



# Detector integration organisation





- Introduction :
  - **RD's recommendations**
  - **Interactions with the other ILD working groups**
  - **Motivations for a detector integration effort**
- Detector integration studies
  - **Present status and main priorities**
  - **Integration strategy**
  - **CAD management**
  - **Notion of Placeholders**
  - **Use of the ILC EDMS**
- Conclusions



# RD's recommendations

- Continue R&Ds on critical components to demonstrate proof of principle
- Define a feasible baseline design (options may also be considered)

*Charge of the detector integration team*

- **Complete basic mechanical integration of the baseline design accounting for insensitive zones**

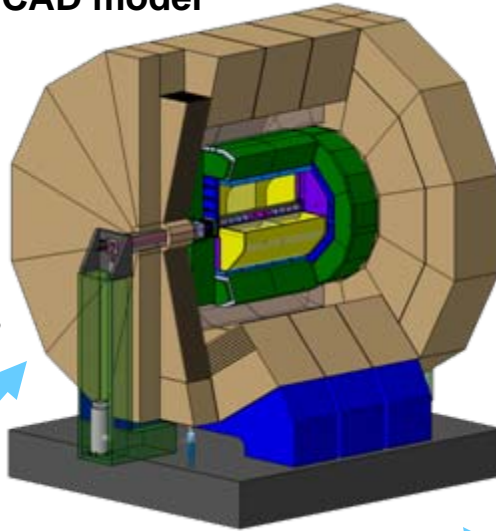
- Develop a realistic simulation model of the baseline design, including faults and limitations
- Develop a push-pull mechanism working with relevant groups
  - **See Tauchi san's talk**
- Develop a realistic concept of integration with the accelerator including the IR design
- Simulate and analyse benchmark reactions, which can be updated
- Simulate and analyse some reactions at 1 TeV, including realistic higher energy backgrounds demonstrating the detector performance
- Develop an improved cost estimate.



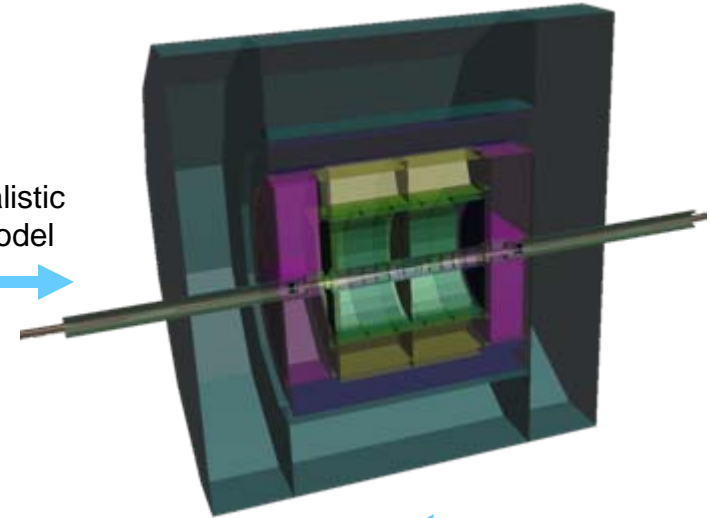


# Interaction with the ILD groups

ILD CAD model



ILD simulation model



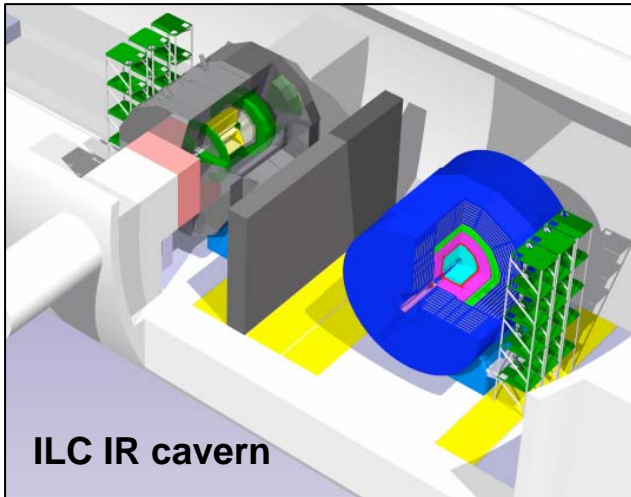
Integrate ILD in cavern, push-pull mechanism, services

Develop a realistic simulation model

Integrate support structure, services, etc..

