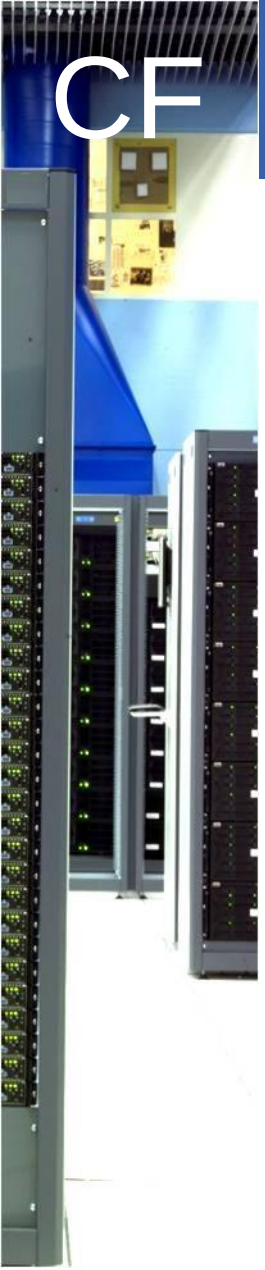

CERN IT Facility Planning and Procurement

HEPiX Fall 2010 Workshop

Olof Bärring, CERN IT/CF

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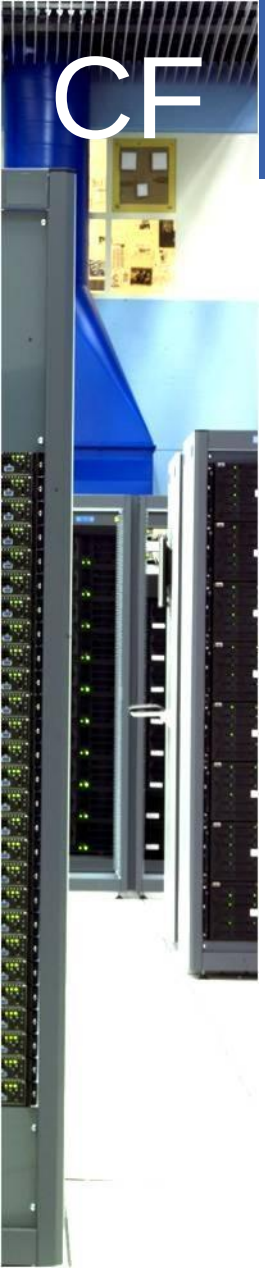
HEPiX



Outline

- Team & Tasks
- IT facility
- Hardware inventory
- Procurement
- Conclusions

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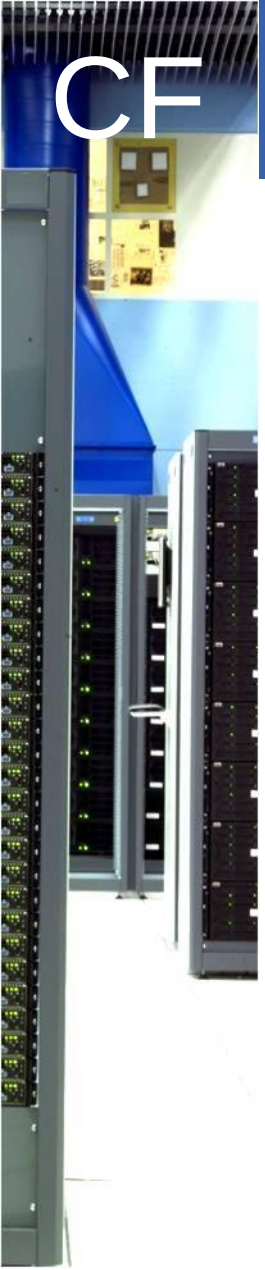

Team & Tasks

- IT re-org in effect from Jan'10
- Computing Facility group (CF)

  "*Management and operation of the CERN Computer Centre and associated Computing Facilities.*"

  - Automated Services for Infrastructure (ASI)
  - Facility Planning and Procurement (FPP)
  - System Administration and Operation (SAO)

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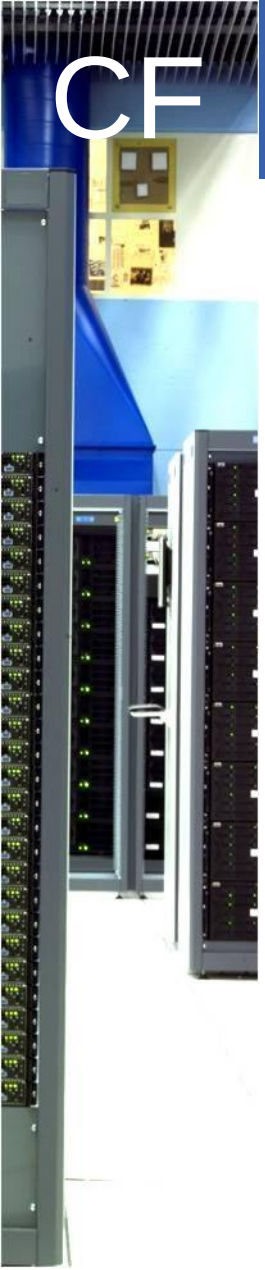

Team & Tasks

- IT re-org in effect from Jan'10
- Computing Facility group (CF)

  "*Management and operation of the CERN Computer Centre and associated Computing Facilities.*"

  - Automated Services for Infrastructure (ASI)
  - **Facility Planning and Procurement (FPP)**
    - 3 staff: Andras Horvath, Eric Bonfillou + me
    - 2 students: Michael Scott, Imre Szebenyi (fellow)
  - System Administration and Operation (SAO)

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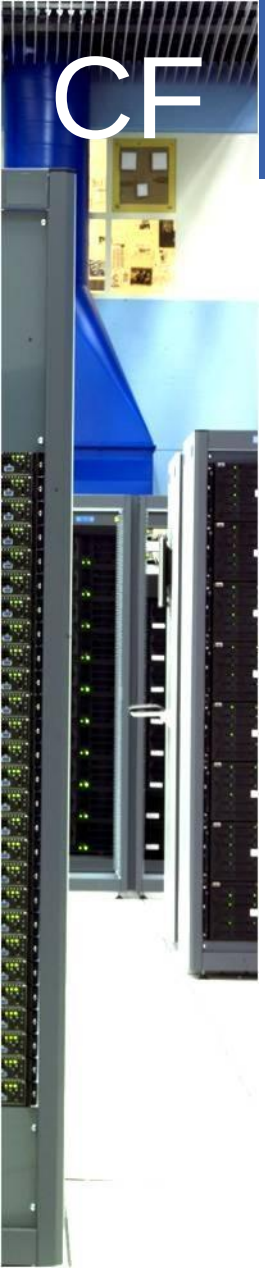
Team & Tasks



