

Report from Physics and Detectors

Sakue Yamada
LCWS10 @ Beijing
March 26, 2010

The activity of the two detector groups

IDAG monitoring

Common Task groups

SB2009 working group

**Joint working group for ILC-CLIC detectors
cooperation**

Detector Activity came into new phase after the validation.

- **Purpose of the present work:**
- In 2012, when GDE completes the ILC design to propose the project to governments, we wish *to present that detectors can be built to pursue desired physics at ILC.*
- Each validated detector group aims to complete its **detailed baseline design**, *which is still conceptual but detailed enough to design MDI parameters and integration with the accelerator,* and *to allow realistic physics simulations.*

Three key points

- **Each group establishes its plan toward the goal with mile stones.**
(There are 9 items to be considered in the planning.)
- **The five common task groups will play important roles in the new phase.**
(Time for competition is over and cooperation between the two groups are crucial, **particularly when resources are limited.**)
- **IDAG will monitor the progress of the two detector groups and the activities of the common task groups through 2012.**
(IDAG resumes its activity during this WS.)

The first planning was made *last October* and is being refined.

The 9 items include e.g.

- R&D for critical components to demonstrate feasibility,
- Define baseline design including realistic support structure, holes, I/O cables, etc.
- Settle Push-Pull scheme
- Study new benchmarks, which are suited to demonstrate the ability of ILC, and including some reactions to check performance at 1 TeV.

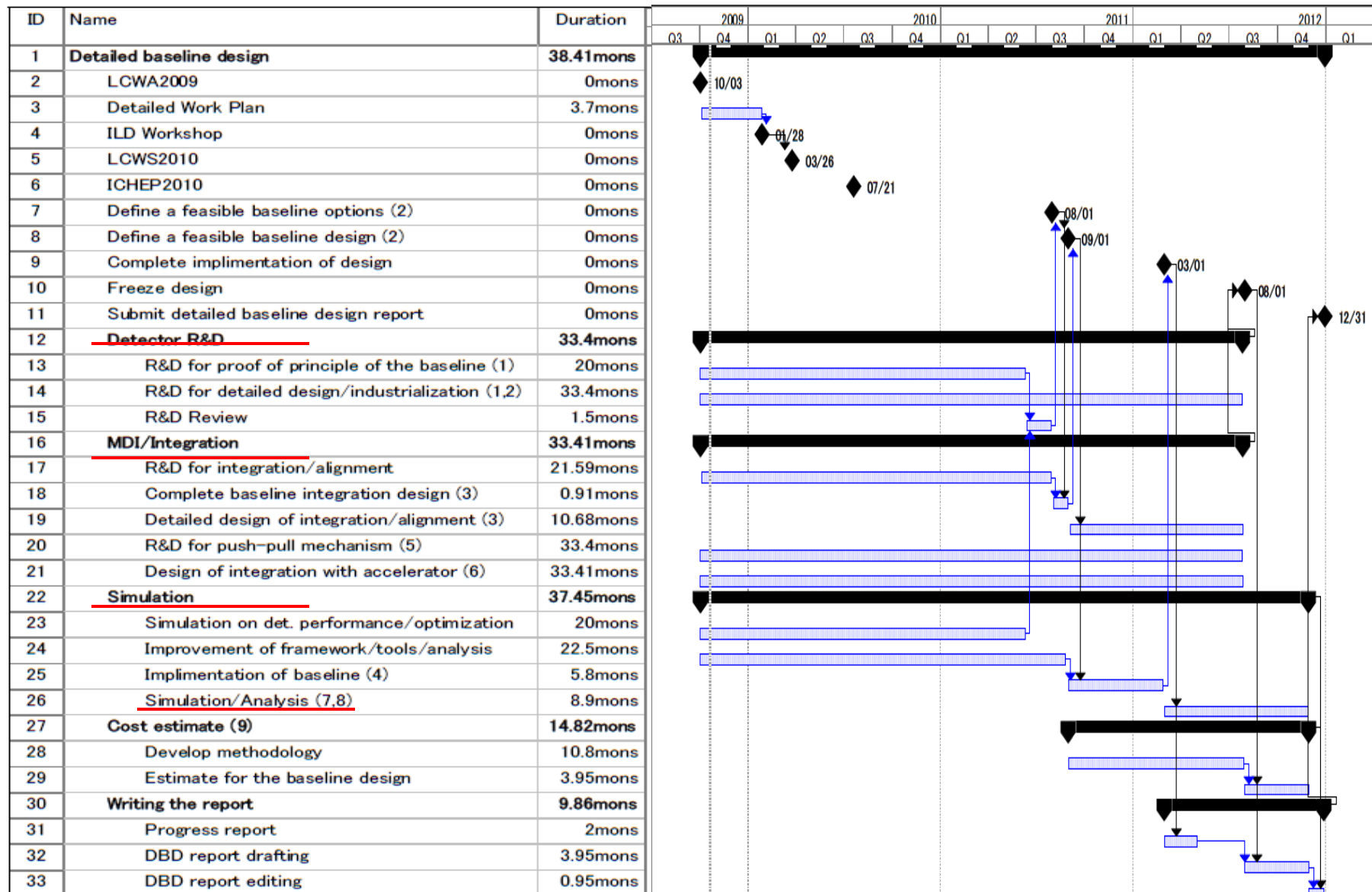
Planning of the groups (contnd)

