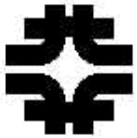

CD FY08 Tactical Plan Review

FY08 Tactical Plans for Linear Collider Controls, LLRF, Instrumentation, Detector, Physics Studies

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Linear Collider Tactical Plans Overview for FY08

1. **ILC (Project 18) effort (SWF) is funded as a "line item" in the CD budget, FY08 at $2.301M (direct) – Rich Stanek, 11/1/07. This corresponds to ~17.92 FTE (depends on the rate used for direct costs).**
    1. **In FY07 the project 18 SWF was $1.782M and we charged $1.816M (2% over budget).**
    2. **The money is divided into sub-projects, some funded by the DOE for GDE work (18.1.), the rest for other aspects of the project, including Fermilab-based facilities and detector activity.**
2. **ILC M&S is funded through the Fermilab ILC project office and is held in the Directorate budget. CD charges ILC travel, conferences, computing, and materials associated with the project to to project 18. Approval goes through the labwide ILC management chain.**
3. **ILC effort is very highly matrixed – effort is part of Fermilab, national, and international agreements. These change during the year in many cases. In addition, the project 18 funds are divided into fund types that cannot be mixed except with some coordination with the project 18 office (Bob Kephart and Rich Stanek) and with CD division office.**

Linear Collider Tactical Plans Overview for FY08

- In FY08, many things will change, as usual.
- “Detector” funds will be split from the rest of project 18 and tracked separately.
- Detector/Scientist effort will be tracked separately.
- Global systems will be “GDE” funds rather than SCRF
  - Details will be learned on Thursday at 1:00
- The key to surviving all of this is to be flexible.

FY08 Tactical Plans for Linear Collider

- Relevant Strategic Plan(s):
  - FY08 Strategic Plan for Linear Collider (2214)
  - Strategic Plan CPA (2237)
  - FY08 Strategic Plan for Engineering (2224)
  - FY08 Strategic Plan for DAQ (2217)

- Tactical Plans
  1. ILC Project Management (2216)
  2. International Linear Collider Engineering (2241)
  3. ILC Accelerator Modeling (2239, already covered by Panagiotis)
  4. Linear Collider/ILC Controls (2240)
  5. ILC Detector/Physics Studies (2337 + 2486)

FY08 Tactical Plan for 1. Linear Collider Project Management

- Tactical Plan Goals
  - Coordinate CD's ILC activities within the lab, with the Americas region efforts and world efforts, assuring that CD optimally supports ILC activities.

- Tactical Plan Strategies
  - Work with project management in the Fermilab directorate (Bob Kephart, Rich Stanek) to budget effort to activities. Track the effort during the year to ensure that the effort is consistent with the budget and priorities, or to make adjustments if necessary.

FY08 Tactical Plan for 2.Linear Collider Engineering

- Tactical Plan Goals
  - Establish a CD role in ILC low-level RF (LLRF), ILC Controls and ILC detector R&D programs.
  - Support the ILC Instrumentation R&D as requested.
- Tactical Plan Strategies
  - Participate in the ILC Global Design Effort and EDR process.
  - Participate in R&D activities related to LLRF and detector R&D.
  - Train engineers and technicians in the use of new tools, techniques, hardware and software.
  - Partner with other Divisions at the lab and with other labs and universities on projects and coordination activities required for the development of the ILC.

2. Linear Collider Engineering Tactical Plan Objectives for FY08

- FNAL-LLRF hardware design.
  - 2nd production of the ESE LLRF controller.
  - Possible implementation of other hardware needed for ILTCA LLRF.
- Algorithm development for ESE LLRF controller.
- Algorithm implementation for the ESE LLRF controller.
- LLRF: Cavity modeling and feedback control.
- Commissioning and operation of LLRF hardware and firmware in ILC Test Areas.
- Testing of LLRF algorithms and models in ILC Test Areas.
- Hire a new engineer/physicist to work in Digital Signal Processing and Control for Accelerator projects.
- Continue the evaluation of the ATCA platform as an infrastructure that provides and supports high availability of the electronics for the accelerator. In collaboration with the ILC Controls group, support the ATCA module design efforts of the group and consider a new design in the department.
- Support the EDR writing effort as managed by the ILC Controls group.
- Continue the development of state of the art test stand systems for ILC Detector R&D.
- Design new telescope and data acquisition systems for the test beam facility at MTest.
- Continue participation in collaborative efforts in ILC Detector R&D with other divisions at Fermilab.
- Investigate critical technologies (such as serial power distribution to pixel detector elements and tracking trigger concepts) for future detector electronics.
- Support the ILC Instrumentation R&D as requested. Contribute to the ATCA for Physics profile development and as possible test new board designs in the ATCA format.

