Report back from GDE

EDR Planning: ILC 2007 Closing Plenary

Marc Ross

Fermilab

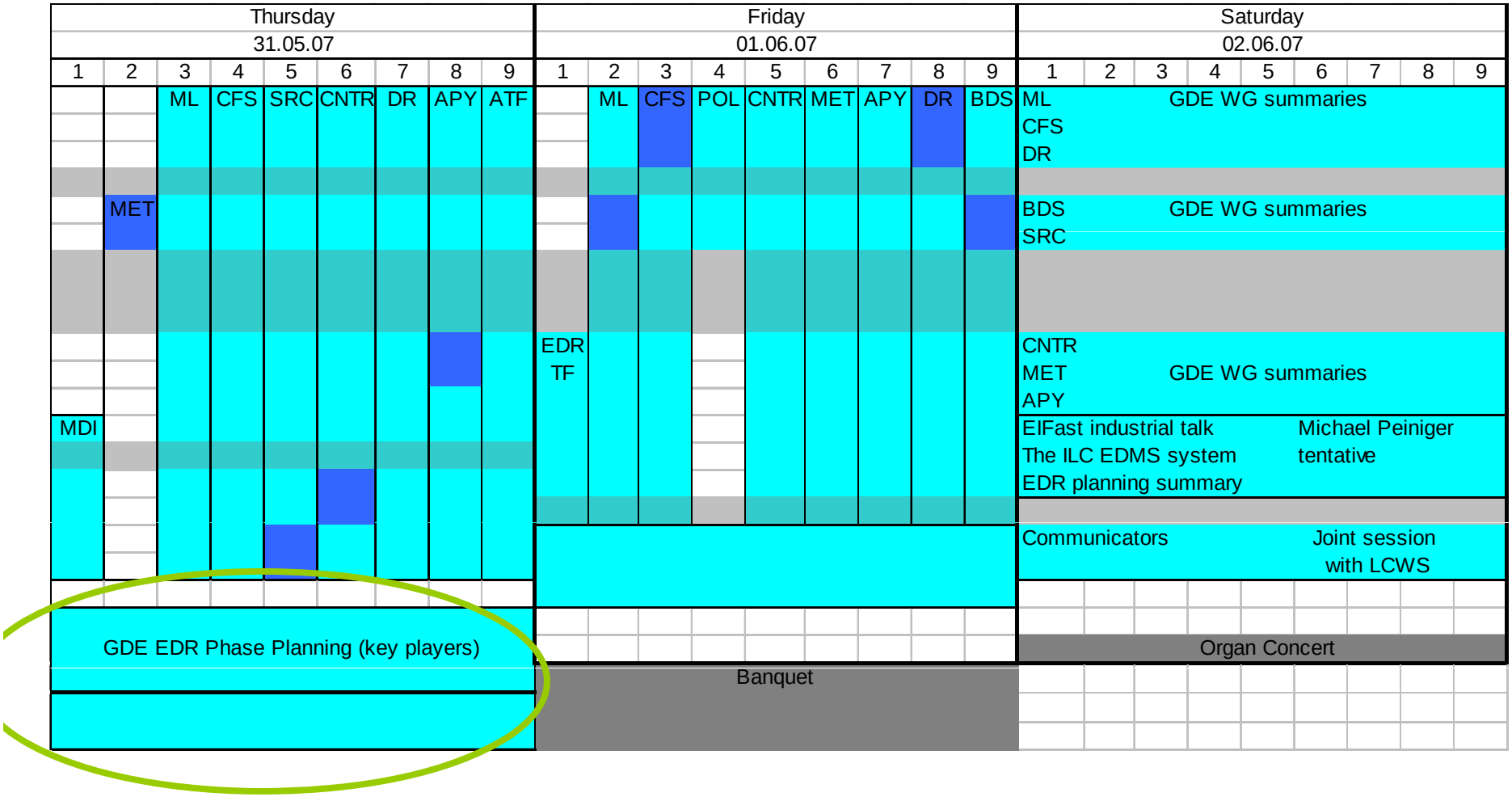
Workshop Goals:

- We are at a critical juncture of the ILC.
  - **Almost two years after the formal formation of the GDE,**
  - **the recent completion of the draft Reference Design Report (RDR) marks a major milestone in this truly global effort.**
- The GDE is now in the process of restructuring itself and making plans for the engineering design phase, leading to the completion of the ILC Engineering Design Report (EDR) in 2010.
- ILC2007 provide(d) an opportunity to discuss these plans and share them with the larger community.

