Controls Telecon
July 18, 22007

John Carwardine

Agenda

- Timing and Timestamp introduction for NML (Brian Chase)
- Controls EDR Kick-off meeting (John Carwardine)
- Any other items (all)

EDR and Kick-off Meetings

RDR (Near) Final Draft

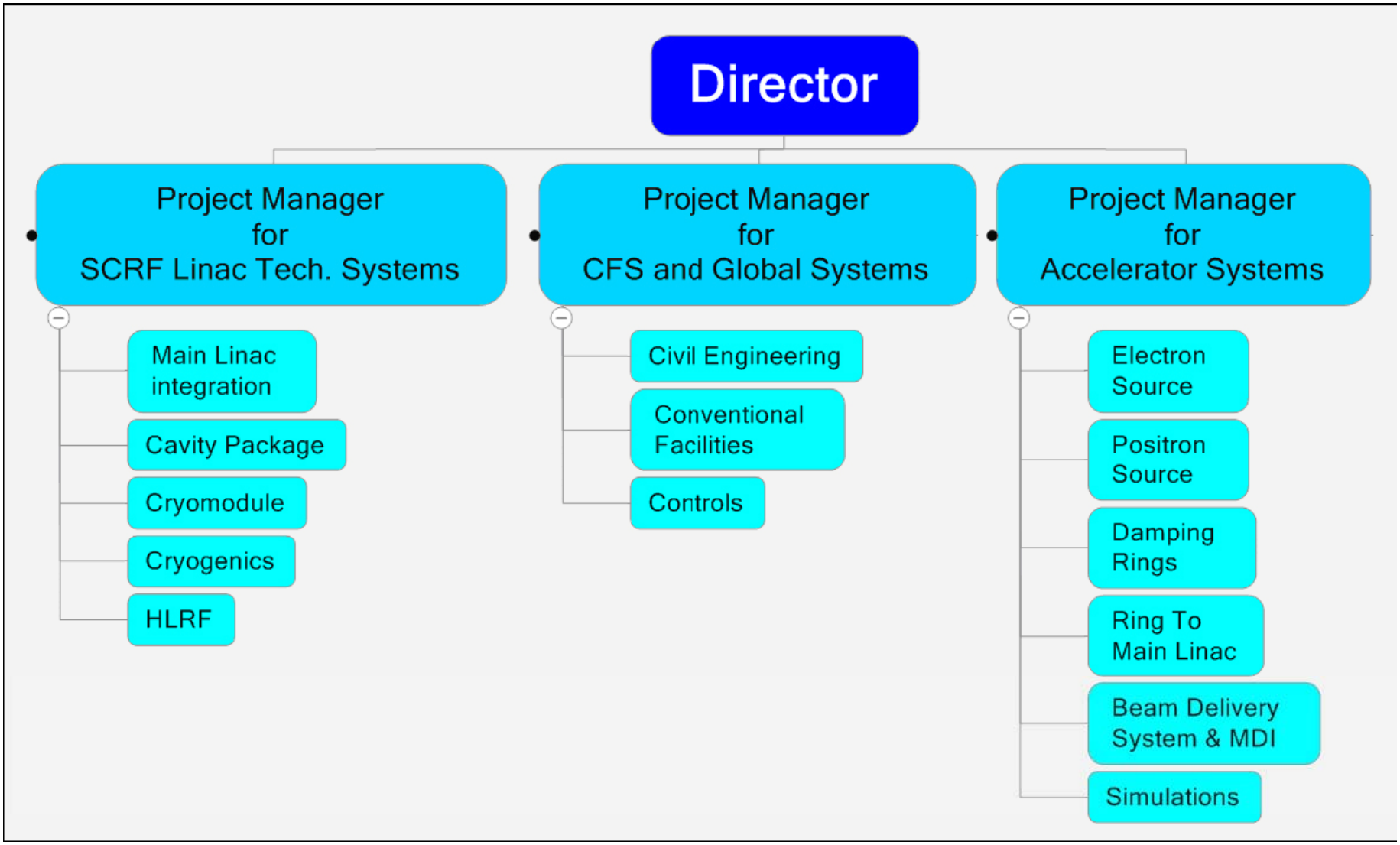
- "FALC draft" of the RDR report is available for review.

