Vault Reconfiguration

IT DMM
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Reminder

- Estimated Space and Power Requirements for LHC Computing
  - 2,500m² — increase of ~1,000m²
  - 2MW — nominal increase of 800kW (1.2MW above current load)
- Conversion of Tape Vault to Machine Room area agreed at post-C5 in June 2001.
  - Best option for space provision
  - Initial cost estimate of 1,300-1,400KCHF

Why Today's Talk?

- Serious money will be committed by Friday.
  - Last chance for Divisional Management to comment on the conversion.
- Some choices need to be validated
  - No remote control of electrical power distribution
  - No pre-heating of fresh air intake in case of fire
  - Future arrangement of storage space in former MG room.

The Project

- Convert the tape vault to Machine Room area of ~1,200m^2
  - False floor, finished height of 70cm
  - 6 × "In room" air conditioning units.
    - » Total cooling capacity: 500kW
  - 5 × 130kW electrical cabinets
    - » Double power input
    - » 5 or 6 20kW normabarres/PDU
      - 3-4 racks of 44PCs/normabarre
  - 2 × 130kW cabinets supplying "critical equipment area"
    - » Critical equipment can be connected to each PDU
    - » Two zones, one for network equipment, one for other critical services.
  - Plus smoke detection, but no fire extinction

The Cost

Vault Conversion	
Civil Engineering	446K
Electrical Installations	410K
Cooling and Ventilation	500K
Network infrastructure	120K
Fire Detection	135K
Total	~1,600K

- Cost increase since June 2001 is almost entirely due to addition of fire detection and replacement of lighting. Some small increase in cost of false floor and similar items (access ramps/stairs, reconditioning the floor, …).

The Schedule

- December 2001
  - Start Dismantling
    - » Old false floor, electrical & data network and much ducting gone.
- February/March
  - Major civil engineering, Vault then MG room
- April
  - Install air conditioning & smoke extraction
- May/June
  - Install new electrical distribution
  - Install false floor
  - Install network cables and equipment
- End July
  - Vault available to house new equipment.

Any Alternatives?

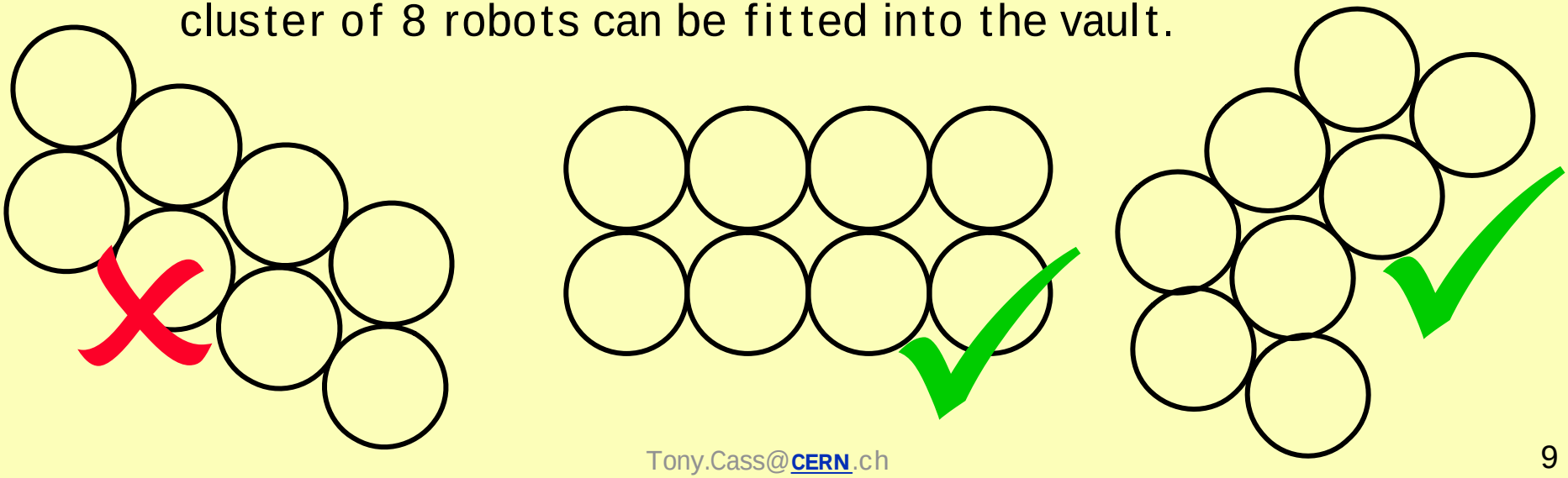
- Rent space from, e.g., PSI, Digiplex, Telehouse
  - Price before the dot.com crash: CHF500/m²/month
  - Price now: CHF150/m²/month for >500m²
    - » **CHF1.8M** for 1,000m² for one year.
    - » This even after I told them of our conversion costs.
    - » Includes some ongoing costs (e.g. HVAC maintenance), but not electricity consumption.

