Americas

ART Program Overview

- US Program overview
  - ART Program Goals
  - GDE Role
  - ART Management/Strategy
- ART Program – snapshot
  - Highlights
  - Trends
  - Issues
- Program beyond 2012
- Conclusions

Particle Physics Project Prioritization Panel (P5) – US Strategic 10 year plan, June 2008

"Whatever the technology of the future linear collider, and wherever it may be located, the US should plan to play a major role. For the next few years the US should continue to participate in the international R&D program for the ILC. This R&D will position the US for an important role should the ILC be the choice of the international community"

- **"The panel recommends for the near future a broad accelerator R&D program for lepton colliders that includes continued R&D on the ILC at roughly the proposed FY2009 level in support of the international effort"**

This is about as close to a mission statement that ART possesses. On the basis of this recommendation the ART budget for FY09 -> FY12 at $35M/yr.

ART Program Strategy

- The US ART program is designed to:

  1. Support the Global Design Effort (GDE) goals (international collaboration)
  2. Position the US optimally to make contributions consistent with the US HEP community priorities (future program)
  3. Consistent and synergistic with our US lab plans & programs (intrinsic merit)

  Not what one would term a completely crisp or consistent set of criteria. More like a virtual lab rather than a 'project'.

  The ART program is integrated into the GDE Technical Design Phase which runs until 2012 and has the goal of Project Proposal.

ilc
Americas

GDE Program themes

Remains special case

Industrialisation in-kind contribution models

SCRF Technology

- Regional expertise, global Industrialisation
- Average accelerating gradient
- Cost (cryomodule, mass-production models)

R&D (General)

- Sources
- DR (e-cloud)
- BDS / MDI

Site requirements

AD&I (CFS)

- Consolidation of baseline(s)
- Design choices (parameters, layout etc.)
- Design work (documentation)

Project Schedule

Cost & Schedule

- ICET (schedule tool)
- Traceable, defendable
- Justification

Remaining Technical activities

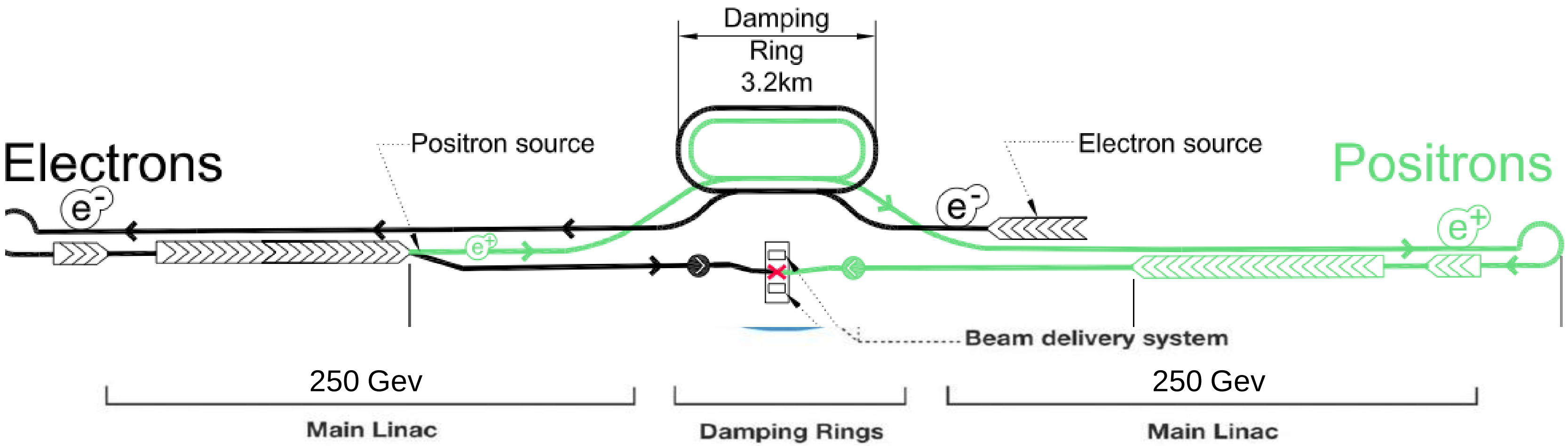
TDR Risk

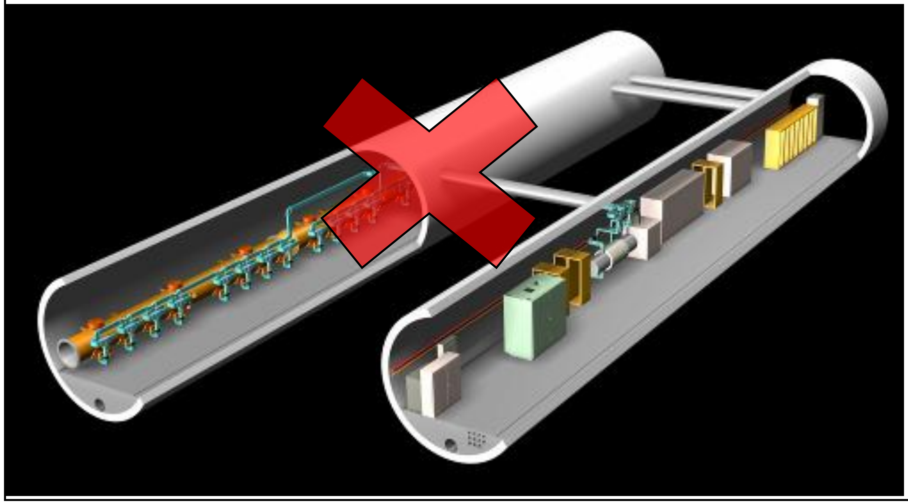
- R&D (and engineering) beyond 2012
- Impact (design, cost, schedule)
- Mitigation (fall-back solutions)

>2012

Project Implementation Plan

ILC Baseline Design - Evolves





e+ e- Linear Collider

Energy	250 Gev x 250 Gev
Length	11 + 11 km
# of RF units	560
# of cryomodules	1680
# of 9-cell cavities	14560

