

CLIC MEETING

1 - ILC – Frascati workshop

2 - Conventional Facilities & Siting

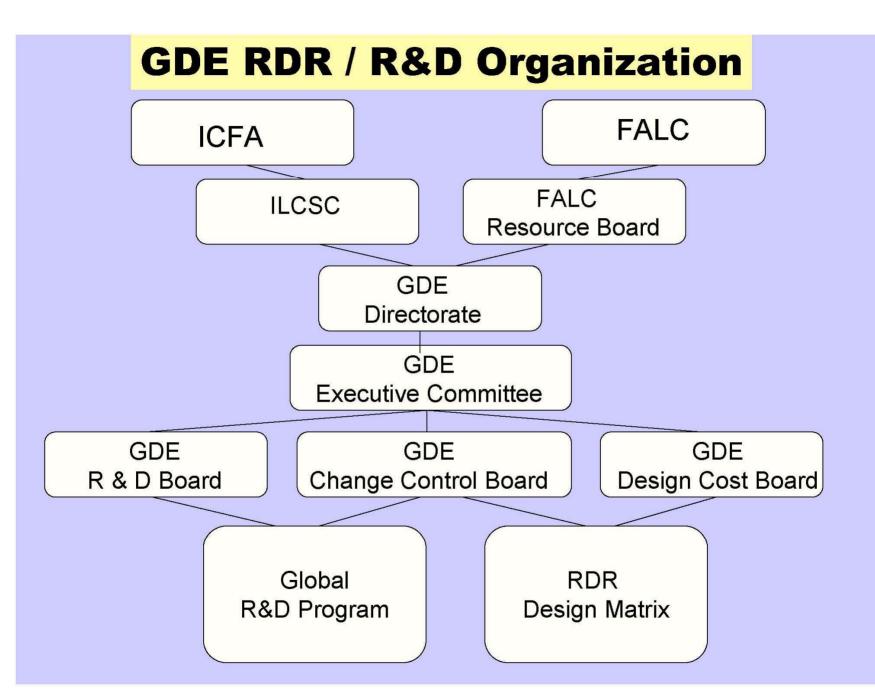
CFS Group of GDE

J.L. Baldy

13 January 2006

Global Design Effort

- The Mission of the GDE
 - Produce a design for the ILC that includes a detailed design concept, performance assessments, reliable international costing, an industrialization plan, siting analysis, as well as detector concepts and scope.
 - Coordinate worldwide prioritized proposal driven R & D efforts (to demonstrate and improve the performance, reduce the costs, attain the required reliability, etc.)



GDE Structure and Organization

- Executive Committee for Baseline Configuration
 - GDE Director
 - Barish
 - Regional Directors
 - Dugan Americas
 - Foster Europe
 - Takasaki Asia

Accelerator Leaders

- Yokoya Asia
- Raubenheimer Americas
- Walker Europe



 Responsible for decisions and documentation for the Baseline Configuration Document (BCD)

GDE Structure and Organization

• GDE Groups

- Design / Cost Engineers

- Shidara Asia
- Bialowons Europe
- Garbincius Americas

- Siting, Civil Construction and Infrastructure

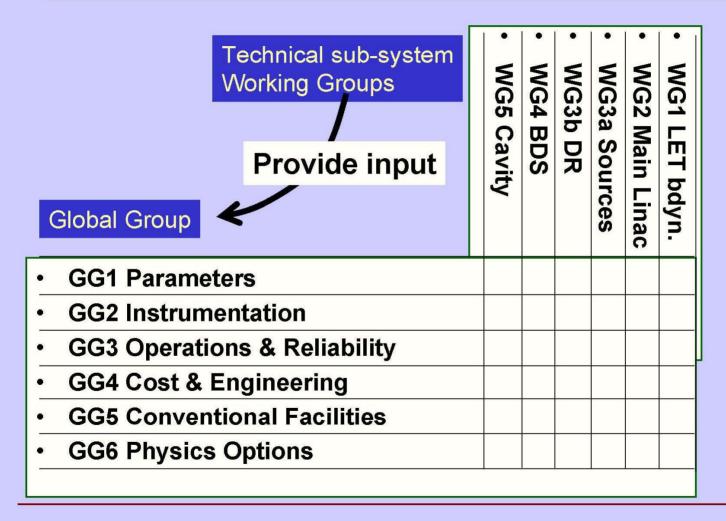
- Baldy Europe
- Enomoto Asia
- Kuchler Amercas