Items to approve

- Layout of storage zones in old MG room
  - Some for existing users
  - Some for “PC Shop” to replace barn and archive store
  - Choice never perfect, but layout seems reasonable.
- Remote Supervision of Electrical Supply
  - Operators will be able to view state of electrical supply equipment at the normabarre level, but will not be able to switch power on or off remotely (but manual control will be possible, unlike today).
    - » ST recommend against as additional equipment introduces additional risk of failure.
    - » Same choice will be made for main Machine Room in future refurbishment.
- No pre-heating of replacement air in case of fire.
  - Input air could be as low as –12C if there is a fire in Winter. Service managers wanted preheating, but
    - » this is very difficult to achieve, and
    - » do really we want two 120kW heating coils under the false floor?

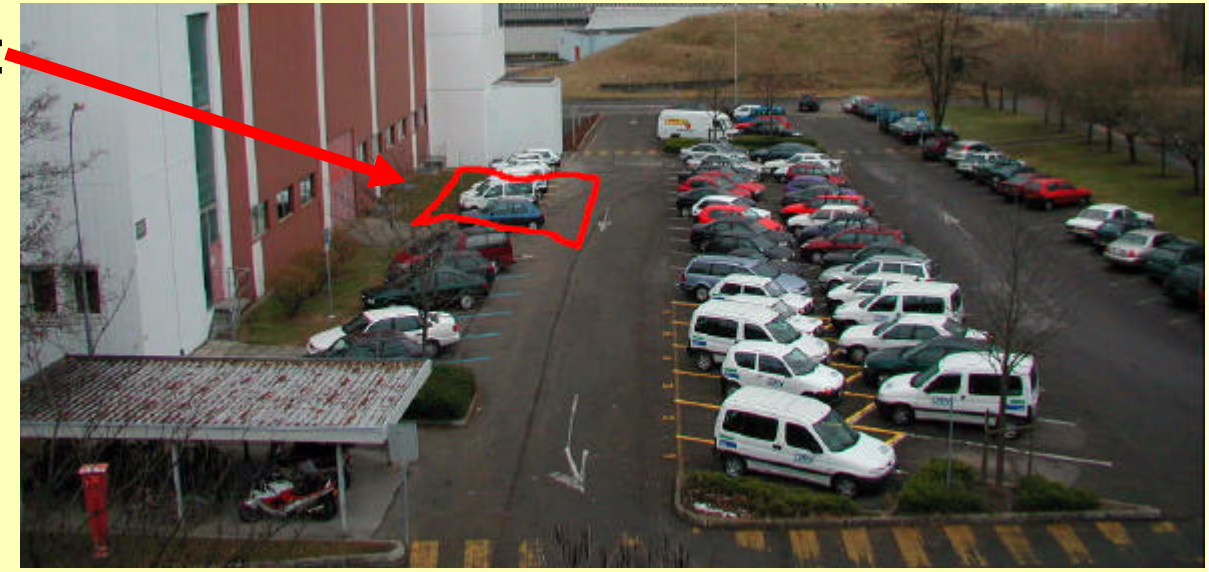
Using the extra space

- Air conditioning capacity, not space, limits use of the vault.
  - Maximum heat load of 500W/m^2
    - » Machine Room can support heat load of 1.5kW/m^2
  - PCs generate 1,500W/m^2 even with today's low density racking.
  - Use the vault for equipment with low power density.
    - » Tape Robots! Pillars are a problem. However, with imagination, a cluster of 8 robots can be fitted into the vault.



The Next Steps

- Create a new Substation for B513
  - To power 2MW of computing equipment plus air-conditioning and ancillary loads.
  - Included in the site-wide 18kV loop—more redundancy.
  - Favoured location:
  - Underground, but 5 transformers on top.



- Refurbish the main Computer Room once enough equipment has moved to the vault.