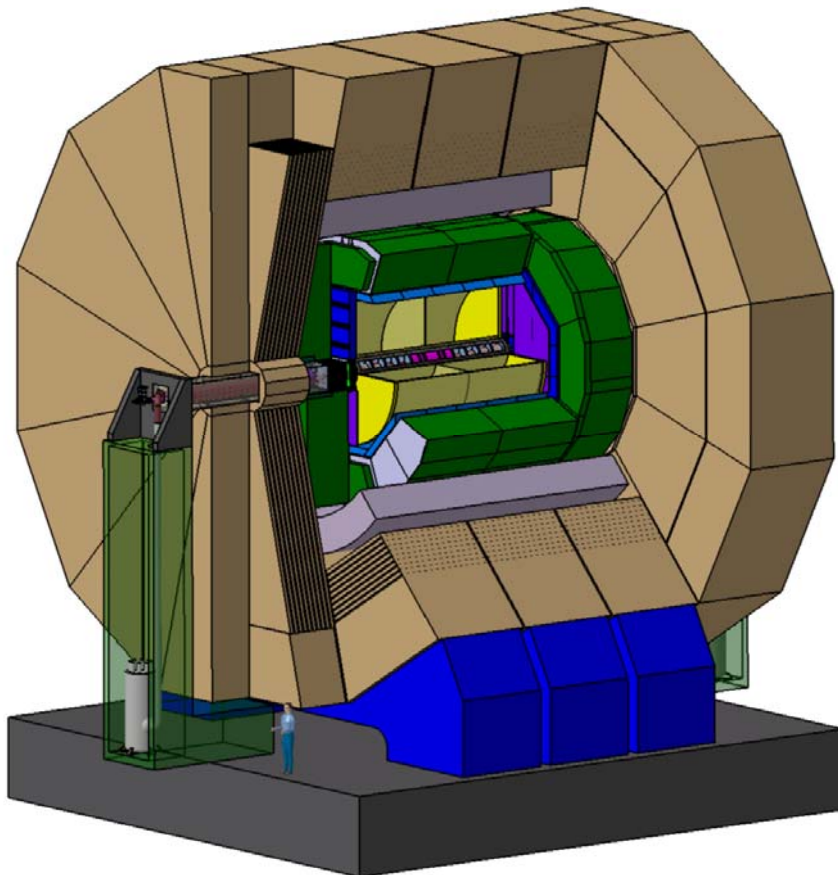


From Lol 2012 to DBD 2012

Mark Thomson
University of Cambridge



This talk:

- ① LDC/GLD to the ILD Lol
- ② Simulation
- ③ Optimisation/Performance
- ④ Background
- ⑤ Time stamping
- ⑥ Aims

1 From LDC/GLD → Lol

- ★ **Worth remembering how much we have achieved**
 - **Oct 2007: Call for Lol**
 - **Jan 2008: first ILD workshop Zeuthen**
 - **Sep 2008: “software baseline” defined: Cambridge workshop**
 - **Mar 2009: Lol submitted**
 - **Jun 2009: Final presentation to IDAG**
 - **Aug 2009: IDAG: “At the LOI stage the progress of the Collaboration in realizing their detector concept is impressive and the path is clear for ILD to make continued progress”**
- ★ **Only 1.5 years from formation of ILD to Lol !**
 - **This was an impressive achievement**
- ★ **Now have ~2.5 years to develop DBD**
 - **A real opportunity !**
 - **But aiming higher, a more refined study.**
 - **Need to define a prioritised plan of work – Paris 2010**
- ★ **In next few slides aim to give a brief introduction/some context to the talks in this session**

2 Simulation

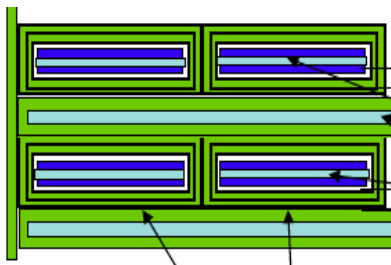
Guideline for the Plan of the detector groups