- Technical responsible for procurement of servers and storage
  - Planning
  - Technical spec and questionnaire
  - Validation of bids
  - Liaise with purchasing and accounts payable services
- Hardware expertise
  - Follow-up systematic issues
  - Liaise with vendors
  - Maintain BIT suites and assist benchmarking
- Asset management
  - Maintain up-to-date inventory
  - Systematic tracking of FW, BIOS – plan and coordinate deployment campaigns
  - Track warranty service performance
- Vendor contacts
  - Regular warranty service reviews
  - Organize information/roadmap meetings

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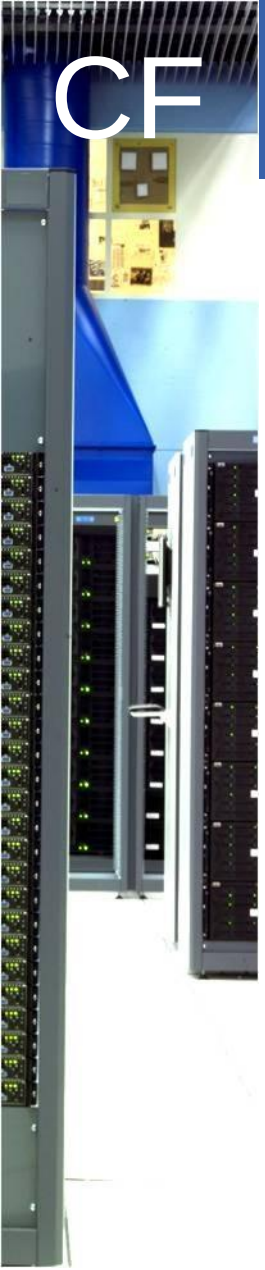
Facility Planning & Procurement



Users

Planning and coordinate commercial procedures (tenders)

IT resource mgr, Service responsible

Planning h/w resource provisioning

DPO, Purchasing

Vendors

FPP

Installation/removal planning

IT operations & sysadmins

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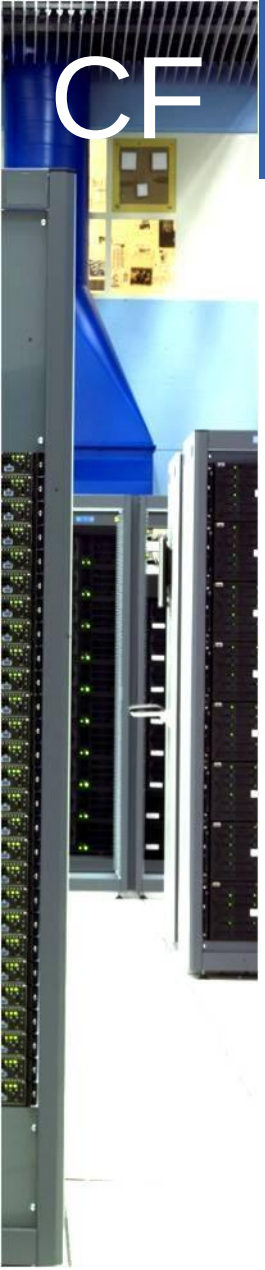

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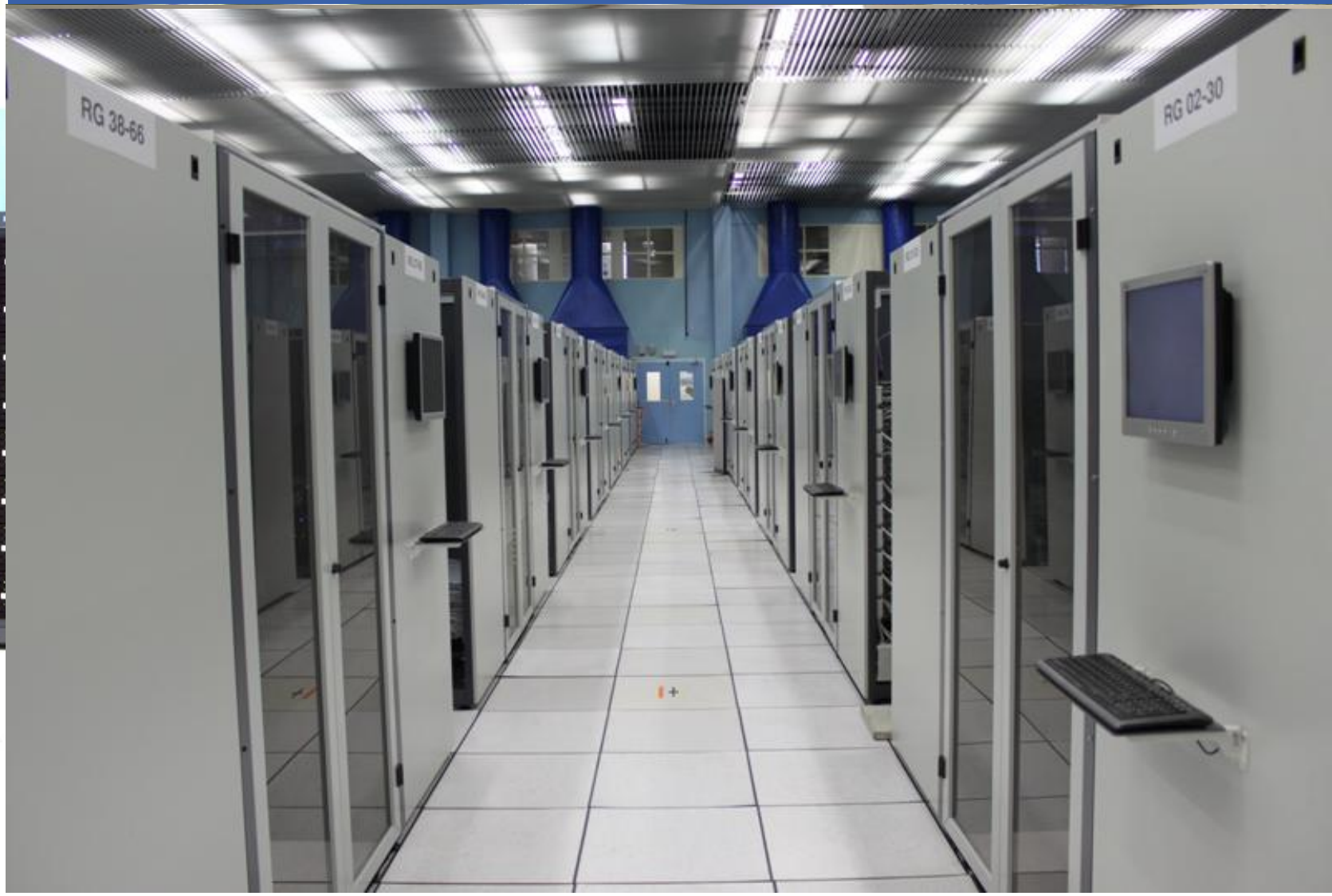
IT facility