- It has 4 volumes:
  - **Vol 1: Executive Summary**
  - **Vol 2: Physics Case**
  - **Vol 3: Accelerator**
  - **Vol 4: Detectors**

- The full versions are available for review at http://www.slac.stanford.edu/grp/ilc/positron/RDR-CD/

- Accelerator volume contains chapter on EDR Planning…

EDR Organization from RDR Final Draft



Kick-off meetings - Schedule

- Each meeting is slated for 2-3 days
- Remote and on-site participation
- Working sessions more than ‘reviews’
  - **Goal is to begin developing an overall EDR plan**

Topic / host r	Start Date	Primary Host	RDR - co-leaders (cc'd)	Host location
Controls	Monday, August 20, 2007	John Carwardine	Stefan Simrock, Shin-ichi Michizono	ANL
CFS - US	Wednesday, August 22, 2007	Vic Kuchler	Atsushi Enomoto, Jean-Luc Baldy	FNAL
RTML (US)	Monday, August 27, 2007	P. Tenenbaum	Eun-San Kim	FNAL
CFS- EU	Monday, September 03, 2007	J-L Baldy	Atsushi Enomoto, Vic Kuchler	CERN
CM - AS	Monday, September 10, 2007	Hitoshi Hayano	Harry Carter, Carlo Pagani, Norihito Ohuchi	KEK
Cav - EU	Monday, September 17, 2007	Lutz Lilje	John Mammosser, Kenji Saito, Dieter Proch	DESY
e- US	Monday, September 24, 2007	Axel Brachmann	Pavel Logatchov (Matt Poelker ART)	SLAC
ML - US	Wednesday, September 26, 2007	Chris Adolphsen	Lutz Lilje, Hitoshi Hayano, Nikolay Solyak	FNAL
HLRF (AS)	Monday, October 01, 2007	Ray Larsen	Shigeki Fukuda	SLAC
CFS (AS)	Wednesday, October 03, 2007	Atsushi Enomoto	Jean-Luc Baldy, Vic Kuchler	KEK
e+ - US	Monday, October 08, 2007	Jim Clarke, John Sheppard	Masao Kuriki	CI
BDS-US	Thursday, October 11, 2007	Andrei Seryi	Deepa Angal-Kalinin, Hitoshi Yamamoto	SLAC/CI
**********	Monday, October 22, 2007	LC Meeting Fermilab	**********	
DR - EU	Monday, November 05, 2007	Andy Wolski	Suzanna Guiducci, Mike Zisman, Jie Gao	CI

PM charge for kick-off meetings

(Carwardine's annotations in green)

1. Assess the technical maturity of the RDR design and the completeness of the value estimate
   - ***Overview of our design/cost model, methodology***
   - ***Details of each topic as much as we have them.***
   - ***Level of maturity and certainty of each topic.***
   - ***Technical and cost drivers, key requirements.***
2. Evaluate plans for the EDR design work including development and incorporation of items presently outside the baseline
   - ***Limitations of the model, what to do to improve it.***
   - ***Proposed path to a more mature but still meaningful design/cost model.***
   - ***Controls 'deliverables' for EDR***
3. Examine proposed Work Packages and comment on how they support the EDR goals
   - ***R&D activities***
   - ***Maturing the design/cost models***
   - ***Connections with beam facilities***

PM Team objectives…

- Opportunity for more comprehensive technical review
  - **Go beyond the '1-hr' reviews at ILC-wide meetings.**
  - **Review design choices, design maturity, issues, challenges, R&D requirements, cost drivers, etc**
  - **Top-level conceptual design review of ILC**