The primary focus is to:

- review current status of global ILC R&D and future plans,
  - **for both the baseline configuration and alternative designs;**
- review and plan activities in and around Test Facilities (both existing and proposed);
- identify and prioritize critical engineering milestones for EDR phase (cost driven), which are consistent and integrated with the critical R&D milestones;
- promote and improve collaboration between groups working on ILC related R&D:
  - **o To encourage a broader participation from active groups around the world;**
  - **o To attract new researchers to the field;**
- define the scope of the EDR and consolidate EDR planning:
  - **o Review general project structure and possible 'Work Package' (WP) structures;**
  - **o Refine proposed schedule, milestones, deliverables etc.;**
  - **o Begin process of WP allocation.**

EDR Planning Task Force – WG joint sessions



EDR Task Force … Collecting input:

- A two-fold process…
- Task force joint sessions with WG's
  - **Development of WP,**
  - **Planning for RDR Technical reviews**
- RDR leaders, GDE Boards with Task Force
  - **Presentations by Board Chairs**
  - **Review of EDR definition and plans**
- If you would like to contribute, please e-mail or ask any TF member
  - **(see Wed plenary for TF member list)**

Change Control Board Comments

- *Formality*…. Adopting the RDR as a baseline.
- *Completeness* … creating a coherent baseline
- *Ownership*… taking change control deeper into the design
- *Hierarchy*… establishing process for different kinds of changes
- *Management* … using change control to check rather than make decisions; giving change control adequate independence
- *Context*… Interfaces must be under change control!

Design Cost Board Comments

- Difficulty adapting to confidentiality rules
  - **This should change now**
  - **Forces us to initiate a technical / cost internal review process → soon**
- *Product*… is the EDR a document (yes)… is this document required in all regions (prob no).
- ***Cost Engineering*** and ***Scheduling*** efforts must continue and be strengthened***!***
  - Primavera to be used.
- Next?
  - **Most feel that such a panel is needed to bring continuity and strength to the cost reduction/risk mitigation effort.**

Research and Development Board Comments

- *Management* … the need to implement tracking tools
- *Role* … confidence in the ability to advise funding agencies
- *Measurement* … cost effectiveness of RD
- *Scope* … pilot projects require a different metric
- *Challenge* …

We are still just getting started!

Joint task force / working group meetings

- Main Linac
- Sources
- Damping Rings
- Beam Delivery
- Conventional Facilities
- Controls
- Metrology
- Accelerator Physics

Sample of the (Linac) Table

Topics	Description	Justification	Impact on other systems (severe, significant,minor, none)	Impact on whom	Time needed for re-design	Expected deadline (proposer)	Expected deadline (affected systems)	Test needed before decision	Test possible after decision	Remark
Gradient choice	Define ILC gradient		severe	CF&s	~1year	end of 2008		S0/S1		Defined by EC
Large-grain	Change niobium for cavities		small	cavity manufacturer		Before cavity order		perfomance test on multi-cells, make high-power test, build 10 cavities, demonstrate cost benefit	built pre-production	
Cavity Shape	Ichiro as alternative	Two options:Higher yield, shorter linac	Two options: Increase linac gradient or increase yield					Performance demonstration, beam test		
Corrections to shield piping		Optimise design	small	components inside module	3 month	can be post-EDR				

- The information should guide the development of an overall ILC planning
  - **need pre-defined categories**
  - **process of getting the data should provide crosscheck via affected systems/components**

Electron Source

- Milestones identified
- Laser performance
- Photocathode performance, etc.
- Timeline
  - **Dec.07 define WPs (leader, staff, schedule, design depth/breath)**
  - **Dec.08 freeze layout**
  - **Dec.09 EDR complete**

Positron Source

- Milestones
  - **Demonstrate undulator parameters**
  - **Demonstrate HLRF of NC-SW structure**
  - **Demonstrate target prototype**
  - **Design of OMD (Optical Matching Device), etc.**
- Timeline
  - **Dec.07 EDR Scope definition (Form WPs)**
  - **Jun.08 Upgrade scenario (pol. and 1TeV)**
  - **Sep.08 OMD selection, undulator params**
  - **Dec.09 EDR complete**

Possible WP's

- Modeling
  - **Undulator**
  - **Production/Capture**
  - **Transport**
  - **Remote control**

- Hardware development
  - **Undulator**
  - **Target**
  - **Capture**
  - **Beamline**
  - **Instrumentation**

Compton Scheme (Alternative Positron Source)

- Already a world-wide activity
- Proposed timeline
  - **Dec.07 Conceptual design**
  - **Dec.08 Complete basic R&D**
  - **Dec.09 Deliver EDR**
- Resources
  - **Getting resources more or less from outside ILC community**
  - **It must be evaluated how much manpower/budget needed beyond the present activity**
- How to include `alternatives' in EDR must be discussed