- Physics / Detectors (WWS chairs)

- Brau Americas
- Richard Europe
- Yamamoto Asia

- Accelerator Experts (44 GDE members)

GDE Organization for Snowmass



9-Dec-05

<u>Area</u> <u>Systems</u>	5				
e- source	e+ source	Damping Rings	RTML	Main Linac	BDS
	Kuriki	Gao	E.S. Kim	Hayano	Yamamoto (MDI Ch)
???		Guiducci	РТ	Lilje	Angal- Kalinin
			А	dolphsen	
Brachmann	Sheppard	Wolski		Solyak	Seryi

Technical Systems

Vacuum systems
Magnet systems
Cryomodule
Cavity Package
RF Power
Instrumentation
Dumps and Collimators
Accelerator Physics

Suetsugu	Michelato	Noonan
Sugahara	BINP ??	Thompkins
Ohuchi	Pagani	Carter
Saito	Proch	Padamsee
Fukuda	Saclay ??	Larsen
Urakawa	Burrows	Ross
KEK	??	??
Kubo	Schulte	??

Global Systems

	Commissioning, Operations Reliability	s &
	Control System	
	Cryogenics	
	CF&S	
	Installation	
Ì	9-Dec-05	GD

Terunuma	Elsen	Himel	
Michizono	Simrock	Carwardine	
Hosoyama	Tavian	Peterson	
Enomoto	Baldy	Kuchler	
Shidara	Bialwons	??	
JE - Frascati		2	6

Office of the Global Design Effort PO Box 500 Batavia, IL 60510 USA 630-840-8907

November 18, 2005

Dr. Gerry Dugan Regional Director for the Americas

Dr. Brian Foster Regional Director for Europe

Dr. Fumihiko Takasaki Regional Director for Asia

Dear Regional Directors of the GDE

As you are well aware, the detailed technical design and implementation of the ILC will be intimately connected to the features of the site where it will be located. For that reason, it will be important to have real site information during the technical design effort in a couple years. However, at the present time, our design effort is conceptual and we have much less need for specific site information. Therefore, it would be premature to solicit actual site proposals at his time.

More specifically, <u>our needs during the reference design effort are to learn about the factors that</u> are important in doing the siting and can help set site requirements. Secondly, it is important to <u>develop an ILC reference design that is consistent with the features of real sites</u>. For these reasons, I am requesting each regional director to produce information on one "sample" site in their region by this December 2005. Even though the final candidate sites are likely to be different sites, <u>the information on these sample sites will help to insure that we produce a realistic</u> reference design.

Let me assure you that the sample site information from the three regions will not be used to compare one site with another or to do any preliminary site selection, or in a way that will reveal those sites. Instead, we plan to study siting issues and to develop a reference design for a range of site conditions. We will not make public any detailed or individual site information and the chapter we produce on siting in the Reference Design Report will not discuss or compare individual sites.

