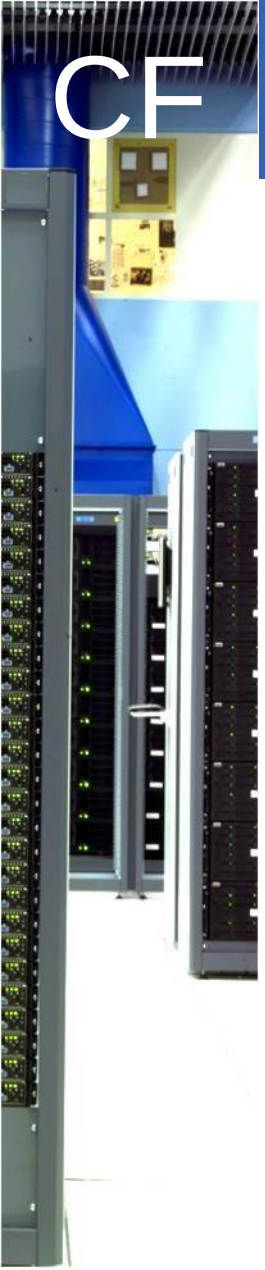

Parameters - II

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- January 2013
  - 10 racks for LAN routers and 2 racks for WAN routers
- October 2016
  - 2 additional racks for LAN routers
- October 2018
  - 4 additional racks for LAN routers

Each router shall be installed and operational within its rack within one working week following delivery, including all necessary cabling. In the case of the delivery of multiple routers at one time, it shall be one elapsed working week for each delivered router.

		2013		2014	2015	2016	2017	2018		2019
		Q1	Q3	Q4	Q4	Q4	Q4	Q1	Q4	Q1
Delivery	Non-critical	28				14			28	28
	Critical	56								56
Retirement	Non-critical									28
	Critical									56
Total Installed	Non-critical	28	28	28	28	42	42	42	70	70
	Critical	56	56	56	56	56	56	56	56	56
	Total	84	84	84	84	98	98	98	126	126

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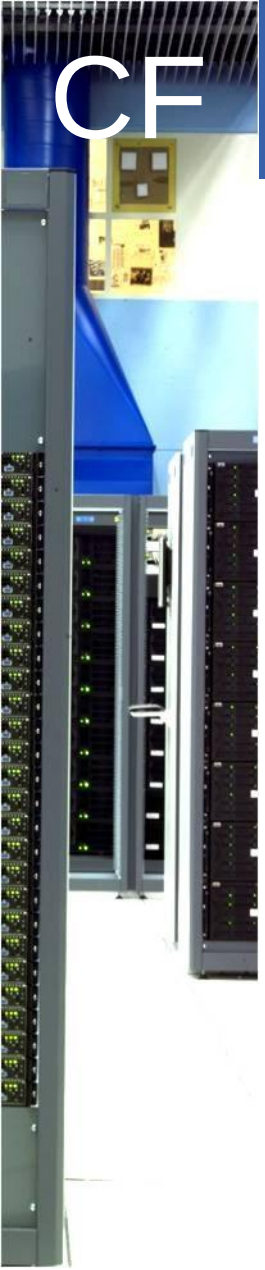
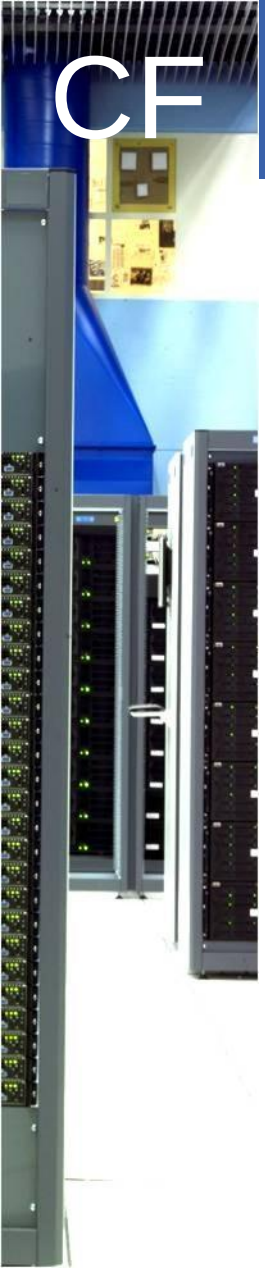