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Installation & removal

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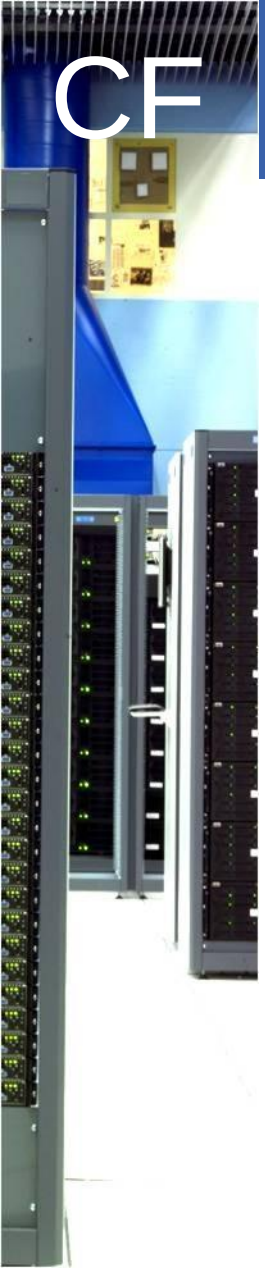

Machine room considerations

- Machine room
  - Total available electrical power: 2.9MW
  - Power distribution in main machine room: 50kW per PDU feeding row of 15 racks → average 3-4kW/rack
  - Power distribution in vault allow for ~10kW/rack in water cooled racks (WCR)
- Available power committed
  - Cannot install without a prior remove
    - Example: remove 388 servers for installation of 350 disk servers (12PB raw)
  - Consolidate CPU workers to WCR
  - Disk (DAS) servers in air cooled racks 8 x 4U

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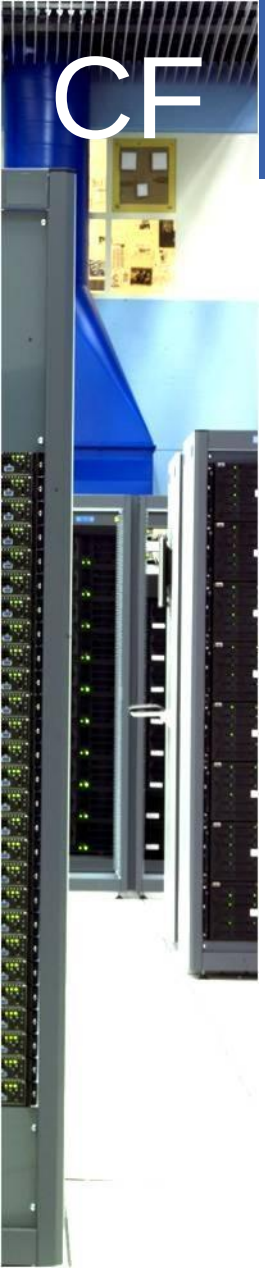
Outline



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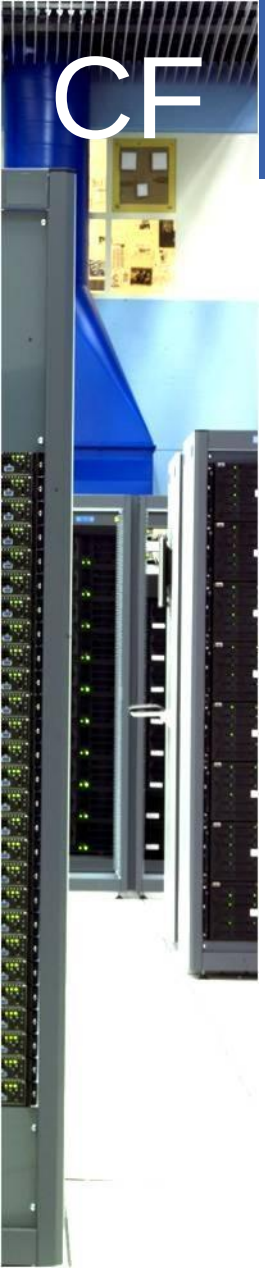
Inventory



Number of racks:	**841**
Number of systems:	**11,320**
Number of processors:	**15,321**
Number of cores:	**57,651**
SPEC CPU2006:	**404,279**
Raw HDD capacity (TiB):	**61,137**
Number of HDD's:	**62,608**
Memory capacity (TiB):	**142**
Memory modules:	**50,775**
Number of RAID controllers:	**3,871**
Current power consumption (kW):	**2,486**
Current power consumption (kVA):	**2,622**

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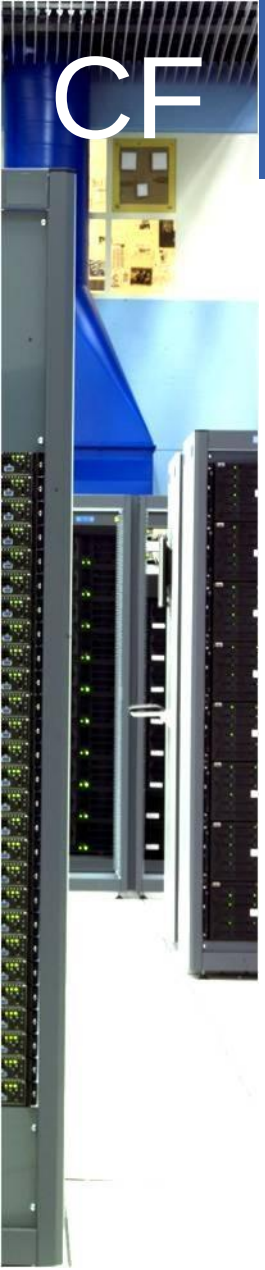
Inventory @ SLS