- Both ILD and SiD groups tried hard to make their detailed plans. These plans were made with a warning that they were the best the groups could do at the time, and ***the plans could be modified in the future.***

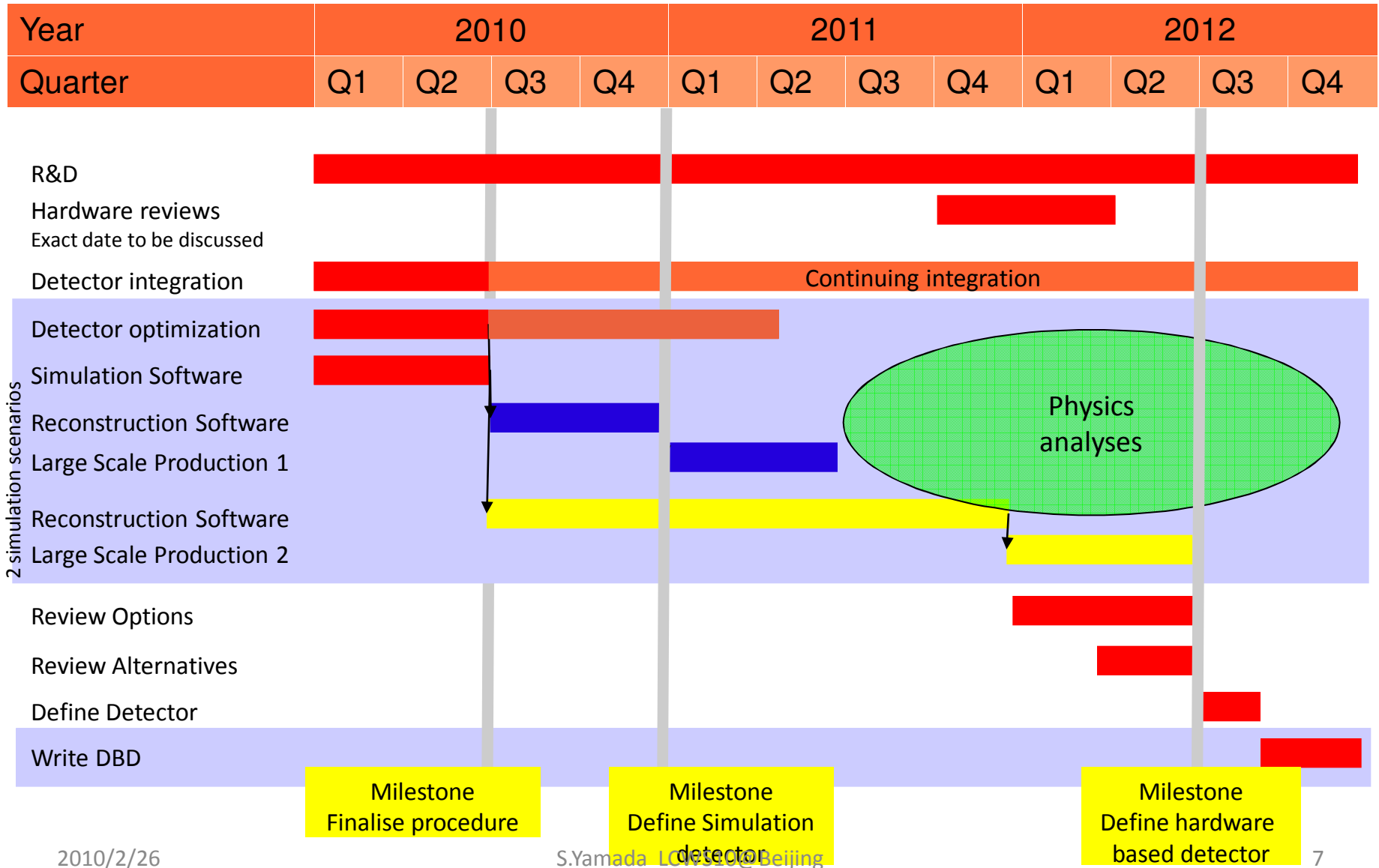
Difficulties are:

