

RD's Report on detector activity

General Overview

Project Advisory Committee
@Eugene

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November 11, 2010

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- **Introduction**

Brief overview of the LOI process

Purpose and crucial points

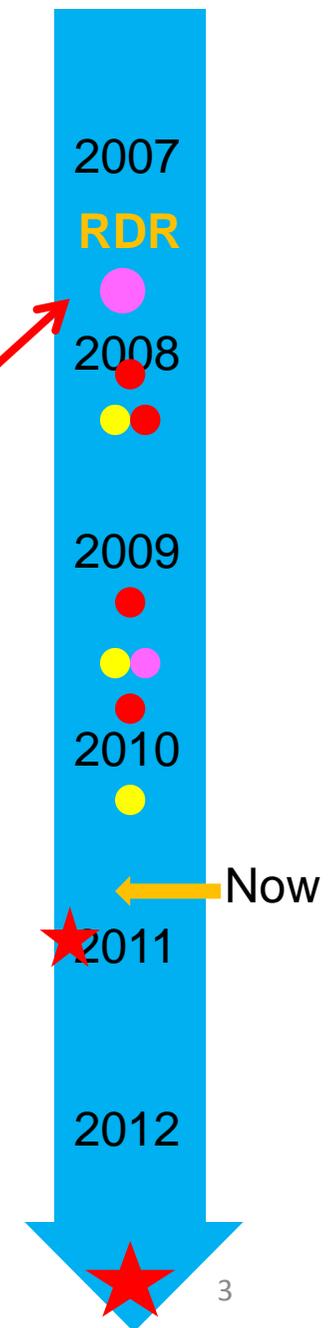
*(Detector groups, IDAG, MDI and CLIC-ILC cooperation
are presented separately in details.)*

- **Common task groups**

- **Interim report and after 2012**

The LOI process

- Summer 2007: GDE made RDR
(4 detector concepts)
- Oct. 2007: **Call for LOIs was made by ILCSC
for two detector designs**



Call for LOI by ILCSC

“The International Linear Collider Steering Committee (ILCSC) announces a call for Letters of Intent (LOIs) to **produce reference designs for the two ILC detectors**. These designs will be detailed in ~~two Engineering Design Reports (EDRs)~~ to be completed on the timeline of the machine ~~EDR~~**TDR** being prepared by the Global Design Effort. **Detailed Baseline Designs (DBDs)**

- The LOIs should be received by the ILCSC not later than ~~October 1, 2008~~ and will be reviewed by an advisory body appointed with the approval of ILCSC.

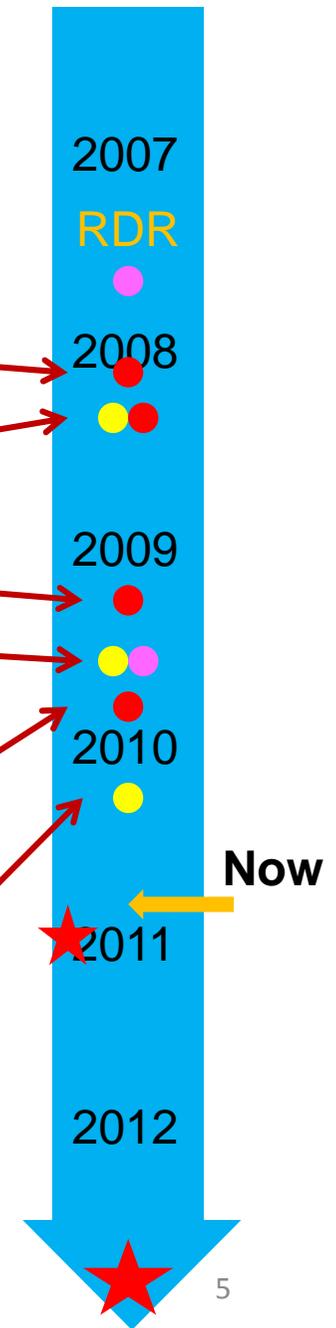
March 31, 2009

**International Detector Advisory Group
(IDAG)**

Later modifications (February 2008) are written in red.

The LOI process

- Oct. 2007: **Call for LOIs was made by ILCSC**
appointment of RD to conduct the process
- Jan. 2008: Detector management was formed
- Mar.2008: IDAG formed, 3 LOI groups known
- Mar.2009: 3 LOIs submitted
- Summer 09: IDAG recommendation for
validation and ILCSC's approval
- Oct 2009: Work plan of the validated groups
- Mar:2009: IDAG began monitoring the progress
- **End 2010: Interim report to be produced**
- **End 2012: Detailed Baseline Design Report**
including physics case for ILC



Purpose of the Detailed Baseline Designs

In 2012, when GDE will complete the ILC design to propose the project, ***we need to present that detectors can be built and pursue desired physics at ILC.***

The detectors must have unprecedented high precision, e.g. for recoil mass or jet-jet mass.