Sincerely,

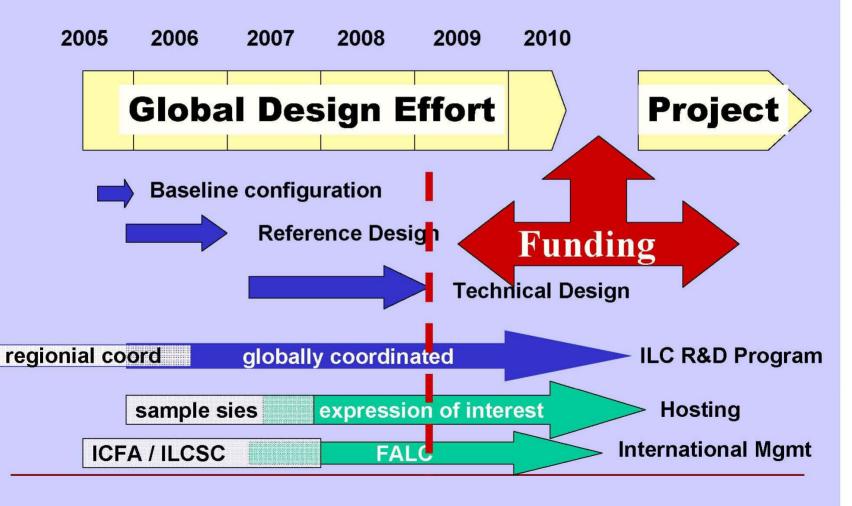
Bany C. Barick

Barry C. Barish Director, ILC Global Design Effort

Request for Sample Site Information

To be used to study siting issues, in advance of a call for "expressions of interest" to host the ILC





Baseline Configuration Document

- Our 'Deliverable' by the end of 2005
- A structured electronic document
 - Documentation (reports, drawings etc)
 - Technical specs.
 - Parameter tables
 -
- A 'printable / readable' summary document (~100 pages) ---- (available in January)

Arriving at the BCD (cont) 2005

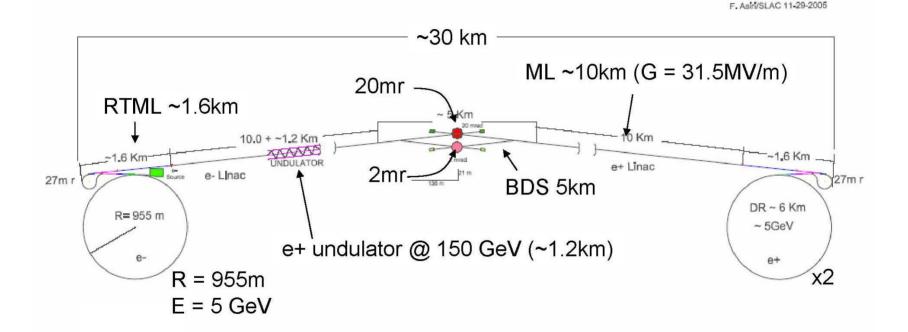
		T.	-			
August	September	October	November	December		
l		WW/GG summar	ies + broader input			
1		Response to Him	el list (40 question	S)		
			recommendations' v (request commun	and the second second second		
1			review	by BCD EC		
BCD Ex	ecutive Committe		 BCD EC publishes 'strawman' BCD 			
Barish				public review		
Dugan, Foster, Takasaki (regional directors)						
Raubenheimer, Yokoya, Walker (acc. design leads)				Frascati GDI meeting		
	C					

White Papers

Energy upgrade

- □ Lijle, Raubenheimer, <u>Toge</u>
- IP configuration
 - Bialowons, Markiewicz, Yamamoto
- Number of tunnels
 - Delahaye, <u>Hayano</u>, Phinney
- Location of positron source
 - Himel, Walker, Yokoya
- Tunnel topology
 - □ Funk, <u>Schulte</u>, Shidara

The Baseline Machine (500GeV)



not to scale

LC International Linear Collider Nick Walker – GDE meeting Frascati 8.12.05

BCD Formal Acceptance

- The Role of Change Control
 - □ today is <u>not</u> the final word!
 - requests for modifications will now be formalised via the CCB
 - many questions and decisions on details still remain (not currently in the BCD document)
 - CCB will probably be more of an 'Acquire Control Board' in the first few months.

Discussion Session: Problems

- New GDE Organization for RDR
 - We need systems integration
 - We need a single point of contact for each area, technical system and global group
 - We need infrastructure / Tools EDMS, management tools, etc
 - We need the technical manpower to carry out the work of the area groups, technical systems, etc
- Problem -- Communications within and between board, area groups, EC, etc. GDE websites – please post minutes, technical notes, meetings, etc (Max will help)



ILC EDMS Selection Committee Progress Report

Tom Markiewicz SLAC 7 December 2005 Frascati GDE Meeting



John Ferguson – CERN Lars Hagge - DESY Tom Markiewicz - SLAC (Chair) Richard Stanek - FNAL Nobu Toge - KEK Harry Weerts - Argonne



The committee should recommend a specific web based software solution, which may mean an integrated collection of distinct software packages that will allow ILC collaborators worldwide to store, search for and retrieve various kinds of documents.