1. that the resources for the activity are NOT clear over the coming years, both for R&D budget and human resources,
2. that they need to discuss with various R&D collaborations, which requires time.

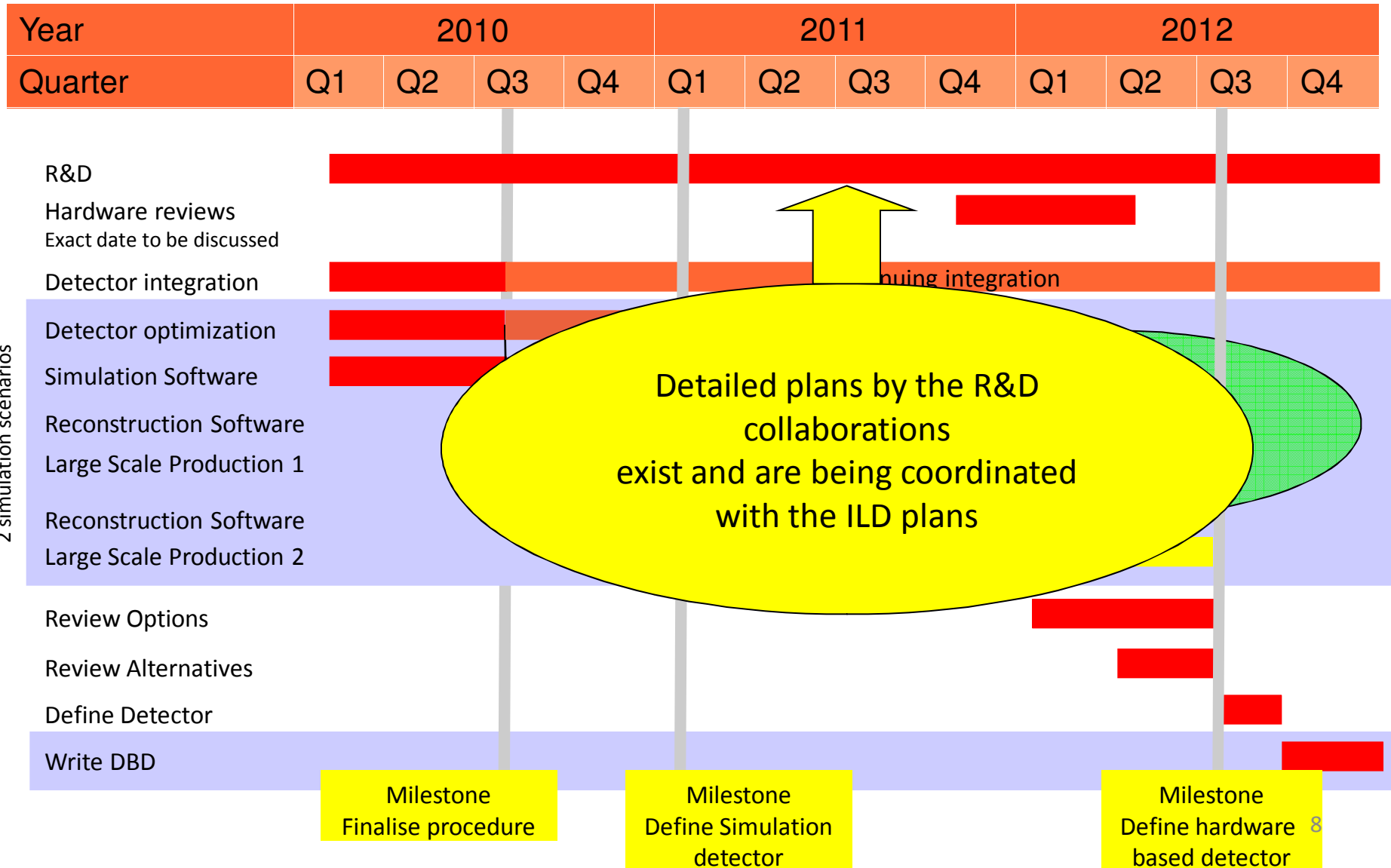
ILD (October 2009)



