



LINEAR COLLIDER COLLABORATION

Designing the world's next great particle accelerator

EDMS and Data Management
Benno List, DESY

CFS Two-Day Workshop
CERN, Geneva, 27./28.7.2015



- CMB has responsibility to check that Change Requests do not inflate project costs -> Cost Impact of a CR has to be evaluated
- Cost evaluation can be provided with CR submission, or be provided during review process
- Likely, the cryogenics relocation CR will be considered favourably by CMB -> if cost estimate is available, approval can be fast
- Current baseline design was relatively sketchy; TDR cost estimate did not include additional costs from moving cryogenics equipment underground (ventilation, safety, ...) except costs for caverns
- CR should answer two questions:
 - What is the realistic cost impact of moving cryogenics above ground?
-> what costs are reduced, which ones increase (including forgotten items)
 - What is the new best cost estimate for the cryogenics?



- See: also Presentation of T. Peterson at Windsor Cost Review, Feb 6, 2013: “Cryogenic Systems - Overview and Cost Estimate”
- Cryogenics costs evaluated separately for KCS (Americas/Europe) and DKS (Japan)
- Main difference: 12 (KCS) vs. 10 (DKS) cryo plants, and different lengths of cryo strings -> more connection boxes
- Unit costs are the same
- **No differences for underground installation of cryogenics equipment, or horizontal access shafts taken into account**
-> estimate assumes vertical shafts for calculation of transfer line costs etc
- Overall cryogenics costs: xxxM\$ (KCS) / xxxM\$ (DKS): $\Delta=-13\text{M}\$$
- ML and RTML cryo plants: xxx / xxx M\$: $\Delta=-27\text{M}\$$
- Cryogenic distribution: xxx / xxxM\$: $\Delta=+13\text{M}\$$
difference dominated by number of ML feed and end boxes
- These are 2006 costs, not exact TDR numbers (TDR escalated to 2012)



- CONFIDENTIAL DATA NOT INCLUDED HERE



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- Provide a WBS based cost estimate at similar / same level of detail as current cryogenics cost estimate **for differing items**
- This may include costs forgotten in TDR cost estimate, if necessary to demonstrate cost-effectiveness of Change Request
- To keep cost estimates comparable, use same cost basis (unit costs) as for TDR cost estimate – reevaluation of unit costs not necessary

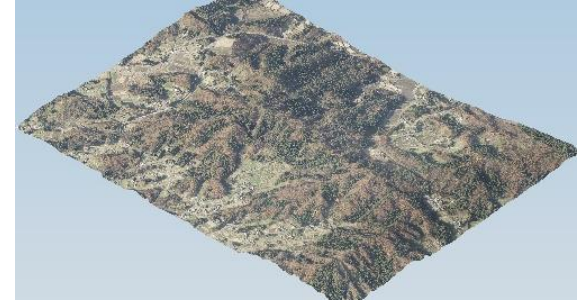


- Cost documents are confidential – you will probably have no access
 - D*0998745: Cryogenics TDR cost basis (ILC_TDP_CryogenicsCosts-6July2012_gdmod.xls)
 - D*01055745: TDR Asian CFS WBS, Half power operation (120725h TDR CFS Cost (Asia)-gdmod.xls)
 - D*01006425: Civil Unit Costs (Civil Unit Cost Comparison 102212.xls)
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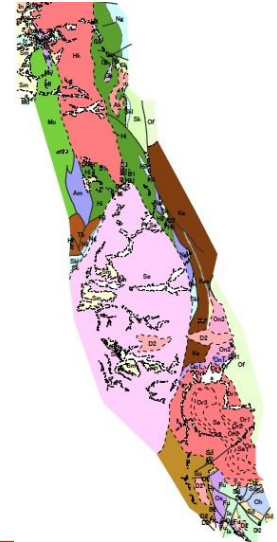
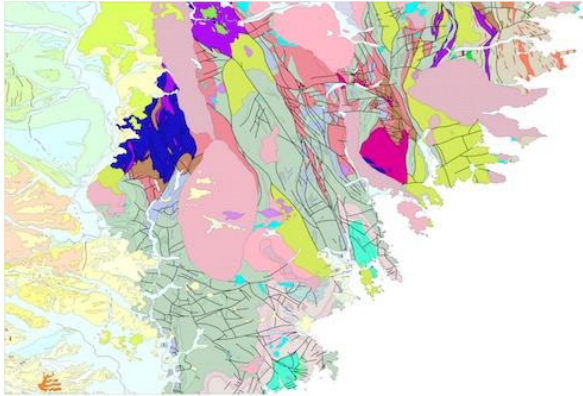
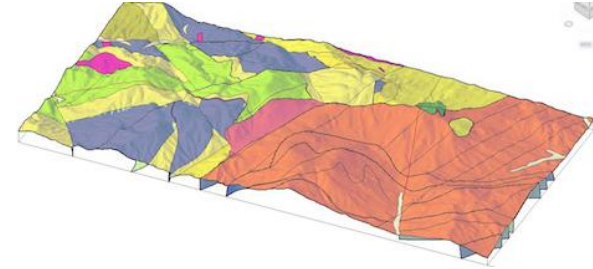


