



CCB Report at Valencia GDE Meeting

Nobu Toge @KEK%CCB!GDE



In Brief

I will present to you

- Introduction
- CCR#18 (Centralized DR Layout CCR)
 - To illustrate how CCB works nowadays
- Ongoing CCB processes
 - CCR#19 (RTML rev to match CCR#18)
 - CCR#20 (ML cost reduction)
- Remarks



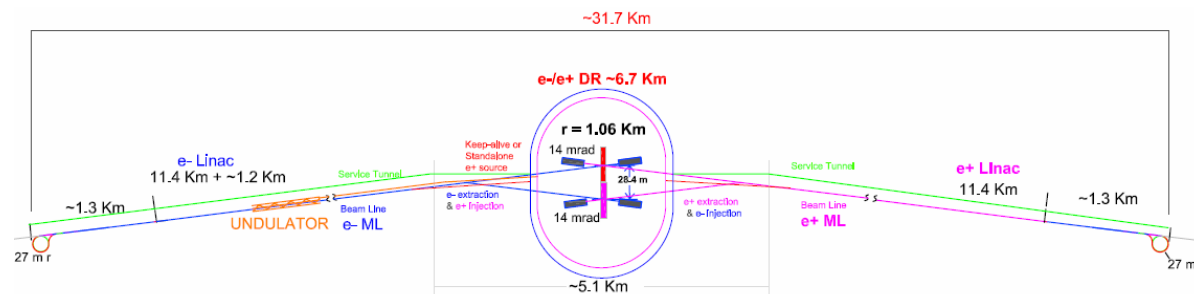
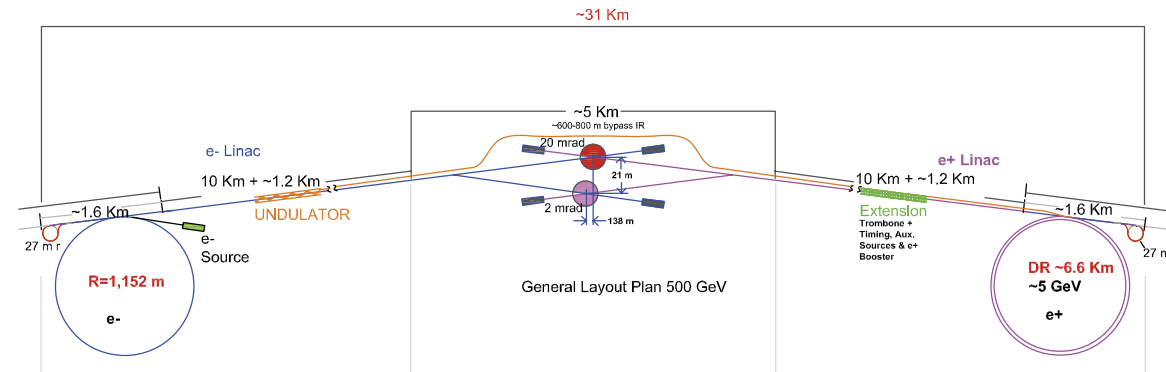
Introduction

- CCB = Change Control Board
 - C.Pagani, G.Blair, D.Schulte, T.Markiewicz, S.Mishra, W.Funk, K.Kubo, M.Kuriki, N.Toge
- CCR = Change Configuration Request
 - Class 0 : Minor touch-up/corrections/filling-in.
 - Class 1 : Moderate impacts (< 100M\$).
 - Class 2 : Major impacts (>100M\$) → EC approval needed for final decision
- CCB chair, AG/GG leaders and RDR Integration Scientist may submit CCRs
- BCD/CCB wiki at http://www.linearcollider.org/wiki/doku.php?id=bcd:bcd_home
 - ALL relevant information is posted there for public viewing



CCR#18 Experience

- CCR#18 = Class-2 CCR which proposed to implement both e+ and e- DRs in a single tunnel housing located around IR.
- Some illustrative remarks concerning the CCB review process on CCR#18, which do not directly show in the CCB report:
 - **Generic Issues**
 - **Specific “Technical” Issues with CCR#18**
 - **Specific “Handling” Issues with CCR#18**



Schematic Layout of the 500 GeV Machine



General Config Control Issues, including CCR#18

- CCR is an “outline of the proposed design” for further study, i.e. CCR is:
 - **Not a completed design**
 - **Not a completed engineering solution**
 - **Not a completed cost study**
- Hence, the criteria for CCB’s assessment on CCR is
 - **if a proposal offers a “healthy-looking solution with certain merits (cost, performance etc),**
 - **which is reasonably likely to offer a workable design with a realistic amount of efforts of available experts,**
 - **from all conceivable/known technical standpoints at that time,**
 - **Without incurring excessive performance compromise.**
- Does a proposal belong to that category, or not?
 - **That is the issue that CCB has to look at.**
 - **CCB, in addition, documents the review process and maintains the BCD, as a result.**