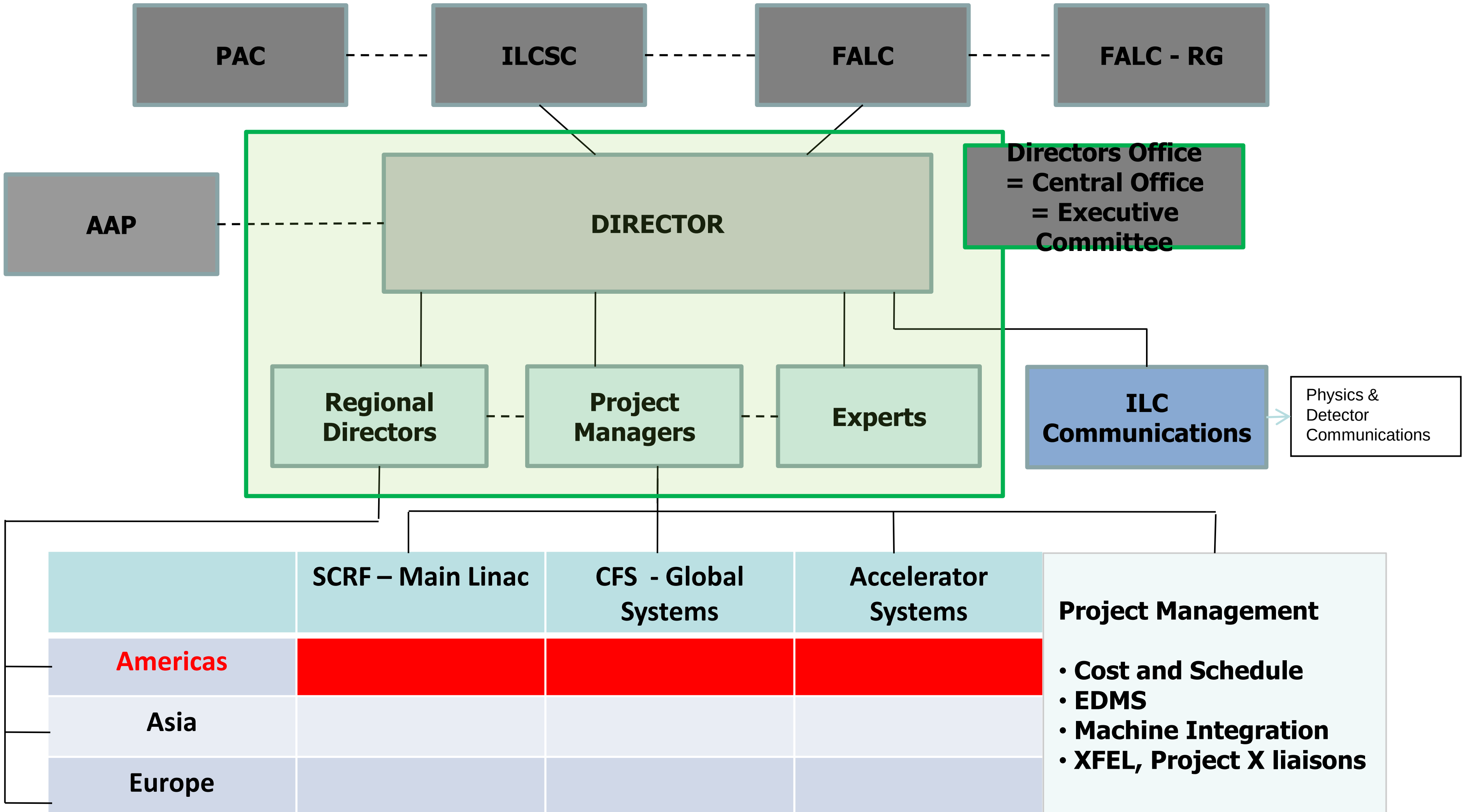
2 Detectors push-pull

2e34 peak luminosity

5 Hz rep rate, 1000 -> 6000 bunches per cycle

IP spots sizes: σ_x 350 – 620 nm; σ_y 3.5 – 9.0 nm

GDE Global Organisation



GDE Technical Management

Akira Yamamoto – Project Manager, SCRF Tech.

Marc Ross – Project Manager (chair), CFS & Global

Nick Walker – Project Manager, Accelerator Systems

- Tetsuo Shidara (KEK)
- Jim Kerby (FNAL)
- Wilhelm Bialowons (DESY)
- John Carwardine (ANL)
- Frank Lehner (DESY)
- Junji Urakawa (KEK)

SCRF Tech.:

- RongLi Geng (JLAB) – Cavity Processing
- Hitoshi Hayano (KEK) – Cavity Production & Integration
- Norihito Ohuchi (KEK) Leader, Harry Carter (FNAL) Co-Leader – Cryomodule
- Shigeki Fukuda (KEK) – HLRF
- Tom Peterson (FNAL) – Cryogenics
- Chris Adolphsen (SLAC) – Main Linac Integration

CFS & Global:

- John Osborne (CERN) – Civil Engineering
- Vic Kuchler (FNAL) – Conventional Facilities

Accelerator Systems:

- Axel Brachmann (SLAC) – Electron Source
- Jim Clarke (STFC) – Positron Source
- Susanna Guiducci (INFN) – Damping Ring
- Nikolay Solyak (FNAL) – RTML
- Andre Seryi (SLAC) – BDS
- Kiyoshi Kubo (KEK) – Simulation

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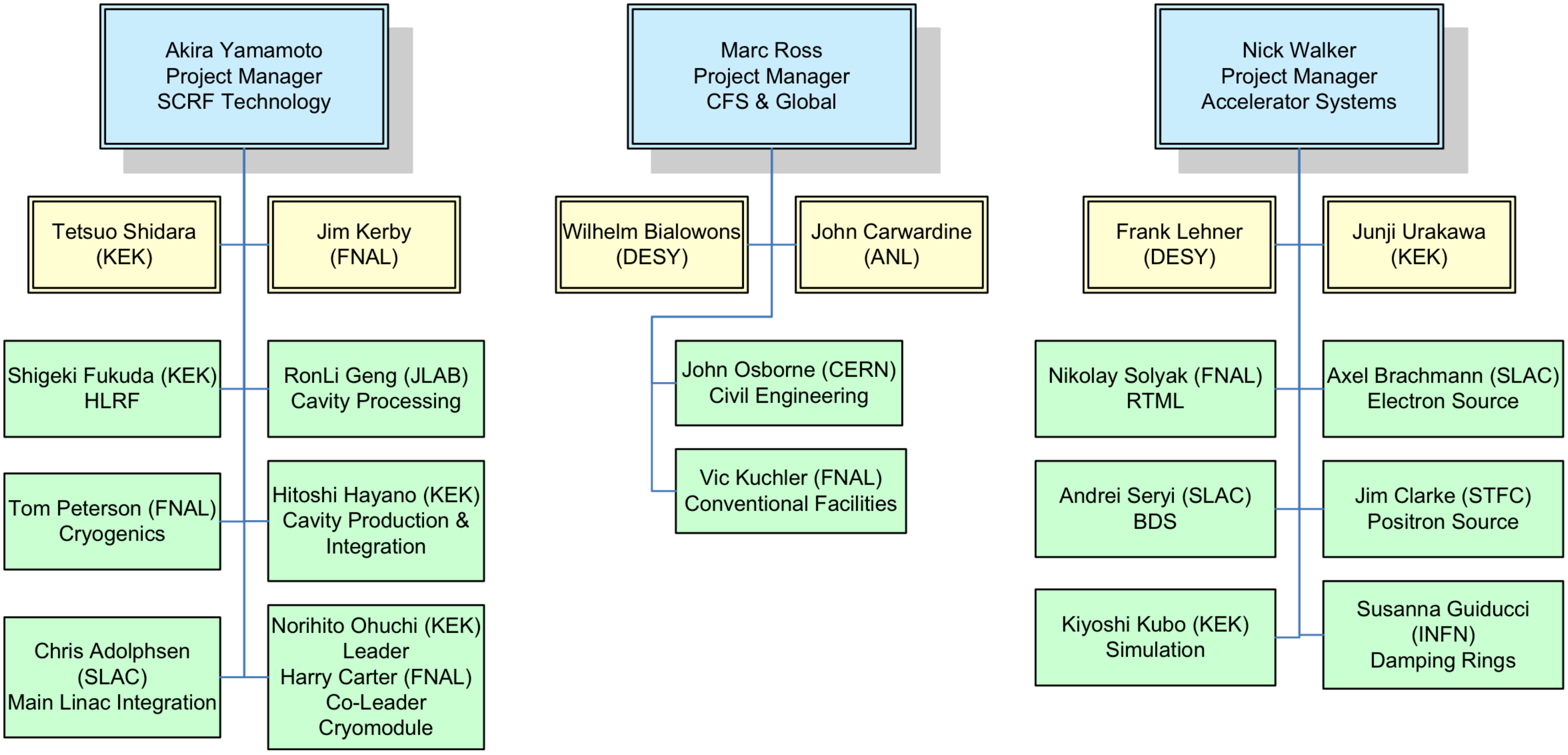
- **Engineering and Scientific Management**
  - 7 Asia
  - 6 EU
  - 11 Americas