Damping Rings

- Management… Many people, Many places, small fraction of their time
  - **Very difficult**
  - **But it is extremely important to retain intellectual mass**
- Integration … Critical RD with parallel engineering
- Interfaces … CFS
- Cost …

Beam Delivery

- Management … Alternate selection decision process
  - ***EDR will include alternates and an alternate decision process*.**
- Communication / Integration… Is BDS the Physics interface?
  - **MDI**
  - **Push / Pull**
- Cost…

Conventional Facilities

- Strategy …CFS is critical path, cost driver, political challenge, technical challenge
  - **Concentration of issues**
- 3 fold approach:
  - **Value-engineering / optimization of requirements and costs**
  - **'plan approval process'**
  - **Connecting to potential bidders → the GDE / regional interface**
- Timing … Pivotal role of site selection, planning must accommodate
- Communication … Substantial improvements needed
  - **Requirements need better definition (my opinion)***
  - **This should be the focus of upcoming CFS review process**

Controls

- Communication … Shortcomings of the ‘point of contact’ system
- Targets … where are we going?
  - **Progress at this meeting**
- Management … degree of commitment, widely distributed work, coordination of closely aligned work
- Testing and scalability

Metrology

- (new Working Group – contact Rick Ford, FNAL)
- Just getting started
  - **Technical plan**
  - **Evaluating Area system specifications**
  - **Site grid mapping**
  - **Implementation plan**

Accelerator Physics

- Communication
  - **Handling requests from groups**
  - **Connection to management**
- 3 fold approach
  - **Start to end simulation ←**
  - **Responding to community**
    - Specification: development and review
  - **Developing tools for all to use**

Task Force Summary

- Emerging engineering orientation
- Better communication channels and more formal documentation (EDMS)
- Review and Change Process

- Shifting gears, changing pace
  - **Provides opportunity for more focused effort, better concentration**
  - **Meetings, travel, community development**
- Next meeting – Fermilab, Starts October 22 2007

RDR Technical Reviews

- To start in the next few months
- Complete by October 22
  - **Beginning of the Fermilab GDE meeting**
- Will be one of the highlights of that meeting
  - **Parallel / plenary sessions structured accordingly**
- Charge (s) and Procedures under development

EDMS

- Identify ILC teams to bring ‘EDMS on -line' over the next months
- PM office will coordinate and drive this
- Upcoming reviews will be used to bring groups into EDMS
- S task forces will also form initial target groups
  - **DR (S3) will be first**
- ILC-EDMS workshop @ DESY

EDMS Goals

Baseline Configuration

- will directly support/replace the current baseline configuration document

Ultimate Goal →

- Get organised and structured in EDMS
  - **will replace ad hoc web based communications (wiki sites etc.)**
  - **All ILC collaborators will be in ILC-EDMS**
- Prepare for seamless transition to a construction project

Beginning the next phase

- In the next 3 years we will:
  - **At once: concentrate our efforts and develop diversity within the community**
  - **Strengthen our design through engineering and RD**
  - **Develop a project plan**
- Confident that we have the resources for the envisioned scope…

- Most amazingly →
  - **Someone else is paying for a 1G€ 'test facility'**
  - **DESY ←→ XFEL**

XFEL Accelerator Components

RF Gun + 1 single acc.module

25 units (4 acc. modules each)

