Summary of

the GDE Tohoku Meeting

ILC-GDE Project Managers

Akira Yamamoto, Marc Ross, Nick Walker

Sendai, March 6, 2008

Outline

- Objective and Goal of the meeting:
- Progress:
  - WG1: Cost Reduction
  - WG2: Superconducting RF
  - WG3: BDS
  - WG4: Damping Ring
- Reports from AAP and PM./PMOs
- Summary

Objectives

- Discuss and Establish:
  - Directions of Technical Design
  - Re-plan the R&D Program
- Focus on Technical discussions for TDP:
  - Cost reduction (WG-1)
  - Superconducting RF R&D (WG-2)
  - Beam Delivery System (WG-3)
  - Damping Ring (WG-4)

WG1: Cost Reduction Studies

Reported by J. Carwadine, T. Shidara, N. Walker

- We must reduce the cost (in view of construction and operation)
- Targets
  - Staging / Scope
  - Main Linac Technology
  - CFS -- Scope of halls, caverns, shafts, etc.
  - Two vs one tunnel, and Shallow vs deep sites
- Premise for WG-1
  - Invite new ideas, provide a forum for open discussion.
    - RDR is technically sound but not optimised for cost.
  - No changes in scientific scope without engaging the physics community.
    - WG-1 is not a decision-making group.
- Began sessions with >100 suggestions
  - that came from a call for cost reduction ideas.
  - Small sub-groups selected their 'top-10's.
- Specific topics highlighted
  - Aim to have initial assessments on key items by the Dubna meeting

WG2: SCRF

Reported by H. Hayano, N. Ohuchi, A. Yamamoto

R&D Re-plan:

- High gradient “E” R&D (S0)
  - E = 35 MV/: 50 % and 90%, in TDP1 and inTDP2
- Operational “E” to be achieved with “**International Effort**”
  - <E = 31.5 MV/m>, at S1-Global, in TDP1 : **Positively discussed**

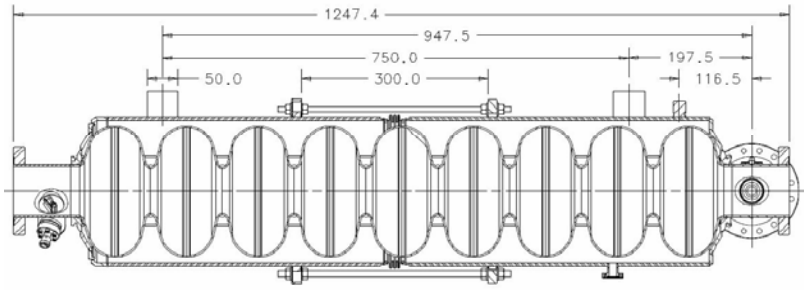
Cavity/Cryomodule Design:

- “Plug-compatible” interface boundary condition: **defined**
- Quadrupole location at center: **agreed**
- Cryomodule design w/ or w/o 5K shield: **progressed**
- High-Pressure design condition: **confirmed**
- Maintainability and MTBF issues: **pointed out**

Global R&D Plan

Calender Year		2008	2009	2010	2011	2012
EDR	TDP1				TDP-II	
S0: Cavity Gradient (MV/m)	30	35 (> 50%)				35 (>90%)
KEK-STF-0.5a: 1 Tesla-like/LL						
KEK-STF1: 4 cavities						
S1-Global (AS-US-EU) 1 CM (4+2+2 cavities)			CM (4_{AS}+2_{US}+2_{EU}) <31.5 MV/m>			
S1(2) -ILC-NML-Fermilab CM1- 4 with beam			CM2	CM3	CM4	
S2:STF2/KEK: 1 RF-unit with beam			Fabrication in industries		STF2 (3 CMs) Assemble & test	

SCRF Cavities
to be plug-compatible



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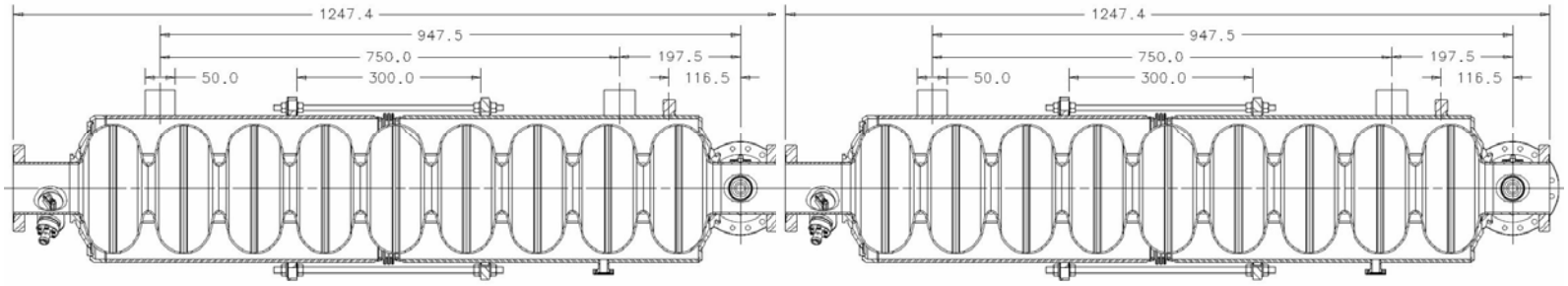