Technical Issues Specific with CCR#18

1. Fundamentals of the injector complex are not changed
 - ... so they are “neutral”.
2. It gives a certain amount of cost reduction
 - ... so that is positive.
3. It gives a lot of new engineering design issues
 - ... so that is a question.
4. It gives a lot of commissioning / maintenance schedule issues
 - ... so this is a question too.
5. It introduces a long 5GeV transport ...and certain beam dynamics issues need to be looked at.
 - **We must be “reasonably” confident that it works, i.e. emittance preservation, emittance ratio preservation, impacts on the ML beam dynamics have to be deemed OK. This is another important question.**



Handling Issues Specific with CCR#18

- Constraints:
 - **“Process it fast”**
 - Standing order within GDE as a whole, or from EC.
 - **“Never ‘take a short-cut’ for sake of speed, in terms of the contents of review process and questions- to-ask .**
 - Internal standing order within CCB.
 - **BB’s remark Tuesday PM is consistent with this attitude.**
- CCB’s steps to follow in usual cases
 - **Technical Q/A**
 - **Cost Q/A**
 - **CCB hearing in case of Class-2 (webex-based tele-conference)**
 - **Examination, evaluation, then, report writing**
- Solution: Not particularly magical
 - **Do all four steps above, yet**
 - **Pipeline,**
 - **Parallelize, and**
 - **Not compromise**



Handling Issues Specific with CCR#18 (cont)

- Pipeline:
 - CCB question, in time early, for proponents to prepare for discussion in CCB hearing.
 - Use the same question sheet as a basis for the CCB report.
 - Interactions with proponents, in time early, on additional illustrations and refinement of the replacement text for BCD.
- Parallel processing:
 - Internal CCB analyses (beam dynamics, timing, others) to proceed concurrently.
 - Drafting of the hearing minutes and the CCB report concurrently. (4-5 drafts before final, as usual)
 - CCB members assigned to draft portions of CCB report in parallel.
 - Take advantage of “around-the-clock” availability of someone in CCB for work somewhere on the planet.



Technical Assessment on CCR#18

- Q3: Design engineering issues:
 - **Engineering is an area of major additional effort: However, none fundamentally unfeasible identified. i.e. tunnel diameter, support system, alignment, etc.**
- Q4: Maintenance / Commissioning issues:
 - **Issues of temporal order of installation / maintenance work, and personnel safety interlocks ... We found they belong essentially to the same category as Q3 also.**
- Q5: Beam dynamics with 5GeV Beam Transport.
 - **Seemingly innocuous BT is something that often bites you. “Interface junction always tends to be a problem”... So this was a concern. “Care-taker” for this has been identified - RTML AG.**
 - **CCB looked for some quantitative evaluations, which was not really there in the proposal whose statements were mostly qualitative.**
 - **Some quantitative simulation results (by Kubo) became available during CCB review, supporting proponents’ claim.**
- Thus all the technical questions did NOT lead to major performance threats, according to CCB evaluation that was reached through interactions with the proponents and through CCB’s own analysis.