- Opportunity for more comprehensive technical review
  - **Cost 'scrubbing' across areas and systems.**
  - **Understand cost drivers, issues, etc**

- Establish a baseline for moving forward into EDR Phase
  - **Consolidate RDR content + in-depth technical documentation, get BCD in sync with RDR.**

- Begin migrating to Project Management tools and methodology

Benefits…

- Main benefit would be to communicate (establish) a starting-point for EDR phase
  - **Level of maturity of technical design and costing.**
  - **Issues, challenges, questions to be answered.**
  - **Scope and interfaces with other groups.**
  - **What we believe an EDR might contain for Global Controls.**
  - **What is realistic to accomplish in 3 years.**
  - **Initial task (work package) list.**
  - **General approach to accomplishing the work**

Scope of Controls meeting

- Global Controls - Yes
- Area systems controls (front-end controls) - yes
- LLRF - maybe (may also be covered in each Area review)
- Availability - I propose Yes

EDR goals for Controls

- Bring the design to ‘EDR maturity’
- Optimize the design model, evaluate design options
- Optimize cost, understand cost-benefits
- Perform R&D to answer key questions
- Build momentum for ILC Controls efforts
- Strengthen ties with beam facilities (XFEL, NML, STF)
- Contribute to the accelerator community at large

Kick-off Meeting outline (rough draft)

- Overview of the design model, costing model, and methodology in the RDR chapter

- Special presentations…?
  - **Availability requirements**
  - **High availability implementation: challenges, issues**
  - **Accelerator control systems roadmap?**
  - **Front-end electronic systems**

- Working sessions going into more detail of the design model (follow our costing outline)
- Our goals for the EDR Phase
- Key questions to be answered through R&D, outline plan.
- Working session on the WBS
- Discussion of work packages, goals
- Integration and role of beam facilities

Controls WBS from RDR (snip)

	X			**Integrated Control System & LLRF**					**$ 236,073**	**32**		**754**
	X	***1***		***Control System Engineering***					***$ 10,080***	***41***		***547***
	X	***2***		***Global Control System Equipment***					***$ 23,113***	***19***		
	X	2	1	Computers			$	6,949				
	X	2	2	Network Infrastructure			$	13,327				
	X	2	3	Control Rooms (not software, just infrastructure)			$	2,837				
	X	***3***		***RF Phase & Timing Distribution System***					***$ 40,503***	***49***		
	X	***4***		***Protection Systems Equipment***					***$ 13,739***	***18***		
	X	***5***		***Front-end Control System Equipment***					***$ 72,888***	***23***		
	X	***6***		***Controls/LLRF Relay Rack Assembly & Test***					***$ 3,400***	***22***		***75***
	X	***7***		***LLRF Engineering***					***$ 2,640***	***28***		***132***
	X	7	1				$	1,280				64
	X	7	2				$	1,360				68
	X	***8***		***LLRF Equipment***					***$ 69,709***	***36***		

RDR WBS to EDR WBS

- RDR WBS provided good basis for costing, probably not ideal for the EDR Phase.
  - **Not easily expanded to lower levels that collect together ‘all tasks’**
  - **Effort and Equipment separated at first level.**

- Project Management Office will likely define WBS model, to get consistency across all systems and areas.
- We should consider some options, present proposal.

Work Breakdown Structure

- Collect together ‘all tasks’ to be performed.
- Group hierarchically into manageable deliverables or outcomes.

- What are the deliverables…?
  - **Engineering Design Report**
  - **The ILC Control System**
  - **A design for the ILC Control System**

- How to include R&D in the WBS…?
  - **Separate R&D WBS structure (probably not optimal)**
  - **Integrate R&D into main WBS as answering design decisions.**

- How to group activities into packages of work that might not fit into the WBS structure…? Eg, grouping all Controls front-end equipment across all Accelerator areas
  - **Define a ‘Work Package’ as a collection of ‘horizontal’ WBS elements.**

- How to integrate beam facilities in the WBS…?