4. Develop a realistic simulation model of the baseline design, including faults and limitations

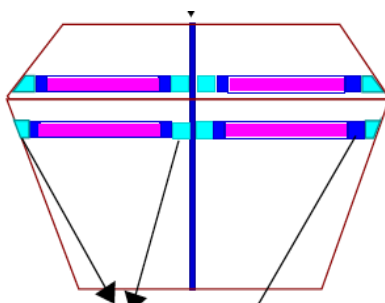
★ What does this mean for ILD ?

- Many sub-detectors already in pretty good shape

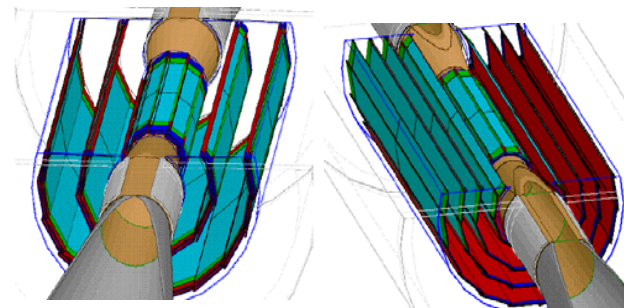
ECAL



HCAL



VTX



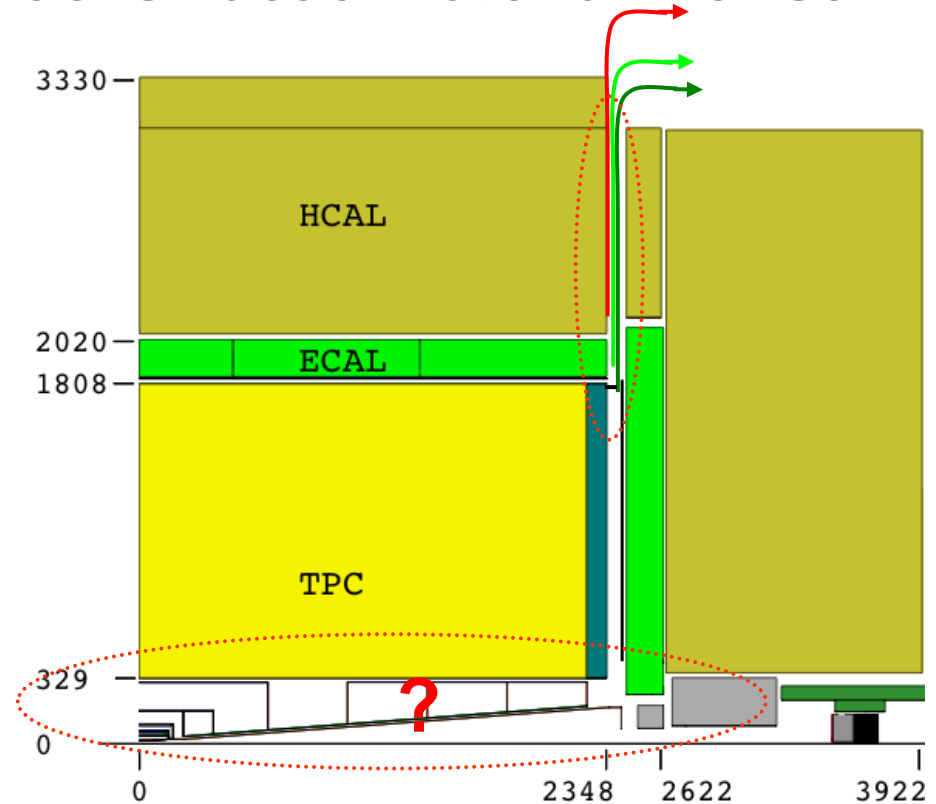
- Others require more work... See Steve's talk
 - ◆ Need to plan, i.e. define a "deadline"
 - ◆ Also need to consider carefully what level of detail is required, not an engineering design – i.e. not every screw

