14 June 2007

ILC Detector R&D Panel

Vertex Detector Review, 22-27 October 2007, Fermilab

Guidelines for Participating Groups

These notes provide guidance to groups and collaborations which will participate in the vertex detector review. The guidelines are not intended to be prescriptive, particularly because we are well aware that R&D projects are at different levels of maturity. It is understood that some groups will be unable to satisfy these requests in full, and others may find more appropriate ways of presenting their work to the committee. However, these guidelines have been drawn up in consultation with members of the FALC (Funding Agencies for Large Colliders), whose perspective is different from that of a purely technical review. For their benefit, we request groups to do their best to follow these guidelines.

Since much of the ILC vertex detector work is in the hands of collaborations, in the remainder of these notes we use this term. However, we understand that in some cases individual groups will wish to present their reports separately. These guidelines apply with little change to these cases.

Purposes of the Review

The main purpose is to review all ILC-related vertex detector R&D under way world-wide, in the belief that improved communication will lead to enhancements in the R&D programmes. Having representatives of all the collaborations meeting together and presenting their work in face-to-face discussions will be a major factor, reinforced by the presence of expert consultants from outside the ILC community, who can be expected to provide new insights. We hope to ensure that the R&D is focused on the essentials and that we avoid unnecessary duplication of work on a given topic.

We believe that the self-organising abilities of our community, operating in the light of this review, will be the main factor in refining the world-wide R&D programme. Ideally, the closeout discussions with the committee will do little more than document these mutually agreed plans. The R&D Panel, in organising these reviews, is well aware that 'if you don't have buy-in, you can't effect change', so recommendations will need to have the support of the collaborations concerned.

While this initial review will receive only a snapshot of the R&D work, it will be followed by others at 16 month intervals. In between, the Review Committee will be available to re-convene by teleconference on request, for example to review new proposals or proposals for expanded R&D work. This will provide a function already in place for accelerator R&D via the Research and Development Board (RDB) of the GDE, which is proving useful to funding agencies. The FALC was particularly interested in this ongoing role, since it will help national funding agencies to evaluate proposals from a fully international perspective.

The Review Committee will transfer responsibility for reviewing vertex detector R&D (by then, mostly 'D') to detector collaborations, when the time is right. It could be that specific aspects (for example work on ideas for upgrades after ILC startup) may remain generic, hence under the umbrella of this Review Committee, even for some years following the formation of the collaborations. This should be decided by mutual agreement of those involved.

Guidance notes for reports

Every collaboration is requested to submit a written report describing their R&D programme. Suggested content of these reports is approximately as follows:

Overview of the goals, starting from where they are now, up to the completion of their R&D programme, ready to start construction with a frozen design and proven manufacturers. Typically, this overview could include topics such as:

- overall physics-driven performance goals
- track-finding efficiency, down to what lower limit of polar angle and momentum
- special case: tracks originating from *B* and *D* decays within or beyond the vertex detector
- forward tracking - a weak area or not?
- impact parameter resolution vs momentum and polar angle over full range
- design of sensors, modules, and support structures
- readout electronics and DAQ system
- system power dissipation, quantifying the benefits of pulsed power if used
- cooling system
- cabling and fibre optics - power and data
- other infrastructure such as gas control systems
- overall mechanical stability - implications of push-pull on calibration needs
- tolerance of backgrounds
- radiation resistance
- tolerance of EMI (electromagnetic interference) during the bunch train
- overall material budget; implications of secondary interactions and photon conversions on system performance such as jet energy resolution
- other topics that lie in the cracks between vertexing and other subsystems

We would appreciate a frank description of any problems that you think could be showstoppers, where R&D is most urgently needed to establish proof of principle. It is in everybody's interests to be aware of and work together to solve such problems.

Following the overview, the report should discuss the R&D programme in detail, subdivided into Work Packages (WPs), addressing key topics from the overview. It is of course likely that individual groups, and even some vertex detector collaborations, may not cover all topics relevant to their technology.

For each WP, it would be useful to have a brief summary of recent progress, followed by a detailed discussion of the future work, with specific goals and milestones to monitor progress. In order to give the Review Committee a complete picture, it will be extremely helpful to describe the hoped-for evolution of the WP all the way to the completion of the R&D programme. This implies a description of plans through to the production (in industry, university groups or wherever) of pre-production modules. For example, roughly how many iterations of prototype modules will be needed, and on what timescale? While the ILC schedule is not yet defined, groups should be planning for the earliest technically feasible startup of the machine in around 2019, and R&D programmes should in general be matched to this timescale. While the uncertainties associated with future milestones will increase with time, it will be important for the Review Committee to be able to assess whether all aspects of the programme are compatible with the physics startup, or whether some projects may be considered more plausible for an upgrade path.