High resolution and Fine granularity

> ***advanced Component R&D***

Hermeticity, dead material (area) reduction

> ***Integration studies***

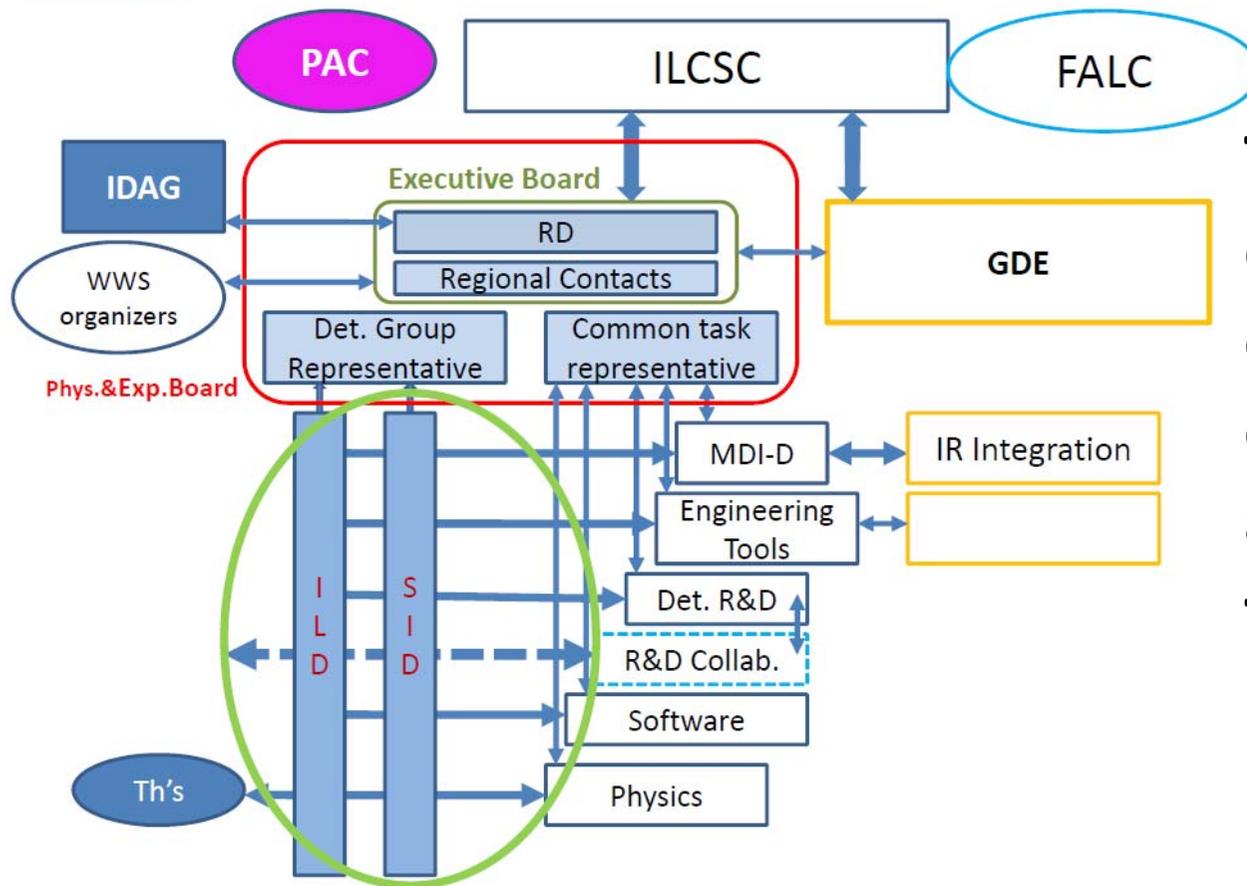
- ***Realistic physics simulation to confirm performance***

Now the two detector groups are in the middle of hard work towards the goal.