(1) x 4 x 8 x 23.6 = 500 MeV

(2+1) x 4 x 8 x 23.6 = 1.5 + spare -> 2 GeV

(20+1) x 4 x 8 x 23.6 = 15.1 + spare -> 17.5 GeV

Rapid start-up scenario for 17.5 GeV

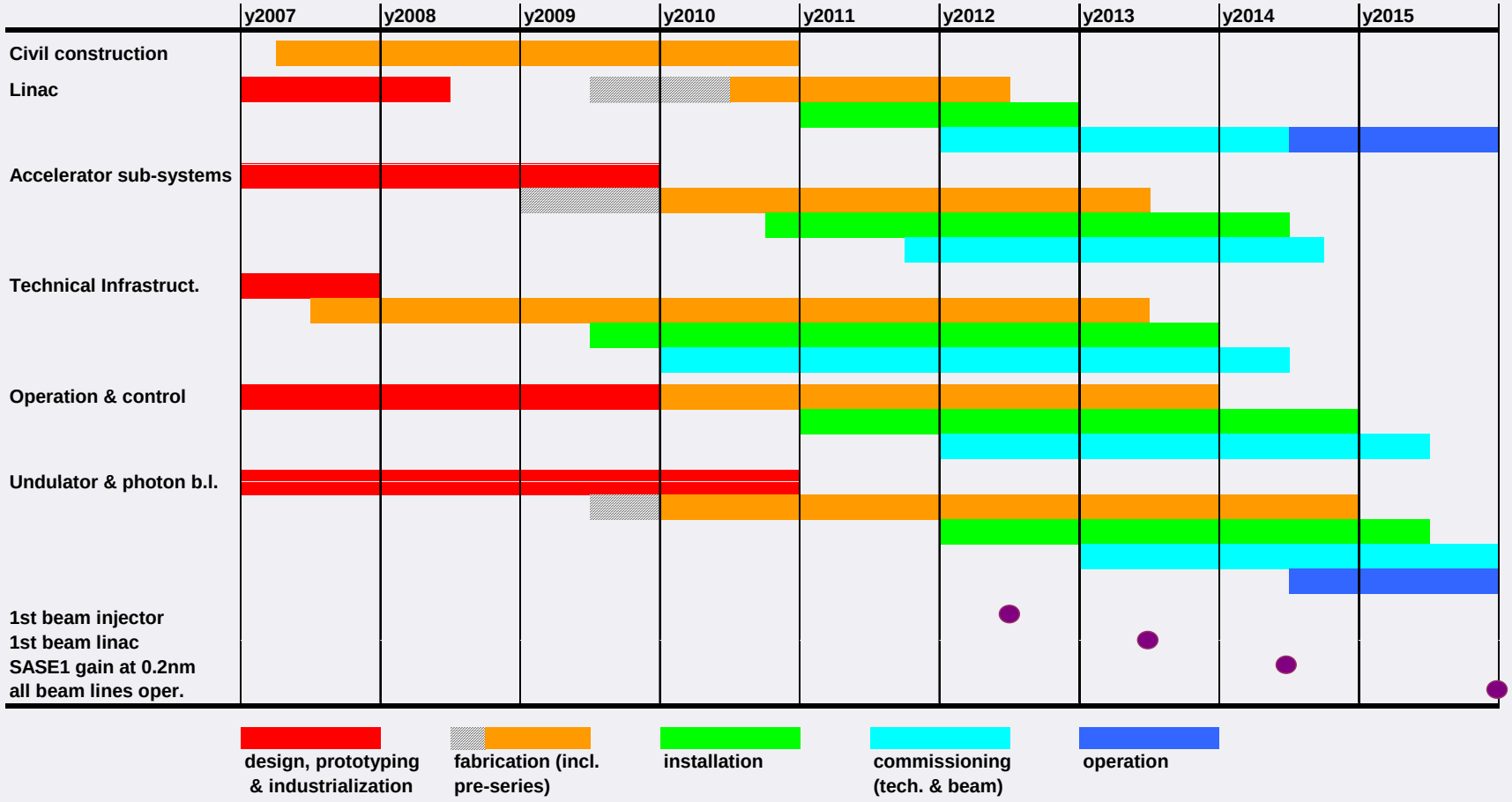
101 Accelerator Modules

---

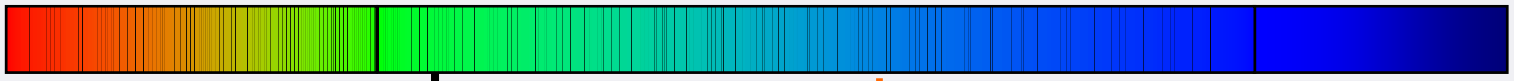
module installation from 3/2012 until 7/2012 **at a rate of 1 unit / day**
all modules to be tested at AMTF between mid 2010 and mid 2012

cold-mass delivery at a rate of 1/week; 1st cold-mass delivered Q3/2009
1st cavity string components Q3/2009
1st module spring 2010
i.e. **all accelerator components ready to order end of 2008**; actual R&D status supports this

XFEL Schedule



XFEL Principal Schedule



2004 — 2006 — 2012/13 → 2014/15

preparation

project start

construction

2009: LCLS start operation (SLAC)

beam operation

SASE1

SASE2+3, spont. rad

industrialization of all Linac sub-systems

production

commissioning

acceptance test and installation

input for ILC

FLASH FLASH FLASH operation experience XFEL XFEL XFEL

XFEL Project - June 5, 2007

- *"The formal launch of the XFEL project will take place on June 5* (at the European Conference on Research Infrastructure) at the invitation of the German Minister, Annette Schavan, with the Research Ministers of participating countries.
- *This is a big success for the TESLA technology*, and therefore for our common and exciting as well as successful work over the last decade.
- A big thank you to all of you and to all friends of the superconducting RF."
  - **Hans Weise, DESY**

- Congratulations from ILC
- We look forward to working with you