We ask each collaboration to inform us of the resources (manpower and equipment budget) currently allocated to their R&D programme. Manpower should be stated in FTEs, and 'equipment' should include all other expenses associated with the R&D programme, such as travel directly allocated for the R&D work, as well as hardware. This information should be provided in the form of a table indicating the budgets allocated to the different groups within the collaboration (see example). This will enable the funding agencies associated with that collaboration to appreciate which WPs they are supporting, and to correlate their support with the recommendations of the Review Committee, for example a recommendation that activities of a specific WP should be increased.

This table should specify funding at the national level, and not below that level. For example, for a UK group, we do not need a breakdown between STFC, university funds, Royal Society grants, etc. However, EU support (eg via EUDET) should be listed as for a separate country.

For individual groups, this table will consist of only one or two rows (national plus EUDET support, for example).

Example table: Current levels of support in Collaboration X for manpower/equipment in units of FTEs/k$ p.a.)

Country	Group	Topic/Work Package				**TOTALS**	
		sensors	electronics	mechanics	alignment	**group**	**country**
Albania	NameA		3.5/21		2.0/12	5.5/33	10.5/43
	NameB	5.0/10				5.0/10	
Belgium	NameC			2.5/15	1.0/10	3.5/25	17.5/93
	NameD		3.5/21		2.0/12	5.5/33	
	NameE	5.0/10				5.0/10	
	NameF			2.5/15	1.0/10	3.5/25	
Canada	NameG		3.5/21		2.0/12	5.5/33	14.0/68
	NameH	5.0/10				5.0/10	
	NameI			2.5/15	1.0/10	3.5/25	
Denmark	NameJ		3.5/21		2.0/12	5.5/33	10.5/43
	NameK	5.0/10				5.0/10	
Ethiopia	NameL			2.5/15	1.0/10	3.5/25	3.5/25
EUDET		7.5/15				7.5/15	7.5/15
TOTALS		27.5/55	14.0/84	10.0/60	12.0/88	63.5/287	63.5/287

As well as the snapshot of current R&D, we ask collaborations to assess the levels of support needed to achieve their future goals for each of their WPs, through to completion of their R&D phase. These assessments would not normally be expected to be tied to specific funding agencies. It will suffice to indicate the global levels of support needed to achieve the goals. Thus in the above example, they could state that the support for sensors will need to be increased to 35 FTEs and $80k p.a. for the next 4 years, without being asked to predict from which funding sources the increase is likely to come.

These assessments (current and future) are simply updated versions of what was provided by all the detector R&D groups at the end of 2005, in order to compile the tables in the ILC Detector R&D Panel Report of 6 Jan 2006. In view of this, it should be straightforward for the collaborations to provide this information.

Guidance notes for presentations

Collaborations should decide how they would like to present their work to the Review Committee. Typically, they might suggest an overview talk followed by one talk for each WP or group of WPs. Once the bids are in, we will allocate time, and possibly suggest merging of talks, in order to fit within the schedule. As a rough guide, larger collaborations could expect a total time allocation of 1.5-2 hours, with 0. 5 hours for the smaller groups.

Output from Review

After the open session presentations, the following day will be devoted to detailed discussions with the collaboration representatives, Work Package by Work Package. The Committee will then discuss internally what they have learned, and compile a rough draft report. The provisional recommendations will be discussed in the closeout session with the groups, where there will still be time to correct misunderstandings. By this process, we hope to arrive at a Committee Report which will have the full support of the R&D collaborations themselves.

The final Committee Report will be published within the following 4 weeks. It will be made available to the R&D collaborations, the WWS-OC chairs, the GDE EC, and the relevant funding agencies, who will also be given access to the material submitted by the groups as input to the review. The financial information, as for our report in January 2006, will thus receive only a restricted distribution.

The hope is that one outcome of the Review will be a clear estimate of the future support needed for the various WPs to be completed in time. Armed with this endorsement, it is hoped that groups will be in a stronger position to approach their funding agencies with requests that are matched to their needs, as perceived by mutual agreement at the end of the review.

As previously mentioned, the Review Committee will be prepared to re-convene by teleconference after the Review, if asked to consider specific new funding applications for ILC vertex detector R&D work. Having arrived at a consensus in the Review, it is hoped that such extensions of the process will continue the harmonious relationship between the R&D collaborations and the Review Committee.

Schedule

Monday 24th September Reports from collaborations and requests for open session talks (titles of talks, names of speakers and time requested) . This will give time for the committee members to study the reports before the Review.

Monday 22nd Oct **ILC Workshop, opening plenaries**

Tuesday 23rd Oct ***Vertex Detector Review*** - open session presentations, followed by dinner for all involved.

Wednesday 24th Oct ***Vertex Detector Review*** - am, open session presentations: pm, closed session discussions with individual groups

Thursday 25th Oct ***Vertex Detector Review*** - am, closed session discussions with individual groups: pm, executive session of committee

Friday 26th Oct **ILC Workshop, closing plenaries**

Saturday 27th Oct ***Vertex Detector Review*** - closeout session; feedback of draft recommendations to individual groups