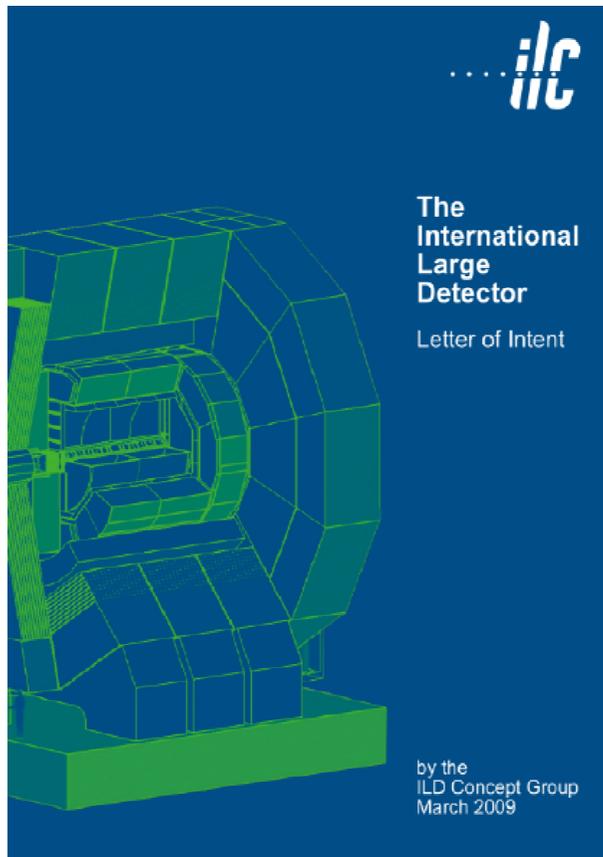
The detector organization works to assist and promote the effort.

Oct. 03, 2009



There are various cooperation & communication channels, and monitoring of the progress by IADG and PAC.

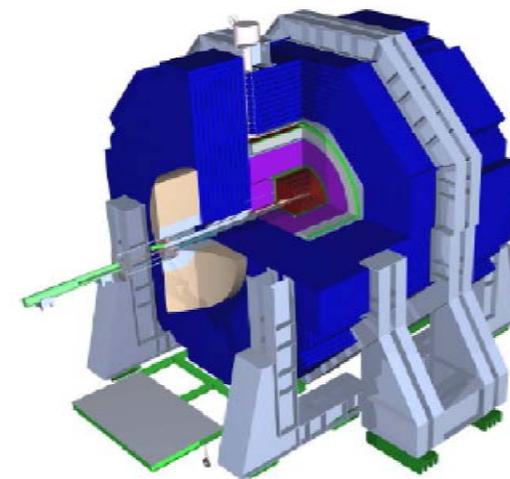
Remarks and/or Issues on each category of activities



Component R&D,
Integration,
Physics simulation

SiD Letter of Intent

31 March 2009



2010/11/10

PAC@Eugene Sakue Yamaguchi

Component R&D

- ILD and SiD employ somewhat different approaches for R&D. (for a historical reason)

Many detector studies are made by horizontal R&D collaborations, which are independent organization.

ILD cooperates with them heavily, i.e. for most of the components, while SiD has less cooperation with them and runs SiD-proper programs.

- **R&D budget is acquired by the member institutes of the detector groups.**
- **R&D budgets lie in the hand of R&D collaborations. Often their interest is wider than ILC.**

The R&D Matrix

Component	ILD	SiD
Vertex	Vertex R&D Groups	
Tracking	LC-TPC	SiD - Si
	SILC	
ECAL	CALICE	SiD - EM
HCAL	CALICE	
Coil	ILD – Coil	SiD – Coil
Muon	ILD - μ	SiD - μ
Forward	FCAL	
Testbeams	CERN – DESY – FNAL – SLAC	

TA Dual
readout

The community cuts across a large number of boundaries

Component R&D (continued)

- **While good progress has been made so far, budget situation is unstable and tends to reduce.**

(a common tendency for detector R&D in general)

If looked more precisely, there is difference among the regions/countries.

In Europe the new budget (AIDA) was approved but reduced relative to the present EUDET (till end 2010).

In Asia, grant renewal is approaching (with competition).

In US, university budget will end FY2012. The funding scheme is changing.

IDAG noted this problem through the interview of the R&D CTG.

Integration

Many items of integration are important

- **Detector components into a system**

Dead material/area deteriorates the performance and they tends to increase as study goes on.

simulation with realistic configuration needed

- **Integration with the accelerator**

Here push-pull is a critical item to be studied.

Vibration, relocation of the components (acc. & det.), switching period, etc.

Integration is crucial

Through study is required to be sure that the designed performance is realized after integration.

Issue:

Engineering support is lacking or missing.

This is common for the two detector groups.

The reason is likely:

The importance of engineering in the R&D phase is not understood well. ILC project has no “host” laboratory yet.

Each supporting lab has its own urgent project.

The request, which was made through ILCSC before the last PAC, is waiting for a response yet.

Physics Simulation

- New benchmarks were proposed by Physics CTG and are being considered by the joint working group of **ILD, SiD, Software and physics representatives**.
- The consideration is based on the proposed list and the suggestion of IDAG. It will be finished soon.
- Various software tools are being prepared by the software CTG. A new working groups for event generation was set up.
- Hope: when the detector baselines are made, simulation can be started with these tools.
- **Here, however, there is also a lack of human resources.**

Human resources

- **Physicists for various works are becoming less due to reduction of budget, possible loss of enthusiasm for ILC and involvement in other activities.**

Human resources (continued)

A recent outflow of human resource is toward CLIC.

