The ILC Control Work Packages

Who We Are

- *Collaboration loosely formed at Snowmass which included SLAC, ANL, FNAL, and DESY. And then KEK.*
- *Continuation of work that has been ongoing since Snowmass, but with few FTEs worldwide. On the order of a handful.*
- *Need to capitalize on the controls work being done at the test areas – STF, XFEL, and NML.*
  - **These areas are not controls R&D projects.**
  - **These efforts may not be specifically part of an ILC program**

Where We are in the Process

- *All of the workpackage descriptions can be found on the controls wiki at*
  - **http://www.linearcollider.org/wiki/doku.php?id=ilc_controls:list_of_work_packages_for_the_edr**
  - **Will move into EDMS shortly (end of today?)**
- *Call for EoIs has not yet been made – early next week*
- *We have more work than bodies identified*
  - **EDR will lack some details in certain areas**
  - **Not all workpackage leaders identified**
- *Workpackages divided into roughly 10 major areas.*
  - **EOIs can commit to just a portion**
  - **Especially if it's not deemed part of an ILC program per se (eg, XFEL).**

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- *Electronics Platform*

  This work package is to investigate the suitability of the ATCA ("Advanced Telecom Computing Architecture") electronics platform as a High Availability compliant standardized electronics platform for the ILC accelerator control system.

- *High availability*

  High availability is achieved through the application of a variety of well-known techniques. Within this work package we research the application of these techniques in the context of accelerator control systems. We examine those techniques where the application to controls is not well understood. Among the techniques to apply are software and hardware redundancy and failover, resource monitoring, fault detection algorithms, automated diagnosis, and adaptive control.

- *Timing and Synchronization*

  The ILC controls system needs R&D on distribution techniques for the 1300 MHz timing distribution system. The specified phase stability requirement for timing across the 15 km accelerator complex pushes the state-of-the-art in stable RF signal distribution. The intent is to build on recent systems at SNS, DESY/TESLA and KEK and ongoing work at SLAC and ANL.

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- *Controls system architecture*

  This track involves researching and documenting the overall control system architecture. Included here are the site-wide controls network infrastructure, client applications tier, services tier, technical equipment tier, and protocols. In addition, the set of standards, interfaces, and methodology are to be documented. Unique research is required to assure that the requirements for high availability, scalability, automation, feedback, synchronous operation, and remote operation are met with an optimized design. In particular, the network architecture requires analysis (simulation) to verify that requirements for throughput and latency are met. Prototyping of selected aspects of the architecture will also be necessary to evaluate alternatives.

- *Engineering*

  Engineering analysis needed for design including the risk analysis, value engineering analysis and cost optimization. This will need to include the impact of baseline configuration changes such as the 1 tunnel solution.

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- *Software Development for International Collaboration*

  Software development in an international environment is a difficult problem. Each institution has its own methodology including build, distribution, and deployment practices. Software will need to be tested/verified in an integrated offline environment.

- *Configuration*

  Configuration management is the act of maintaining the state of a system over time. For a control system this means software, hardware, firmware (FPGA code in particular), and documentation as it relates to operations. The techniques are often applied to control systems and networks, but typically in an incomplete and ad-hoc manner. This work package involves research into tools, data modeling, workflow, and standards for the comprehensive management of the control system configuration. The goal is not to engineer a comprehensive solution, but rather explore the problem domain, potential solutions, and applicable standards and use generated documentation as input for authoring the EDR.

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- *Integration*

  Technical equipment in each area system comprises field hardware such as power supply controllers, vacuum equipment, beam instrumentation, and motion control devices. These systems are the responsibility of the area system groups. However, they must interface to the control system in a coherent way to allow equipment to be accessed via a common interface for application programming, data archiving, alarms, configuration, and remote diagnosis. In order to meet the very stringent requirements for overall system reliability, as well as provide for more efficient R&D and long-term maintenance, standards must be applied to the technical equipment for packaging, field bus, communication protocol, cabling, configuration, and remote diagnosis.

- *Safety Systems*
  - **Machine protection**
  - **Personnel Safety Systems conceptual design, including tunnel zones and locations of movable beam-stops to support phased machine commissioning).**

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- *Project Management*

  Coordinate with work package leaders to deliver individual work package deliverables tracking progress on a monthly basis. Provide a conduit of information between GDE and people actually doing the controls work and to ensure that the controls group is adequately communicating among all three regions.

EoIs

- *Coming into controls*
  - **We know we have interest from SLAC, DESY and KEK especially in ATCA.**
  - **ANL, FNAL, and DESY interested in most areas.**
  - **Still big gaps especially in engineering, integration, and safety systems.**
- *Coming out of controls*
  - **Very few work packages have anything to do with controls**
  - **What are your thoughts in terms of diagnostics and instrumentation? Feedback requirements?**