US plays a significant role in the GDE management

GDE Technical Management



US plays a significant role in the GDE management

ART Program contributions to the GDE

The US ART program contains:

- High gradient cavity development (JLAB/Fermilab/Cornell/ANL)
- Cryomodule design and fabrication (Fermilab)
- HLRF (SLAC)
- Electron cloud/high brightness experimental program (Cornell +………)
- Beam Delivery system design (SLAC)
- Final focus & MDI (BNL, SLAC)
- RTML (Fermilab)
- Positron production (ANL, LLNL)
- Electron source development (SLAC, JLAB)
- Beam Test Facilities ATF2, FLASH (SLAC, ANL)
- Conventional Facilities (Fermilab)

All elements of the program have well defined deliverables for 2012.

US ART Program – SRF technology

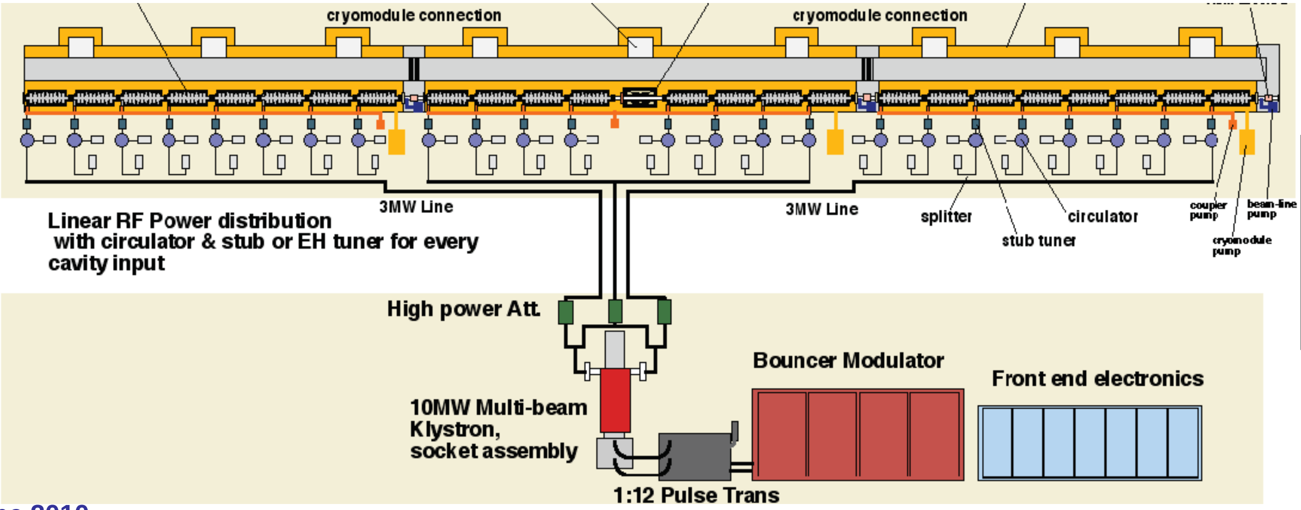
- Cavities – Fermilab, ANL, JLAB, Cornell
- Cryomodules – Fermilab
- HLRF Systems – SLAC
- LLRF Systems – Fermilab, ANL, SLAC

- The SRF technology development is about 50% of the total ART program through 2012

ART SRF R&D Program Deliverables (2012)

The highest priority activity in the ART program is SRF development which represents 50% of the total effort. In collaboration with Fermilab Project X, the deliverables are:

- High gradient cavity fabrication (35 MV/m, yield 80%) tech transfer to at least 2 North American vendors completed
- Cryomodule type 4 design, fabrication and horizontal testing completed for 3 cryomodules
- Marx modulator, tunable power distribution system
- LLRF control
- String test of a complete, high gradient, RF unit; installed



ILC RF Unit: 3 CM, klystron, modulator, LLRF

The ART Program – Management

There is no ART organisation chart per sec, we are matrixed into the national labs. The ART management team:

SLAC:	Nan Phinney
Fermilab:	Bob Kephart
JLAB:	Bob Rimmer
ANL:	Rod Gerig
LBNL:	John Corlett
BNL:	Brett Parker
LLNL:	Jeff Gronberg
Cornell:	Mark Palmer

ART Management Process

- Annual program scope documented at the lab level together with milestones at the beginning of the fiscal year i.e. goals for this year. This is in the context of a multi-year US R&D plan. The detailed program is determined on an annual basis.
- SRF Cavity program co-ordinated nationally (Mark Champion)
- Monthly (ish) conference calls with the national lab senior managers
- ART Face-to-Face meetings at the GDE bi-annual meetings
- Labs visits by ART management (MH) + Marc Ross when possible. These discussions are both technical and management. Fermilab (ANL) – monthly, SLAC – quarterly, JLAB – biannual, BNL - monthly, Cornell – biannual. TRIUMF – annually.
- Weekly GDE Executive Committee conference calls. EC face-to-face meeting every few months
- Bi-annual reports from the labs
- Germantown meetings every ~ 2 months with OHEP, NSF briefings bi-annual.