Service Level Status overview

Home | Search | KPIs | Tags | Admin | Documentation | Help

Computer Centre By Numbers 2 Nov 2010 Tue 20:47:03

Service information

full name: **Computer Centre By Numbers**
short name: CCBYNUM
group: IT-CF-FPP
site: CERN

email: **imre.szebenyi@cern.ch**

manager: **Imre Szebenyi**

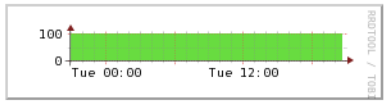
Service availability (more)

availability:
percentage: 100%
status: **available**

last update: 20:40:09, 2 Nov 2010 (7 minutes ago)
expires after: 1440 minutes

rss feed with status changes

availability in the last 24 hours (more):



Admin

admin tools

Additional service information (more)

Number of processors:	15,321
Number of cores:	57,651
Memory capacity (TiB):	142
Memory modules:	50,775
Raw HDD capacity (TiB):	61,137
Number of HDD's:	62,608
Number of systems:	11,320
Number of RAID controllers:	3,871
Number of enclosures:	1,340
SPEC CPU2006:	404,279
Number of racks:	841
Number of virtual machines:	1,140
Number of Fibre channel ports:	944
Number of 1G ports:	15,703
Number of 10G ports:	390
Current power consumption (kW):	2,440
Current power consumption (kVA):	2,575

Part of (subservice of):
none / not declared

Subservices
none / not declared

Clusters, subclusters and nodes
none / not declared

Depends on
none / not declared

Depended on by
none / not declared

× Find: asset management Next Previous Highlight all Match case

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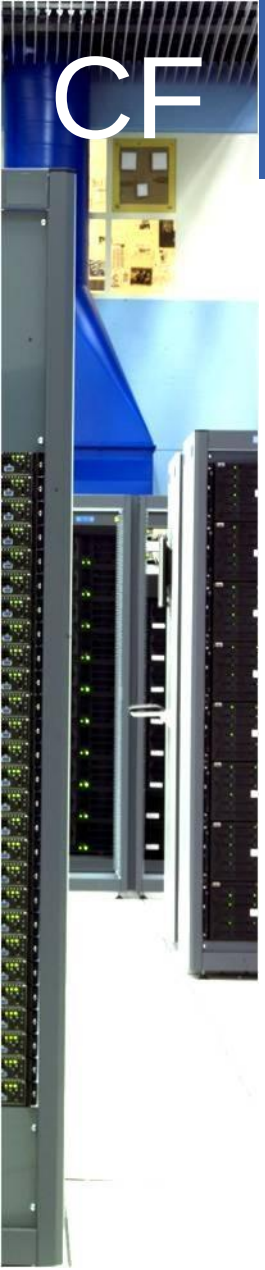
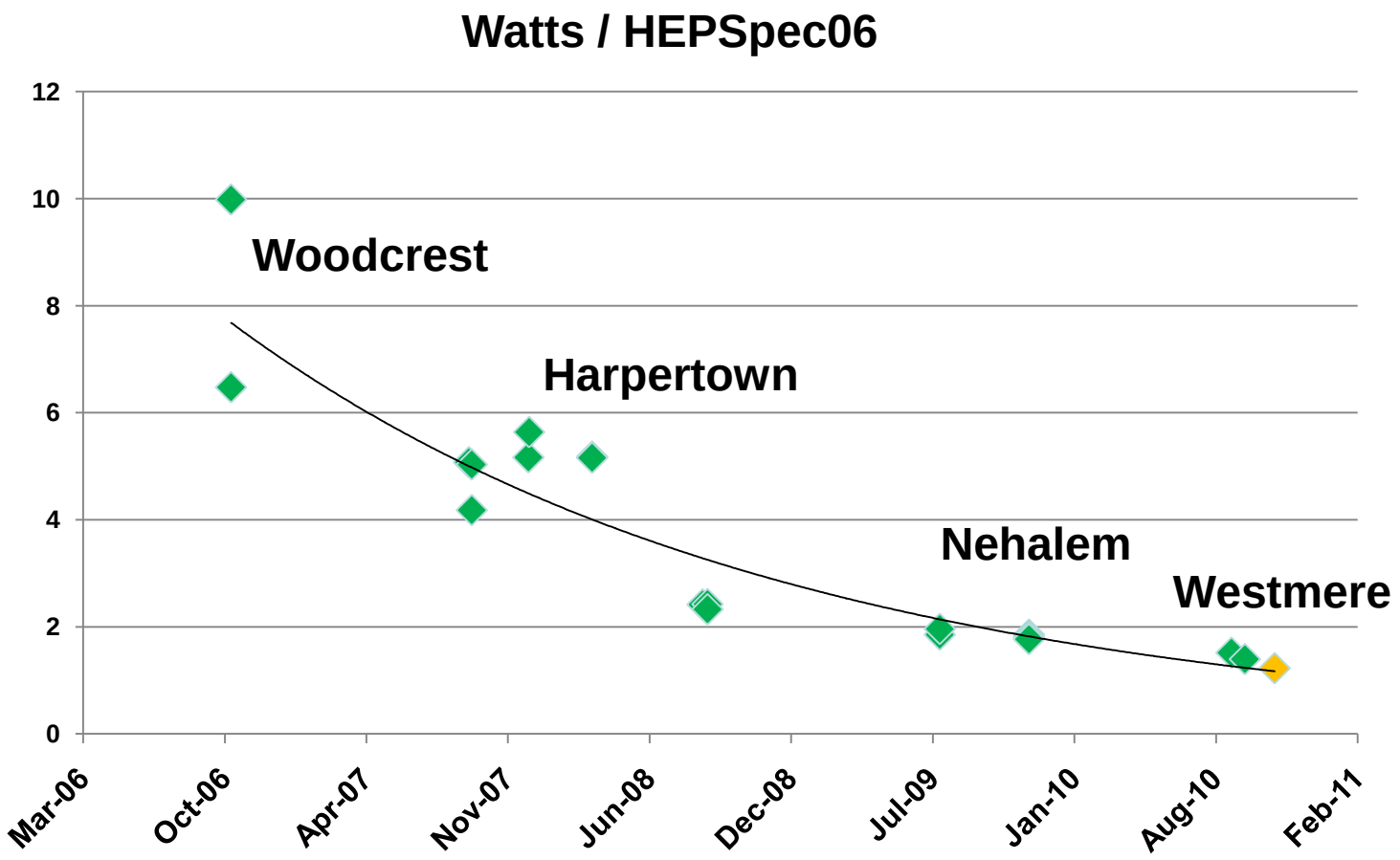
Inventory → trends