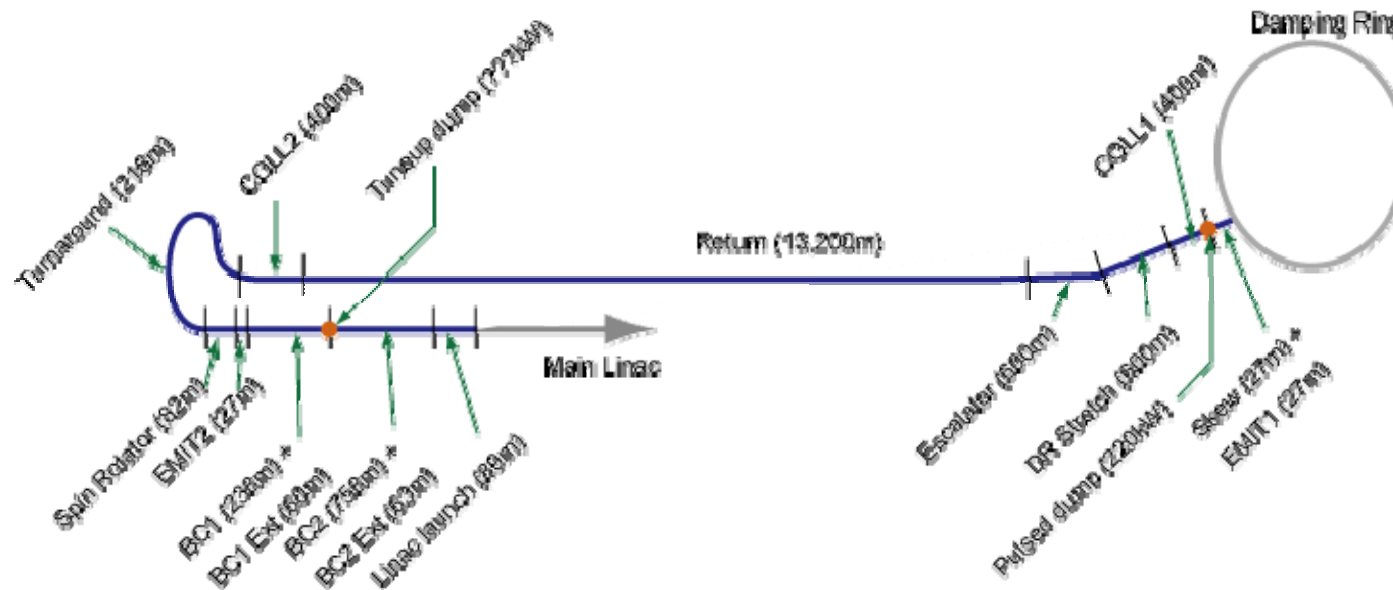
CCR#18 - Summary

- Calendar:
 - **CCR#18 submission: Oct. 7, 2006**
 - **CCB hearing: Oct. 23, 2006**
 - **CCB report to EC: Oct. 28, 2006**
- Pipelined, parallel, no-compromise approach worked.
 - **3 weeks to get one Class-2 CCR processed by CCB**
 - **Plus 1 week for EC to give the final approval.**
- We benefited from the facts that:
 - **CCB had a pre-warning beforehand.**
 - **No major interruptions were caused by conferences and travels.**
 - **CCR, as it was submitted, turned out to be in a “good shape”.**
 - **It really did not pose major, quantifiable performance threats, as CCB came to understand it.**
- Note that,
 - **It is impractical to try processing any faster.**
 - **Unlikely to be able to process Class-2 CCRs this fast all the time:**
 - Not all CCB members can devote 100% time on CCB business all the time.
 - Forthcoming CCRs might incur performance risks/compromises, which complicates CCB's thought process.



CCR#19 under CCB Process

- CCR#19 is: RTML CCR to
 - Restore consistency with CCR#18 (i.e. centralized DR)
 - Introduce cost cutting measures.





Current Status of CCR#19 (1)

- Calendar
 - **CCR#19 submitted on Oct.25 (was on hold initially, since CCR#18 was still under processing)**
 - **Review process started on Oct.28**
 - **CCB question sheet to proponents on Oct.31**
 - **Response from proponents on Oct.31**
 - **CCB hearing on Nov.9**



Current Status of CCR#19 (2)

- Remarks from CCB so far, out of its review and its interaction with relevant experts and the proponents:
 - **Reclassified as Class-2 (Nov.9).**
 - **BC text for CF/S is needed eventually.**
 - **Highly desirable to have a figure for RTML outline layout.**
 - **Most technical questions from CCB have been (nearly) resolved.**
 - **Endorse maintaining provision of space for 2 additional Laser wires besides the assumed 4.**
 - **Under discussion: Reduction of BC2 RF units appears OK, but should we not reserve tunnel space for them?**
- Estimated CCB conclusion date
 - **Not next week.**
- Anticipated CCB response
 - **Not available yet.**



CCR#20 under CCB Process

- ML cost cutting measures in the areas of
 - **24 cavities/RF unit → 26cavities/RF unit**
 - Reduction of RF unit (i.e. mod + klys, but NOT cavities + WGs) population by factor 1/13.
 - Canonical Eacc still is 31.5MV/m, but max Eacc now is 33.5MV/m rather than 35MV/m.
 - **Elimination of 3.5% energy overhead**
 - Reduction of 3.5% worth of RF + WG + cav + CM + LLRF + CF/S
 - Need all cav + CM to run to get ECM = 500GeV
 - **Elimination of uncertainty factor in the cryogenic static heat load**
 - Lower cryogenic capacity by 13%.
 - Allowance still reserved for dynamic heat load.
- Calendar
 - **CCR#20 submitted on Oct.30**
 - **CCB questions to requesters on Nov.2**
 - **Requester response to CCB on Nov.7**
 - **CCB hearing on Nov.9**