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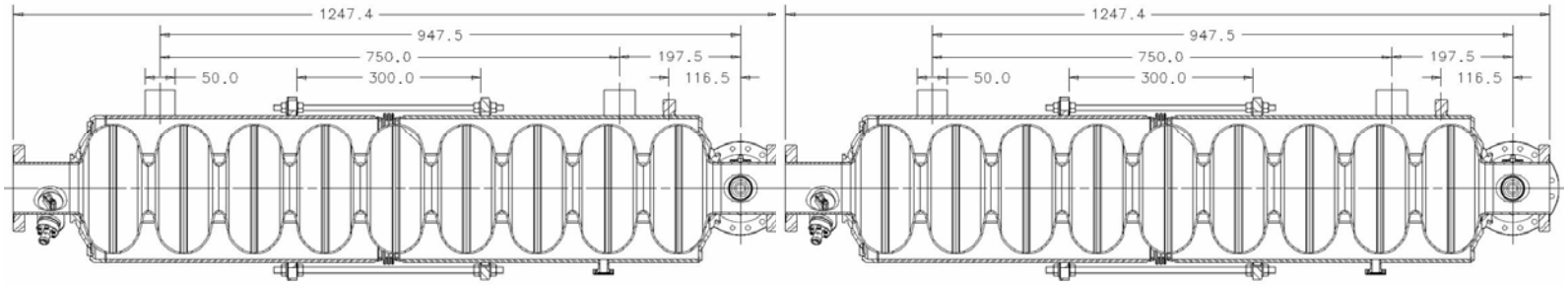

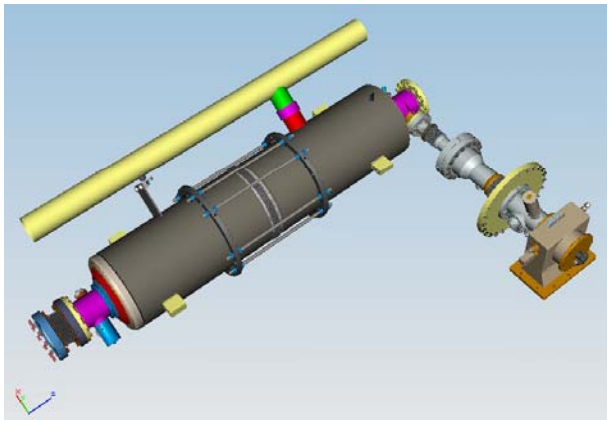

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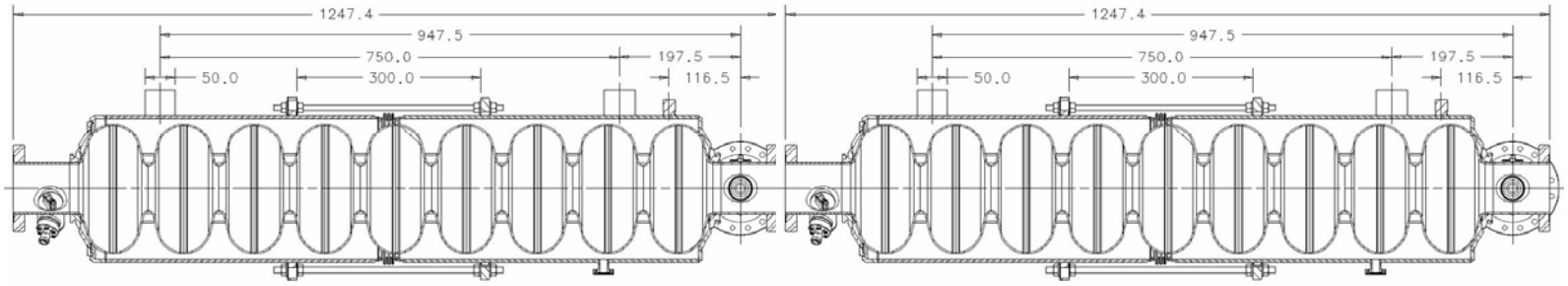
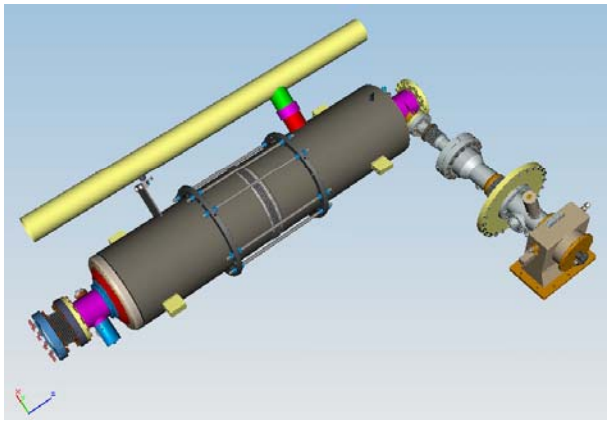
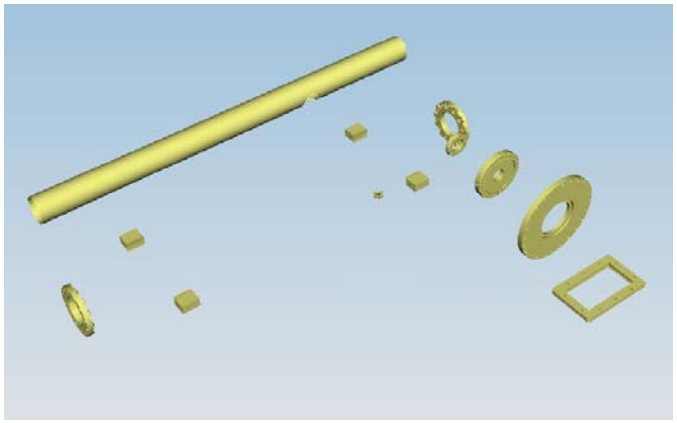






