BDS KOM Close-Out

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SLAC

BDS Design Maturity

- Lattice design is probably most mature of any Accelerator System
  - **NLC legacy**
  - **Many iterations**

- Now is a good time to consolidate / review
  - **Understand ‘base design criteria’**
  - **Cost performance derivatives**
  - **Cost reduction**

- Current RDR status provides an excellent base to start from.

Understanding Cost Drivers

- Critical for EDR planning
  - **“value” engineering and cost-driven design should be reflected in the WBS**
  - **A cost leverage should be assigned to each identified WP.**

- Critical (accelerator design) items
  - **How much does support of 1TeV cost?**
  - **HEP diagnostics requirements driving costs**
  - **General lattice design / requirements / functionality**

- Engineering cost drivers
  - **Concrete! (Keep It Short and Simple)**
  - **Water cooling**
  - **Power**

Tightly connected and must be iterated (VALUE engineering)

AS link to CFS must be clearly defined

Integration WP

Planning and Process (General)

- Critical for cost containment
- Difference from RDR phase: we have a cost base
- Must have process for maintaining / updating / reviewing VALUE estimate throughout EDR phase
  - **Avoid last minute panic / shock**
- Change Control will provide some of this
  - **But not all. Small changes can accumulate**
- Documentation is critical!!!

- Action item for PM and Technical Area Group Leaders.
  - **FNAL meeting agenda**

CF Comments

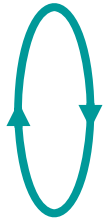
- Design of water cooling system specific to BDS is required
  - **Current estimate is scaled from ML shaft**
  - **ΔT of 20deg (F) assumed (as in linac)**
  - **(has been clearly identified by groups in this meeting)**

- Tunnel air temperature stability
  - **Understand accelerator driven requirements**
  - **(some simply models/estimates are possible)**
  - **At what point / levels does there requirement become challenging?**
    - Cost begins to escalate
    - Might be regions of tight tolerance (as in light sources)

- Vibration criteria for magnets (critical for BDS)
  - **Review / define / iterate**

Magnets

- Part of the “critical path” for engineering design:
  - **Lattice design**
  - **Magnet specifications**
  - **Power supply and cable definitions**
  - **Water/Air cooling requirements**
  - **Underground Volume**



- Level of engineering effort must be balanced against cost leverage:
  - **~64MILCU for Magnet systems**
  - **~11% of BDS cost**
  - **<1% TPC**
  - **knock-on effects may be more critical (CFS again)**

- Consolidation of magnet families a clearly desirable (action item)
  - **Lattice design.**

- Note all magnets born equal
  - **Critical magnets requiring prototyping**
  - **(unlikely needed in ED phase given cost leverage and BDS time-scale)**

- FMEA, Radiation Hardness requirements → availability
  - **Requirements need better definition**
  - **Again, cost derivative / leverage must be understood**

Other Systems

- Instrumentation
  - **Identify critical path for EDR**
  - **How much of these systems must be "fully engineered" by 2010**
    - We expect very few if any
    - Detail engineering can start after project approval
    - Result: mosty R&D effort, which will need to be justified to PMs during review (note large return on EoI)
- Vacuum
  - **Again, identify critical EDR path (cost-drivers)**
  - **Full 100% engineering for BDS not required by 2010**
  - **Rank list of issues presented**
  - **Review 100um alignment issue**
  - **IR vacuum (very special case) should be moved to IR & IR Integration**
- Collimation
  - **Study concept of shorter 500 GeV CM with consumable collimator solution for TeV upgrade**

IR & IR Integration

- Biggest single point cost associated with BDS
- Will require special attention during ED Phase
  - **Careful planning needed**
  - **Interface definitions critical**
  - **Base design criteria for detector groups**
- SC FD included in here
  - **Integration aspects the main challenge**
- Well defined coordination with detector groups
  - **Problem of ‘design maturity’ of detectors noted**
- Some concern that costs are already beginning to escalate in this area
- Cost control for this critical item must be high-priority during ED phase

Alternative Crossing Angle Solutions

- All current designs have weaknesses and performance issues
  - **Baseline is most mature but there are still valid questions:**
    - Crab cavity (alignment specs; interaction with tuning systems)
    - Complex IR geometry: impact on tuning / stability
    - …
- Although less mature, it remains prudent at this time to keep alternatives as back-up
- Downstream diagnostics remain a critical ‘down-select’ criteria
  - **But needs review also for baseline**
- Baseline remains primary engineering focus
  - **Additional resources for ACD WP will need to be found.**

Policy Decisions

- Require top-down policy from PM/EC/HEP community for
  - **Support of TeV upgrade**
  - **Options:**
    - G-g, fixed target,…
  - **General approach: incremental cost**
- ES&H requirements policy (in progress)
- Managing ACD

BDS R&D

- Many R&D topics covered in last two days
- S4 priorities identify (mostly) critical single-point R&D items
  - **Must understand time-scale for necessary R&D**
  - **How items impact BDS design**
    - Risk analysis
- Critical R&D milestones need to be included in schedule/WBS
  - **Identify their relationship to engineering design**
  - **Again CFS impact is critical path**

Short Term Milestones

- Complete WBS matrix
  - **Review/refine WBS (WP definitions)**
    - templates
  - **Consolidate EoI**
    - Understand resource base
- Document RDR baseline in EDMS
  - **All relevant documentation in EDMS structure**
  - **Re-establish traceability between design and cost information**
    - Specifications etc.
- Begin first iteration of accelerator design
  - **Lattice review**
  - **Aim for partial EDR freeze by Sendai**
- *Any one of these will keep BDS management 100% occupied*

Close-Out Report

- This presentation is just the beginning
- PM will produce a draft close-out report (from template) which will contain more detail
  - **Iterate with Andrei before publication**
- All reports will hopefully be available by GDE meeting
  - **DR excluded.**

An Excellent Meeting…

- …if not a little intense!
- Many thanks to all the presenters
  - **<u>All</u> comments and suggestions have been duly noted and will receive our attention.**
- Many thanks to our host (Andrei)