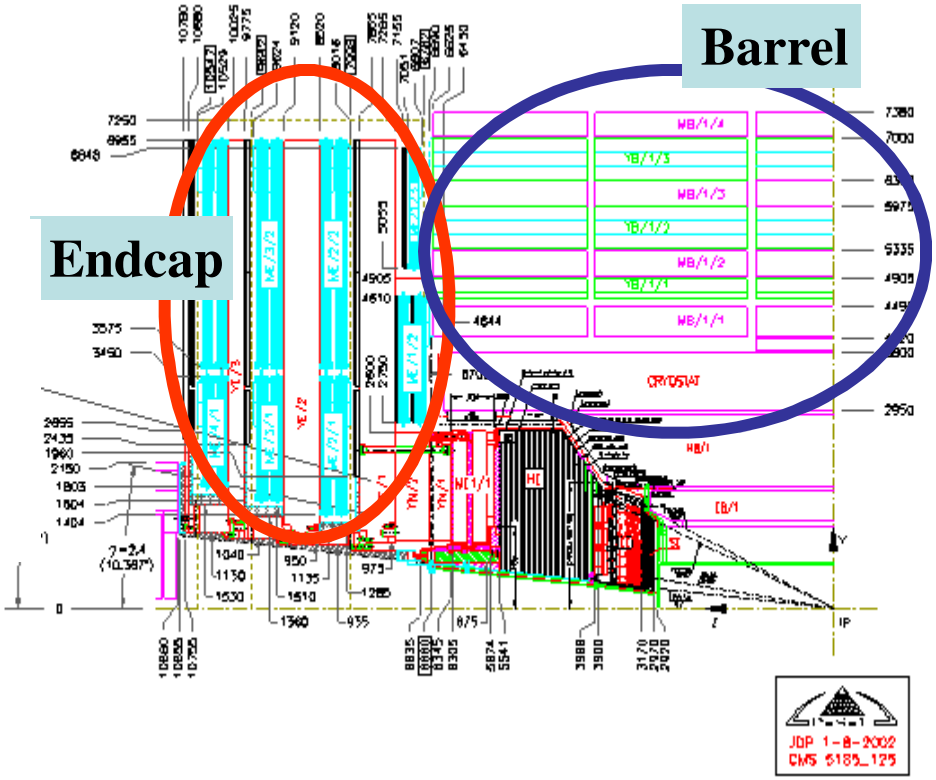
The RPC up scope

Scope:
Restore the low η TDR design

Goal:
Install chambers in 2011-2012 shut down



	RE 1/1	RE 1/2	RE 1/3	RE 2/1	RE 2/2	RE 2/3	RE 3/1	RE 3/2	RE 3/3	RE 4/1	RE 4/2	RE 4/3
No. of chambers	36*2	36*2	36*2	18*2	36*2	36*2	18*2	36*2	36*2	18*2	36*2	36*2