At least three basic kinds of documents must be handled:

- 1. meeting/conference/seminar related files
- 2. publications/white papers/notes and
- 3. engineering documents:
 - CAD drawings, cost estimates, vendor quotes, and QC documents.



Products Considered

CERN Suite InDiCo (Meetings&Conferences-CERN written) **CDS-CERN** Document Server (CERN written) Not yet reviewed **CERN EDMS**, as used for LHC (Commercial) Axalant Datastream7i User Databases **DESY/FNAL UGS Team Center EDMS (Commercial) UGS Team Center Enterprise (DESY) UGS Team Center Engineering (FNAL)** Hybrids of these elements (for example) InDiCo + CDS + CERN EDMS InDiCo + CDS + TeamCenter InDiCo + TeamCenter

Each lab has invested many man years in customizing the underlying databases and tailoring the web user interface



Committee's Current Consensus (NB: Not yet a recommendation)

Use InDiCo for Meeting Management

- Back fill CERN or TC EDMS with InDiCo pointers & files
- Begin an ILC specific instance of InDiCo

Decide among TeamCenter, CDS & CERN EDMS for document & engineering control by applying Benchmark Functionality Tests that are being written into the Requirements Document

- Certain committee members already have an opinion
- Ideally we would construct a "light" ILC implementation of each product as part of selection process, but
 - Requires more time and resources than committee has
 - "Light" exercise unlikely to have adequate breadth & depth to discriminate



SUMMARY

- Organization overview / Activity of the CFS Group since Snowmass
- Requirements and general parameters
- American Sample Site
- Asian Sample Site
- European Sample Site (CERN and DESY Sample Site)
- Conventional facilities :
 - Facilities Design (Main tunnel, Access, Detector, surface building)
 - Power Distribution
 - Ventilation & Air-conditioning System
 - Cooling Water System
 - Handling Equipment
 - Safety and Fire Fighting System
 - Survey and Alignment
- Conclusion / Next Year Activities



Conventional Facilities and Siting Requirements and General Parameters

- 1. Accelerator energy: 0.5 TeV cm Initial, upgradeable to 1 TeV cm
- 2. Accelerator gradient: 31.5 MV/m Initial (500 GeV CM), 36 MV/m Final, each w/75% fill factor
- 3. Accelerator length: ~26 km Initial, including BC1, BC2, undulator, diagnostics, etc.
- 4. Crossing angles: 20mrad & 2mrad, length of BDS between wyes 3.84km
- 5. Damping ring length: 3 @ 6 km circumference each (1 line for electrons, two stacked lines for positrons)
- 6. Linac elevation; continuously curved to follow earth's curvature (horizontal)
- 7. Beam line alignment: Follow earth's curvature, laser straight Beam Delivery
- 8. Number of tunnels: 2, with periodic surface buildings
- 9. Number of interaction regions: 2 Final. One IR hall will be fully costed initially.
- 10. Overall Length of the Tunnel : ~30 km initial ; the site should accommodate ~50 km.
- 11. Vibration requirements



Methodology for sample site selection : Assessment Matrix

- 1. Site Impacts on Critical Science Parameters,
- 2. Scientific /Institutional Support Base,
- 3. Land Acquisition,
- 4. Environmental Impacts,
- 5. Construction Cost Impacts,
- 6. Operational Cost Impacts,
- 7. Environmental, Safety and Health Issues,
- 8. Regional Infrastructure Support, and
- 9. Risk Factors



Americas Sample Site

Situation :

In solid rock, close to existing institute, close to the city of Chicago and international airport, close to railway and highway networks.