Many thanks for Don Mitchell and Lars Hagge for 3D-CAD and EDMS

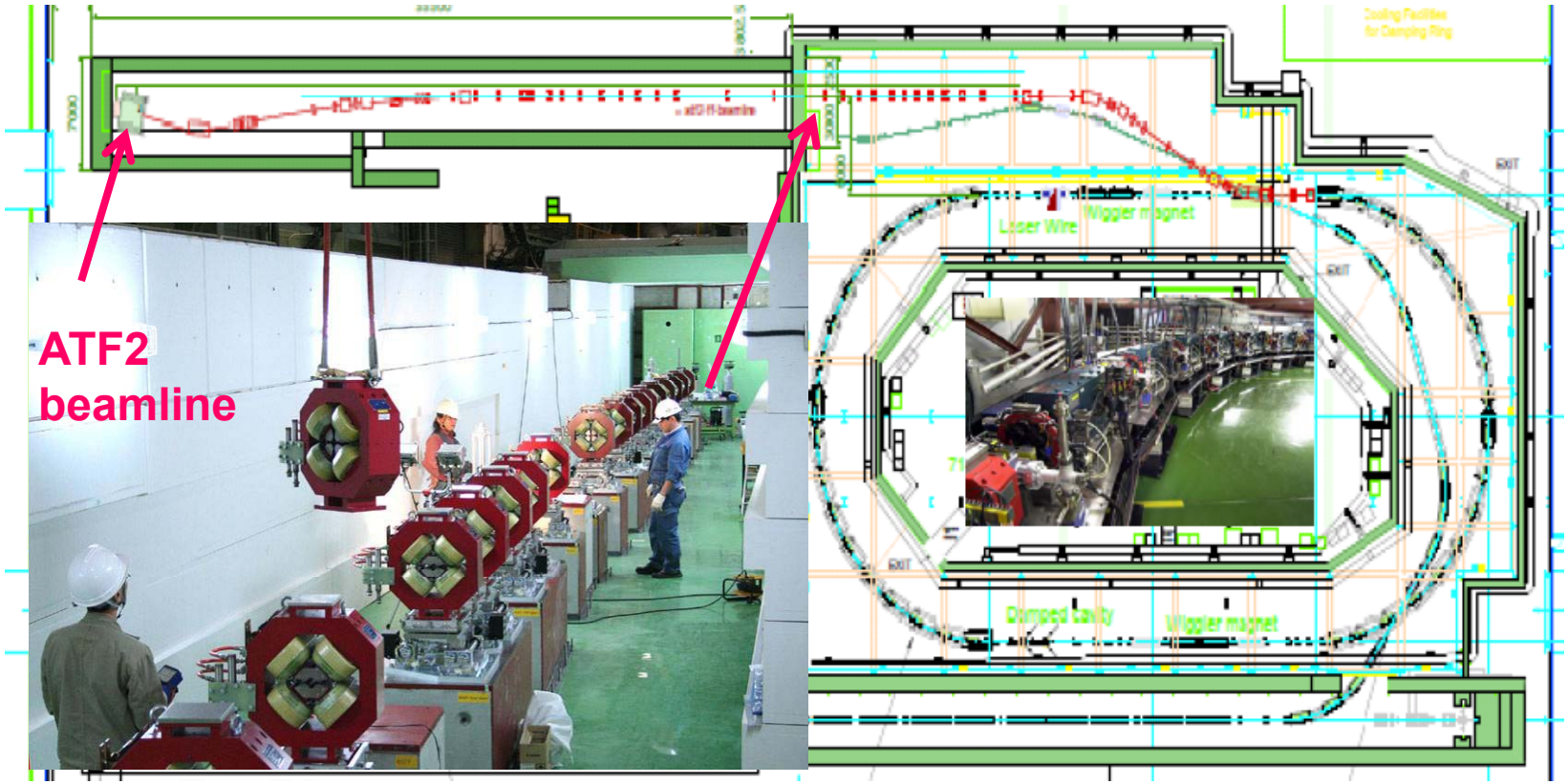
WG3: BDS/MDI and ATF

Reported by M. Ross, Andrei Seryi

- 'Just wait' in FY08
  - Focus on critical areas, strategic items
- Strong return in 09 (hopefully)
  - Especially in US (SLAC)

