

WWS Detector Roadmap

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SiD Workshop

April 9, 2007

Emergence of the Concepts

- Early period – detectors conceived by regional teams
- 2003 Amsterdam ECFA-DESY Workshop
 - TESLA Detector
 - Silicon Detector - introduced
- Concepts formally introduced in 2004
 - Three formed right away
 - SiD
 - LDC
 - GLD
- 2005 - Snowmass
 - 4th concept introduced
- 2006 - DOD
- 2007 - DCR



The GDE Plan and Schedule

2005

2006

2007

2008

2009

2010

CLIC

Global Design Effort

Project

Baseline configuration

Reference Design

**LHC
Physics**

Technical Design

ILC R&D Program

Expression of Interest to Host

International Mgmt

Global Design Effort

Next Steps for the Global Design Effort

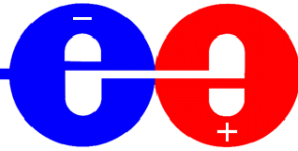
- Finalize RDR
 - Final form this summer after review
- Organization of the GDE for the Next Step
 - Engineering Design Report (EDR) around 2009
 - Coordination of R&D
 - Engineering

Keeping up with Machine: Motivation for Roadmap

- progress on machine side must be followed by detectors
 - 2004 - technology decision
 - 2005 - GDE formed
 - 2005 - baseline configuration
 - 2007 - reference design
 - 2009
or so - engineering design
- similar engineering effort is only possible if support is combined to two efforts, rather than addressing >2 engineering designs

Discussions with ILCSC regarding the Detector Roadmap

- Valencia – 11 Nov 2006
 - JB presentation to ILCSC
 - Proposed IDAG
- Beijing – 8 Feb 2007
 - Discussions in plenary meetings
 - F. Richard presentation to ILCSC
 - Roadmap with IDAG



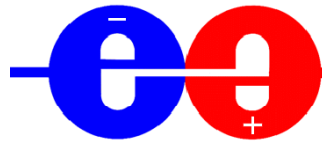
Worldwide Study of
the Physics and Detectors

for Future Linear
e⁺e⁻ Colliders

Detector Roadmap (the future)

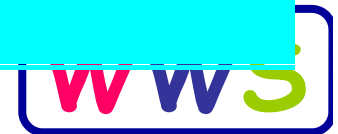
- 2008 – Conceptual Design Reports received by IDAG
Panel characterizes positive aspects and criticizes weaknesses
Guides community to the definition of two detectors for
EDR preparation
Collaborations formed to develop EDRs
- 2009-2011 – Development of two technical designs,
produce first technical design report for the overall detectors,
which will be followed by additional volumes
(detailed technical reports on subsystems)

Proposal Discussed in Valencia



Phase I

- Start immediately, for ~1/2 year, an open and intense study held in common between the 4 concepts on critical items: μ vertexing, tracking, PFLOW
- Set horizontal WGs on these items, with the concept experts, to understand the differences, weaknesses, strong points, R&D issues, of each concept
- First results presented at LCWS07
- Try, based on these comparisons, to converge on two optimal concepts by summer 2007





Phase II

- Depending on the result of phase I, start, by fall 2007, for two CDR or N(>2) CDR
- An International Detector Advisory Group, appointed by the ILCSC and recognized by ICFA, will review the CDR's and, if needed, will unify all efforts towards two detectors retaining the best features of each CDR
- Convergence on 2 Detectors by end of 2008



Beijing ILCSC Minutes

- **6. Worldwide Study**
- Francois Richard reported on progress towards producing the Detector Conceptual Report. Given the need for an Engineering Design Report (EDR) for 2 detectors in 2010-2011, there should be a selection of 2 detectors by the end of 2008. ILCSC supported the concept of an International Detector Advisory Group to unify efforts towards 2 detectors on this timescale, and requested that WWS produce by June 2007 a plan to lead to this.

