In this note we summarise the discussions concerning the MDI/integration which took place in the MDI group or during the ILD meeting held in Sendai march 2008.

There are points where we reached an agreement, some others will be pursued independently trying to evolve toward an agreement. The responsibilities are stated as much as possible. The actions to take are stated. The forgotten points are mentioned if identified.

It is emphasised that the current list corresponds to the subjects we consider as urgent for our purpose. Some points like ETD or SET are left out for the moment.

A time chart should be developed. We should agree on common names for the parts. Concerning the name of the detectors it is probably better to identify more easily GLD-like and LDC-like models with version numbers. We could use ILD_Gn and ILD_Lm where n or m are version numbers.

This concerns :

- The magnet, coil and return yoke, muon chambers
- The forward region
- Hall, push-pull, opening of the detector
- TPC
- Inner detectors
- Calorimeters

Coil

We agreed on some field constraints:

-A maximum stray field of 200 G at 10m in z and yoke outer radius + 50cm transversally. The value is lower than most of the big labs recommendations.

-A TPC field uniformity corresponding to a maximum displacement of 2mm (conventional value) in the absence of DID or anti-DID. The question of the anti-DID and the shape of the field has been discussed in the ILD meeting without a clear answer. The displacement could grow to 5mm or even 20mm.

A request in presence of the anti-DID to ensure a $\Delta B_z/B_z < 4.10^{-4}$ within 50 cm around central electrode is under consideration. Should be decided by LCTPC.

An anti-DID will be designed by M. Kawai with B. Parker.

The cryostat of the coil has to be strong enough to support all calorimeters without too much deformation (about 4-5mm in the case of CMS). What is our tolerance on the move of the coil and thus the thickness of the stainless steel?

The magnet has to be dimensioned for 4T maximum even if B is chosen to be 3.5T with 4 layers of windings a la CMS.

The dimensions of the cryostat are :
- inner radius 3.30 m (ILD_G1~GLDc), 3.36 (ILD_L2 ~ LDC')
- outer radius 3.85 m (ILD_G1), 4.11 (ILD_L2)
- half length 3.75 m (ILD_G1), 3.79 (ILD_L2)

But for the outer radius, the differences are minor and should be smoothed out once the HCAL thickness is optimised. The cryostat thickness has to be looked at.
The space between cryostat and end cap is 10cm. The distance between end of coil and end caps should be as small as possible.

The engineers in charge are:

- Saclay F. Kircher
- KEK H. Yamaoka (Technical coordinator at KEK)

Return yoke and Muon Chambers

Considering a surface assembly a la CMS, the general yoke barrel structure with 3 rings is agreed upon with gaps around 5cm in between (15cm in CMS), and 2.5cm at both ends toward the end caps.

The shape and the iron plates thickness is to be defined (see muons). For the quality of the flux return only the section of iron matters, the shape should then be defined from mechanical constraints.

The overall thickness is derived from the constraints on stray field, see coil section.

The presence of gaps may have an impact on the self-shielding against radiations. T. Sanami will estimate the self-shielding with gaps.

End caps:

The thickness is dictated by the stray field. LLR/LAL proposed an end cap structure in two rings, the inner one supports the calorimeters and is made in one piece, the outer one can be split in two for the opening. LLR/LAL consider a square hole around the QD0 mainly to improve the stiffness of the support structure for forward instrumentation, but a circle hole may be maintained for the inner part to keep the possibility of sliding off the TPC. The impact on the stray field of the square hole in the yoke will be checked (Saclay).

DESY should work on the return yoke structure and in particular the end caps.

Muons:

The coil is about 2 interaction lengths thick. A first layer of muon chambers should be installed between the coil and the yoke in the barrel to preserve some tail catching capability. For the same reason the thickness of the first layer of iron should be optimised. The number of layers for muon identification and tail catching is to be defined. GLD and LDC consider 8 or 9.

A layer outside the detector, if we have the space, could be useful against cosmics.

Outer "rigid" structure:

An additional outer structure might be necessary to strengthen rigidity of the "3-ring detectors" in the push-pull scheme.

DESY should work on it if necessary for the LoI .

Forward region

The forward detectors are of the FCAL collaboration responsibility, our concern is about supporting the detectors with their services and shielding. The items are Lumical, LHCAL, BeamCAL with pair monitor, QD0, pumps, BPM's, beam pipes.

The shielding need not to be done by the support structure itself, a W shielding on the end cap seems OK.

Two solutions for this support structure are pursued and will be compared:

- a cylinder supported from the floor outside of the detector, studied at KEK (H. Yamaoka)
- a square structure (about 70cm x 70 cm) supported from the floor and the end caps studied at LAL (M. Jor»)

Two solutions are also pursued for the IR beam pipe:

- a conical shape by M. JorÈ / M. Anduze
- a cylindrical shape by Y. Sugimoto / H. Yamaoka / Y.Suetsugu

A cylindrical beam pipe might be a problem for Fcal introducing material in front, but the mechanical behaviour of the cone is not evident.

The studies done by Y. Suetsugu on wakefield, FEA analysis and pumping for the cone solution show that it may be viable but the materials used and the thickness are to be studied more. He will pursue.

Hall, push-pull, opening of the detector .

Also platform, PACman,..

Profiting of the existing studies the work will stay in DESY's hands.
According to GDE-BDS, the platform is a part of the interface, while SiD doesn't want one, ILD may need one.

TPC

The main point concerns the inner radius (mechanical). It's under LCTPC group responsibility. The discussion at the ILD meeting has shown that, even though a small radius may be beneficial to the reconstruction of low energy tracks, it is difficult to envisage a radius lower than 25 or 30 cm because of positive ion accumulation from the background and the fact that the inner field cage at very shallow angle could damage the pattern and the momentum measurement.

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The crucial point, for the inner radius, of the SIT and the number of its layers is still pending (optimisation group).

We can pursue with two different radii but this impacts the work on the inner detectors and integration.

The thickness of the TPC end plate is the responsibility of LCTPC, currently 10cm seems OK. The end cap tracker thickness depends on SilC. The distance between the two is taken as being 10cm.

Inner detectors

We consider a unique cylindrical structure holding the SIT, the forward disks, the beam tube and the vertex detector.
France will provide the study of the support (LPNHE in Paris). It has to be confirmed.

We wish to get also support from the Korean group who has investigated performances of the silicon trackers in GLD. To be discussed with Prof. Hwanbae Park.

Calorimetry

Barrel:

the question is about the shape 8 or 12 folds, SiD prefers 12 on cost reasons, ILD_L considers 8 as structurally simpler. It has to be looked at by the optimisation group and studied from the mechanical point of view.
End-caps:
as for the barrel LLR/LAL will provide their mechanical concept description.
This can be presented and discussed extensively in a calorimetry meeting linked to the FJPPL meeting in Paris in May.
We should try to reach an agreement on a common rough design by that time.