ART FY09 Program Milestones Final

WBS System	Milestones (FY09 only)	Institution	Initial Forecast	Actual	Current Forecast	Comments
1.2 Electron Sources	Laser bunch pattern demo	SLAC	Q1	Q1		
	Full Laser system demo	SLAC	Q4		2010	issues with laser power
1.4 Damping Rings	Grooved coated chambers for Cornell and KEK	SLAC	Q3	Q2		
	transfer e-cloud expts PEP II -> CESR TA	SLAC	Q1	Q1		
	CESR TA low emittance lattice	Cornell	Q2	Q2		
	Complete final CESR TA machine hardware installation	Cornell	Q3	Q3		
	Evaluate CESR TA damping ring configuration	Cornell	Q4	Q4		
	Specialized vacuum chambers to Cornell	LBNL	Q3	Q2		
1.5 Accelerator Physics	Evaluate positron yields	ANL	Q4	Q4		
1.6 Beam Delivery	Redesigned BDS layout for minimal machine	SLAC	Q4	Q4		
	Complete ATF2 hardware	SLAC	Q1	Q1		
	MDI IR interface document	SLAC/BNL	Q2	Q2		
	Final focus prototype coil vertical testing	BNL	Q4		2010	coil winding issues with mechanical deflections
	ATF2 FF coil winding start	BNL	Q3	Q4		program under discussion with KEK
1.7 Conventional Facilities	Complete water & HVAC VE	FNAL	Q4	Q2		
	Main Linac tunnel alternates	FNAL	Q4	Q4		
	Minimum machine CFS conceptual design	FNAL	Q4	Q4		
1.8 Global systems	VME adapter prototype	SLAC	Q3	Q4		
	L-Band test stand controls demo	SLAC	Q3	Q3		
	FLASH phase 1 report	ANL	Q4	Q4		
1.9 HLRF	2nd generation Marx design	SLAC	Q4	Q4		
	Sheet beam klystron beam tester	SLAC	Q3	FY10 Q1		
	Fabricate RF distribution system for Fermilab CM testing	SLAC	Q2	Q2		
	RF test stand - Marx prototype 1500 hrs	SLAC	Q4	FY10 Q2		made ~800 hrs in FY09
	Cluster klystron POP - stage 1	SLAC	Q4		2010	decision & funding delayed by GDE
	10 couplers to Fermilab	SLAC	Q3	FY10 Q3		
1.10 Cavities & Cryomodules	Complete & commission ANL/Fermi processing Facility	ANL/FNAL	Q2	Q2		
	First dressed 1.3 GHz cavity tested	FNAL	Q3	FY10 Q1		
	Start testing Cryomodule 1 at NML	FNAL	Q3		FY10 Q3	
	All Cryomodule 2 components available	FNAL	Q4	FY10 Q1		
	Complete 8 dressed cavities	FNAL	Q4		FY10 Q3	3 complete in FY09
	30 EP/VTA test cycles (15 Q2 + 15 Q4)	JLAB	Q2/Q4	Q2/Q4		83% & 97% respectively
	Complete 2 9-cell large grain cavities	JLAB	Q4		FY10 Q2	
	Test vertical EP system prototype	JLAB	Q4	Q4		both single & multicell

ART FY10 Program Milestones

WBS System	Milestones (FY10 only)	Institution	Initial Forecast	Actual	Current Forecast	Comments
1.2 Electron Sources	laser system operational	SLAC	Q2	FY11		
	ILC bunch train in SLC gun	SLAC	Q2	Q1		
	HV gun at 200 KV	JLAB	Q4		Q4	
	second generation electrode design	JLAB	Q3		Q3	
1.3 Positron Source	Flux concentrator conceptual design & feasibility	LLNL	Q4		Q4	
	Lithium Lens feasibility study complete (report)	Cornell	Q3	Q2		
1.4 Damping Rings	Complete hi-res BPM system	Cornell	Q1	Q1		
	Install e-cloud mitigating vacuum chambers	Cornell	Q2	Q2		
	Complete CESR TA phase 1 scope	Cornell	Q4		Q4	
	Define e-cloud mitigations for ILC DR	SLAC	Q4		Q4	
1.5 Accelerator Physics	Evaluate positron yields under parametric variations	ANL	Q4	Q3		IPAC 10 paper is the milestone
	bunch compressor stability studies (at FLASH)	FNAL	Q3			
1.6 Beam Delivery	wind and test final focus prototype coil package	BNL	Q4		Q4	
	ship ATF2 fast emittance monitor: OTR (with Spain)	SLAC	Q3		Q3	
	Beam dump TDR (with India)	SLAC	Q3		Q3	
	Commission ATF2 software for nominal optics & beam size	SLAC	Q4		Q4	
	Complete TDP II BDS optics (with UK)	SLAC	Q3		Q3	
1.7 Conventional Facilities	Complete single tunnel surface layout	FNAL	Q4		Q4	
	Single tunnel US life safety study complete	FNAL	Q4		Q4	
	Update criteria for revised TDP II CFS baseline	FNAL	Q4		Q4	
1.8 Global Systems	MicroTCA demonstration - Marx P2 Interlocks	SLAC	Q4		Q4	
	ACTA VME adapter demonstration	SLAC	Q3		Q3	
	Organize DESY beam loading workshop	ANL	Q2	Q2		
	Submit FLASH 9mA studies proposal	ANL	Q3		Q3	
1.9 HLRF	sheet beam klystron review (requires cavity instab test)	SLAC	Q2	Q2		Program cancelled
	klystron cluster POP phase I R&D comlpete	SLAC	Q3		Q4	
	components in-house for CM2 RF power system	SLAC	Q4		Q4	
	Marx phase 2 power cell tests	SLAC	Q4	Q3		
1.10 Cavities & Cryomodules	2 dressed cavities for S1 global	FNAL	Q1	Q1		
	CM2 dressed cavities complete, fabrication start	FNAL	Q3		Q4	
	CM1 testing start	FNAL	Q3		Q3	
	demonstrate 4 EP's per month	ANL	Q3	Q2		
	demonstrate 9-cell cavity repair (4 units)	Cornell	Q4		Q4	
	30 EP/VTA test cycles (15 Q2 + 15 Q4)	JLAB	Q2/Q4		Q4	
	demonstrate 9-cell cavity repair (2 units)	JLAB	Q2/Q4		Q4	

ART DOE FY11 proposed Funding by System ($35M)

Program Element	$M	%
GDE & Lab Management	4.26	12.1
Electron & Positron Source	2.09	6.0
Damping Rings	2.35	6.7
Beam Delivery	4.10	11.7
Accelerator Physics	1.69	4.8
Global systems	1.23	3.5
RF Technology (SRF + systems)	15.70	44.8
Conventional Facilities	1.46	4.2
Contingency	2.19	6.3

Nominally ~ 95 FTE's

ART FY11 Allocations - from $35.0M total

Institution	$M
SLAC	10.32
Fermilab	11.55
JLAB	2.15
BNL	2.1
Argonne	1.4
LLNL	0.8
LBL	0.4
Cornell	2.35 + ~ 5 (NSF)
GDE (mostly at Fermilab)	1.9