Detailed description of sub detector model

Sub detectors models



ILC IR cavern



- CMS experience has taught us that we need to start integration as early as possible (start of integration before 1994)
- Realistic simulation model must be ready of end of 2010  
*(result of soft pre meeting)*
- Integration studies to be performed before :
  - ***Identification of insensitive zones such as the beam holes and gaps***
  - ***Design of support structure for each sub systems***
  - ***Integration of cables and services***



- Detector integration baseline has reached a good status in the Lol

## BUT

- Some remaining studies need to be performed for end 2010 :
  - **TPC support**
  - **Inner detectors integration (VTX+silicon disks) including beam pipe**
    - First concept exists but a more detailed design is mandatory (who?)
  - **First integration of cables and services**
  - **Optimisation of the forward region including beam line components**
- Other points to be studied/optimised for DBD 2012:
  - **QD0 support**
  - **MONALISA integration (QD0 position monitoring)**
  - **HCal/ECal interface**
  - ...



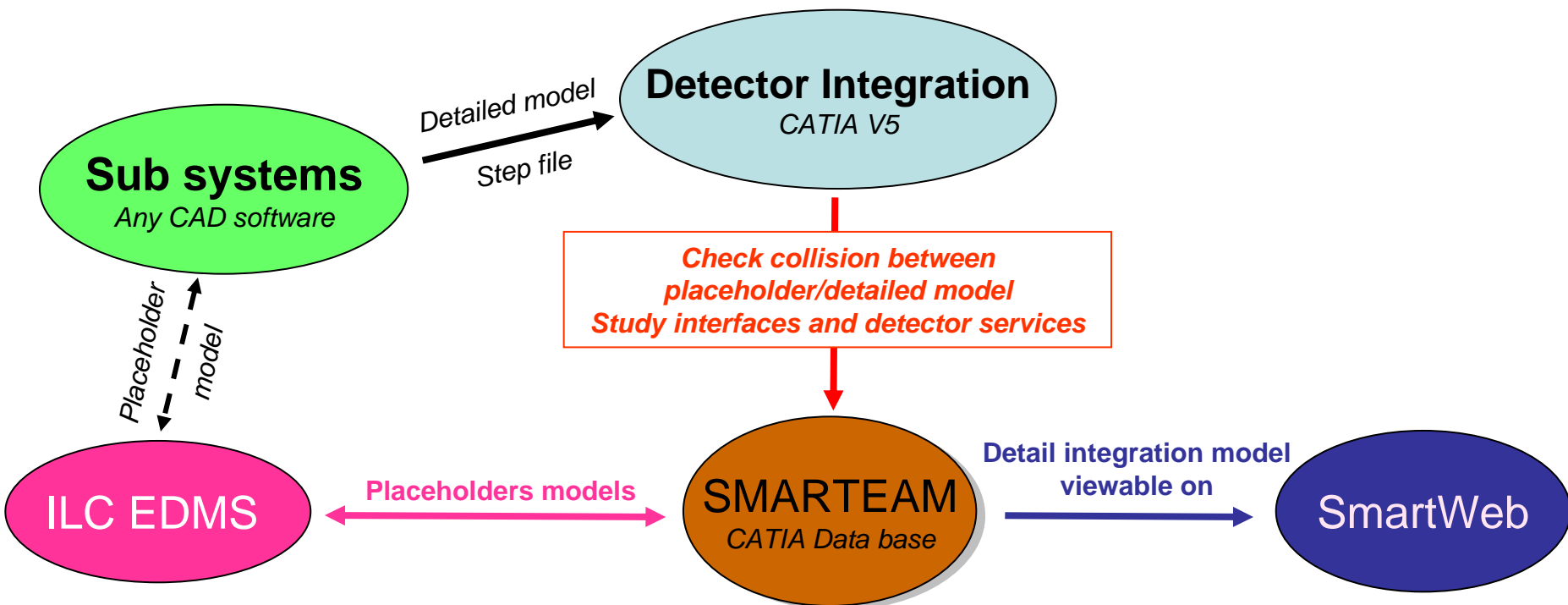
# Integration strategy

- Integration rules will be defined :
  - **For 3D model exchange (coordinates system, name, etc....)**
  - **For integration : adiabatic detectors (no heat exchange with its neighbours), ...**
  - **No go boxes & placeholders for each sub system**
  - **Etc...**
- Information from sub detectors groups are mandatory :
  - **Technical contact to be identified**
  - **Services (cooling needed, cables, monitoring system)**
  - **Supporting method**
  - **Weight**
  - **Accuracy needed, alignment method**
  - **Etc....**
- C. Clerc is preparing a template document which would be filled by each sub detector groups (*"Sub detectors interface parameters document"*)
- These will be stored in the ILC EDMS