ILD Main Milestones (Updated Feb.2010)



Main Milestones

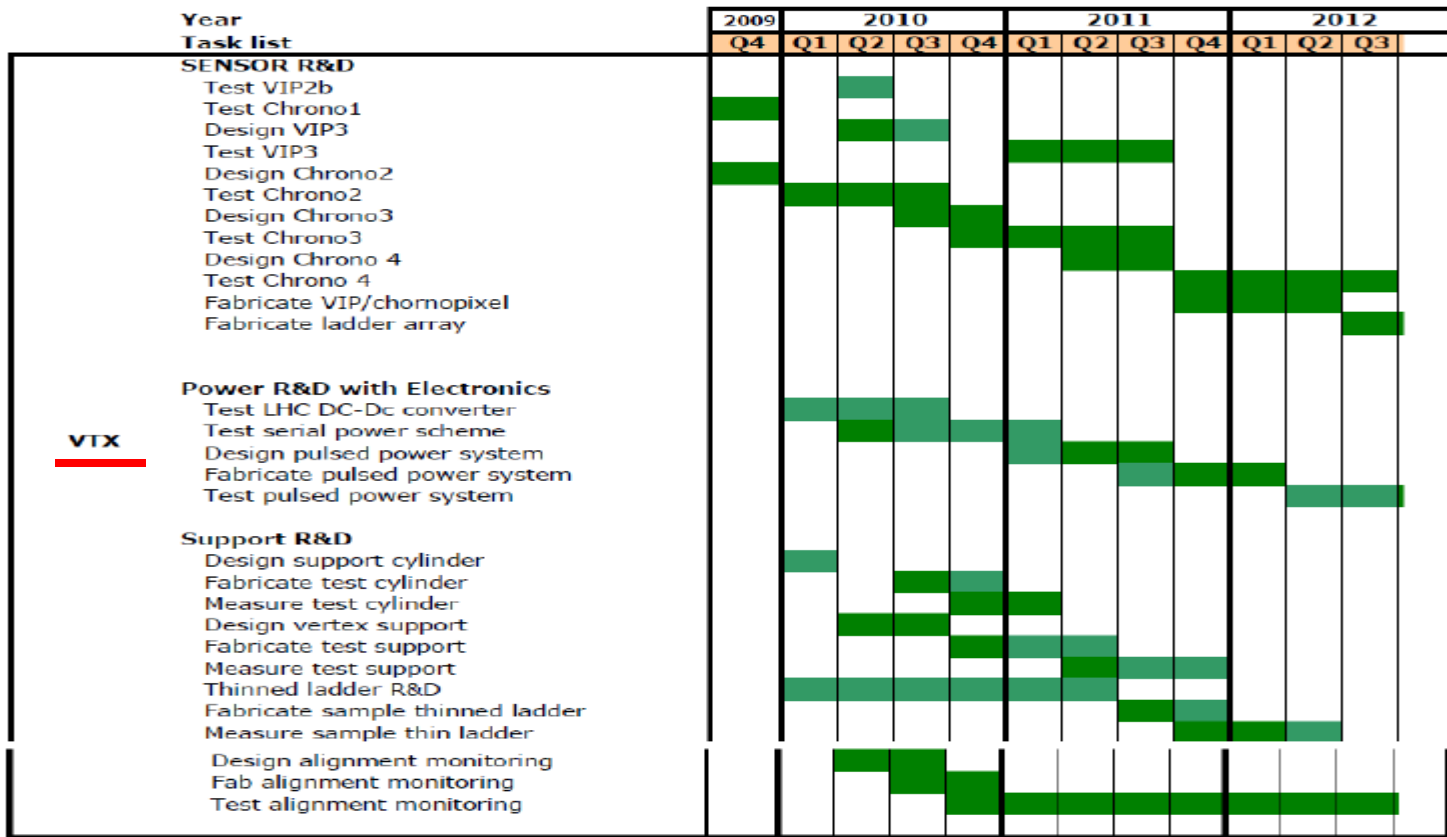


SiD (October 2009)