I have the detailed budgets for FY10 if useful to the committee

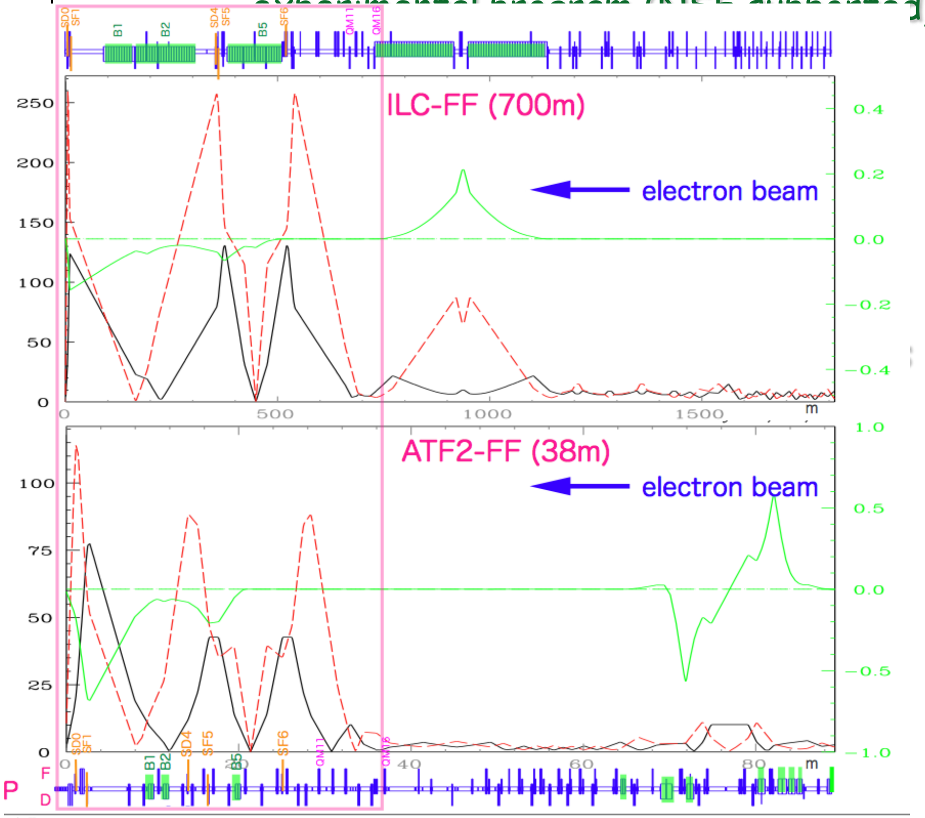
Americas

FY10 – Highlights

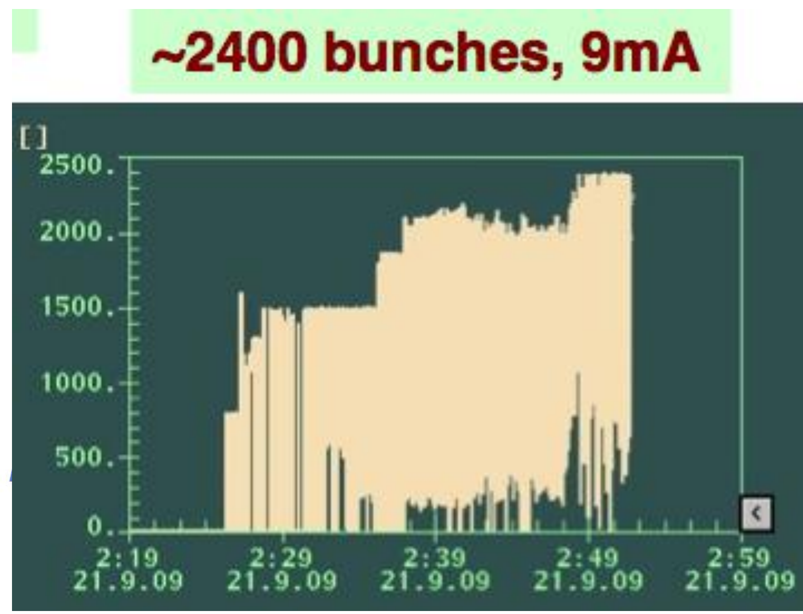
- Budget arrived on time and at the agreed upon level ($35M). Thank you agencies.
- Cavities
  - The first US cavity manufacturer is well established and we are working on number #2. Significant progress is in gradient is evident. Cavity yield is also improving. Starting to look at repair possibilities (yield of 100% ??)
- Dressed cavities
  - The first two attempts had issues but the underlying experience is very positive. We can dress a cavity in a week. We have also shown that there is no systematic gradient degradation in the dressing process

FY10 – Highlights

- CESR TA (Cornell)
  - The CESR TA e-cloud/brightness program is on track to finish on time and also appears (to me at least) that mitigation techniques are promising. The program is evolving to analize (and incorporate into the baseline) the results and launch a smaller follow on experimental program (NSF supported)



Assuming perfect lattice, no further imperfections (!)



