

LHC Operational Consolidation

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LHC Operational Consolidation

- Injectors (1 slide)
- LHC: Areas covered
- Priorities
- Conclusions

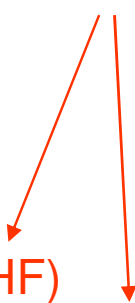
Existing Injector Consolidation

- PS and SPS projects
 - Started in 2002 (60 MCHF) now 85% completed
 - Essentially covered ageing beam related equipment
- Additional program approved in December 2007 (32 MCHF)
 - Included 11 MCHF for Infrastructure consolidation (mainly SPS electrical network)

LHC Operational Consolidation

- Study launched @ LMC 1st July 2009
- Contact all interested parties = 144 Work Units identified
 - EN: CV, EL, HE, MME, STI
 - mainly consolidation of existing infrastructure
 - Cooling systems, CERN Electrical network, lifts, cranes (safety conformity), workshop equipment, radiation shielding for electronics in LHC tunnel...
 - GS: ASE
 - LHC Access/Safety system consolidation and upgrade
 - SC: RP
 - LHC and Injector radiation monitoring consolidation
 - TE: CRG, EPC, MPE, MSC, VSC
 - Additional Helium storage & Spares for Cryogenics, warm and cold magnets, vacuum...
 - BE: ABP, BI, RF
 - spares + new ideas

- Consolidation: LHC + Injectors
 - Water cooling and Ventilation (38 MCHF)
 - Electrical network distribution (48 MCHF)
 - Transport, Cranes, Lifts etc (22 MCHF)
 - S/C Splice clamping (12 MCHF)
 - Workshops (8 MCHF)
 - Radio-protection (13 MCHF)
- Spares: LHC
 - RF (3 MCHF)
 - Beam Instrumentation (1 MCHF)
 - Cryogenics (6 MCHF)
 - Magnets (15 MCHF)
 - Vacuum (10 MCHF)
- New/upgraded equipment: LHC
 - Additional Helium storage (7 MCHF)
 - LHC Access and Safety system (10 MCHF)
 - Cooling redundancy for LHC Cryogenic plants (22 MCHF)
 - Tunnel Radiation shielding etc (4 MCHF)
 - Remote radiation survey (1 MCHF)

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-
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graph TD; A[Covered by existing budgets] --> B[Additional Helium storage (7 MCHF)]; A --> C[LHC Access and Safety system (10 MCHF)];
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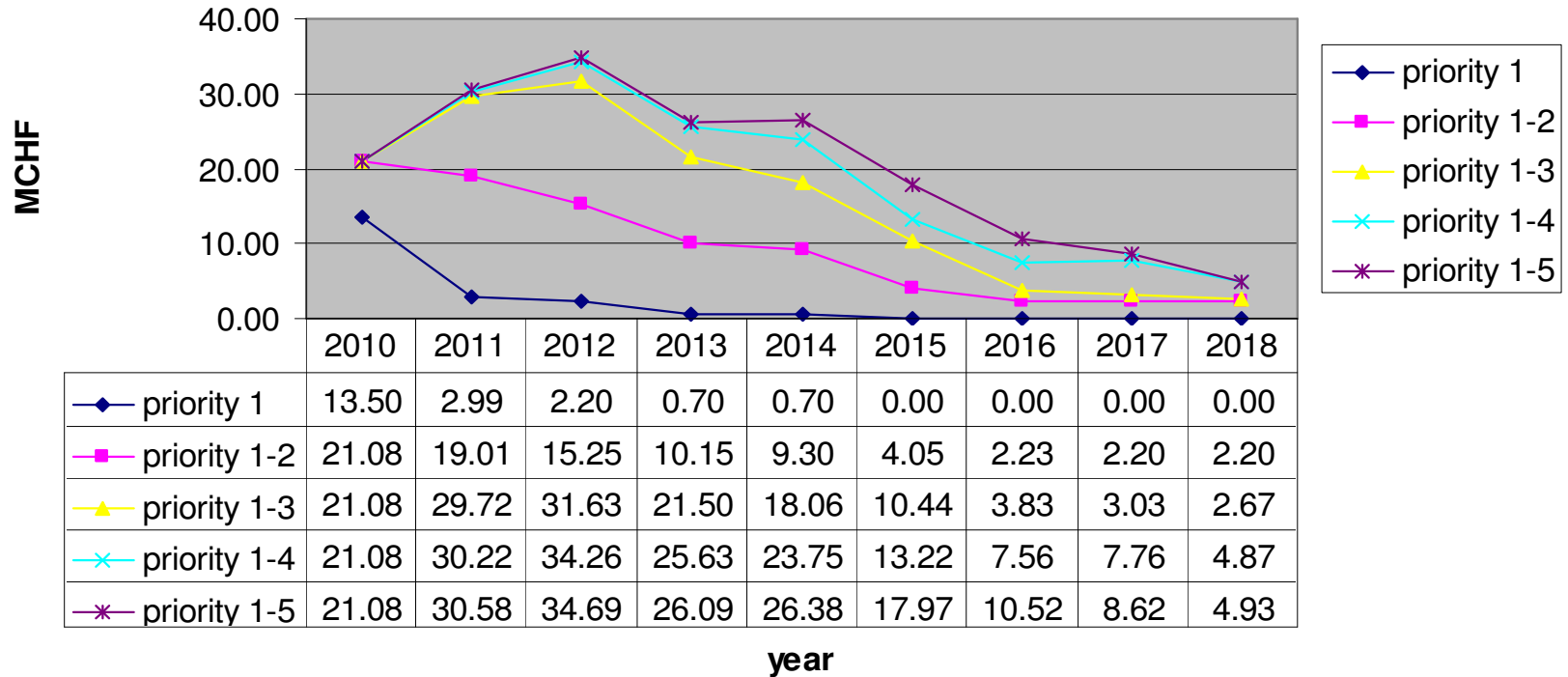
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    - **S/C Splice clamping (12 MCHF)** ← **Need strategic approval**
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# Priorities

- Risk analysis for Consolidation activities
  - Likelihood of failure combined with impact of failure etc..
  - Safety
- Priority for spares
  - How many exist... are they tested, usable..
  - Long lead time to order.
  - Impact of failure...
- Priority for New/Upgraded equipment
  - Reduce down time
  - New system requirements to improve performance, safety...
  - Prevent/reduce failures
- Priorities assigned from 1 to 5
  - 1 = most urgent, 5 = least urgent

# Budget profile by priority



- Items not included above

- `Clamp all LHC splices (12MCHF)
- Cooling redundancy for LHC cryogenic plants (22MCHF)
- Protection of machine vacuum from massive Helium leak (technical solution??)
- Major Civil Engineering to move all underground electronics (????)

# Current priority 1 items for 2010

- Water cooled cable replacement
- Steel shielding blocks for protection of underground electronics against radiation plus displacement of certain racks etc.
- Additional Helium storage
- Cryogenics spares
  - Compressor blocks
  - Cartridges
- S/C magnet bus bars
- Separation magnets D3/D4
- SPS 18kV distribution
  
- Everything else waits until 2011 (or later)

# Strategy/Next Steps

1. Start all priority 1 items in 2010
2. Agree on priorities for 2011 and beyond  
Need decisions on Splice Clamping and Cooling redundancy for LHC cryogenic plants early in 2010
3. Injectors???

More detailed information on LHC and the existing Injector Consolidation projects see:-

<http://en-dep.web.cern.ch/en-dep/Groups/MEF/Projects/consolidation.htm>