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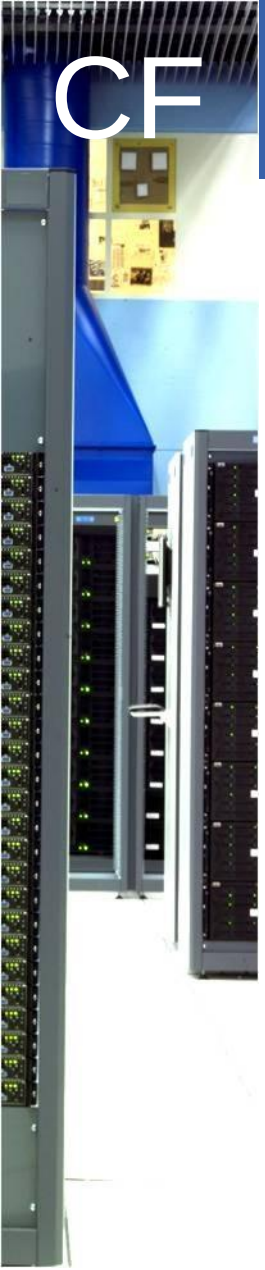
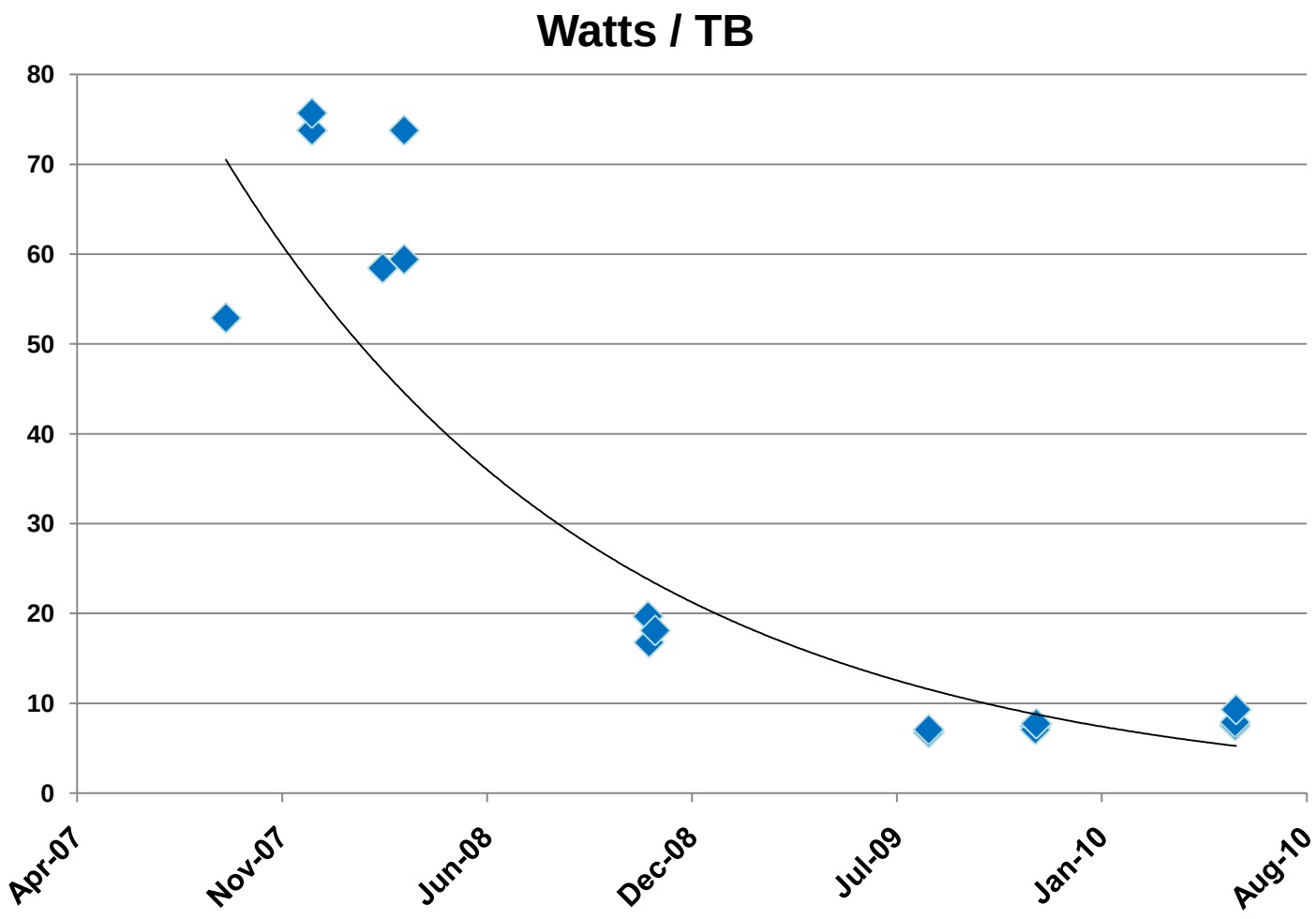
Inventory → trends





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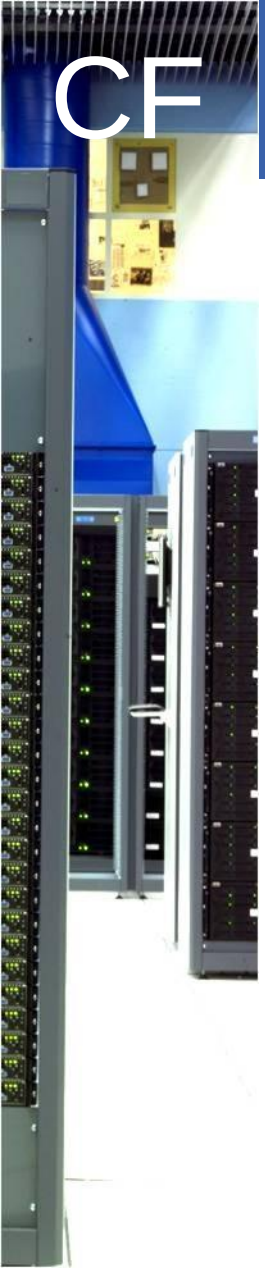
Inventory → tracking