# CAD management

- Slight changes from the previous CAD organisation :
  - add a technical contact for each sub system
  - Add the use of the EDMS for engineering data storage and placeholders models







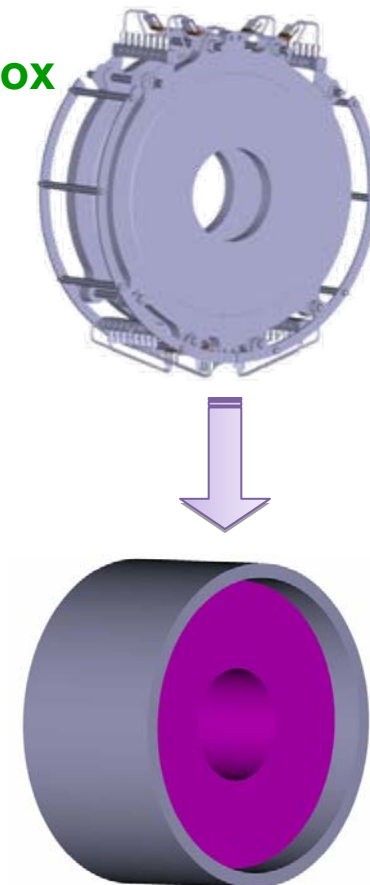
# Notion of placeholders

- Integration of sub systems with defining a placeholder (= integration box)
  - **Quicker to integrate in full model than detailed model (first level of integration)**
  - **Easy to check detailed model dimensions / allocated box**

- Example of LumiCal :

Overall dimensions

- + Gaps for fixing system
- + Tolerances ; deformations
- + Services : cables/cooling
- + Room for mechanical alignment and for monitoring

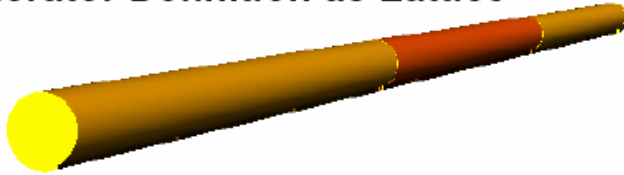


*From C. Clerc presentation during MDI/Integration pre meeting*



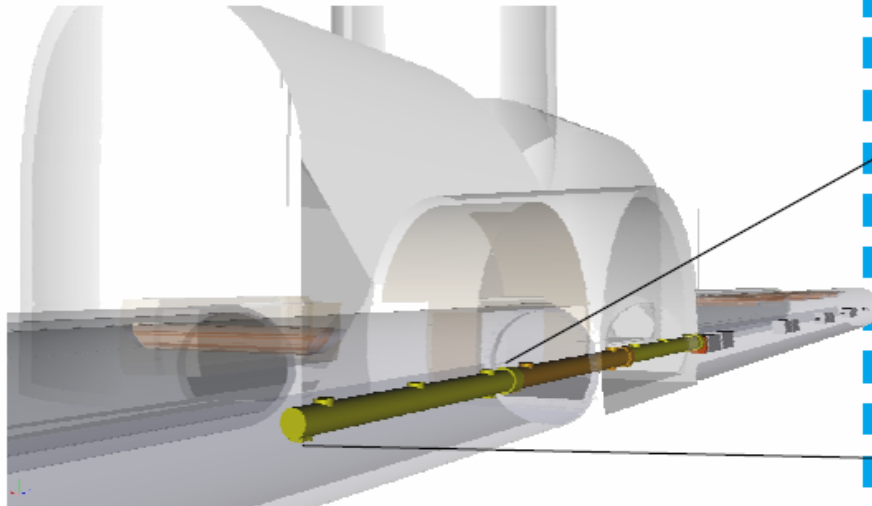
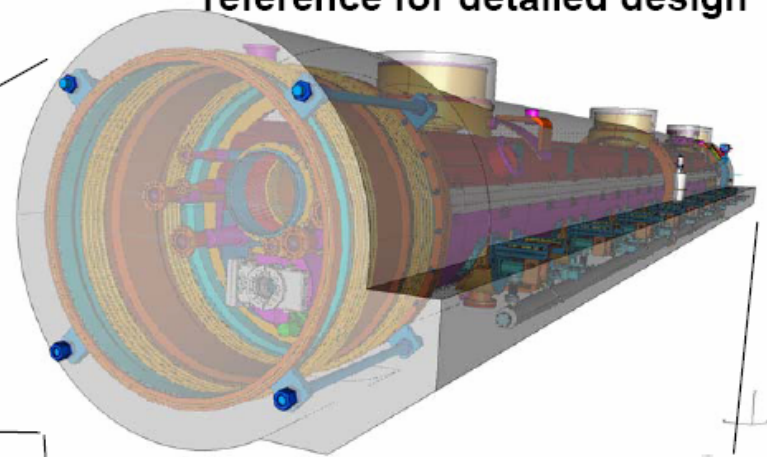
# Example of XFEL tunnel design