+ Services

★ Current detector model lacks “dead material” for services

★ Services:

- cables, data out
- cables, power in
- gas flow?
- cooling



★ Layout / material budget needs to be defined

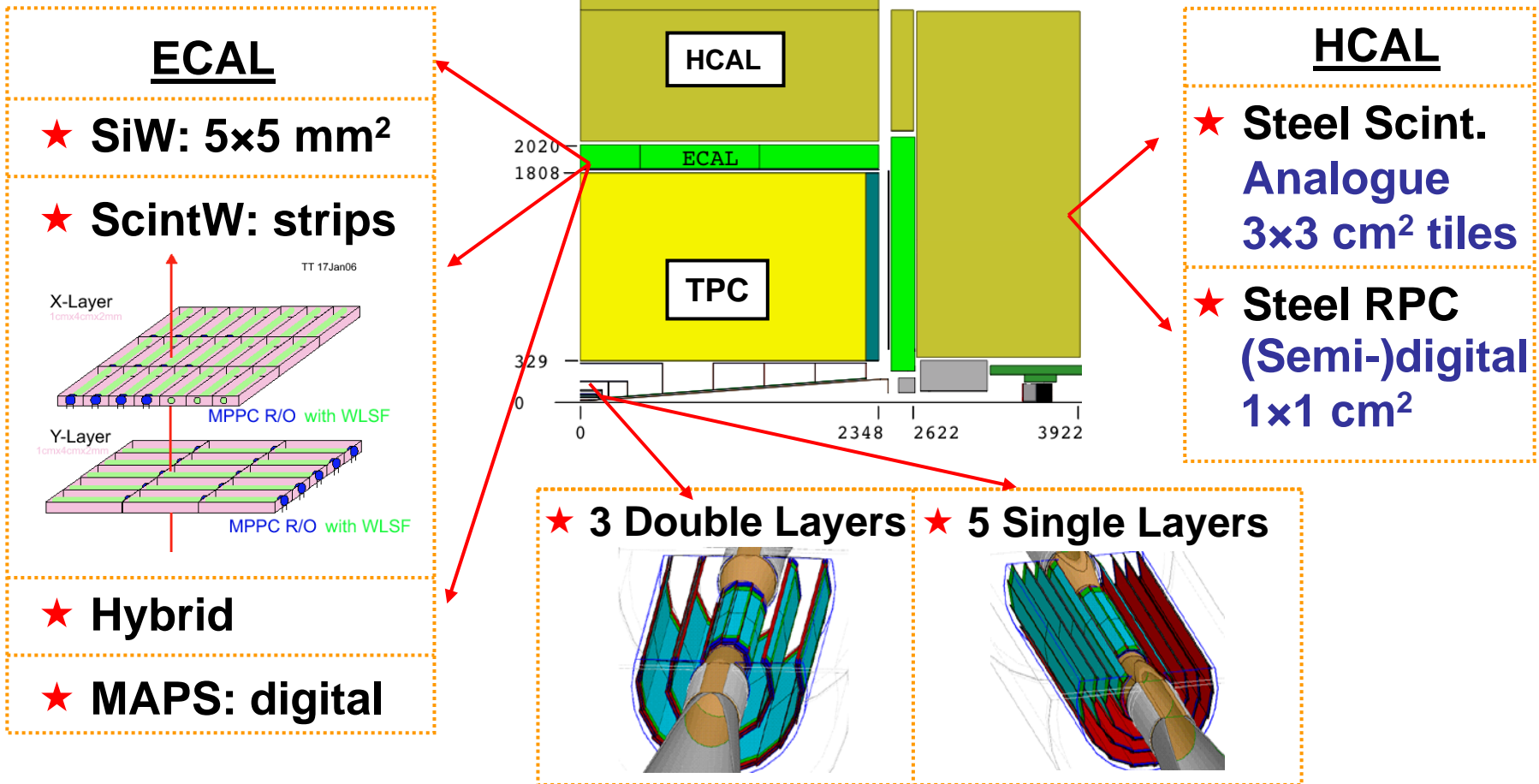
- **A lot of services in same region of detector**
- Needs coordination between sub-detectors
- + need to consider different detector options

Set up small WG to focus discussion?