- Serial numbers recorded in Cdb since 2009
- Can be used for tracking repairs
  - Component change → new SN
- No Lemon sensor (yet) but daily cron-job
  - Dumps a snapshot of all SNs from Cdb
  - Compare with dump from previous day

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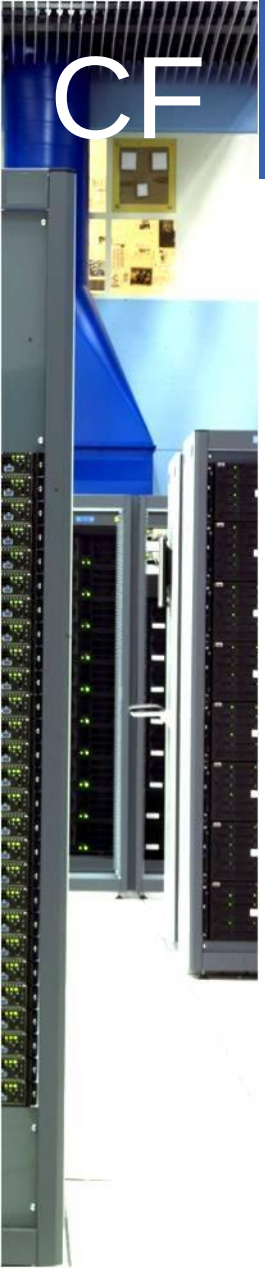
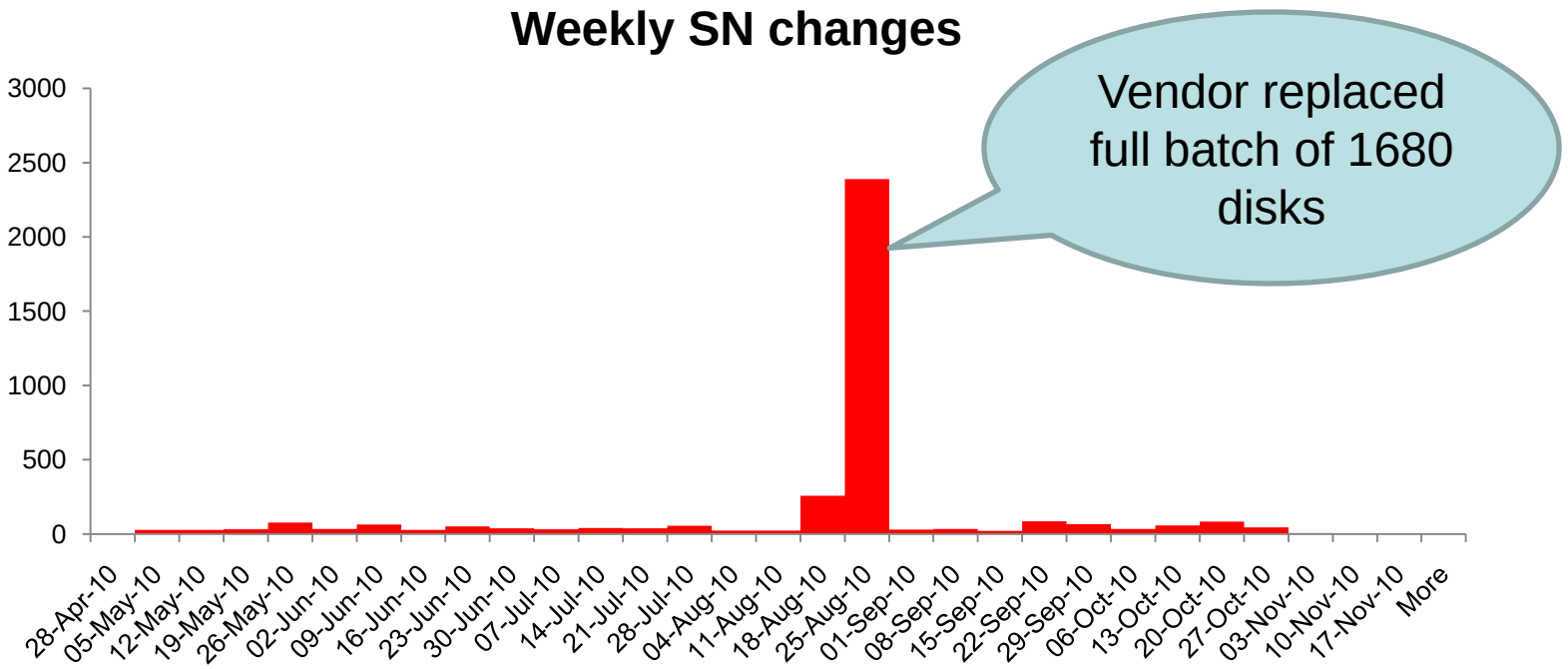
Inventory → tracking