Accelerator Definition as Lattice

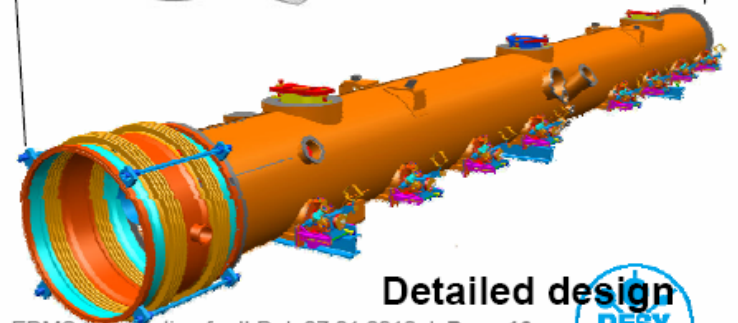


Detailed Design

Placeholder acts as reference for detailed design



Facility Planning using Placeholders



Detailed design





# Use of the ILC EDMS

- A GDE recommendation
- ILC EDMS system provides :
  - Data storage system allowing technical data sharing in an international context
  - ILC is a long-term experiment: Product lifecycle management
  - Powerful drawings and 3D viewer

- For ILD, this would be the place to share :

- Technical notes
- Sub detectors interface parameters document
- Drawings and placeholders model
- FEM calculation results
- ...

- Ease the work of integration


	<i>Lumical interface parameters</i>	Ref: ILD-000-xxxx
		Issue
		Date: 20/01/2010
		Page: 2

1. Technological description

- 30 layers of W/Si/electronics cards
- Thickness of a layer : W3.5+ Si 1.5+ elec 1= 6mm

2. Overall dimensions

	W/Si centered on outgoing beam	
Rin(support/sensitive)	7690	
Rout active	196	
Rout support	220	
Zin	2450	Total thickness : 165 mm
Zout	2635	Estimate weight : 250 kg



3. Support

- The Lumical will be fixed to the front of the beam pipe

4. Services

- Power dissipation : overall 20-50 W
- 4 cooling pipes ( water????)
- Cables
  - ✓ output 360 LVDS
  - ✓ 8 power lines ( 10 A )
  - ✓ control ( 4 coax 1 fiber cables )

5. Alignment

Initial alignment requirement :

- 1mm in xy
- 10 mm in z ( between the two lumical )
- 1mm regarding to the beam pipe.

Position measurement requirement :

- 1/2mm in xy
- 60 µm in z ( between the two lumical )
- 4 µm inner radius. This could be guaranteed by construction and checked online by FSI system.

Alignment system possibilities :

- Laser beams in the beam pipe ( 4 windows of 2mm of diam per side at least )
- Introduction of a tube in the Fodet carbon support structure with vacuum
- Reference point on QDO, and thus what is the accuracy of Monalisa system ( < 10µm? )

Draft

From C. Clerc presentation during MDI/Integration pre meeting



# Conclusions

- Detector integration studies are mandatory for having :
  - **A basic and feasible mechanical integration of the baseline design**
  - **A realistic simulation model**
- Tools are available for performing this work :
  - **CAD management system**
  - **ILC EDMS**
- The detector integration group need :
  - **Information from sub detectors' group**
    - Sub detectors interface parameters document
  - **A technical contact named from each sub detector**
  - **To define integration rules and placeholders as early as possible**

Thanks for your attention.