

Status of the process of costing ILD

Without giving any new cost numbers

Henri Videau
Chair of the ILD costing group
Laboratoire Leprince-Ringuet
CNRS/IN2P3 Ecole polytechnique



At the kick-off meeting I had stated:

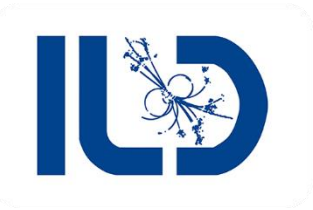
“I propose that you start preparing the documents for your sub-detectors. Then we can exchange and discuss each document first privately, between the costing officer, Karsten and myself, then in the group to ensure that everyone agrees with the method and the way it is described.

I am personally ready to discuss with each sub-detector and help as I can, including meeting you in your place, to get something good and looking good in due time.”

“Do we agree that then a first good iteration should be ready for Arlington mid-October, but maybe not presented publicly?”

The agreement was YES

But I got really one answer from Christophe Berriaud (Saclay) for the magnet (with Uwe) good intentions from Paul Colas some action from myself and people working with me, the others postponed when solicited or kept quiet.



But looking at the DBD,
magnet (38 coil + 95 yoke =133MILCU) and Ecal Si-W (158 MILCU)
make together 291 MILCU i.e. 74% of ILD cost estimated at 391.8 MILCU,
manpower being set aside

Costing these ones with an adequate accuracy would be a good start

But we have now only 2 to 3 months until the IDR is written
to establish firmly the estimate of the ILD cost.



To my knowledge the only estimates we dispose of for coil and yoke concern the large model.

Then
where are we with the magnet?

From DBD 1 ILCU = 1\$ 2012 ~ 1€ 2012

Christophe is finalising a reassessment of the magnet cost derived from CMS.
There are two main elements in the magnet: the coil and the yoke

Concerning the yoke, the cost was and is obtained by knowing

- the iron mass (15664) needed for returning the field to ensure the comfort of the other detector
- the cost of the kg or ton of the adequate quality iron. CB proposes 5.1 \$/kg today, giving 79886\$(78.7).

The estimate from DBD was 80.4MILCU, ~80.4 M€ by PPP.

- an estimate of the tooling (4M\$)

The actual problem is the thickness of the yoke, very different from CMS for example

This is directly linked to the push-pull scenario and the tolerance agreed on the stray field.

Can we make the two detectors more distant? Cost of a larger cavern?

Can we be more tolerant by an agreement between the two detectors?

Is there any technical solution, like a magnetic wall, possible (looked at DESY, much cheaper but)?

But first: Push-pull or not?

Offer two prices?



And with the coil?

Without antiDID

Christophe has made first a complete reassessment of the CMS coil cost from their numbers
Trying to identify the items as precisely as possible, taking into account the (or part of) in house manpower.
Then he tries to estimate most of the prices as of today using PPI (Producer Price Index) then translate it
in ILCU 2018 (DBD was ILCU 2012) with the adequate method:

Exchange rates, PPP's (Purchase Power Parity) or? $1\$ = 0.97\text{€} = 127\text{Y (DBD)}$

This CMS part has been blessed by Alain Hervé.

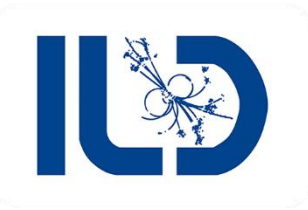
We should not worry at the 10% level

The same path had been used for the DBD estimate.

The differences are being investigated because the new price is clearly higher.

At first sight I could incriminate two effects:

- The in house cost (heavy) had been deliberately set aside (DBD rule, not hidden but given)
- The prices evolution handling, conversion in ILCU seems to have been done differently and has a quite strong impact.



This last point is rather cumbersome, has to be worked out and agreed upon. Work on going.

The idea to follow the ILC costing and use PPP's is not so evidently the best as soon as things are bought in different currencies.

This impacts much more than the coil.



Since the DBD three estimates are being done:

- the large model DBD like,
- the small model
- a version of the small model using thick silicon diodes and 26 layers (V. Boudry presentation)

Notice that a large model with these last features is not excluded

Technical developments have been made to improve the cost, use of 8# wafers and better use of the area, slight increase of the pad area ..

Caveat: the main cost change since the DBD comes from the price obtained by CMS on the silicon

which we consider seriously.

But an improved WBS with very detailed process description is developed, the volumes, masses and material losses have been estimated rather accurately, The phases of the fabrication and integration have been identified from the prototype construction with the times and manpower needed.

A rather adequate estimate of the manpower needed with an idea of the competence levels exists.