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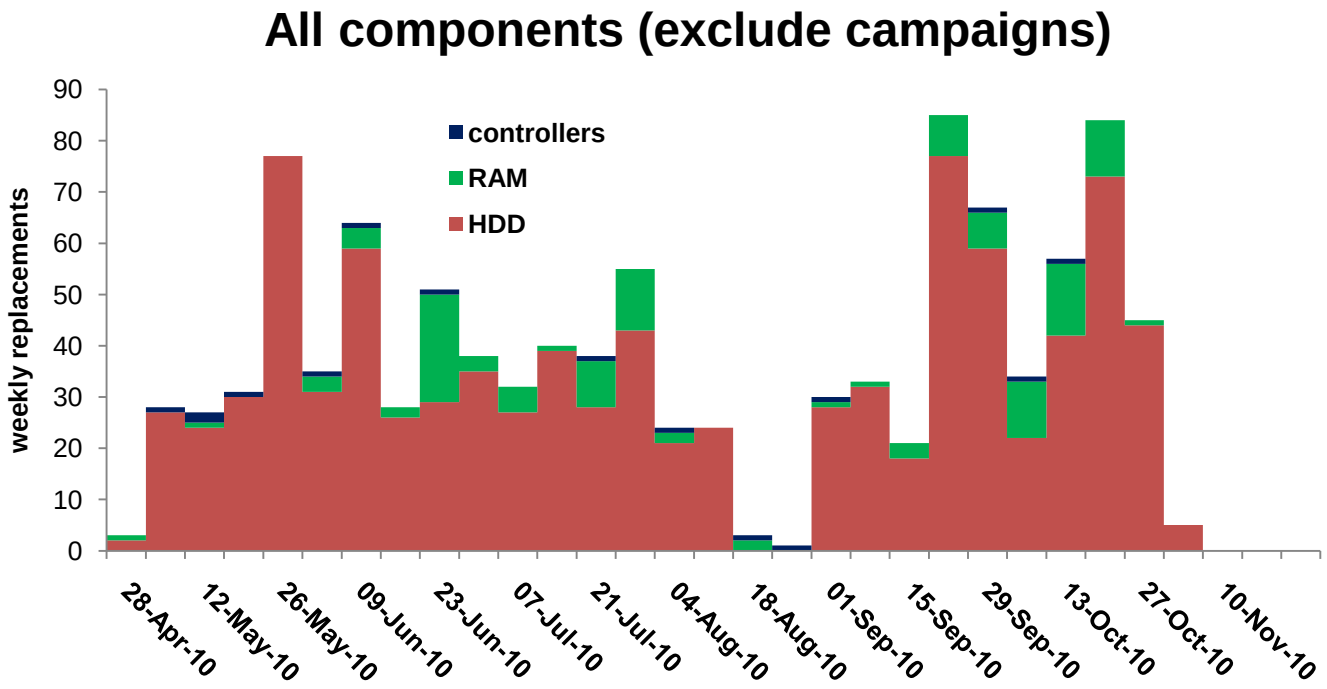
Inventory → tracking



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CF Inventory → tracking

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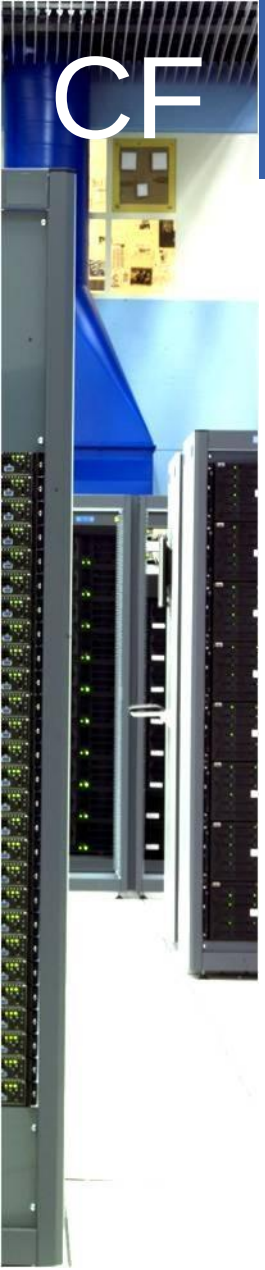