FY08 Tactical Plans for 4. Linear Collider Controls

- Tactical Plan Goals
  - Lead and contribute to the ILCTA controls group efforts to provide a controls framework and device interfaces for the SCRF R&D program. This is primarily focused on the ILC cavity R&D program at FNAL and the most substantial effort will be for the cryomodule testing facility at NML running with ILC beam like parameters.
  - Provide integrations and infrastructure expertise to other ILCTA R&D areas in particular instrumentation (BPM) and LLRF.
  - Collaborate with data management effort (this now includes DB effort).
  - Provide international L3 management for the global controls effort. This involves developing a WBS structure based on the various workpackages although not managing the workpackages themselves and reporting on their progress to the GDE.
  - Provide the leadership for delivering the controls portion of the EDR in 2009/2010.
  - Deliver on the workpackages that FNAL has proposed for controls R&D projects. Labor for this effort may mostly come out of other divisions.

FY08 Tactical Plans for 4. Linear Collider Controls

- Tactical Plan Strategies

1. Provide various control systems and interfaces that standardize control systems across several areas (capture cavity, horizontal test stand (HTS), vertical test stand (VTS), cryomodule test beam area and 3.9 GHz coupler conditioner. Infrastructure should be flexible enough to support R&D on the controls system itself.
2. Establish FNAL as a key player in the ILC Controls global arena. The laboratory has a lot of expertise in this area and it is a strategic place for the laboratory to be as it prepares a bid to host.

4. Linear Collider Controls Tactical Plan Objectives for FY08

- Create integrated, standardized, and ongoing prototype system for control systems
- Provide integration expertise in terms of various controls systems in use:
  - EPICS, DOOCS, Labview, Matlab.
- Provide project management including budget and project planning and reporting.
- Provide infrastructure support in terms of system administrations, software product distribution, and software development methodology.
- Provide integration and infrastructure expertise to other ILCTA R&D areas in particular instrumentation (BPM) and LLRF.
- Improve DOOCS, Labview and Matlab expertise within our group
- Ongoing support

FY08 Tactical Plans for 5. Linear Collider Detector/Physics Studies

- Tactical Plan Goals
  - Preparation of simulation software for a detector (SiD) so as to present meaningful physics statements at ALCPG07
  - Continuation of Detector R&D in areas which have high impact on ILC decisions
  - Broadening Detector Simulation activities to position ourselves more appropriately for the Det. Sim.; group in the ILC host lab, as recommended by the June PAC.
  - Moving toward becoming a useful and key facility for ILC Detector research by FNAL and other investigators
  - Contribution to successful running of ALCPG07

FY08 Tactical Plans for 5. Linear Collider Detector/Physics Studies

- Tactical Plan Strategies
  - Continue a “vertical” strategy of focusing on SiD Simulation to the point where useful physics simulation can be done and where our credibility is established.
  - Formulate and migrate to a broader simulation approach, including software and simulation from all four detector concepts and each of the collaborations. This change in direction should begin to occur in early FY08.
  - Pursue investigations of Detector Physics topics which meet the two criteria of being important areas for deciding on proper ILC detector design, and leveraging FNAL equipment, facilities and expertise. In particular, we should take full advantage of the fact that with the winding down of collider experiments and other activities, significant useful equipment will become available for use in ILC studies.

5. Linear Collider Detector/Physics Studies
Tactical Plan Objectives for FY08

- SiD Physics Simulation:
  - Put together, within the ilcsim.org framework, serious SiD simulations, filling in each of the key steps needed for bana fide physics studies.
  - This framework should incorporate both barrel and forward detectors.
  - Utilize this framework to investigate and report on interesting physics questions.
- General ILC Detector Simulation:
  - Acquire proficiency in the frameworks of each of the proposed ILC detector concepts.
  - Perform detailed studies of selected physics issues using analogous software on multiple physics detector concepts.
  - Report, if appropriate, on comparative results, and/or on where capabilities are strong and weak in the various frameworks.
- ILC Detector R&D
  - Investigate doped lead glass in terms of potential as material for use in Dual-readout calorimetry. Perform experimental investigations as appropriate.
  - Investigate Silicon Photomultiplier chips in the context of potential for use in context of hermetic, 4-pi calorimetry. Look at readout issues, temperature sensitivity, and so forth, leveraging equipment available at FNAL.

5. Linear Collider Detector/Physics Studies
Tactical Plan Objectives for FY08

- ALCPG07
  - Provide effort on the LOC and Program Committee of ALCPG07 to make it a successful conference.
- ILC Simulation infrastructure
  - Support for a viable program of investigations by FNAL groups and others.
  - Provide gateway for grid computing and system for mid-scale simulation jobs.
  - Provide disk space for common-use ILC simulation data sets.
  - Ensure that the ILCVO becomes an important grid resource for ILC Detector Simulation.
- ILC SiD LOI
  - Preparation of simulation software for a detector (SiD) so as to support investigations by FNAL scientists and others of physics issues relevant for the October 2008 LOI.