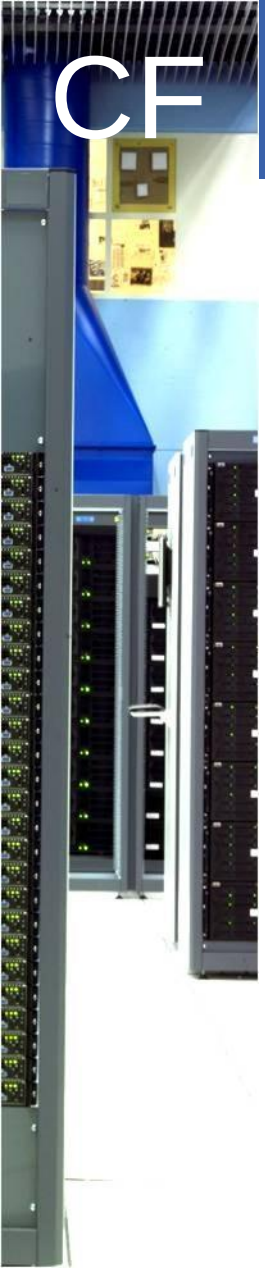
Parameters - III

- CERN equipment shall run at all times
  - Micro cuts
  - Maintenance
    - With the exception of downstream of in-room switchboards for non-critical equipment
- Equipment interruption once every two years < 4 hours
  - For non-critical equipment this can be abrupt
  - For critical equipment a 10 minute buffer must be provided to allow equipment to be switched off in a controlled manner
  - Switch off to be triggered automatically



Parameters - IV

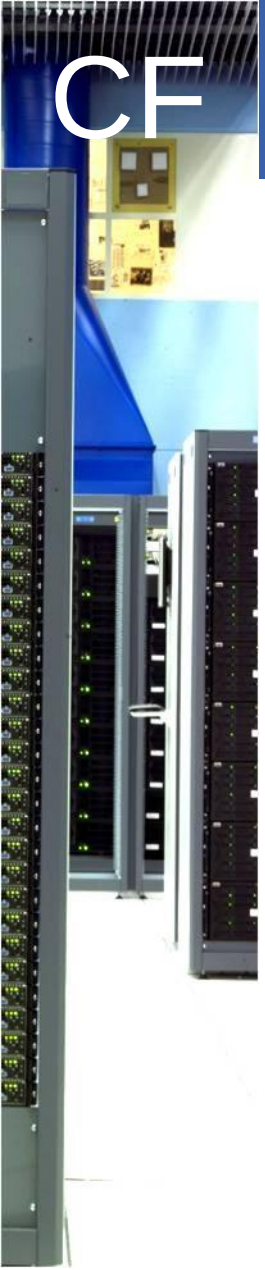
- Operating inlet temperature range 14-27˚ C with limited excursions up to a maximum of 32˚ C (based on the ASHRAE recommendations)
- Real time monitoring parameters:
  - Current power usage of CERN equipment – 10 minutes
  - Current capacity of UPS systems (if used) – 1 minute
  - Infrastructure alarms indicating faults potentially affecting CERN equipment, including any loss of redundancy – 5 seconds
  - Relevant temperature and humidity readings for the cooling infrastructure, e.g. inlet and return temperature of cooling air (and/or water), humidity of inlet air – 1 minute
- For retirements all equipment shall be removed and prepared for disposal or shipment within 4 weeks



Parameters - V

- The following summarises the expected failure rates of IT server components:
  - Disks – 2% annual failure rate, i.e. 2 failures per year for every 100 disks
  - Other standard components: Cooling fans, CPU, Disk, Memory module, PSU and RAID controller – 5 interventions per 100 servers per year
  - More complex repairs such as replacing the mainboard, backplane or investigations of unknown failures – 3 interventions per 100 servers per year
- The following repair times shall be respected:
  - Disks – 8 working hours.
  - Other standard components: Cooling fans, CPU, Disk, Memory module, PSU and RAID controller – 8 working hours.
  - More complex repairs such as replacing the mainboard, backplane or investigations of unknown failures – to be shipped to the appropriate vendor within 10 working days.
- The following summarises the expected failure rates of networking equipment:
  - Switches – 5 repair operations for every 100 switches per year.
  - Routers – 5 repair operations per router per year.
- The following repair times shall be respected:
  - 4 working hours.