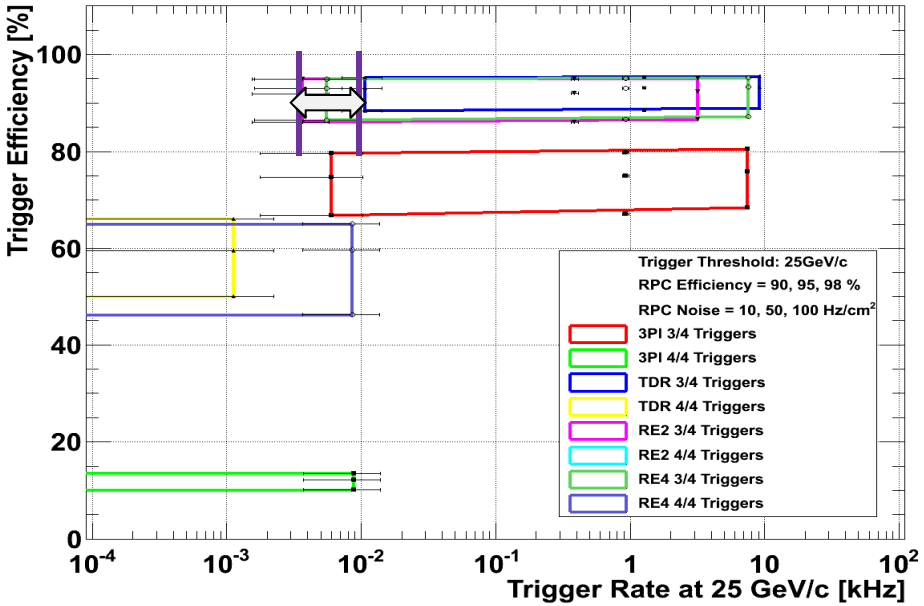
up scope

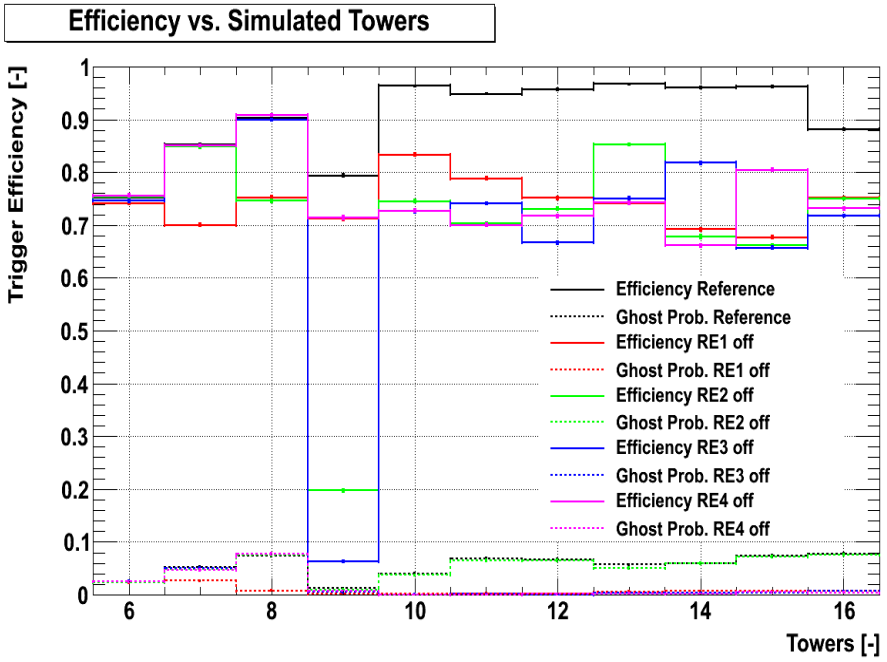
Simulation studies

The TDR design seems adequate
150 chamber to build + spares

TDR Geometry
- ε = 95 %
- Rate = 0.05 Hz cm^{-2}

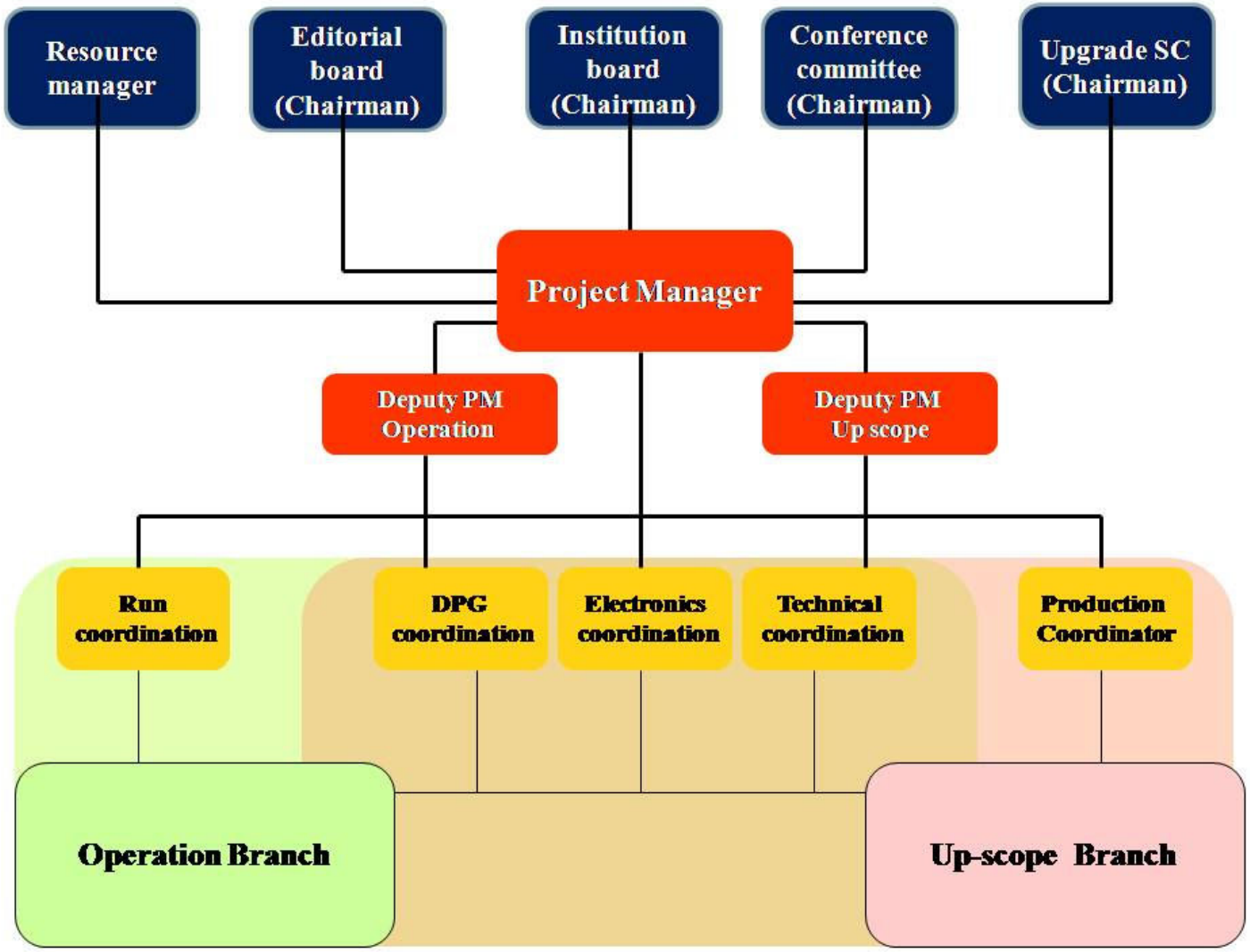
Ghost rate is dominated by RE1 and RE3. Switching off RE2 does not affect the ghost rate