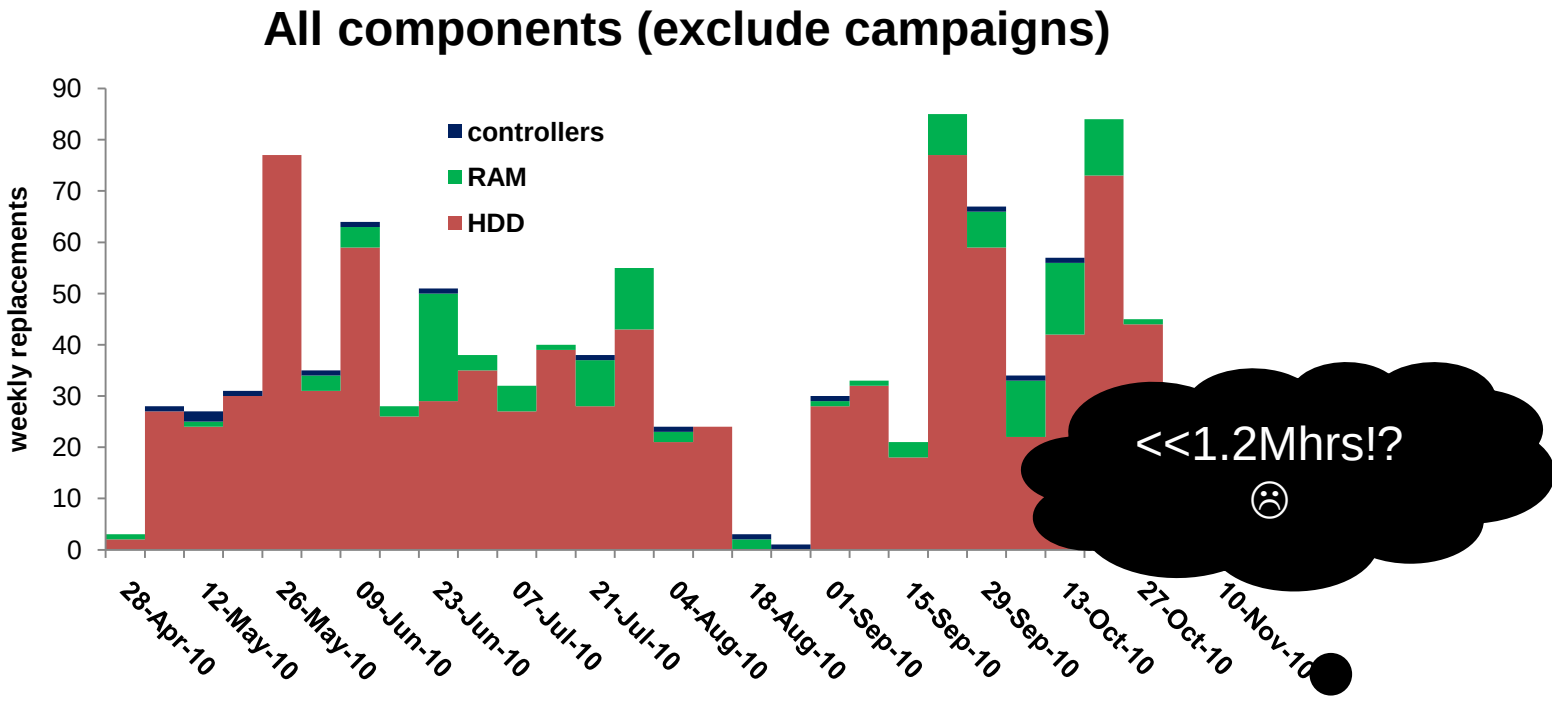

HDD failures/week:30
Hours/week: 168
→hrs/failure: 5.6

drives in the centre: 62,608

→ MTTF = 350,604 hrs

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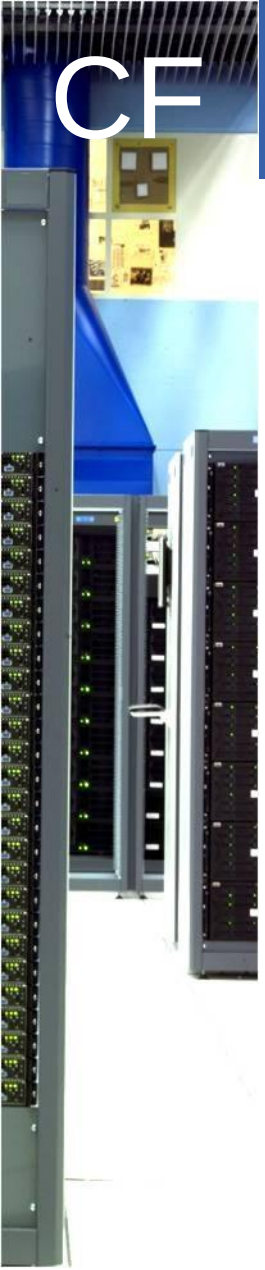
Outline



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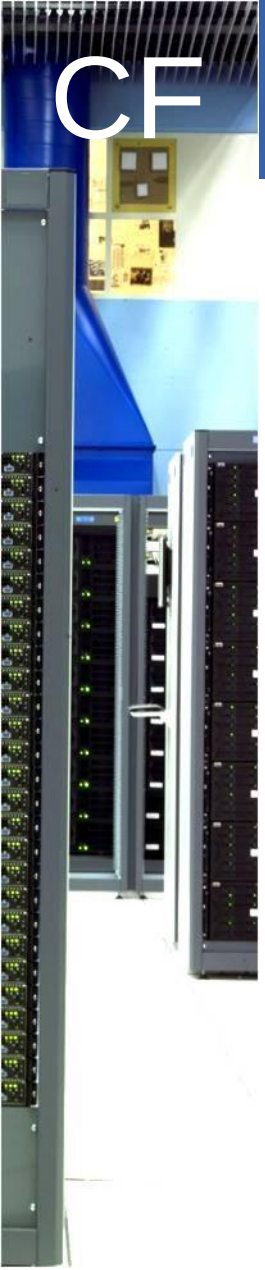

Procurements in 2010

- Sustained the 2009 ‘rate’ up to August
  - CERN wide budget cuts
- Impact of budget cuts
  - Postponed EOY tenders to 2011
    - 50kHS06 and 6PB (12PB raw)
  - Extend warranty where appropriate/applicable
- Opening for some competition
  - Last CPU tender split
    - 2U Twin^2 dual Intel (L5640), 36GB RAM, 141HS06
    - 1U quad AMD (6164HE) batch, 96GB RAM, 319HS06
  - Also some promising bids with alternative chassis

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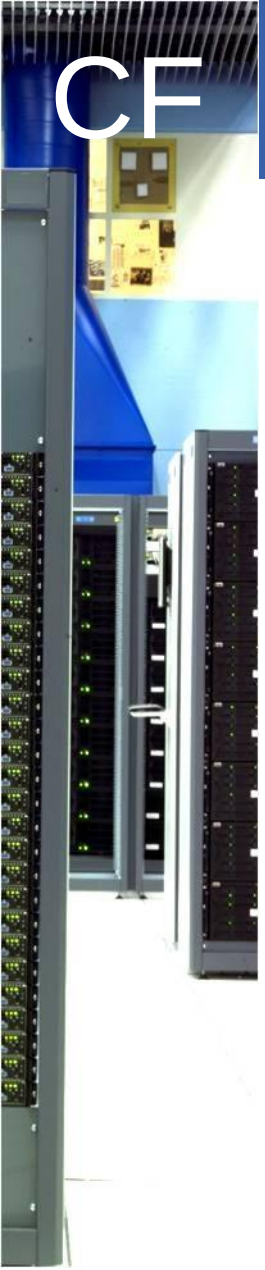
Procurement – issues



- Early failures (or infant mortality)
  - Better burn-in tests → less problems in prod ☺
  - But … acceptance time increases
    - Resources unusable
    - 3-4 months delayed
    - Waste of
- means to put real pressure
- ...ders can go bankrupt
  - Eonex (CH) in 2008
  - Melrow (NL) in 2008
  - CPI (DE) this year

From Wikipedia, the free encyclopedia:

Commodity computing is computing done in commodity computers as opposed to **supermicro** computers or boutique computers. Commodity computers are computer systems manufactured by multiple vendors, incorporating components based on open standards.

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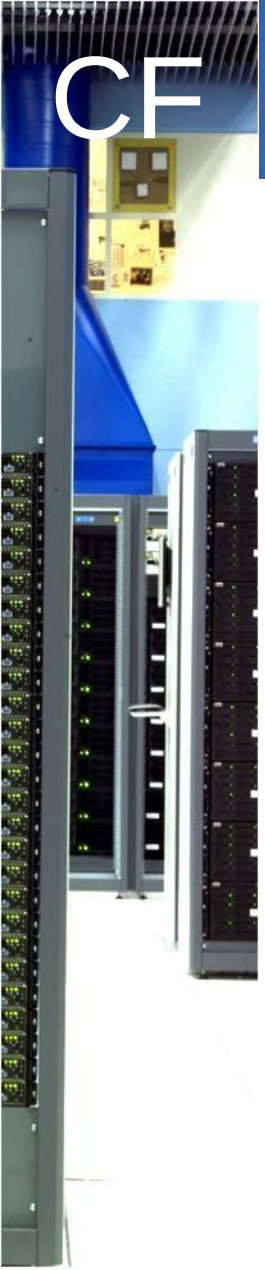
Conclusions



- Installation/removal planning & procurement @CERN IT are intimately coupled through electrical power constraints
- Up-to-date inventory underpins an optimal management of deployed assets
  - Trending and issue tracking
  - Identify and eliminate inefficient (Watts/capacity) resource
- Need to learn to cope with undesired side effects of strong competitive tendering

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