- For CY 2008:
  - ATF2 → First Beam, at Oct.2008!
  - Detector Integration: Critical Design Area
  - Working with CERN/CLIC: developing the link

ATF2: Beam delivery model



Built for ILC. Advanced accelerator study and beam handling applicable to any single path beamlines

ATF collaboration: >200 scientists, 20 institutions worldwide

WG4: Damping Ring

Reported by M. Palmer and A. Wolski

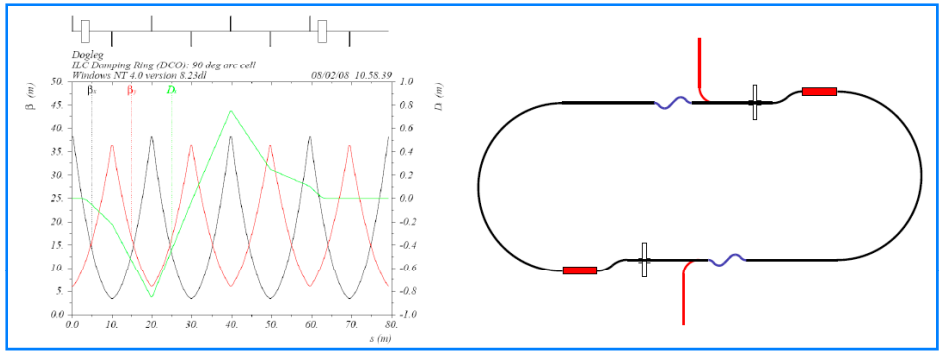
Lattice Design:

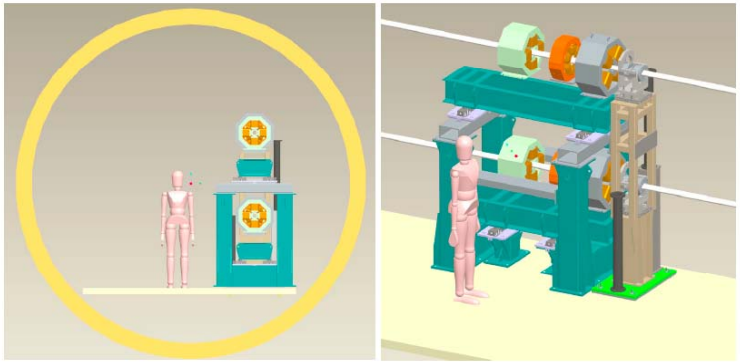
- **"DCO"** proposed by Univ. L. , CI (A.W. , M.K.) selected as baseline
- **"FODO5"** proposed by IHEP (Y.P.S et al.) as alternate

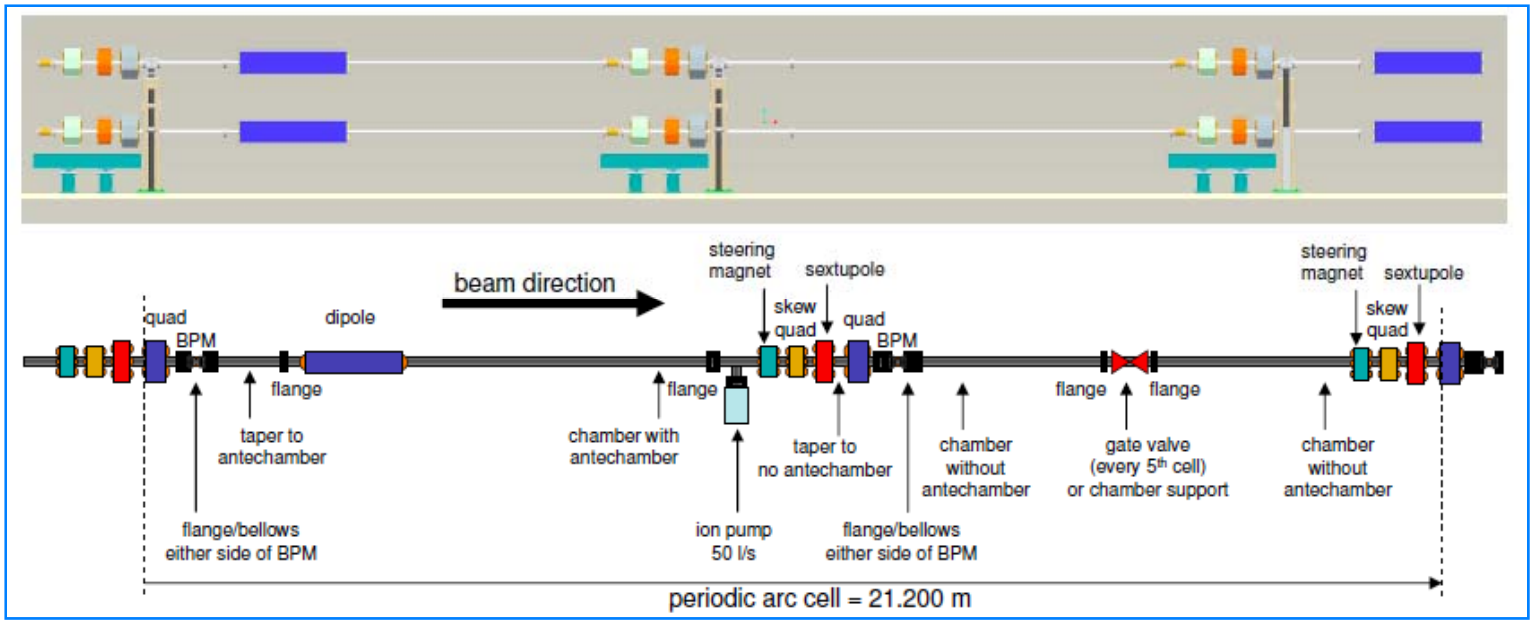
Beam energy	5 GeV
Circumference	6476.440 m
RF frequency	650 MHz
Harmonic number	14042
Transverse damping time	21.0 ms
Natural rms bunch length	6.00 mm
Natural rms energy spread	1.27×10^{-3}