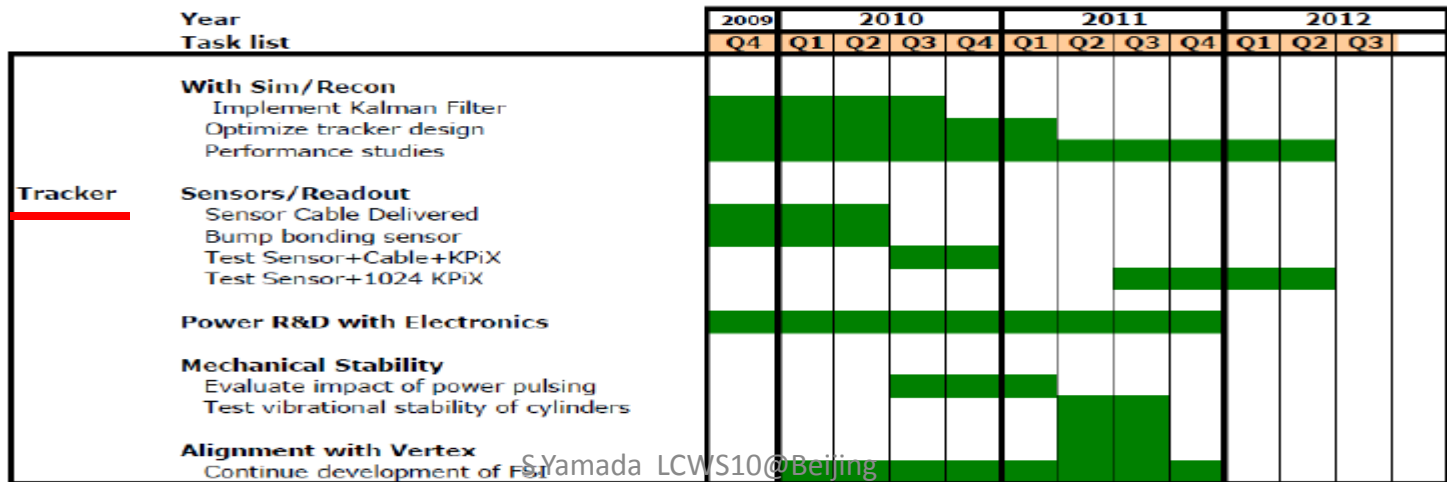
Year	2009				2010				2011				2012		
Task list	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3			
Overall Schedule															
Work Plan	█														
Develop Sim Infrastructure for Realistic Detector Description	█	█	█												
<u>Optimize Detector Design</u>				█											
Engineering input for global params	█	█	█												
<u>Freeze Global Params</u>				█											
<u>Define Subdetector volumes, supports, services, deadspaces</u>				█	█										
SiD Baseline Geometry in G4					█	█									
Subsystem Engineering Designs and Proofs of Principle					█	█	█	█	█	█	█	█	█		
Subsystem Performance Studies							█	█	█	█	█	█	█		
Generate Physics and Backgrounds							█	█	█	█	█	█	█		
Reconstruct Simulated Events									█	█	█	█	█		
Analyze Benchmark Reactions												█	█		
Complete SiD Technical Report													█		

The very long graph below shows the SiD schedule for individual subsystems.

SiD also lists required and available resources for each item.



VTX



Tracker

Crucial points

- The participating groups assume they obtain needed resources. They will make efforts. **Outcome ?**
- There is unbalance observed among the regions. *Also, presently available budgets are ending soon.*
- **Human resources are also VERY important and limited.**
- There will be supports needed from laboratories, including engineering experts for detailed design work of critical parts.

- **These problems were reported to ILCSC last month.**
- *Regarding engineers, there was an offer to look for possible help.*
- *I hope difficulties were understood by ILCSC.*
However, whether this will result in additional support is not known yet. It may depends on each lab.

If these problems are not solved,

- the detailed plans become meaningless.
- Soon we may have to THINK carefully.

A possibility: review the 9 items and make less ambitious and possible list by keeping the very minimum, which will be needed for ILC proposal.

Are there other possibilities ?

IDAG

- Some preparatory discussions in Albuquerque, last September and basic ideas were agreed **although details will be fixed during this workshop.**

IDAG will monitor the two groups, to help them accomplish their goal.

IDAG monitors also the common task groups.