Parameters - VI



- Smart ‘hands and eyes’ supported to be provided during working hours (8 hours between 07:00 and 19:00 CET)
  - 5 per hundred IT systems and 10 per network equipment per year
  - Intervention time:
    - Non-critical equipment – 1 working day
    - Critical equipment, including networking – 4 working hours
- At the end of the contract all equipment shall be removed from racks and prepared for disposal or shipment within 8 weeks.
- Penalties defined for non respect of the SLA

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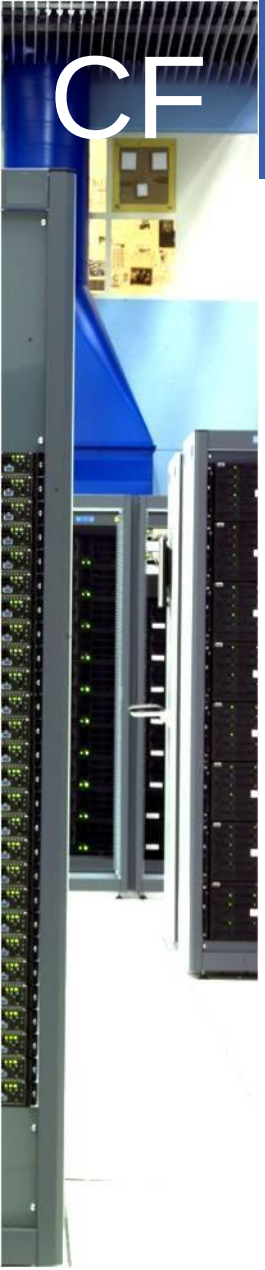
Summary of Tender Replies



Country	Bid	Declined
Belgium	1	
Finland	1	
France		1
Germany	1	1
Hungary	2	1
Norway	5	4
Poland		1
Portugal		1
Spain	2	
Sweden	1	3
Switzerland	1	2
UK	2	
	16	14

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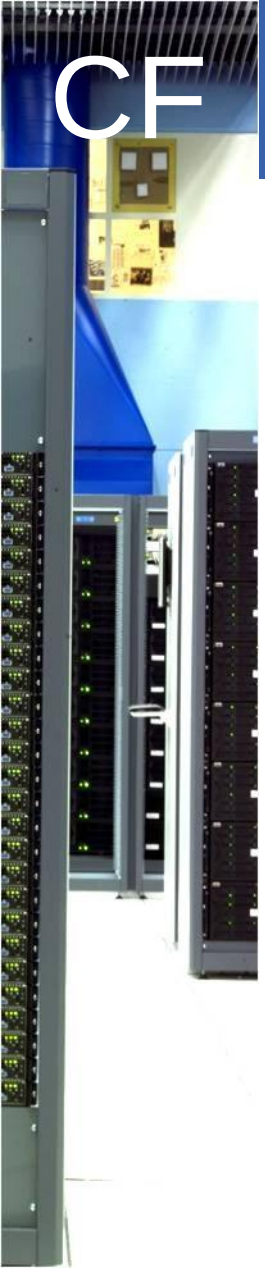

Evaluation Process

- The financial offers were reviewed and in some cases corrected
- The technical compliance of a number of offers were reviewed (those which were within a similar price range)
- Meetings were held with 5 consortia to ensure that
  - we understood correctly what was being offered
  - they had correctly understood what we were asking for
  - errors were discovered in their understanding
- Site selected and approved at FC 14th March