Phase advance per arc cell (approximate)	72°	90°	100°
Momentum compaction factor	2.80×10^{-4}	1.73×10^{-4}	1.29×10^{-4}
Normalised natural emittance	6.53 µm	4.70 µm	4.27 µm
RF voltage	31.6 MV	21.1 MV	17.2 MV
RF acceptance	2.35%	1.99%	1.72%
Synchrotron tune	0.061	0.038	0.028
Horizontal tune	64.750	75.200	80.450
Natural horizontal chromaticity	-76.5	-95.1	-106.9
Vertical tune	61.400	71.400	75.900
Natural vertical chromaticity	-75.6	-93.4	-103.5

Damping Ring Lattice Selected







ILC-CLIC Cooperation

launched in Nov. 2007

Objectives:

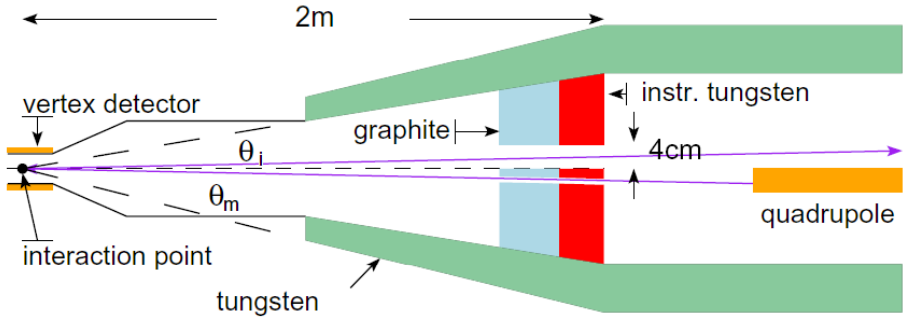
- Develop common knowledge of both designs and technologies,
  - CF&S, BDS/MDI, Detectors, Cost estimates, Beam dynamics/simulations, etc.
- Common Preparation of the (unavoidable) evaluation of technology, in credible and common basis,
- Most efficient use of limited resources,

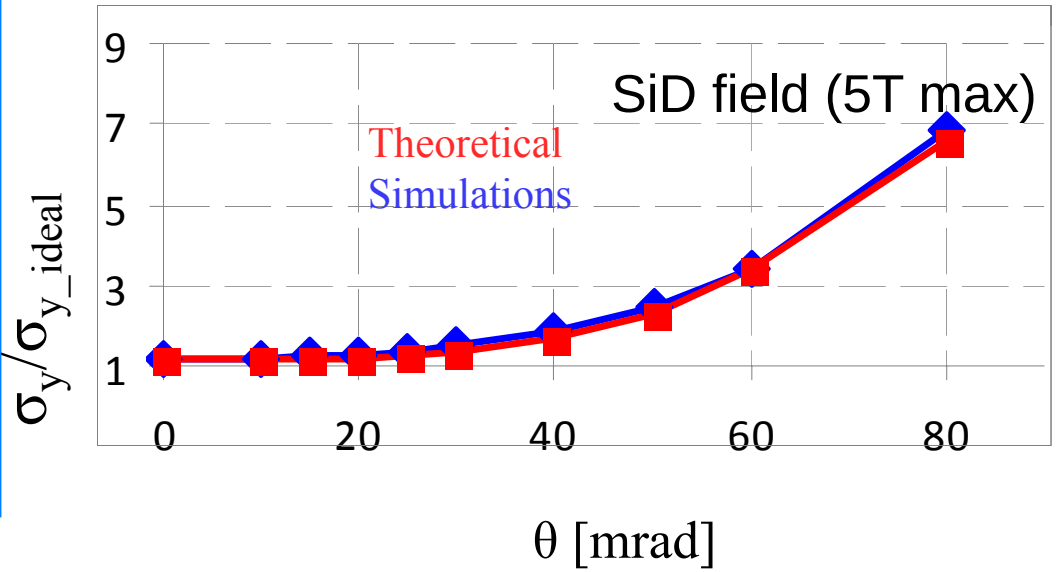
- ILC-CLIC special session held in GDE/Tohoku,
- Important CY 2008 initiative
  - Expectations for November