IDAG will meet during LC workshops twice a year, will meet with detector groups and CTGs.

IDAG will look into some written reports, too.

IDAG (continued)

Plans for this meeting

- IDAG will discuss details of how to monitor.
- They will interview the two detector groups.
- IDAG will meet **the MDI common task group** to survey its status.
- IDAG will study **the new benchmark reactions**, prepared by the physics common task group last November.
- The outcome will be reported by the chair in the plenary session on the last day.

Common Task Groups

- The 5 common Task groups are now made of **the members of the validated two groups and the members from wider community.**
- In order to reinforce the groups and to meet increasing tasks, some new members were added.
- In the CTGs the two detector groups should cooperate and *they do so* as expected.
- This WS is a good occasion for the CTGs to meet and discuss in individual meetings or joint parallel sessions.

Common Task Group Members

From the detector groups

MDI

Convener: Karsten Buesser
Deputy: Phil Burrows

Karsten Buesser
Toshiaki Tauchi
Phil Burrows
Marco Oriunno

Engineering Tool

Convener: Catherine Clerc

Catherine Clerc
Kurt Krempetz
Matthieu Jore
Hiroshi Yamaoka
Marco Oriunno

Det. R&D panel

Convener: Marcel Demarteau
Deputy:

Marc Winter
Tohru Takeshita
Dhiman Chakraborty
Andy White
Marcel Demarteau
Tim Nelson

Software Panel

Convener: Akiya Miyamoto
Deputy: Norman Graf

Frank Gaede
Akiya Miyamoto
Norman Graf
Tony Johnson

Physics Panel

Convener: Michael Peskin
Deputy: Keisuke Fujii
Deputy: Georg Weiglein

Keisuke Fujii
Klaus Desch
Andrei Nomerotski
Tim Barklow
Aurore Savoy-Navarro

members from the wider communities

Representatives
of R&D
collaborations

Jan Timmermans
Aurore Savoy-Navarro
John Hauptman
Ronald Lipton
Felix Sefkow
Wolfgang Lohmann

Recommended
by the wider
community
(3 th. +3 exp.)
or added by the
group

Stewart Boogert
Seong Youl Choi
Youanning Gao
Michael Peskin
Georg Weiglein
Jae Yu
Heather Logan
Klaus Moenig

MDI Group

- **Validation lead to concentrated study of Push-pull scheme.**
- **Discussions between SiD and ILD started right after on common issues for the detector hall and push-pull issues. ILD members spent two months last summer at SLAC to discuss with SiD and ILC-BDS people:**

Ways to get to a common IR hall design

where ILD moves on a platform and SiD does not,

Common push-pull system, shielding design,

Final focus magnets supports and alignment,

Vibration studies.

They meet with IDAG, and MDI sessions will be on the third day.

Engineering Tools group

- Now the group is reinforced and works are going on.
- They try to achieve the implementation of a system breakdown structure compatible to the two detectors and contact EDMS experts.
- **A concrete result aimed for in the near future.**

Detector R&D group

- The group has been making effort since last year **to identify what are the critical items for R&D for the two groups to reach the goal,**
- preparing a report documents, which is under discussions for some time. Their meeting during this WS will be important to complete the document.
- In his report at the last PAC, the convener stressed the crucial importance and serious necessity of R&D resources. It triggered a positive climate for improvement, while such efforts need to be continued.

Software Group

Major items of activity includes

- Developments of software tools to add new functionality and new data models.
- *preparing common data samples for works related to SB2009 which was needed urgently*
- *developing a plan for common data samples for new benchmark processes*

The group makes coordination of these works.

Actual software development involve more members of the two detector groups. They often encounter the lack of human resources when they need experts.

Physics Group

- They studied new benchmark reactions last year and made report in November.
- *The idea was to demonstrate the ability of ILC.*
- These reactions are being examined by the two groups and software group, as well as IDAG from different view points.
- *The group will investigate the possible scenario with the new LHC schedule.*

November 13, 2009

Benchmarks for the ILC Physics Studies – 2009-10

ILC LOI Common Task Groups Physics Panel

1 Introduction

To document the capabilities of the ILC accelerator and the detectors proposed for it, it is useful to have a list of benchmark reactions for which the experimental capabilities can be studied in detail. After the specification of the ILC and the call for LOIs, a group appointed by the World Wide Study assembled a proposed set of benchmark reactions [1]. Actually, this document proposed two sets of benchmark reactions, an extended list of 27 reactions and a reduced list of 7 reactions. Eventually, even the shorter list was viewed as too time-consuming for the LOI studies, and the list was reduced further, by agreement between the LOI groups, to 5 reactions that were studied in detail for the LOIs.