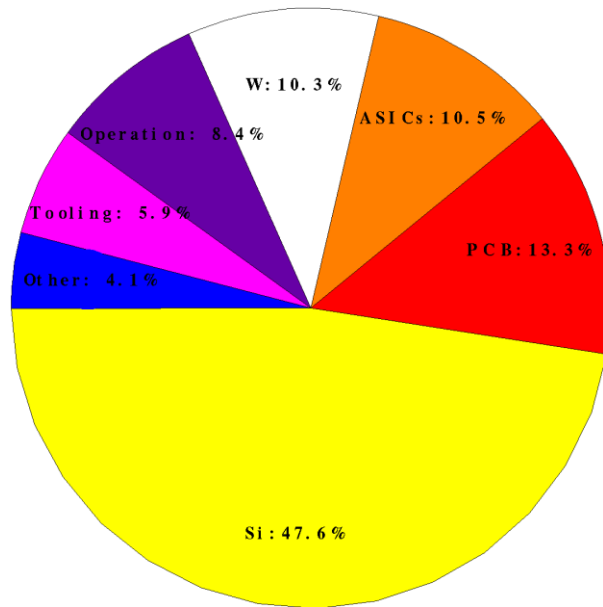
Once this is done, the tooling and operation manpower can be estimated properly and the uncertainties rest with the prices, essentially Si, W, PCB, ASICs and the conversion to ILCU if !



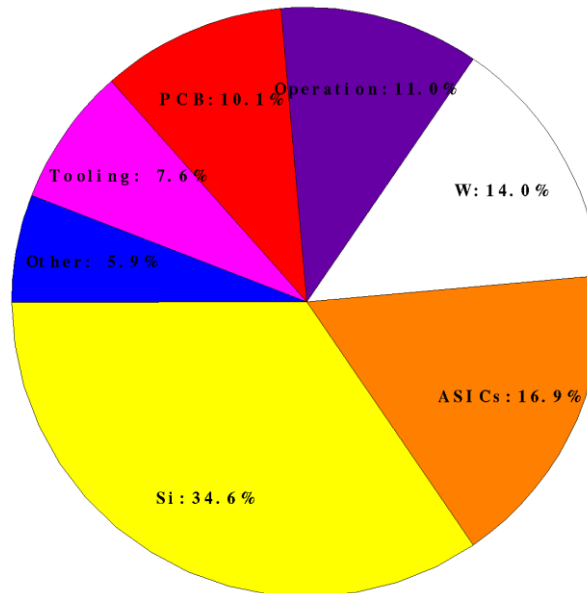
The absolute cost may suffer uncertainties but

Probably a rather adequate comparison of the cost of the different versions can be done under these circumstances, since the way to scale these different items costs is very similar: the area of the detecting layers.

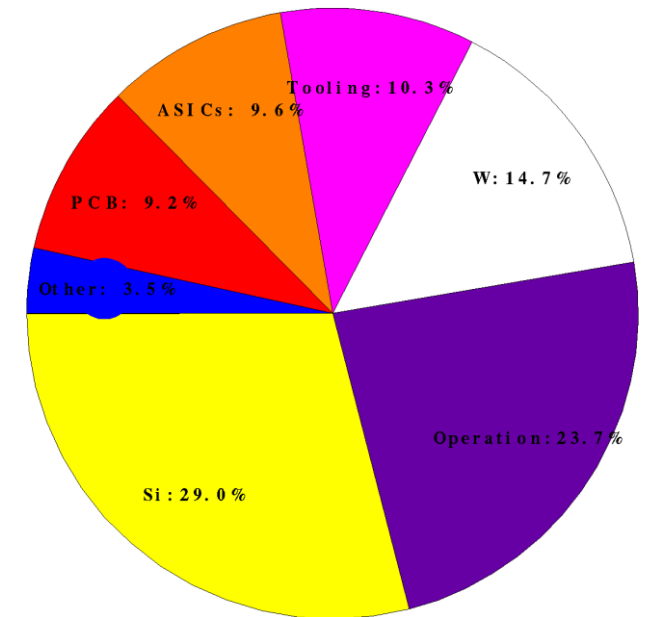
But the sharing of the cost between the different items is more delicate.



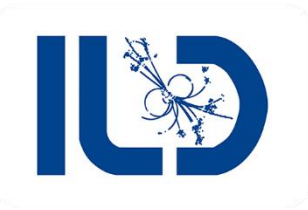
DBD



Large model
with reduced Si price



26 layers small model
Including manpower



Conclusions

A lot remains to be done

A lot remains to be understood

Probably for the coming evaluations using as a start euros
would make things easier

An adequate and common conversion to ILCU coming later if
needed

But the estimate for the coil from CMS may remain delicate.