Start of CLIC-ILC design work

discussed/reported at GDE-Tohoku, WG3

- Reviewed physics driving CLIC BDS design
  - coherent pairs; short train; post-collision measurements…
    - D.Schulte
- Started study SR size growth in realistic detector field using tools developed for ILC
    - S.Seletskiy

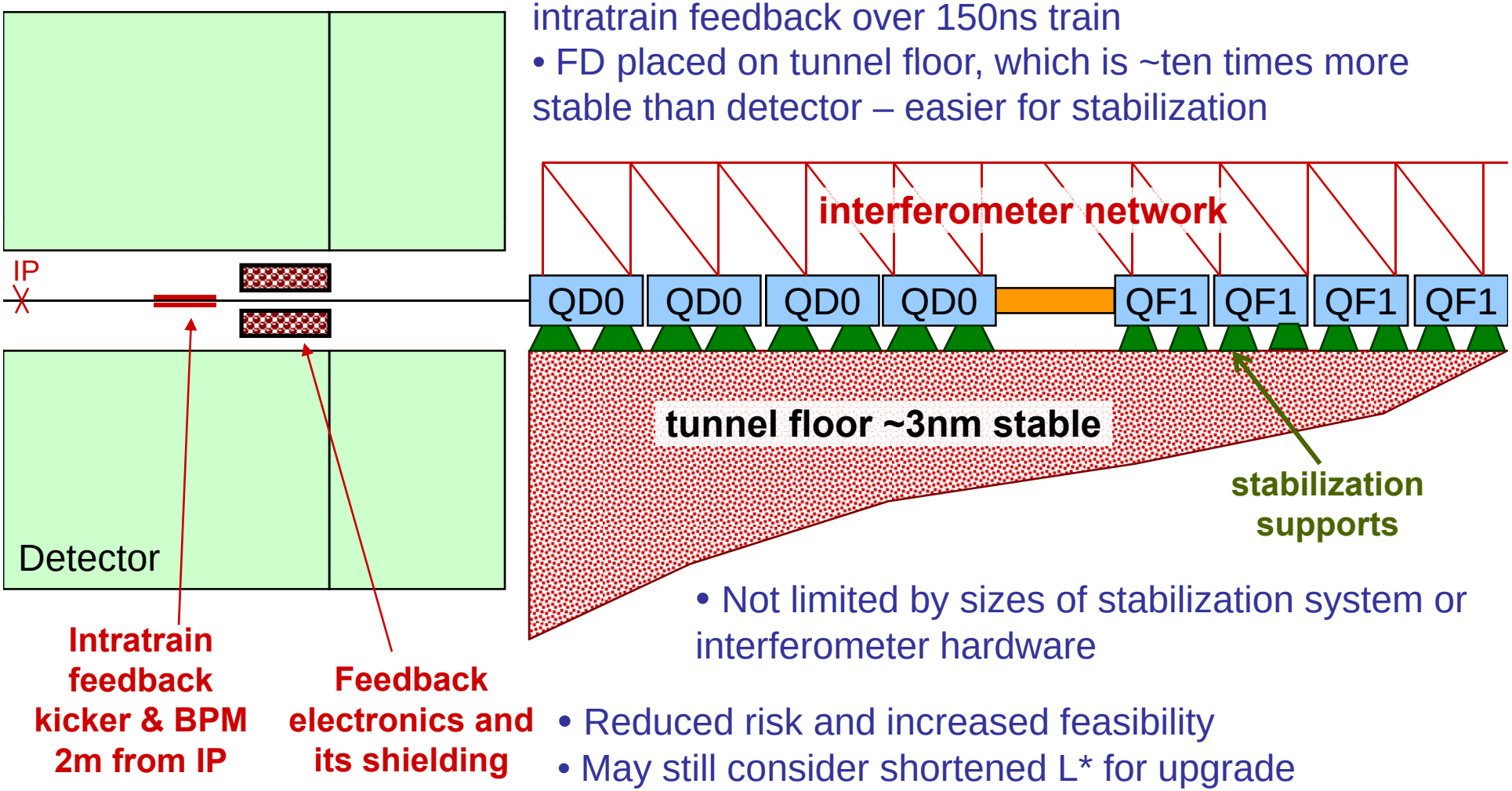




An approach to CLIC IR stability

discussed/reported from GDE-Tohoku, WG3

- Slower than 1/L* dependence of Lum => ↑L*
- Reduced feedback latency – several iteration of intratrain feedback over 150ns train
- FD placed on tunnel floor, which is ~ten times more stable than detector – easier for stabilization