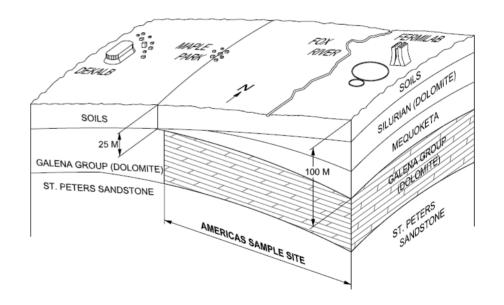
Geology :

Glacially derived deposits overlaying Bedrock. The concerned rock layers are from top to bottom the Silurian dolomite, Maquoketa dolomitic shale, and the Galena-Platteville dolomites.

Depth :

Average ~ 135 m

Americas Sample Plan / Section





European Sample Site - CERN

Situation :

Proximity of CERN existing site and the city of Geneva with its international airport. Possibility of connection with the SPS tunnel. Close to railway and highway network connections.

Geology :

Solid an stable bedrock called "molasse" (sandstone), which stretches between Jura mountains and Lake of Geneva.

Depth :

Average ~ 120 m



European Sample Site - DESY

Situation :

Closed to DESY existing site and the city of Hamburg with its international airport and seaport. The ILC layout will follow closely The TESLA layout on the first 32.8 km and then be extended to 50 km in the same specific direction. Possibility of connection with the HERA tunnel. Close to railway and highway network connections.

Geology :

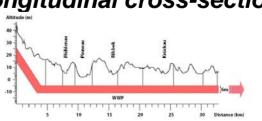
Quaternary sand and smaller part in marl. Tunnel situated below the ground water table over nearly entire length.

Depth:

Shallow position, average ~ 20 m

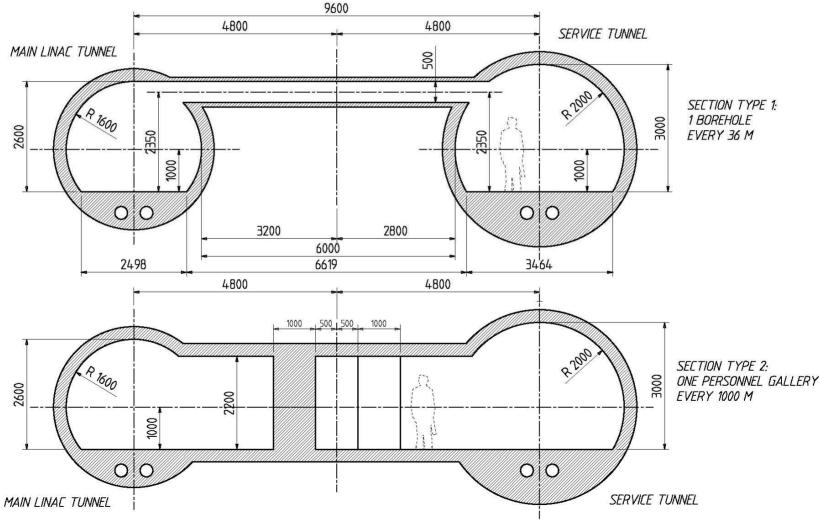
DESY Sample Plan







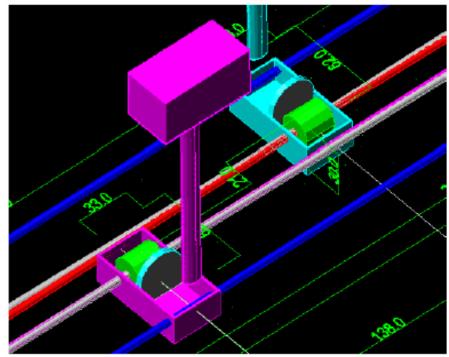
ILC Tunnel Cros sections





Detector Hall

- Two interaction zones
- An above grade assembly building and below grade collision hall.
- Inside space for each IR collision halls is 33 meter wide by 62 meter long by 30 meter high.
- Steel multi storey mezzanines to provide areas for computer, control room and office facilities.
- Other utility areas to house process water systems, electrical power services and air handling equipment.