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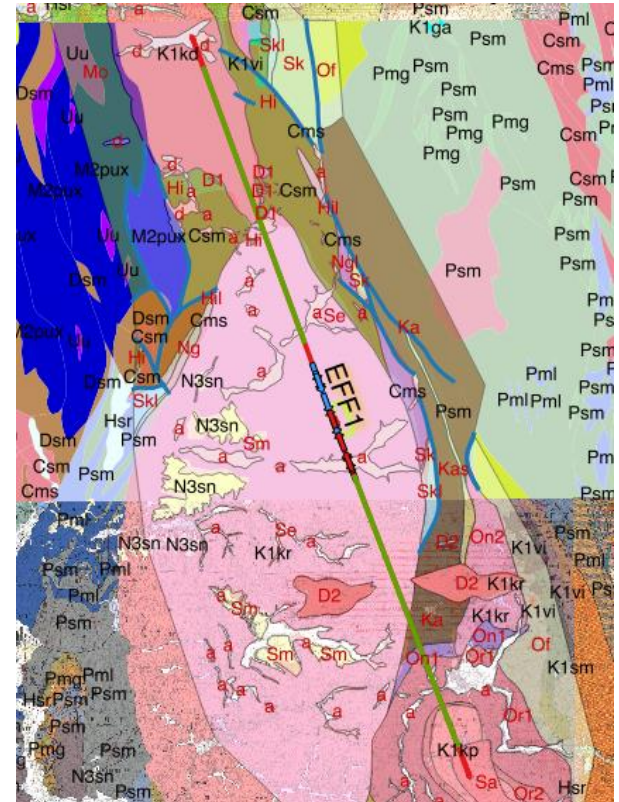
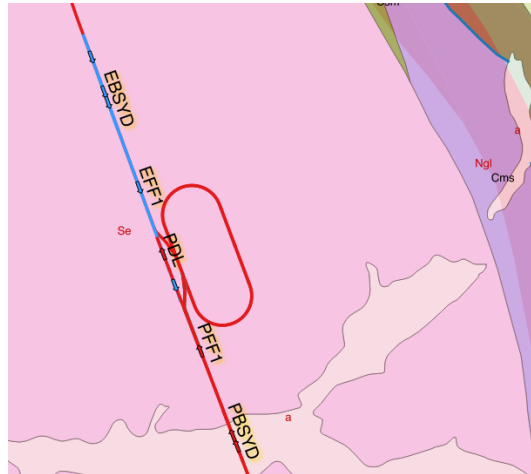
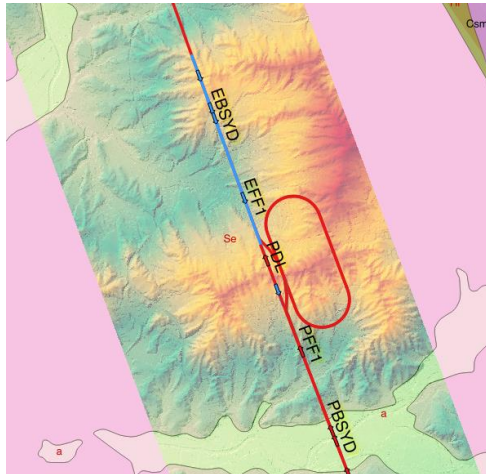
- Accelerator Layout:
- D*0982315: Reference points for civil engineering
- DEM (Digital Elevation Models), 1m resolution:
- JT files of DEM with aerial view in ILC CRS (29 files)
- DEM as GEOTiff in ILC CRS
- Original GEM in JGD/2000 coordinates (106 files)
- PHOTO: Aerial view images, 25cm resolution:
- Aerial images in ILC CRS, JPG and GEOTiff (2x29 files)
- Aerial images in JGD/2000, GEOTiff (106 files)
- ILC-CRS:
- Definition of ILC Coordinate Reference System