- Not limited by sizes of stabilization system or interferometer hardware
- Reduced risk and increased feasibility
- May still consider shortened L* for upgrade

Aceelerator Advaisary Panel (AAP):

an “Experiment” for SCRF started

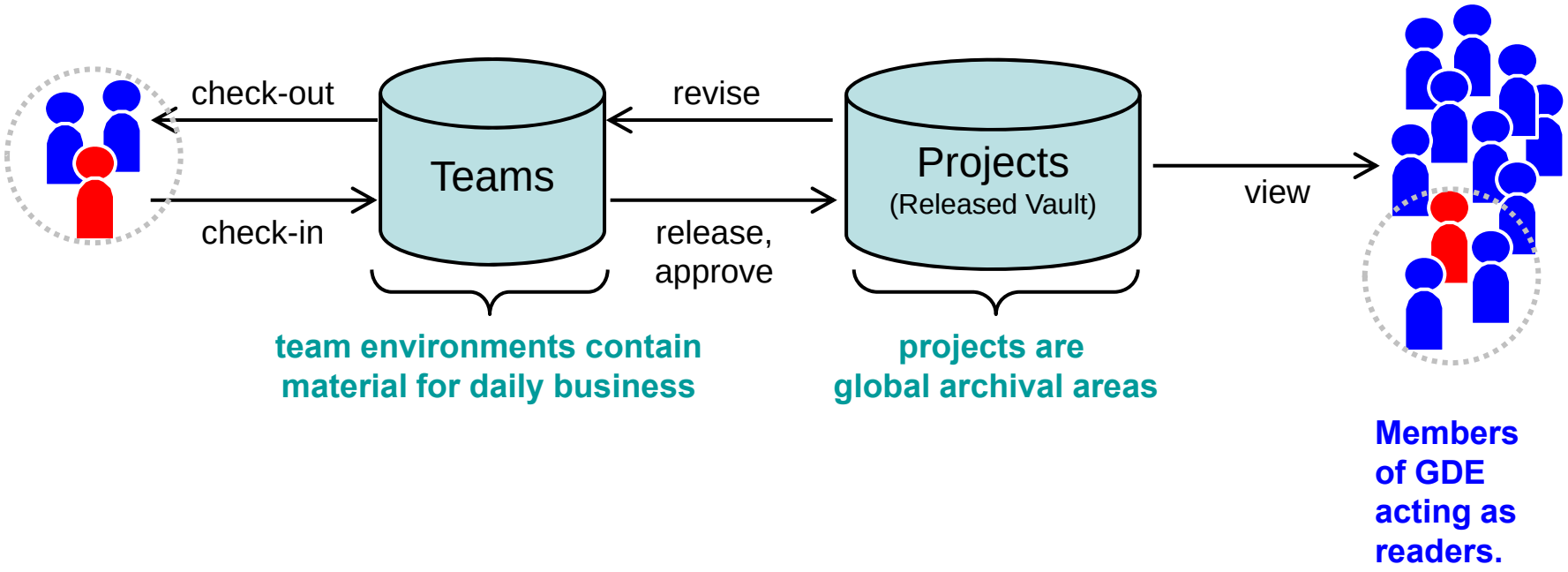
1) Hasan Padamsee are working with us as an adviser from Accelerator Advisary Panel (AAP),

2) Monitor the EDR work with getting report from PMs/GLs with participating general/individual technical meetings to be carried out during the EDR phase.
   - for examples: monthly technical group leader meetings, specifice are meeting (such as SCRF meeting in April), and individual communication,
   - Give us technical advices, and