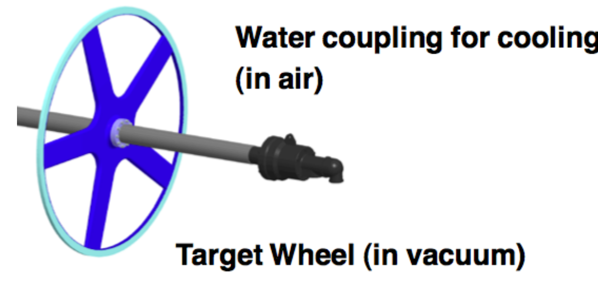
Program Trends

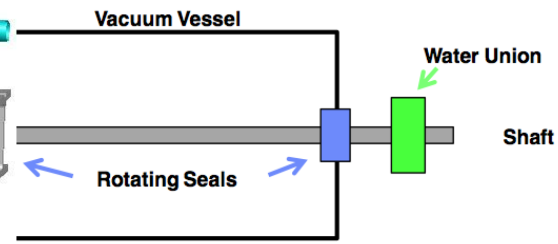
Risk Area – Pulsed Flux Concentrator

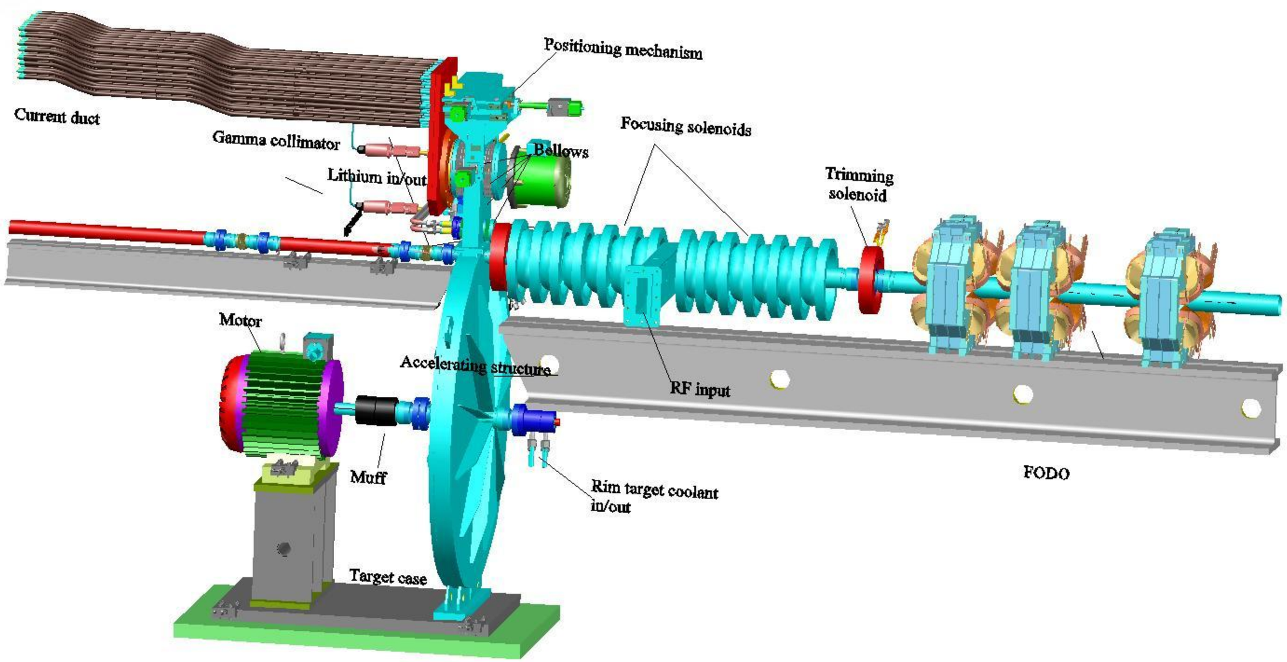
- Design based on Brechna Magnet

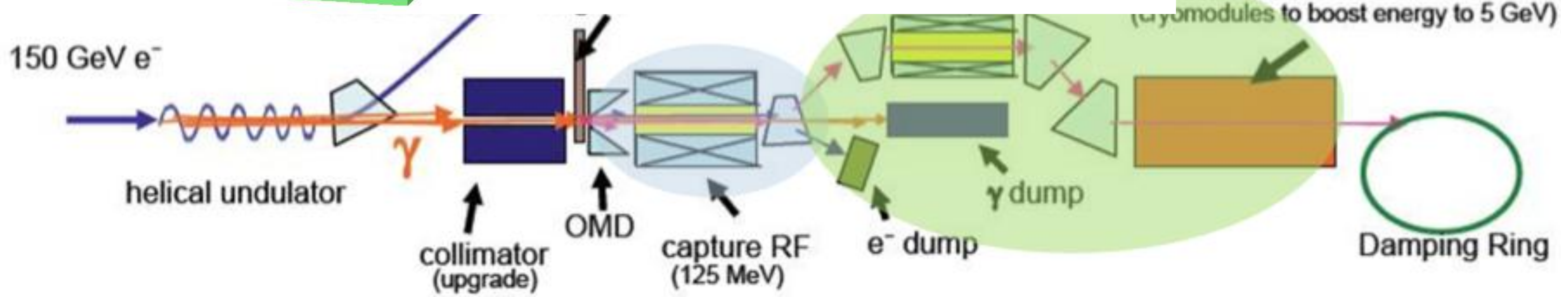
Parameter	Brechna	ILC	Units
Field Strength	10	4	T

Wheel-less mockup of rotating shaft and seals





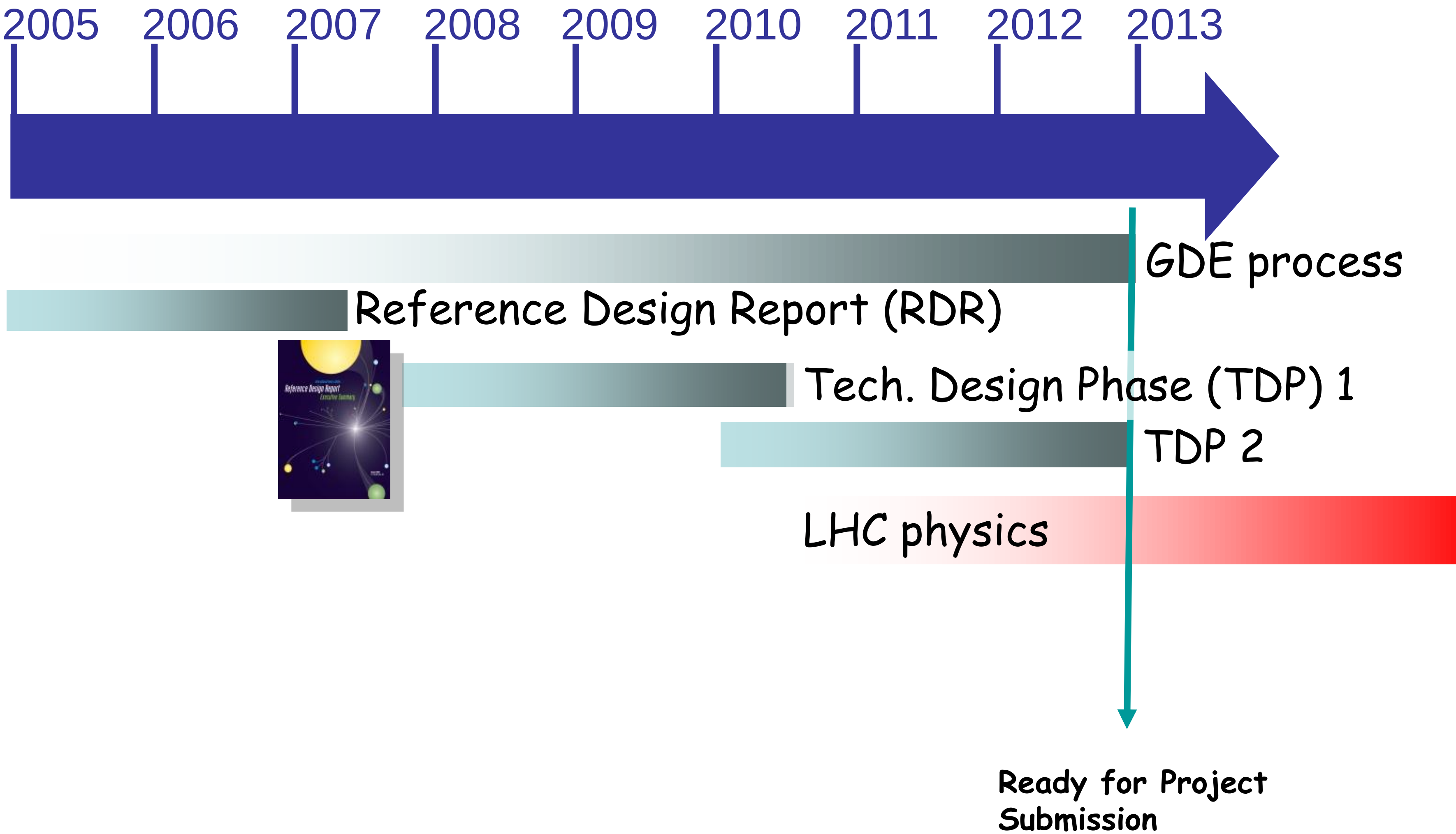




The ART Program – Issues

- Andrei Seryi, who has led both the US and the GDE beam delivery system program throughout the ILC R&D phase is leaving to head the John Adams Institute in the UK. We will split the ART effort into the machine detector interface (Tom Markiewicz – SLAC), ATF2 (Glen White – SLAC), final focus & IP design (Brett Parker – BNL). These efforts will continue to be co-ordinated through the GDE.
- Evolution of the CESR TA program in a way to capture the R&D results into the ILC baseline design, write up the data, as well as support the reduced experimental program.
- Cavity yield: Gradient is demonstrated but 90% yield ?
- ATF2 SC quad upgrade – will KEK operate the facility after JFY12 ? Requires non-trivial funding in FY11 before we will know about KEK plans for ATF2
- Increased resources for push-pull work – a formal request from BDS/MDI
- Project Ambiguity: The ILC remains an unapproved project with an uncertain timeline. How do we proceed after the R&D program ends

GDE ILC Timeline (circa 2008)



The View from ATLAS on physics requirements

- Precision EW and top measurements
- Search for SUSY at > 1TeV after a few fb^{-1} at 14 TeV
- Standard Model Higgs:
  Exclude with 2 fb^{-1} at 14 TeV
  5 σ Discovery with ~20 fb^{-1} in full mass range (M_H>115GeV)
- Z′, graviton with early data
  - Up to to 3.5TeV with 10 fb^{-1}
- Compositeness, Vector-Boson scattering at high L.
- LHC lifetime goal remains high
  - 250-300 fb^{-1}/year, total L=3000 fb^{-1} by 2030
  - Fully explore the energy frontier, SUSY, extra dim, Z′, W′…

Estimated LHC performance – *(Chamonix 2010)*

- **2012: splice consolidation (and DS collimator prep (?))**
- **2013: 6.5 TeV ~25% nominal intensity**
- **2014: 7.0 TeV ~40% nominal intensity**