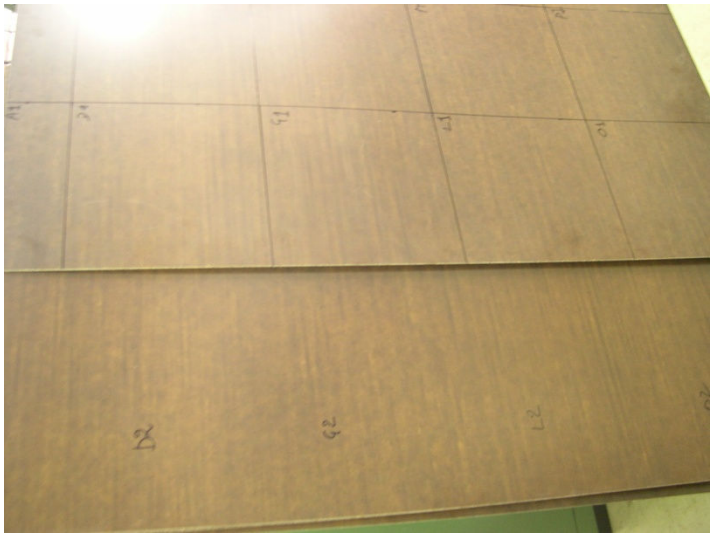
Full Endcap (Towers 8 – 16 1.04 < η <2.10)

Project organization



Electrodes procurements

Contact with experts re established. New company selected and visited last week. Road map for pre-production and production discussed.