Shin-ichi Kurokawa, ILCSC Chair

Albrecht Wagner, ICFA Chair

Subject: Letter to WWS Co-Chairs

- 26 February 2007
- To: Co-Chairs of the WWS International Organizing Committee
- From: ILCSC
- The realization of the International Linear Collider has taken major steps forward in recent years. This could not have happened without the leadership taken coherently by the particle physics community, within the framework of ICFA. Unprecedented collaborative steps have been necessary, and the community has adapted successfully to what, in some regions, required major redirections of traditional accelerator R&D effort.
- Two major milestones, the selection of the main-linac RF technology and the GDE's announcement of the RDR budget and associated design choices, keep the GDE on pace to complete a construction-ready engineering design for the ILC accelerator-complex by 2010.
- Maintaining this momentum requires also that the equivalent strategic decisions and the level of technical maturity for the two ILC detector proposals keep pace with the accelerator schedule. Major progress in this regard is ongoing under the auspices of WWS. In addition, a definite plan together with milestones is needed to have detector designs of a maturity similar to that of the accelerator by 2010. This needs an enhanced effort by the community. ILCSC will support the formation of an International Detector Advisory Group to assist this effort. ICFA looks forward to receiving such a plan from WWS at the June 1, 2007 ILCSC meeting at DESY.

Working Group on the WWS Roadmap for Detectors

teleconference/March 20

- participants:
 - Weerts/Jaros - SiD
 - Behnke - LCD (absent Videau)
 - Sugimoto/Thomson -GLD
 - Popescu - 4th (absent -Hauptman)
 - Richard/Yamamoto/Brau – WWS OC
 - Damerell WWS R&D Panel
- agenda:
 - roadmap/IDAG
 - coordination group on jet reconstruction
- action:
 - draft charge (JB)
 - charge for coordination group (Ties)
 - concepts designate 2 each for coordination group

2nd teleconference/April 4

DRAFT IDAG CHARGE - paraphrased

- The World Wide Study goal to produce two engineering design reports for the two complementary detectors in 2010
- The International Detector Advisory Group (IDAG)
 - charged by the ILCSC to assist in overseeing WWS efforts
 - refine and facilitate the process
 - critically review the designs and plans
- IDAG will meet until oversight of the ILC experimental program assumed by the World Lab
 - Will detector designs that achieve physics goals of ILC?
 - Is detector R&D matched well to needs of detectors?
 - Can the detector design and engineering keep pace with machine?
 - Are adequate resources available?
 - Are schedules, including construction estimates, reasonable?
 - Are costs well understood?

DRAFT IDAG CHARGE - paraphrased

- review status of designs,
 - note strengths and weaknesses,
 - R&D needed,
 - complementarity,
 - and the work, manpower, and resources needed for EDRs
- suggest mechanisms to facilitate the two internationally based, complementary detector efforts by the end of 2008.
- critically review the detector designs which emerge and plans for EDRs. If more than two remain by the end of 2008, select 2 and suggest how the community can be integrated.
- review progress toward the completion of two detector EDRs.
- evaluate the relationship between the WWS and the GDE
 - Is it effective?
 - Are MDI issues being addressed adequately?
 - Is the GDE responsive to the needs of the WWS?
 - Does the WWS respond to the requests of the GDE?
- Identify concerns, including worldwide collaborations, MOUs, work packages, and documents (CDRs, Lols)

DRAFT CHARGE - reaction

- Broad agreement on 2010 goal for 2 EDRs
 - With concern on realism of GDE schedule
 - Why not wait for World Lab?
- Concern for openness to newcomers
 - How can this be achieved with EDRs moving
- Concern that charge is too detailed
- Concern for maintenance of independence of WWS from GDE

Personal View

- The community should prepare for the opportunity that we expect around 2010
- This means having engineered detector designs ready, along with the machine EDR (+ ~1 year)
- Organizing in this way will enhance credibility with funding agencies
- SiD should plan for this process, and work to engage a larger global “collaboration”
- Must maintain some openness to revision in design with future revelations
 - keep critical R&D alive

Detector Program (action for ILCSC)

- Write IDAG charge (begin now)
 - Will be discussed with concepts
- Recruit IDAG chair (2007)
- Form IDAG (by end of 2007)
- Invite CDRs (beginning of 2007,
to be submitted 2008)
- IDAG Reviews CDRs (during 2008)
 - With guidance, community Defines 2 detectors
- Invite EDRs (end of 2008)
- Take action at Beijing following discussion
and input from community



Personal Perspective

U.S. Program

- The U.S. spends \$800M+/year on HEP, and we must follow the priorities we set to move the field forward scientifically.
- The U.S. is in a unique position, due to the transitions in the US program at Fermilab and SLAC.
- The U.S. has the opportunity to take the lead on the ILC, to recapture a leadership role in HEP, and to even host this frontier facility.
- Beware of **“Lost Opportunities!!”**