



# GDE Program for the ILC Technical Design Phase

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Presentation to the 'ILCDR08' Workshop Closeout,  
Cornell

Risk Reduction (Cost, schedule, technical)  
and  
Cost Reduction through R&D and design work



## GDE TDP Overall Goal or Mission:

- **Develop an 'ILC Project Proposal' by mid-2012**
  - A complete and updated technical description
  - Results from critical R&D programs
  - One or more models for a Project Implementation Plan that include in-kind contribution schemes
  - An updated and robust VALUE estimate and construction schedule



## TD Phases

### **Phase 1 (July 2010)**

- **Critical R & D**
- **Evaluate the potential for cost reduction**
- **Re-baseline to prepare for technical design**

### **Phase 2 (late 2012)**

- **consolidate the new baseline reference design**
- **detailed technical design studies**
- **updated VALUE estimate and construction schedule.**
- **critical R&D and technology demonstration milestones will be concluded.**
- **detailed development of the Project Implementation Plan.**



## This talk:

- **Background**
- **R & D priorities**
- **Design and Specification priorities**
- **Communication and organization**
- **Reviews**



# GDE Basis for TDP

- **Project Managers provide technical coordination, monitoring and communication**
- **Regional Directors work through funding agencies and institutional managers to authorize the work**
- **Group Leaders are the link between work package leadership and project managers**
  - Andy Wolski, Damping Ring Technical Area Group Leader
  - Mark Palmer – CesrTA work package leader
  - ...



# Role of in-kind R & D during TDP

- **SCRF (technology development) →**
  - development of regional/national/institutional/individual capability *working in parallel* with ILC development
  - development of common goals and plans a key strategy
    - e.g. XFEL
- **Test Facilities →**
  - *\*LC specific\**; purpose built
  - primary prioritization and funding authorization for ILC specific tests →
- **Design and Specification →**
  - strongly ILC specific
    - rebaseline 2010
    - updated design and estimate 2012
  - resource requirements? →



# Test Facility Program

- **ILCDR08 – The CesrTA kick off meeting**
- **Practical EC program:**
  - (Achievable within schedule, infrastructure and resource constraints)
    - TiN / NEG are clear baseline technologies
    - How ‘reliable’ are they? What is the synergy with vacuum?
    - How to extrapolate from tests to a mature design?
    - Benchmarking?? Parameter fitting?
    - Experimental program and interpretation – test accelerator beam time
    - Electrical/Geometric mitigation techniques
- **Globally comprehensive**
  - communication, development and documentation is our responsibility
- **Project Risk Mitigation**



# Minimum Machine Design

1. General layout considerations (“Integration”) whereby the goal is to reduce overall underground volume by more integrated use of tunnels, shafts and vaults.
2. Technical component specifications, for example water cooling parameters which should be less conservatively defined for individual sub-systems.
3. Accelerator performance specifications, for example reducing the number of individually powered magnets (“stringing”), relaxing alignment stability requirements and environmental specifications (temperature stability).





# CF / S Strategy

- **RDR: Deep Rock, twin tunnel configuration**
  - strong similarities → each region developed the same design
- **Value Engineering:**
  - understand the cost drivers; review and evaluate the technical criteria that define them
    - underground volume
    - tunnel dimensions; second tunnel
    - stability and etc

## Goal:

- Devise practical, 'minimum', technical criteria
- Strategy (must be site-independent):
  - Develop contrasting machine configurations
    - *for example: shallow site (Dubna); single tunnel (XFEL), etc*
- Implement comparison and analysis process between these and the RDR baseline

- Update site specifications; recommend further technical development and R & D



# Damping Ring Area Group:

- **Minimum Machine effort connection**
  - (draft plan to be mailed to all shortly)
  - is a *integrated* effort (focus on central complex)
- **Re-baselining well underway from RDR**
  - new layout
  - technical advances
  - the DR Area Group should take credit for this
- **Lead the groups in documentation process**
  - this is our deliverable
- **need to define goals for April 2009 review**



# Documentation

- **Transition to electronic document management will take time**
  - needs strong pro-active support and involvement
- **DR Area Group has an excellent record with ‘structured documentation’**
  - must be kept up and developed
- **Fundamental activity**
  - forms the basis of next step for ILC
- **Basic part of moving from a loosely-knit set of collaborations and bilateral agreements toward a project**

# Global Resource base 2007-2010: Accelerator Systems

		FTE-Years							total M&S							
		Elec. Source	Posi. Source	Damping Rings	RTML	Beam Delivery	Simulations	total FTE-years	Elec. Source	Posi. Source	Damping Rings	RTML	Beam Delivery	Simulations	total M&S	
Americas	Canada			5				5			20				20	k\$
	USA	11	8	28	1	48	16	113	617	144	7174	3	3847	190	11975	k\$
Asia	China			12	4	20	2	38		69	686	14	27	14	809	k\$
	Japan	2	7	16		23	4	52			6447		3348		9795	k\$
	Korea			2	2	4	3	12			28	28	217	28	301	k\$
Europe	EU (CERN)			2		1	4	7			10		3	13	26	k\$
	France		11		5	12		27		573			9		582	k\$
	Germany		22	3		4	4	33		47	10		53	20	129	k\$
	Italy			17				17			441				441	k\$
	Spain					2		2								k\$
	Sweden				2	2		3								k\$
	UK		10	11		85		106		70	124		3069		3263	k\$
		13	57	97	14	201	33	415	617	903	14939	44	10574	264	27342	

- **Notes:**

- Test facilities account for ~80%
  - Damping Ring is largest M&S; largest ongoing FTE
  - Fraction to devote to Design and Specification tasks?
- Currency conversion based on 01.01.2008



# TDP External / Internal Reviews

## Reviews by:

- **Project Advisory Committee**

- J. – E. Augustin, Chair
- reports to ILCSC
- October 19-20, 2008
- includes detector group review (50 / 50?)
- will involve project managers (tbc)

- **Accelerator Advisory Panel**

- Bill Willis, Chair
- reports to Project Director, Barry Barish
- April 2009 (tbc);
- facilitated through ongoing, 'embedded', interaction between Panel and TDP Managers
- 10 to 15 reviewers (?)
- will involve Group Leaders and their support



# GDE - DR Meetings

- **Twice monthly meetings important**
- **DR workshops**
  - essential to provide focus on R & D
  - (Kickers, impedance, Vacuum,...)
  - Integrated with GDE meetings?
- **One broadly based collaboration meeting / year**
  - DR participation and involvement important
- **4 AAP reviews**
  - alternating with above (tbd)
- **schedule DR meetings to avoid overlap and optimize review preparation process**



## Preparation for April 09 review

- **Goals for DR Area Group?**
- **Basis for the review will be the 'TDP R & D Plan'**
- **We should show:**
  - progress and direction toward R & D goals
  - minimum machine definition and potential for cost reduction
  - consistency with longer term TDP activities: (re) baselining, preparation for updated Value estimate, documentation process
  - resources, plan, schedule...
- **2009 review is our first 'real' review →**
  - please consider the likely charge; develop DR Area Group responses