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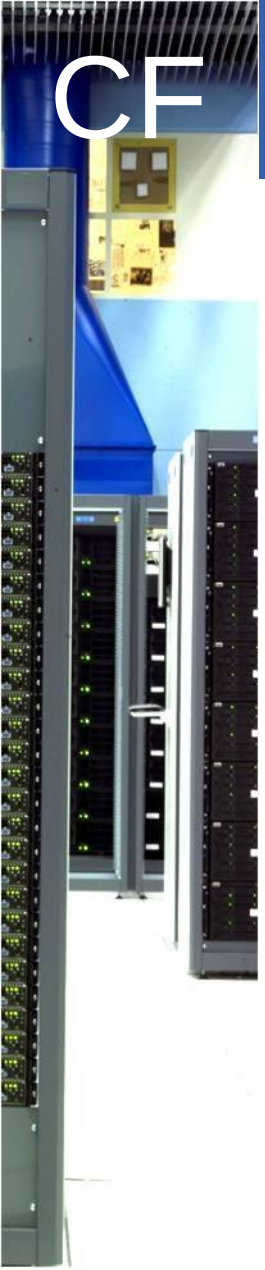
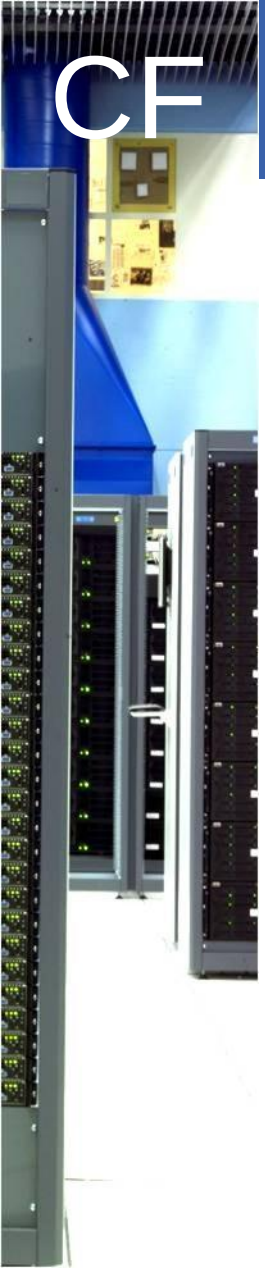
And the winner is….