- ILD and SiD members (including some important members) are now participating in the CLIC CRD preparation.
- Both groups expect there will be return in the future for the present expense,
partly as **common tool or knowledge to be applied for ILC,**
and by **new active participation in the effort of DBD preparation.**
- **But seen at this moment, effort of the community is less focused on ILC-DBD.** (We may have to live with this difficulty hoping this is temporal.)

Planning toward DBD

- The two groups are updating their planning.
- The original ones were made assuming resources will be obtained as wished. The actual environment is different and changing.
- We had 9 items to be fulfilled for DBD.
- Seeing the realistic resources, we shall have to reduce the level of accomplishment of some of these items, but keeping all of them.

The idea was supported by IDAG with a comment that LOIs contain substantial information and update of them will be enough by putting still missing items.

Planning continued

- **Some consideration along this line is already going.**
The benchmark working subgroup is discussing to reduce the proposed list of the benchmark reactions.
However, the new benchmarks will contain some reactions at 1 TeV.
- Similar effort will be made for the other items seeing the level of resources in the coming months.

IDAG monitoring

- IDAG continues to be helpful giving good suggestions.
- **IDAG meets twice a year now,**
- **IDAG met during IWLC2010 in Geneva last October.**
 1. IDAG discussed with the management first, and made interviews with the detector groups, detector R&D CTG and Software CTG.
 2. IDAG observed the status and issues of detector R&D made by the various R&D collaborations.
 3. IDAG recognizes the importance of R&D beyond the TDR phase and expresses its concern about funding.

Details will be covered by the IDAG report.

Quick view of the Common Task Groups

- **MDI:** They are working on push-pull hoping that a common solution be reached between ILD and SiD by next Spring.
As push-pull has been adopted by CLIC as well, there can be an additional input from the engineering study of CLIC push-pull.
(A detailed report is made by Karsten.)
- **Engineering Tools:** Clear direction is set for EDMS and joint effort to form a common system is starting.
The accelerator people are also using the system.

CTG continued

- **Detector R&D:**

It provides a good communication channel among detector groups and R&D collaborations. The CTG seeks a way to promote detector R&D in large, too.

They had an interview with IDAG last October. Some details will be included in the IDAG report.

CTG continued

- **Software:**

The group is working on the common tools.

event generation sub-group, communicates with CLIC

The group was also active for simulations required by SB2009WG.

Interview with IDAG was made as well.

- **Physics:**

The groups is leading the discussion of the new benchmarks.

The will study possible physics scenarios for ILC with new findings at LHC.

Working group to study SB2009

- **The members were reinforced by inviting 3 theorists. (J. Hewett, Y. Okada, G. Weiglein)**
- The group is working to provide inputs for BAW2 to be held in SLAC January 2011. Some simulations may be updated, using the latest accelerator parameters, from what Jim Brau reported at the last PAC.
- **This group communicated with GDE's physics group and received all relevant information for this preparation.**

Cooperation with CLIC detector

- Francois Richard will report more in detail.
- Some points were touched already.
- The joint working group met twice and surveyed on-going cooperation.
- Many cooperation programs are going on the grass-root level. And more possibility for common effort is looked for.
- We wish the cooperation turns out beneficial for the both sides in the long run. In the short run, the shortage of resources on the ILC side makes it difficult and also necessary to cooperate. (a kind of dilemma.)

Interim Report

- We plan to make an interim report by spring next year.
- It will be a report to ILCSC, but will be circulated to the community and beyond, too.
- It describes **physics overview**, overview of **the LOI process**, activities of **R&D and integration, simulation** and the activity of **the common task groups and the working groups**.
- In a sense it makes an **update of the RDR** and **will be useful for us, too**.
- It will be **rather short and easy to read** with a help of the communicators. The style will be similar with the interim report of GDE.

After DBD

- It is often asked by the detector groups,

“what will happen to DBD after 2012 ?”

“How ILC will be pushed forward after the TDR phase ?

“

The question is beyond our given mandate

but we are much concerned.

We wish the hard work will be awarded by the realization of the project

and also remaining R&D and physics studies need to be continued further after 2012.

ILCSC's initiative is welcome.

Comprehensive Project Design Guideline

was circulated in the community.

We recognize **this is a guideline and details are left open yet.**

The detector/physics community is recommended to participate in discussion by submitting comments.

We plan to organize comments from the two detector groups and the management.

Summary

- Brief overview of what are going on in the LOI process was made.
- Works are categorized into three, component R&D, integration, and physics simulation studies.
- Issues are declining budget for R&D, lack of human resources for integration engineering and reducing human resources for simulation.
- IDAG monitors the progress and observes the issues.
- We plan to make interim report.
- The new initiative of ILCSC is welcome and we wish to participate in the discussions.