First low resistivity HPL produced. Now under certification by the Pavia group. Reiterate until CMS specification obtained for resistivity and surface. Pavia expertise assured in this phase.

At the end of this phase (April) lunch a 10-15% preproduction and validate. Goal is to lunch final production in the summer and have it ready and certified by September /October

Electrodes validation

Discussion with Pavia on going. Two scenarios:

- Pavia takes the scientific responsibility for the validation
- Pavia makes available the table with some expertise for the re-commissioning

The table should be positioned either in Pavia or at the company were the production/cutting will happen (RIVA). Involvement of CERN for re-commissiong and operation anyway envisaged.

Manpower:

1 physicist + 2 technicians for 4/5 weeks

Additional electrode treatment: cutting in RIVA (Milano)
cleaning in GT/KODEL

Ian and Salvatore coordinating this task

Chambers mechanics

Revalidate and update the existing drawing from Pakistan to avoid retrofitting, as necessary in previous production. Cross check all the chamber and gap dimensions using spares at ISR

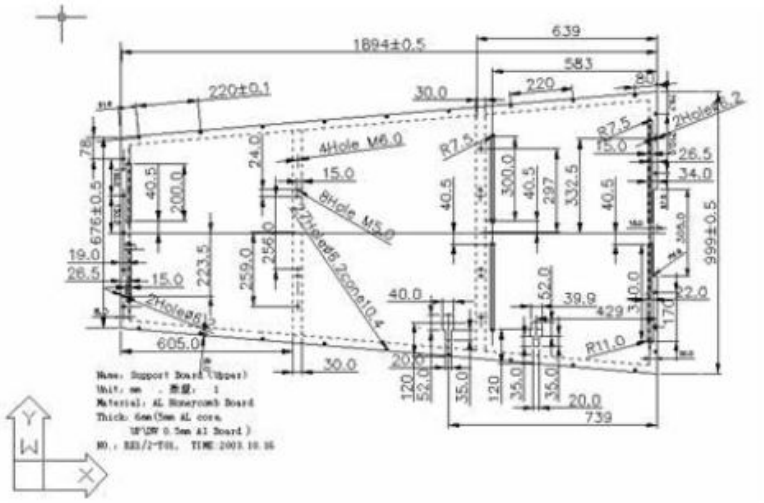


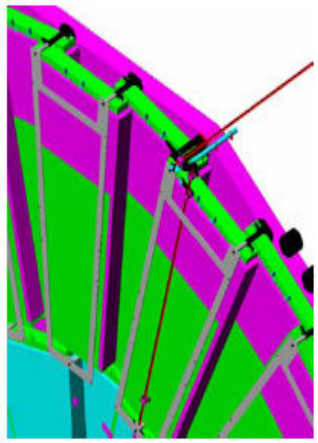
Figure 5.2: layout of a typical RE honeycomb plate

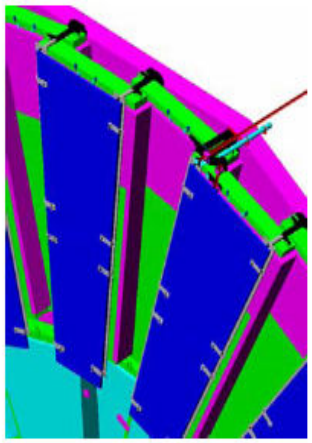
Pre production by June in China. Validate it and launch final production. Goal is to have it ready by October/November

Yong, Luc and Walter coordinating this task

Services/Integration

- List of new services needed (cables, gas, cooling ..)
- Assembly schemes A (CSC on time wtr RPC) and B (CSC late wtr RPC) needs to be defined
- Interaction with YE4





Infrastructure work task force among CSC, RPC, integration office, gas group.