FY08 Resource Request and Preliminary Allocation

Level 0 Activity: *Linear Collider*

FY08 Tactical Plan	Activity Level 1	FTE Request at Activity Level 1	M&S Request at Activity Level 1	Total FTE Allocation at Activity Level 1	October 2007 Effort	M&S Allocation at Activity Level 1
ILC Accelerator Modeling	ILC Accelerator Modeling	2.65	0	2.65	2.88	0
ILC Project Management	ILC Project Management	0.62	6,000	0.62	0.22	6,000
ILCTA Controls						
	ILC Controls	3.79	34,000	3.79	4.38	34,000
	ILC Detector	6.45	126,000	6.45	4.51	126,000
	ILC Instrumentation	0.58	2,800	0.25	2.25	2,800
	ILC LLRF	4.33	19,050	3.67	2.85	19,050
	ILC Physics Studies	0.50	0	0.50	0.71	0
LINEAR COLLIDER Total		**18.92**	**187,850**	**17.92**	**17.80**	**187,850**

Impact of Preliminary Allocation – 1. Project Management

- If major funding or organization changes of ILC activities occur there will need to be a shift of effort or activities. The probability of such a shift is small at the moment, given the strong endorsement of the efforts by the laboratory Director.
- Some change in emphasis and priorities may occur as EDR activities ramp up and adjustments are required.

Impact of Preliminary Allocation – 2. Engineering

- Failure on completing a 2nd production of the ESE LLRF controller can be mitigated by using the prototype design which worked well. There may be a small performance loss. The new controller will become critical mid to late 2008 when we really focus on LLRF performance.
- Similar to 1. The new algorithm development targets specific performance specifications of the LLRF system which are critical to achieve ILC standards.
- Similar to 2. The new algorithm implementation targets performance of the LLRF system which is critical to achieve ILC standards.
- Not critical. New cavity models and control algorithms will improve what we know about the RF system and/or give us a better way to achieve ILC parameters. This can be considered fine tuning for the long run.
- Critical. Part of the success of the ILC tests depends on success and the stability of the LLRF system. Commissioning includes ESE LLRF hardware, firmware and algorithms. The key risk is the availability of personnel and that is driven by the lab priorities.
- Although an important part of the overall LLRF project, this is not critical to the commissioning of the LLRF system needed for the ILC Test Areas.

Impact of Preliminary Allocation – 2. Engineering

- Failure on obtaining a new hire with the specified skills in Digital Signal Processing and Control will impact the pace at which algorithms and control strategies can be generated for other ESE engineers to take on their implementation. It is important to be able to generate those algorithms inside the ESE-ILC group in order to keep competing with other groups and labs and to guarantee that the implementation of those algorithms stays within the ESE-ILC group.
- This effort has the potential to reduce downtime and support costs for the eventual accelerator complex but it is not critical to the success of the project.
- The EDR is a critical component to the approval process and the main risk to this effort is the availability of the people to contribute.
- Test stand development is needed to keep up with evolving technologies and to provide diagnostic capabilities to evaluate and improve detector components and prototypes.
- An integrated, user-friendly, scalable test beam facility at MTest is a key facility for development of detector components. Failure to deliver such a telescope facility will limit and eventually compromise our infrastructure to test detectors in a test beam at Fermilab.
- Lack of participation in the ILC Pixel Detector R&D effort going on at Fermilab will potentially limit our future participation in the project.
- Failure to investigate key technologies will hamper our ability to deliver reliable systems that meet the increasing demands of new detector designs.

Impact of Preliminary Allocation – 4. Controls

- Failure on the vertical and horizontal test stands will have significant repercussions on the ILC cryomodule schedule. The other elements can be delayed a few months but no more before major impacts occur.
- We have a real risk of not meeting staffing requirements. This will delay schedule for NML, but the cryomodule delivery schedule has serious risk being significantly delayed because of funding delays. If we can't meet our staffing requirements, we impact the level of quality and automation of the test facilities.
- If we are short in time or resources, we will first let go of controls system R&D needed to run NML well from an operational standpoint (ie, make it much less automated). The next thing to sacrifice is some of the standards and uniformity across systems. This is robbing Peter to pay Paul as we will pay for this in the long term by a larger support load and the need to standardize later.

Impact of Preliminary Allocation – 5.Detector/Physics Studies

- Work continues on SiD in preparation for the LOI.
- Some infrastructure and effort on detector simulation occurs.
- Detector R&D for vertex detectors and calorimetry continues at some level.
- Not likely that much effort on ILD or host lab activities ramp up.