Now that the LOIs have been submitted and the detector proposals are moving to their next stage, Sakue Yamada has asked the Physics Panel to prepare a new list of benchmark reactions. His charge lists two goals, first, to demonstrate the physics capabilities of the ILC with respect to other proposed accelerators, second, to evaluate the capabilities of the LOI detectors for physics at 1 TeV.

include some channels to evaluate ILC detectors at 1 TeV, as well as Higgs studies at 230GeV

Working group to study SB2009

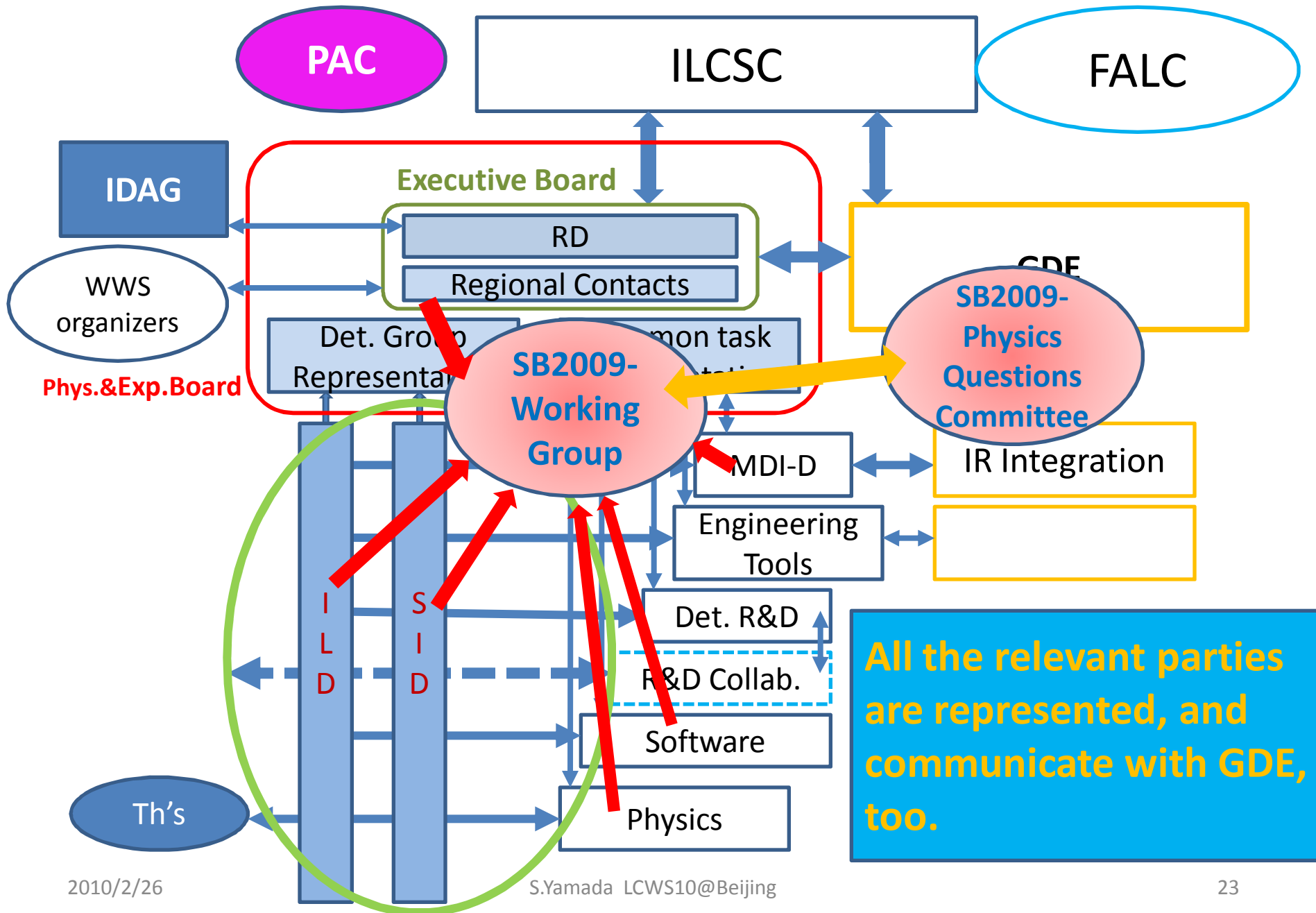
- In order to study SB2009 and communicate with GDE in a systematic way, a working groups was formed right after the Albuquerque meeting.