Controls EDR work packages

- Develop the maturity of the ILC control system design
- Perform R&D to answer key questions
- Implement R&D prototypes
- Support beam test facilities

- Must focus on the beam test facilities (XFEL, NML, STF,…) to strengthen multi-region participation
  - **Participate with design/development.**
  - **Use of facilities as vehicle for R&D prototype demonstration.**
  - **Model: HOM bpm project.**

“List of Lists” for EDR Planning

- **Design and R&D topic areas**
- **R&D Goals**
- **Existing (ongoing and planned) work packages**
- **Issues and unknowns that need to be resolved**
- **New or potential work packages**
- **R&D prototypes to gain field experience**

Design and R&D Topic Areas

- LLRF algorithms
- RF phase & timing distribution, synchronization
- Machine automation, beam-based feedback
- ATCA evaluation as front-end instrumentation platform
- ATCA evaluation for control system integration
- HA integrated control system
- Integrated Control System as a tool for system-level HA
- Remote access, remote operations (GAN/GDN)
- Failure modes analysis

R&D Goals…

- Meet LLRF goals from R&D Board S2 Task Force
- Gain experience using ATCA + uTCA as a platform for ILC front-end electronics applications
  - **Performance as Instrumentation platform.**
  - **Integration with Control system.**
  - **High Availability features.**
- High Availability integrated control system implementation
  - **Integrated hardware and software environments**
  - **Gain experience with tools & techniques.**
  - **Be able to make value based judgments of cost vs benefit of implementation for different applications.**
- Control System as a tool for implementing HA at system level
  - **Integrated Diagnostic tools to detect and pre-empt impending failures in technical equipment**
  - **Managing redundancy at Technical System level.**

New/possible work packages…

- Write test criteria for... complete RF system, Controls front-end, Controls middleware, etc
- Write Use Cases for... LLRF software, Controls applications, Remote access, etc
- Develop algorithms/methods for bpm introspection
- Online database of relevant work being done now
- Online knowledge base of existing (ATCA) solutions to applications (hardware, software, tools, etc)
- ATCA profile for physics applications
- Framework for sharing LLRF algorithms
- …

R&D prototypes to gain field experience

- Vertical slice HA Control System using ATCA front-end instrumentation electronics
- Long-haul and short-haul RF phase & timing distribution
- Fail-over using DOOCS at FLASH
- High Availability EPICS PV gateway on ATCA
- Vertical demonstration of integrated distributed FPGA code management for online front-end systems
- Vertical demonstration of orbit feedback system with transparent recovery from bpm failures
- …

Preparation for EDR kick-off

- Overview presentations on design and costing models
- Detailed material on design and costing models for each area
- Comparison between BCD and RDR

- R&D plan: questions to answer topics, objectives, outline
  - **HA software**
  - **Front-end electronics**

- Plan (ideas) for integrating beam facilities into EDR program
- Overview of Controls work at XFEL, NML, STF in coming 3 years.
- Ideas for expanding Controls collaboration.

- List of ‘all tasks’ and candidate Work Breakdown Structure

- We have a lot of material to draw upon, eg
  - **Many presentations from GDE meetings**
  - **Costing review packages from 9 Nov 2006, 14 Dec 2006**
  - **RDR chapter + Tech notes in support of RDR chapter**
  - **Americas Region planning documents for FY08/09**

Items from last time…

- Begin converging on a set of goals and deliverables for multi-region activities…
- Further explore standardizing (profiling) of implementation of ATCA, uTCA, IPMI, AMC,…
- Pursue VME-to-ATCA adaptor. Specs should be circulated…
- Plan an ‘ATCA for Physics’ parallel session at Fermilab ILC/GDE meeting in October.