

**COMPILATION OF QUESTIONS FROM CONTROLS AND LLRF TEAM MEMBERS
FOR DISCUSSION AT THE CONTROLS & LLLRF EDR KICK-OFF MEETING**

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Text not in Bold reflects comments and suggestions for responses from team members that posed the questions.

1. Questions about the WBS

Q1.1: Do you plan to provide a general template for the EDR WBS that is suitable for handling collaborations smoothly?

Q1.2: What is the scope of the R&D WBS?

- The WBS covers the period 2008-2010.
- The WBS covers all R&D efforts that mitigate the risk towards the ILC construction phase.
- The writing of the TDR is an item of the WBS (the featured item).

Q1.3: What is the deadline to complete the WBS?

- Before the start of FY 2008? (Less than 2 months left.)

Q1.4: What is the level of detail of the R&D WBS?

- The WBS is task oriented.
- The WBS includes system testing and the use of beam test facilities.

Q1.5: How is the R&D WBS interfaced to XFEL, NML and STF facility's WBS?

The WBS does not include XFEL, NML or STF WBSs but implicitly tasks or tests may depend on XFEL, NML and STF schedules. Plan B in case NML or STF schedules slip.

Q1.6: How do we generate a single WBS for all 3 regions?

- Single high-level block diagram.
- Allow for some overlap in the design of system components.
- Write common goals and collaborative efforts.

Q1.7: Is the R&D WBS going to be reviewed?

- Yes, by the PM team. It will be reviewed for consistency with the template and reconciled with other accelerator and technical systems.

WBS columns

- Activity Name.
- Activity description.
- Activity location.
- Effort required.
- M&S needed.
- Task duration.
- Task schedule.

Example of WBS spreadsheet

Task number	Activity Name	Activity description	Effort in FTEs	M&S	Task duration	Task schedule
...						
k.x.x.x	Down converter prototype	bla bla...	0.5 EE, 0.3 Tech	\$20K	6 months	1st & 2nd Q 08
...						

Q1.8: How is the WBS linked or mapped to the R&D budget?

- Maybe we don't need to worry about this now.

Q1.9: How complex does the WBS need to be at this point?

2. Questions about the scope of the EDR

Q2.1: What topics will be covered in the LLRF section of the EDR?

A: The EDR contains all necessary information to be able to develop a final design within 3 years from project start. The topics covered are

1. Requirements (Hardware and Software)
2. Conceptual Designs
3. R&D Results (includes prototypes of critical components and their operation in test facilities)
4. Cost and Schedule

Q2.2: What type of requirements will be covered in the EDR? What will the weight of the different requirements?

A: The requirements covered are:

- | | |
|---|-----|
| 1. Technical Performance (example: field stability) | 30% |
| 2. Interfaces to other subsystems | 10% |
| 3. Operational Performance (incl. automation) | 30% |
| 4. Availability (incl. partial degradation) | 20% |
| 5. Maintainability/upgradeability | 10% |

Q2.3: What is the scope of the EDR?

- Similar to the RDR but with more detail.
- Must address and solve all technical challenges to allow the start of the ILC construction.
- The EDR does not cover the R&D effort, only the results.
- Includes technical information such as parameters, confidence levels, technical drawings and block diagrams, system architecture, etc
- Must be the system description primary document for review process.
- Must reference technical information to supports R&D results.

Q2.4: Does the WBS for 2008-2010 include the work for the ILC construction phase such as WBS, cost, and schedule?

- Yes, because the ILC project will be reviewed during that period.
- Yes, because the EDR will include an ILC construction plan and resource-loaded schedule.

Q2.5: Which of the S2 test results will be covered in the EDR?

The following test results of S2 will be covered:

- Test 4: Develop and demonstrate RF fault recognition and recovery software
- Test 5: Evaluate Quench rates and recovery time
- Test 7: What gradient spread can be handled by the LLRF

- Test 10: Check beam phase and energy stability
- Test 21: Understand RF control issues with many cavities and large physical distances in the system (phase drift !)

Q2.6: Should the main LLRF effort focus on hardware?

No, a large effort should be spent on developing the software applications needed for automated operation.

Q2.7: The Controls Group noted in the RDR that the model for front-end interfaces applies certain requirements and expectations on the technical systems equipment. We will require project management support to establish this with the technical and accelerator groups. How do we go about establishing such standards as part of the ILC project framework?

Q2.8: Is it likely there will be substantial changes to the overall layout given in the RDR?

Q2.9: How do we deal with the reality that we have only a hand-full of part time participants in the group? We have far fewer people available than the job will require.