Interaction Region



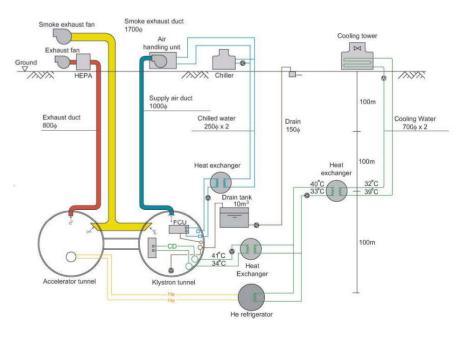
Conventional Facilities – Power distribution

- Supply from high voltage local network
- Substations → Staged medium voltages buried transport lines (loop ?)
- Supply to large users directly from medium voltage (cryo-compressors, modulators, ...)
- Substations \rightarrow Low voltage for other users on short distances
- Safety systems with charger / battery devices or stand by generators
- Network monitoring from industrialized systems



Conventional Facilities – Ventilation and Air-Conditioning

- Heat extracted with water whenever possible
- Air handlers in surface buildings, → required temperature and humidity for tunnel
- Chilled water / an coils in service tunnel to remove heat
- Tunnels used as full section ducts

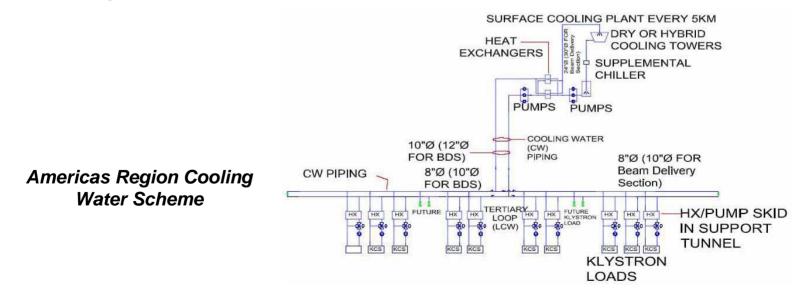


Asian Region Ventilation and Cooling Scheme



Conventional Facilities – Cooling water system

- Efficient cooling of klystrons, modulators and fan coils in service tunnel with water
- Cooling towers / hybrid towers / dry coolers / chillers in surface plants (every ~5 km)
- Heat exchangers and pumping station either at surface or underground





Conventional Facilities – Survey and Alignment

- Geodesic network with references points close to shafts.
- Additional leveling network.
- Geometry transferred to tunnels level through dedicated space in shafts.
- Underground references network to be set up (on slab or deeply anchored).
- Traverses based on gyroscopy likely to be sufficient for Civil Engineering work.
- Substantial studies and R&D to be carried out for alignment of components.
- Possible use of hydrostatic leveling system for linacs alignment.
- At IP, need for permanent view along beam through or aside detector.



CFS Reference Design Report (RDR)

Objective : to adequately define scope, cost and schedule of the ILC conventional facilities, so that the Technical Design Report of the conventional facilities can be fully executed within the baselines established from the RDR information.

Schedule : assuming a completion deadline of December 2006, this task is planned in three phases :

Phase I : the concept level of the report should be ready by March 06 Phase II : preliminary draft of the report should be ready by July 06 Phase III : the final draft should be ready by November 06

Information required : throughout phases I, II & III, increasingly detailed information will be required from each Area System and Technical System.



<u>NEXT GOAL</u> : be ready by Bengalore to start actual design

- New organization fully clear and operational (→ CFS point of contact)
- All pending important questions answered / decisions taken
 → to be translated into a general principle layout common to all
- Contents of RDR fully clear : level of details ? Documentation ?
- Sound/common bases for cost estimation



PRESENT TASKS

- Set up a Work Breakdown Structure / Area systems (with mention of site dependent and independent items)
- Set up a CF criteria list mentioning all structures and services
- Clarify/decide points of contact with Area, Technical and Global Systems (after KEK meeting next week)
- Collect all data relevant to CFS sector



WORRIES

- Time is short, specially between Bangalore and Vancouver (4 months to set up preliminary draft)
- Resources (CE Group very limited) need to place contracts with Consultants soon : budget ?
- Contribution from DESY ?



Work Breakdown Structure

CERN proposal

CX.1 Civil Engineering. Image: Civil Engineering. <th></th> <th>CONVENTIONAL FACILITIES</th> <th colspan="7">Site dependant</th>		CONVENTIONAL FACILITIES	Site dependant						
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