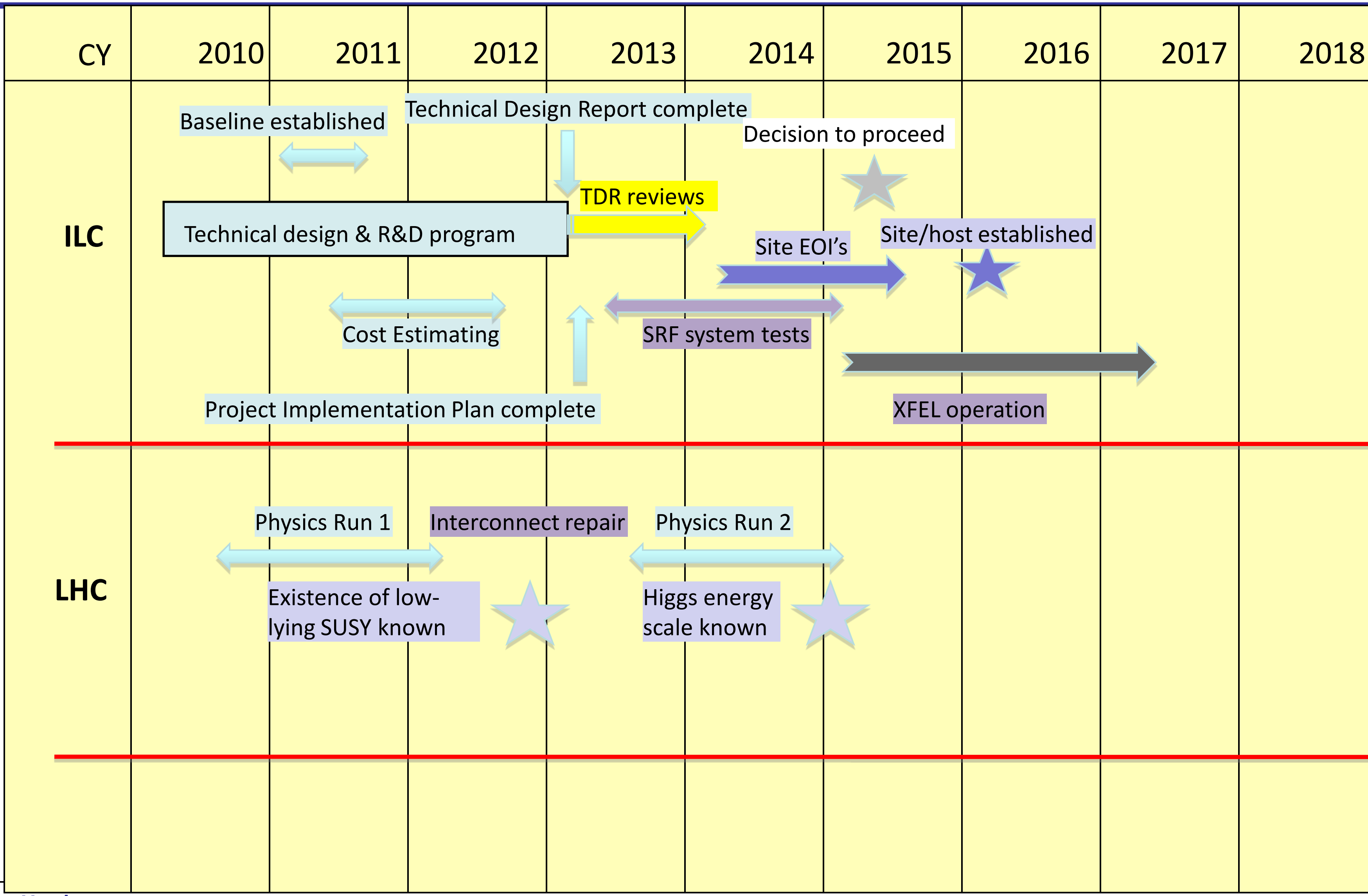
Year	Months	energy	beta	ib	nb	Peak Lumi	Lumi per month	Int Lumi Year	Int Lumi Cum.
2010	8	3.5	2.5	7 e10	796	1.4 e32	-	0.1	0.1
2011	9	3.5	2.5	7 e10	796	1.4 e32	0.1	0.9	1.0
2012									
2013	6	6.5	1	1 e11	720	1.2 e33	0.9	5.4	7
2014	7	7	1	1 e11	1404	2.3 e33	1.8	13	20

Optimistic—
Pessimistic down by
Factor of two

Luminosity estimates

Americas

ILC possible timeline



Why 2012 ? – The Accelerator Advisory Panel, Feb 2010

- **The AAP points to uncertainties beyond 2012 in their conclusions:**
  - *"Some aspects of the R&D for the ILC will have to continue beyond 2012."*
  - *"The milestone 2012 is however timely placed. The LHC will be providing operating experience of a large facility and with some luck the first physics discoveries will emerge."*
  - *"The HEP community is thus well prepared for the decision for the next facility. In a sense the construction of the ILC seems the natural evolution of that process, in which case the efforts for the ILC have to be ramped up without delay."*
  - *"Nature may be less kind or science policy makers not ready for a decision on the next big HEP project. In this case the large community must be engaged to facilitate the decision for the construction of the next HEP project."*
- **We need to prepare for uncertainties in the path to the ILC after 2012, including what LHC tells us.**

The US ILC Program– Post 2012

The goal of the US ILC program immediately following the end of the global R&D phase in 2012 is to "position US to be a significant partner at ~ 10-20% level in a global off-shore ILC, should it go forward."

The decision to proceed with the ILC as a construction project is assumed to be made at some point in the medium-term future, after the submission of the technical design report and the associated cost estimate at the end of 2012.

US activities during this period should be built on the current R&D program and start to prepare for possible US contributions to a construction project

The assumed timeline is:

- 2012 – TDR + cost estimate submitted to 'FALC' (CY12), SRF string test assembled at Fermilab. Concludes the 5-year R&D program.
- 2013 – project proposal reviewed, string test operation
- 2014/15 - potential US role established, "FALC" recommends project decision, CD0 required for DOE participation.

("FALC" – potential collaborating countries)

The US ILC Program – possible US contributions to a construction project

Any US contribution will, at present, require cavities as a major element since globally the number of qualified vendors is small and all qualified production will be needed to meet the ILC volume. Although the situation with respect to cryomodules is less well developed at this point in time a similar logic would seem to apply in regard to US expertise and the needed number of cryomodules. 33% of the cryomodule costs, which includes cavities, is currently 7.5% of the total value estimate by the GDE.

At this time we assume that 2/3 of a US contribution would be SRF related covering at least 33% of the cryomodules. The remaining 1/3 would cover sources, damping rings and the machine/detector interface. The post 2012 program would be formulated to support this concept.

A significant element of the program will involve value engineering to be performed with US industry. Particularly cavities, cryomodules and RF systems. Full industrialisation of components at the scale required for the ILC will not be possible until some form of project approval is forthcoming. Until that point the process is better described as technology transfer and production engineering. This will prepare US industry for US contributions. Project X currently intends to cease 1.3 GHz R&D cavity production.

The US ILC Program– Program elements post 2012

As the TDR phase and the associated R&D program concludes then the technical elements of the program will be drastically curtailed (CESR TA, electron source, HLRF, LLRF, cryomodule design, BDS design.