- Geology:
- 3D Geological model in JGD2000 coordinates (2x5 files), DWG and JT formats
- Explanatory notes to geological map
- Subsurface geological map 1:50000 (Shape files)
- Japanese seamless geological map 1:200000 (Shape)
- Geological map Quadrangle series 1:50000 (scanned)

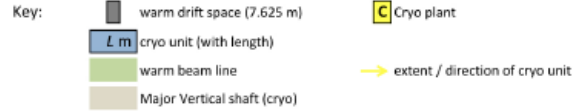


- Lattice files translated to Shape format:
Original lattice ILC2015a, translated into Shape format, using ILC2015a
- Can also be provided in JGD2000 coordinates
- Footprint of Beamlines also available as DFX file (AutoCAD) in Machine coordinates (IP=0/0)
- Shaded Elevation Model



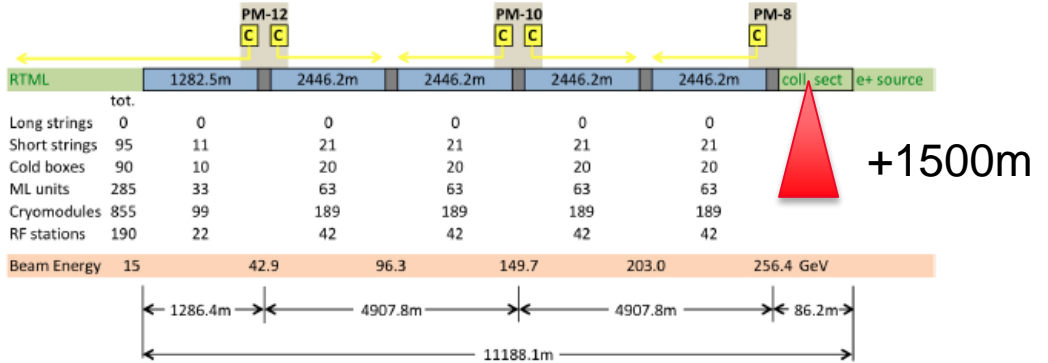


- CR-0004: Extension of the ML tunnels by ~1500 m
- CR-0004 has been approved in 9th CMB meeting
- Implementation requires:
 - New conceptual layout – cryogenic sectioning
 - New lattice (ML, RTML) – new lattice release (2015b / 2016a)
 - Redo all associated / derived documentation:
 - Treaty point documentation
 - Component counts ~~FC-GML-5841-dghm250-20140701.xml~~
 - Lattice visualisations (3D, AutoCAD, GIS)
 - (Cost Estimate)
- Full implementation will need some time
- ARUP study could impact conceptual layout -> should be considered part of CR-0004 implementation
- Proposal: provide conceptual “lattice” with long drifts (not a matched lattice) as baseline geometry for ARUP study -> timescale: ~1 month

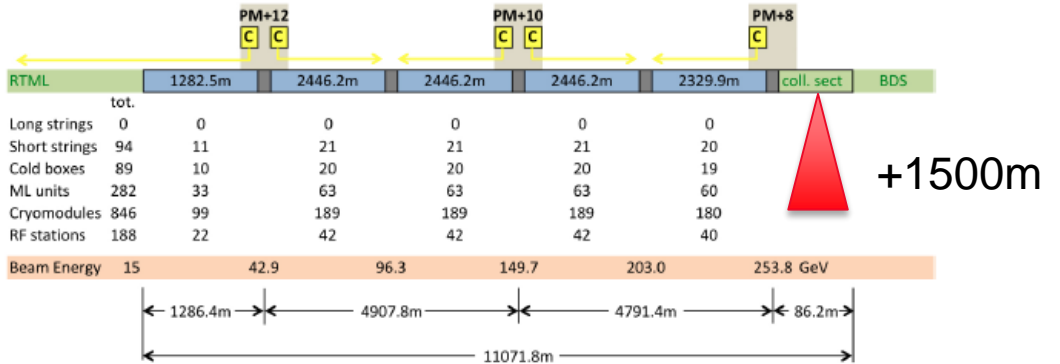


1500 additional meters
 ~ 1/2 of cryo string
 -> re-balance lengths?

Electron Linac



Positron Linac





- Data Format for description of ILC geometry in TOT
- Should geometry be based on extended design after CR-0004?
- Are more data needed / would be useful?
- What are the TOT deliverables?
- “Only” the tool?
- Data collected for display (maps)? -> should go to EDMS