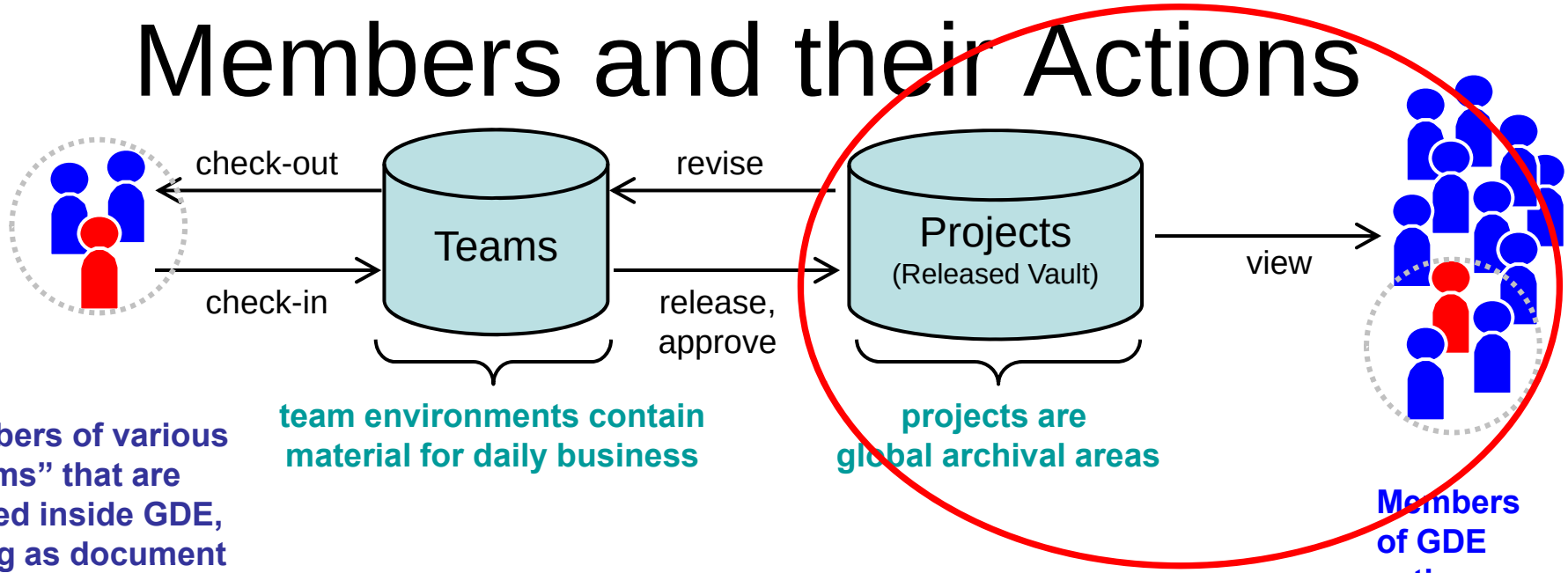
3) Review the progress in the EDR work,
   - for example, two major technical review:
     - Interim review in the middle of EDR (TDP1, 2),
     - Main review prior to the completion of the EDR (TDP1.2).

EDMS to be a Head

- EMO (Engineering Management office)
  - go-ahead to ask TAGLs (Technical/Area Group Leaders) for the member lists to use for EDMS "Teams" ASAP.



Members and their Actions



- **Projects are global archival areas which implement specific access policies; they are used for releasing and publishing items**

- Team workspaces offer structured access to those items which team members need for their daily work

A message from EU RD
UK Situation

- In Dec. UK announced that the UK will drop the ILC,
- The regional director, B.F., is working hard to rescue the UK-ILC situation
- The agreement (shortly to be made official) restores 1 M pounds/year of accelerator funding
- This will support
  - Group Leaders of “positrons” and “damping ring”
  - Key Work-package Managers for the “BDS”
  - With minimum engineering and M&S.

Further Meeting Plans

- April 7-8 DESY Zeuthen
  - Positron source meeting
- April 21-25 FNAL
  - SRF Main Linac Technology Review
- **June 4-6 JINR (Dubna)**
  - **GDE Meeting: ILC CFS Workshop**
- July 7-11 Cornell
  - Damping Ring Workshop (CESR-TA)
- November 16-20 Chicago
  - LCWS / GDE Workshop

GDE (Dubna) Meeting

Goals:

- Examine the CFS requirements of both ILC and CLIC.
  - Develop models for cost scaling to various alternative sites and CFS configurations, in particular shallow sites and single-tunnel options.
  - Examine the conventional facilities of the machines with particular attention to the cost drivers (process cooling water etc.), and understand the impact on them with respect to the choice of site configuration
- Review in detail the JINR site proposal
- Accelerator design of the central injector complex, RTML and BDS.

GDE Dubna Meeting: WGs

WGs	Subjects	Convener
1	Shallow solutions: Explore features and develop reduced-cost, shallow tunnel solutions. Both CLIC and ILC. Includes single tunnel.	Dubna+ILC-CFS(CERN)
2	Infrastructure: Review infrastructure requirements and develop cost-effective solutions for accelerator infrastructure – power, water, air etc. Both CLIC and ILC.	Dubna+ILC-CFS (KEK)
3	Siting: Examine possible sites and evaluate possible design differences that accommodate features. Includes staging, design modifications and upgrade issues.	AS+ Integration
4	Accelerator Systems: particular focus on the central injection complex, BDS and RTML, including beam dynamics.	Two AS leaders

Summary

- Design and R&D works
  - extended Technical Design Phase (TDP) work
- GDE Tohoku meeting progressed in
  - WG1: Cost-reduction
    - Subjects and directions discussed,
  - WG2: SCRF
    - Gradient, Cryomodule R&D re-plan proressed
  - WG3: BDS/MDI and ATF
  - WG4: Damping Ring
    - Lattice DesignSelected,
- Dubna meeting will focus on CF&S.