We will switch to operating the systems test facilities that were fabricated as part of the R&D program e.g. NML. The Fermilab SRF string test will be commissioned in 2012 but the regular facility operations will not start until FY13.

We will continue to support beam delivery system development at the KEK test beam facility (ATF2). This of course is contingent on KEK deciding to continue to support ATF program past the currently approved JFY12.

We will support a core team to maintain US corporate knowledge and be available for TDR reviews

We plan to keep the US SRF industrial base active at a minimally useful level (~12 cavities per year, 1 cryomodule per year).

The US ILC Program– Program elements post 2012

It's likely that positron production will benefit from R&D past 2012.

It is likely that machine-detector interface activities will need to continue. This will help to facilitate the detector program.

The ART Program - 2013

Likely activities in 2013 involve:

- Operation of the Fermilab SRF string w/o beam (33% duty factor for the GDE)
- Program support for ATF2 operation at KEK
- Conclude the mini-CESRTA program (NSF)

- Prepare and participate in the TDR/cost review process.
- SRF value engineering (with industry) + yield & very high gradient R&D (coatings etc..)
- Positron Source R&D continues
- Machine/Detector integration activities

The ART Program - 2014

Likely activities in 2014 involve:

- Operation of the Fermilab SRF string test with beam (33% duty factor for GDE)
- SRF value engineering (with industry) + yield & very high gradient R&D (coatings etc..)
- Positron Source R&D
- Determination of the possible US deliverables (hence project scope)
- Cost US scope in US metric
- Submit CD0 request – mission need

Americas

ART Program 2011->2015: Natural funding profile

System	program element	FY11	FY12	FY13	FY14	FY15
Sources		1771	1771	1000	1050	1100
	electrons	1000	1000	200	200	200
	positrons	771	771	800	850	900
SRF		14860	14498	8000	8200	6800
	Cavity procurement and processing (12 per year)	2760	2760	2400	2500	2500
	Cryomodule fabrication, industrialisation, & value engineering	5000	5000	1500	1600	1700
	HLRF development	5100	4738	2500	2500	1000
	Cavity gradient & yield R&D	2000	2000	1600	1600	1600
High availability hardware	controls, LLRF	1450	1450	400	410	425
Accelerator Physics		1880	1880	600	620	630
Conventional facilities		1450	1450	600	620	630
Damping rings		2300	2000	700	725	740
System tests		1000	1000	4000	4100	0
	Fermilab string test operation	0	0	3000	3100	0
	KEK beam test support	1000	1000	1000	1000	0
Beam Delivery		3000	2800	1250	1250	1250
	Machine detector interface	1500	1300	750	750	750
	Final focus hardware & IP integration	1500	1500	500	500	500
Management & support		7289	6151	3500	3800	3600
	GDE & ART	3000	3000	2700	3000	3000
	Lab management	1600	1600	800	800	600
	Contingency	2689	1551			
Total		35000	33000	20050	20775	15175
Scenario A - low		35000	27000	20000	17000	12000
Scenario B - nominal		35000	30000	23000	20000	15000
Scenario C - high		35000	33000	26000	23000	18000

Scenario B - nominal

The "natural" funding profile integrates to the same total funding as scenario B. The difference is FY12 is +$3M and FY13 is -$3M. Thus the issue becomes how to shift $3M in the least disruptive way from one fiscal year to the other. This is helped by the fact that the GDE schedule is based on calendar years so 3 months of FY13 can be used to help to conclude the GDE R&D phase.

The proposed modifications are:

Shift nominal contingency FY12 -> 13: $1550K (in principle this has no programmatic impact)

Slow down the final focus prototype construction: $500K (there is nothing critical in the TDR that requires this to finish in FY12)

Slow down the completion of the Marx modulator P2 completion: $1000K (this step would probably preclude the Marx as a the baseline component in the TDR)

Scenario C - high

Scenario C has the "right" amount in FY12 so there are no funding/scope changes from the natural profile in FY12. FY13 is +$6M, Fy14 is +$3M, and FY15 is +$3M.

Proposed modifications:

Restore FY12 funding to $35M by backloading $2M from FY13

Restore outyear contingency of $1M/yr (~5%)

Add the SRF coating work to the SRF R&D program: $1.2M/yr

FY13 SRF cost reduction items $1M

FY14 & 15 would continue SRF coating work, SRF cost reduction & create some contingency 4% Total $3M/yr

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Scenario A - low

Scenario A has a significant reduction in FY12 $27M V's $33M for the natural profile, FY13 is OK, but both FY14 & FY15 are -$3M.

It is difficult to manage a $6M reduction in FY12 while at the same time meeting the goals of the GDE program. Since there are no excess funds available in FY13 then pushing activities later, as in scenario B, is not feasible. Possibilities include:

- Stop electron source program – this would terminate the final year of the program during which the SLAC photo-cathode is integrated with the JLAB high voltage gun and installed into the JLAB gun facility for testing. ($800K)
- Terminate Marx modulator program. The final year of the R&D program would have involved testing the second prototype modulator. ($1500K)
- Eliminate nominal contingency ($1500K)
- Eliminate non Cornell DR work ($800K)
- Reduce lab management support ($800K)
- Reduce cavity testing/R&D ($600K)

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Scenario A – part 2

Both FY14 & FY15 need to be reduced by $3M. One would try to preserve the SRF & basic GDE support.

- Eliminate positron source development ($1000K)
- Reduce GDE support ($500K)
- Reduce lab management ($300K)
- Eliminate final focus & IP development ($500K)
- Eliminate HLRF ($1000K)

The ART Program – Conclusions

- Technical progress in the ART program continues to be good.
- ART (and the GDE) are on track to meet the goals of the R&D program in 2012.
- A reasonable observer would conclude that the LHC physics needed to set the energy scale for a linear collider should be available on the timescale of 2014.
- We are starting to develop a post-2012 strategy which emphasizes systems tests, core technology and the US role in the global program.
- The "natural" budget for the R&D phase and post 2012 is consistent with program guidance for scenario B. Scenario A results in difficulties in completing the R&D phase and post 2012 starts to look like an SRF program rather than an ILC one. Scenario C reinforces the SRF value engineering and gradient work which could be very cost effective in a construction project environment.

Americas

2010 ART Review Agenda

Wednesday June 9th, Fermilab	Speaker	Time	Duration
Executive Session		8.00	30
ART Program Overview and future planning	Mike Harrison	8.30	60
GDE Update	Marc Ross	9.30	45
Break		10.15	15
SRF - cavities	Mark Champion	10.30	45
SRF - cryomodules	Tug Arkan	11.15	30
SRF – High level RF	Chris Adolphsen	11.45	45
Lunch		12.30	60
SRF – Low Level RF: FLASH system tests	John Carwardine	13.30	45
CESR TA Update & future plans	Mark Palmer	14.15	60
Break		15.15	15
Conventional Facilities	Vic Kuchler	15.30	30
Electron source R&D	Matt Poelker	16.00	30
Executive session		16.30	60
Thursday June 10th			
Beam Delivery system	Andrei Seryi	8.30	40
Machine Detector Interface Plans	Tom Markiewicz	9.10	20
Breakout , management, systems, etc..		9.30	60
Executive session		10.30	210
Close-out		14.00	