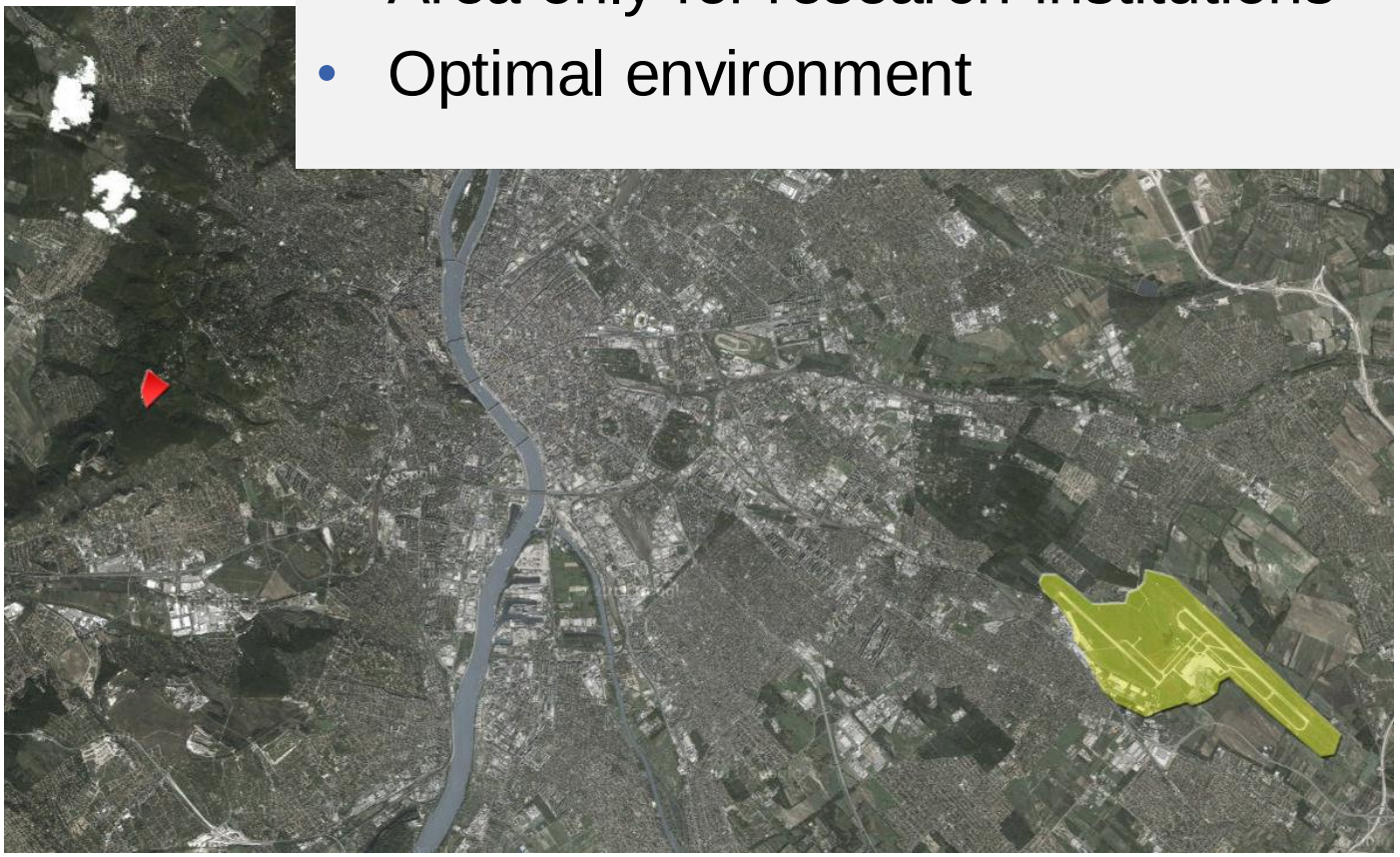
Wigner Data Centre in Budapest

(formerly KFKI RMKI)

Data Centre Location



- Easy reach to the airport and city centre
- Huge area within the fence
- Highly secure area
- Area only for research institutions
- Optimal environment



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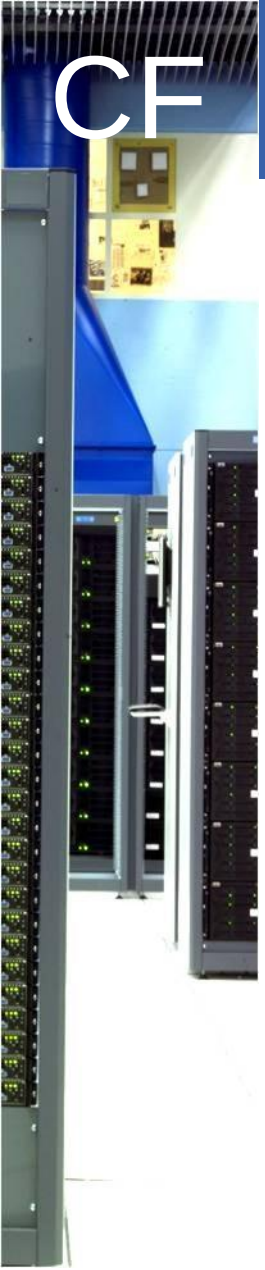

Status and Future Plans

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- Contract should be signed on Friday (this week!)
- During 2012
  - Tender for network connectivity
  - Small test installation
  - Define and agree working procedures and reporting
  - Define and agree SLA
  - Integrate with CERN monitoring/ticketing system
  - Define what equipment we wish to install and how it should be operated
- 2013
  - 1Q 2013: install initial capacity (100kW plus networking) and beginning larger scale testing
  - 4Q 2013: install further 500kW
- Goal for 1Q 2014 to be in production as IaaS with first Business Continuity services

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