Options

2. Define a feasible baseline design

(Options may also be considered. But one of them should be proven to be feasible.)

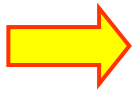


- ★ **Need to be in position to evaluate options**
 - **Essential to include in Mokka as soon as possible**
 - **Should have comparable level of detail in options and current baseline detectors – fair comparison of performance**

- ★ **What ?**
 - **Scintillator strip ECAL**
 - ◆ **Here the reconstruction is a significant task**
 - **Hybrid W Si-pixel/Scintillator-strip ECAL**
 - ◆ **Again major simulation/reconstruction task**
 - **MAPs ECAL**
 - ◆ **Again the reconstruction is a significant task**
 - **Semi-digital HCAL**
 - **...**

Simulation Timeline

- ★ Need well define simulation of ILD/services/options in order to:
 - define a “simulation baseline” for physics (SM production)
 - detector (option) performance studies
- ★ But also need to develop/optimise reconstruction software for all options:
 - this is a significant effort – probably much more than defining Mokka models
 - drives timeline for above studies



Simulation needs to be defined rather soon (this year)

- ★ What does this mean?
 - fix Mokka **sub-detector drivers** with appropriate detail
 - implementation of first order estimate of service material
 - ♦ parametric (not every cable/pipe)
 - Does **not** mean defining optimised ILD software baseline
 - Does mean that simulation is ready for detailed reconstruction software developments/performance studies

③ Optimisation/Performance

Three main aspects:

- ★ Compare performance of “options”, e.g.
 - SiW vs ScintW ECAL: PFA, tau ID, ...
 - AHCAL vs DHCAL: jet energy resolution
 - 5 single layer vs 3 double layer VTX: flavour tag/vertex charge
- ★ Requires:
 - Detailed Mokka drivers for all options
 - Dedicated reconstruction software, e.g. mini-vectors for double layer VTX, PFA for MAPs ECAL, ...
- ★ Not: full “SM mass production” for multiple detector models

- ★ Optimise sub-detectors, e.g.
 - Number of layers in ECAL
 - Understand impact of TPC endplate thickness
- ★ Start to identify “shopping-list” of questions/issues at this WS

- ★ Optimise ILD global design, e.g.
 - L*/HCAL endcap thickness/muon chambers as tail-catcher

4 Background

Guideline for the Plan of the detector groups

8. Simulate and analyze some reactions at 1 TeV, including realistic higher energy backgrounds demonstrating the detector performance.

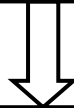
- ★ Heroic efforts for the Lol !
 - But incomplete...
 - Not fully integrated into a physics analysis
 - Will discuss this in more detail later

5 Time-stamping

- ★ Related to treatment of background
- ★ Need to come up with an **ILD bunch-crossing ID strategy**
- ★ Need to understand ILD sub-detector requirements
 - e.g. pixel detector (VTX) integration times
 - what's needed in the ECAL/HCAL?

⑥ Aims for next 19 hours

- Start to develop plans for simulation
 - ◆ **timescales**
 - ◆ **services**
- Highlight holes in reconstruction software...
 - ◆ **what are the priorities?**
- Start to develop lists of detector specific questions
 - ◆ **Use to plan studies**
- Discuss some of global detector issues
 - ◆ **e.g. issues raised by Henri**



**Start to develop coherent ILD detector
optimisation plan post-Lol**

Timeline (without times)