Q2.10: Most of the effort required is not funded by the ILC. If we don't have the manpower to do what is requested, what will happen?

Q2.11: LLRF (Controls) is a relatively small group where project leaders are also leader engineers. Also, LLRF (Controls) is a relatively small cost. Constant review will take time away from doing real work. Where is the balance?

3. Questions about the EDR organization

Q3.1: How will the EDR team interact with the project management team?

The progress of the work will be reviewed by the PM every 6 month.

Q3.2: What is the communication path for system integration topics?

Q3.3: How do we involve university groups in the Americas region without impacting the DOE Lab budget? How do we engage more universities in Europe and Asia?

Q3.4: How do we increase participation from Europe and Asia? We have not been successful in engaging significant effort from Europe and Asia, in large part because they have other priorities.

Q3.5: Whom do we really report to? (Boss conflict issues)

Q3.6: Who are the decision makers for the various aspects of the Engineering Design?

Q3.7: Does the current LLRF group have a role in the damping rings? Why or why not?

Q3.8: In the RDR, some of the Area systems had worked independently of some of the technical groups (eg RF/LLRF for DR). This resulted in duplication of effort and inconsistency in the cost estimates for essentially the same items. How will this be handled in the ED?

Q3.9: What is the role of the Level-3 Managers?

Q3.10: What is the new threshold on cost refinement?

4. Questions about the EDR process/logistics

Q4.1: Do you plan to provide a general framework of EDR tasks, that is what should be included as an EDR tasks, and more importantly what should not be included as an EDR task?

Q4.2: What is the model of incorporating the results of the collaborative R&D tasks and other work packages into EDR?

Q4.3: What are the software tools and templates to be used for the WBS, EDR process?

- "Do know yet, do it your way", usually leads to "do it again later".
- Temple/Lehman format.

Q4.4: How will the value engineering process work with Controls and LLRF? When will this process start?

Q4.5: How will the different region work together on the requirements?
Using standard tools. Everyone can propose requirements. The Project Management will approve the requirements or propose changes. Approval authority may be delegated.

Q4.5: What tools will be used to documents and/or trace the requirements?
Standard tools such as DOORS or Requisite Pro will be used for non-functional requirements. Functional requirements will be documents in Rhapsody or Rational Rose. These tools are well suited for work in collaborations.

Q4.6: how will the different regions develop conceptual designs?
Everyone can propose concepts, which will be discussed and improved by the EDR team. In case of disagreement the project management will conduct a review of the proposals and decide on one concept.

Q4.7: What process and guidelines should we use for allocating work packages?

- To first order, you can assume the ART FY08/09 plan holds in the US.

Q4.8: How many pages will be permitted for the EDR section on LLRF
As many as are needed to cover all topics as detailed as needed.

Q4.9: What is the model for communicating with AS and TS groups? Before we used to have points of contact with the AS and TS groups. Now there are no TS groups per se.

Q4.10: How big is the EDR LLRF chapter?

Q4.11: What tool set will we use for documentation and project planning?

Q4.12: There was a lot of work. How do we avoid having to keep redoing the same tasks, trying to keep up with rapidly changing accelerator designs?

Q4.12: How do we avoid the wasted effort and confusion that occurred (especially) during the latter part of the RDR when we were trying to keep up with all the cost reduction scenarios being considered.

Q4.13: There is strong coupling between LLRF and RF for cost value engineering trade-offs, eg losing control overhead and redundancy as a result of cutting back on spare RF systems. How will these issues be properly reconciled in the ED?

Q4.14: Will the change control mechanism for the ILC baseline design include a mechanism for appeals, eg if Controls or LLRF is impacted by a change but were not fully incorporated into the decision process? (cf loss of RF overhead)

Q4.15: What is the process of configuration control for the Accelerator Systems designs (engineering requirements)? In the RDR phase, the engineering groups got information late, so lagged behind the curve with the changes that were going through at the last minute. How will that be avoided in the ED Phase?

5. Questions about the EDR schedule/timeline

Q5.1: When do we start writing the EDR?

- The EDR will be a work in progress document during 2008-2010.
- The EDR must be in good enough shape for reviews during 2008-2010.
- The final EDR will be written during the last semester of 2010 to include all R&D results.

Q5.2: When will we be given guidelines on how to proceed?

- You will receive some guidance by the Fermilab GDE meeting on October.
 - Version-1 of the ED project management plan will be released.
 - Change management and documentation management, and WBS templates will be provided for Level-3 managers
- The ED planning phase will continue through March 08.