Members: Jim Brau (management, convener)

Mark Thomson(ILD), Mikael Berggren(ILD), Stewart Boogert(ILD),
David Miller(ILD), Tom Markiewicz(SiD), Timothy Barklow(SiD),
Takashi Maruyama(SiD), Norman Graf(SiD),
Karsten Buesser(MDI), Akiya Miyamoto (Software), Keisuke Fujii (Physics)

The contribution of the WG is important for rational consideration to seek good balance of cost and physics performance.

The so-far obtained simulation results and opinions of the detector community will be presented by the convener tomorrow morning in the SB2009 pl. session.



Cooperation with CLIC detector activity

- The joint working group was made, following the suggestion of the ILCSC of last August
- It took rather long but finally the entire members were listed and the activity of the JWG will start soon.

Marcel Demarteau, Lucie Linssen,
Francois Richard, Felix Sefkow,
Marcel Stanitzki, Mark Thomson,
Sakue Yamada

- **In the mean time, practical cooperation is already going on quite well among the people interested.**
- The WG will survey these activities as one of its works and look for more possible synergies.

The group will meet face to face for preparatory discussions during this workshop.

Summary

- The two groups are trying hard to refine their work schedule towards the detailed baseline design. Available resources will be crucial.
- IDAG will monitor their activities and CTG activities. It will start new monitoring here.
- Each common task group is reinforced with new members and is making progress.
- SW2009 working group is studying the consequence of SB2009 to physics and experiment. The first output was obtained and shared with GDE to start quantitative considerations.
- JWG for ILC-CLIC cooperation was formed and will start soon. On the other hand, practical works are already going on.

Back ups

Detector R&D group

The charge of the RD for the detector R&D common task group is to:

- **Coordinate cooperation of detector R&D**
- **Respond to requests from IDAG and PAC on detector R&D**
- **Facilitate communication between LOI groups and R&D collaborations**
- **Survey R&D efforts and organize reviews when needed**
- The group has been making big effort since last year to identify what are the critical items for R&D for the two groups to reach the goal.

Convener's report summery at PAC@Pohang

By elevating the importance of these R&D topics and providing in a timely manner limited additional resources, the experimental foundation for the detector concepts would be on a much stronger basis by 2012

- **Please note that, given the fragility of the detector community, it is equally essential to keep the other R&D programs at the current level**
- **A report is being drafted with these recommendations to the RD; We're almost close to a consensus!**

Common samples for SB2009

- In order to study Higgs recoil mass performance at $E_{cm}=350$ GeV, common samples were made with following conditions.
 - Beam parameter: SB2009 350 GeV with Traveling Focus
 - Processes: $e^+e^- \rightarrow \mu^+\mu^-h^0, \mu^+\mu^-, \mu^+\mu^-f\bar{f}$ ($f=u,d,c,s,\nu$)
- GunieaPig has been used to produce luminosity spectrum.
- We are informed that all problems are solved and some new samples have become available.
- Our plan is to study them using fast simulator

Consideration of physics cases for ILC

Among several things they first consider

Relation between the LHC physics and the case for ILC.

- The case for the ILC must take into account what is discovered at the LHC, like
SUSY, stable sleptons, composite top, Z' resonances,
which could be discovered in early LHC program.

In this context, the group will also study what can be a scenario with the new LHC schedule.

Updated Mandate Document (proposed by CLIC people)

Joint Working Group on General Detector Issues

- ILCSC has encouraged formation of a CLIC/ILC General Issues working group on detectors by the two parties with the following mandate:
 - Promoting the physics and the detectors of the Linear Collider
 - Identifying synergies between the detectors of ILC and CLIC in performance studies, detector R&Ds, and Software tools
 - Discussing detailed plans for the ILC and CLIC efforts, in order to explore possible collaborations such as critical R&Ds on sub-detectors, coil studies, push-pull mechanism and MDI aspects
 - Discussing a possible format of collaboration between the ILC validated detector groups and CLIC
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- The conclusions of the working group will be reported to the ILCSC and **CLIC Steering Committee**.