Current Status of CCR#20

- Remarks from CCB so far, out of its review and its interaction with relevant experts and the proponents:
 - **Parameter section of BCD needs a touch-up**
 - Should insert “proper” beam parameters that were adopted as of Frascati.
 - $S_b = 337\text{ns}$, $N = 2E10$, $I = 9.5\text{mA}$, Train length = 1ms.
 - **Cryogen heat capacity (abs value) needs a more explicit description.**
 - **RF power headroom is tight, from LLRF standpoint, whether it is 24cav/RF or 26cav/RF.**
 - Interactions with experts indicate that it is very difficult to quantify the likely magnitude of energy or beam current compromise
 - **Solid availability of 10MW klystron is a critical assumption.**
 - **Elimination of 3.5% ML overhead nearly guarantees that there will be no full-lumi 500GeV operation.**
 - **Under discussion: What if we drop 3.5% worth of ML RF + cav implementation, yet maintain 3.5% worth of ML tunnels?**
- Estimated CCB conclusion date
 - **Not next week.**
- Anticipated CCB conclusion
 - **Not available yet.**



Now

Assorted set of remarks
which might be of interest.



Costing Subjects and CCB (1)

- For each of most CCRs, CCB is requesting costing information (\$\$\$ and fractional) from the proponents
- This information is used to
 - **Make it possible for CCB to have an intelligent thought process to review the CCR, e.g.**
 - **Determine if it is Class-1 (<100M\$, CCB being the “final gateway” before BCD) or Class-2 (>100M\$, requiring EC final approval)**
 - **Determine if it is “reasonable”. I.e. if there are any noteworthy performance compromises for a (limited) cost reduction, etc**
 - CCB does not review costing methodologies
 - CCB does not assume full costing is available before CCR approval



Costing Subjects and CCB (2)

- The level of costing details CCB requests varies from CCR to CCR, depending on its nature
 - **CCB requests cost data in ways that makes it possible for CCB to understand which piece of CR corresponds to which cost gain (or increase)**
 - **Most likely CCB does NOT request full depth WBS; CCB is unlikely to be capable of making sense out of it anyways.**
- “CCB Hearing” is the platform for siphoning the cost data
- “Minutes of CCB Hearings” are part of CCB final report, which goes public (with data fractional cost deltas).

RDR and BCD

- RDR has to be consistent with BCD (BB statement, VC). So, CCB requests you (AG/GG) to fill in -
 - **Revisions since Frascati / Bangalore / Vancouver that is concrete and substantial enough to make their way into RDR for BCD.**
 - **Illustrations and tables for improving the outlines of your system, if they are missing**
- As a practical / pragmatic solution CCB suggests you (AG/GG) -
 - **Submit Class-0 CCRs to CCB, as you submit draft RDR text + figs + tables to RDR editors (CCB chair happens to be one of them, BTW).**
 - **If you have questions on the adequate level of details to fill in (you usually should have some), consult CCB.**



“Missing Pieces”

- If you find some significant information pieces missing, i.e. important assumptions for RDR missing in the present BCD,
 - **That does not necessarily mean that those missing pieces can stay missing from BCD, and they can stay out of configuration control for good.**
 - **Rather, it is quite likely to mean something else.**
 - **Of course, it is a case-by-case question.**
- In case of “gray” situation, may we ask you AG/GG leaders to act as a responsible owner of your BCD chapter (if you own one), and,
 - **Consult CCB.**
 - **CCB will work with you to find a way out.**



Cost Gain vs Performance Risk (1)

- The summary of GDE discussions at Snowmass 2005 "Notes from Decisions Meeting" states:
 - **Q13: How much is a 1% change in average luminosity worth?**
 - **A13: Between 2 and 100 M\$**
- While this indicates the level of analysis we had given this question 14 months ago, this "Decision" has a number of problems now.
 - **No direction on when it is adequate to take 2M\$/1% and when to take 100M\$/1%;**
 - **Statement has not been really issued as an EC directive.**



Cost Gain vs Performance Risk (2)

- Therefore, the CCB feels that we need EC's advice and guidance. EC might choose to take one of the following options, or generate others:
 - **EC re-draft the guidelines, make them public within GDE, and provide them for the CCB to follow.**
 - **EC restate the Q13/A13 from Snowmass as CCB's basic evaluation guideline, make it public within GDE, and let CCB try its best to make a reasonable judgment (or recommendation) for each case, and let the guidelines grow as judicial precedents.**
- At this moment here is this one open-guideline issue.



This is all for today.
Thank you for your attention