Preliminary conclusions by May/June

Salvatore and Walter coordinating this task on RPC side

Gap production

About 900 gaps produce (600 + spares). Baseline is to assembly in Korea. However:

- Persistence of expertise at KODEL needs to be confirmed
- production yield needs to be evaluated wrt the expected installation schedule

If HPL ready in September/October, gap production to be over within the next 5 months (9 gaps/day). Introduce some parallel production at GT??

Manpower needed for the validation procedure: 1 physicist + 2 technician for 6 months

Pino, Salvatore, Sung coordinating this task

Chamber production

Phase I (October 2010-February 2011)

Pre produce and test 20/30 chambers in Ghent (Belgium) as soon as all the components are available in order to:

- define assembly protocols
- validate procedure
- lunch procurement of additional components (signal cables, connectors, ..)

Responsibility of Belgium

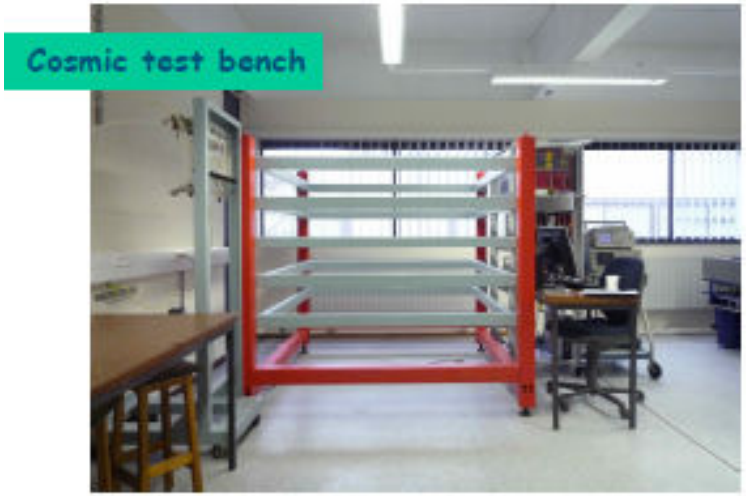
Phase II (March 2011 – October 2011)

Produce and test about 140 chambers at CERN (904). Combined responsibility of Belgium, CERN, India

Phase III (April 2011 – November 2011)

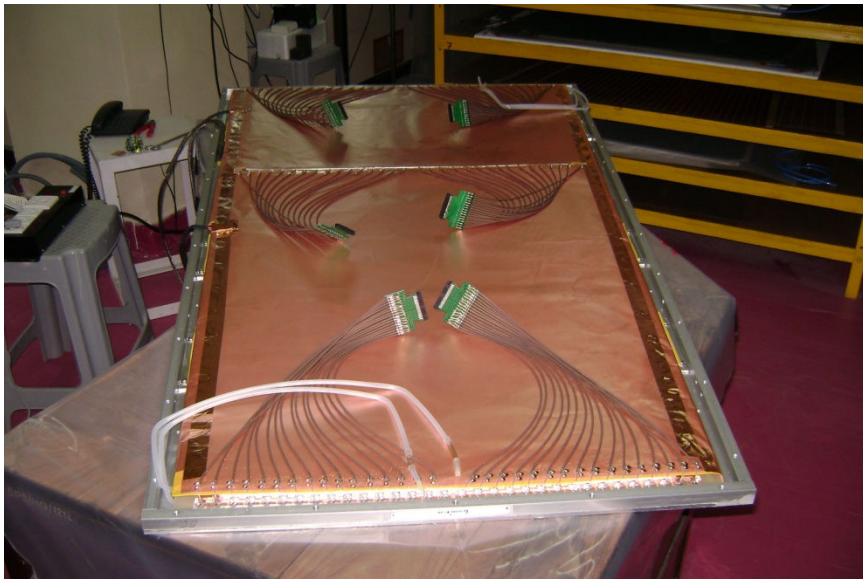
Produce and test about 20/30 spare chambers at BARC (India). Responsibility of India

Site readiness (Ghent - Belgium)



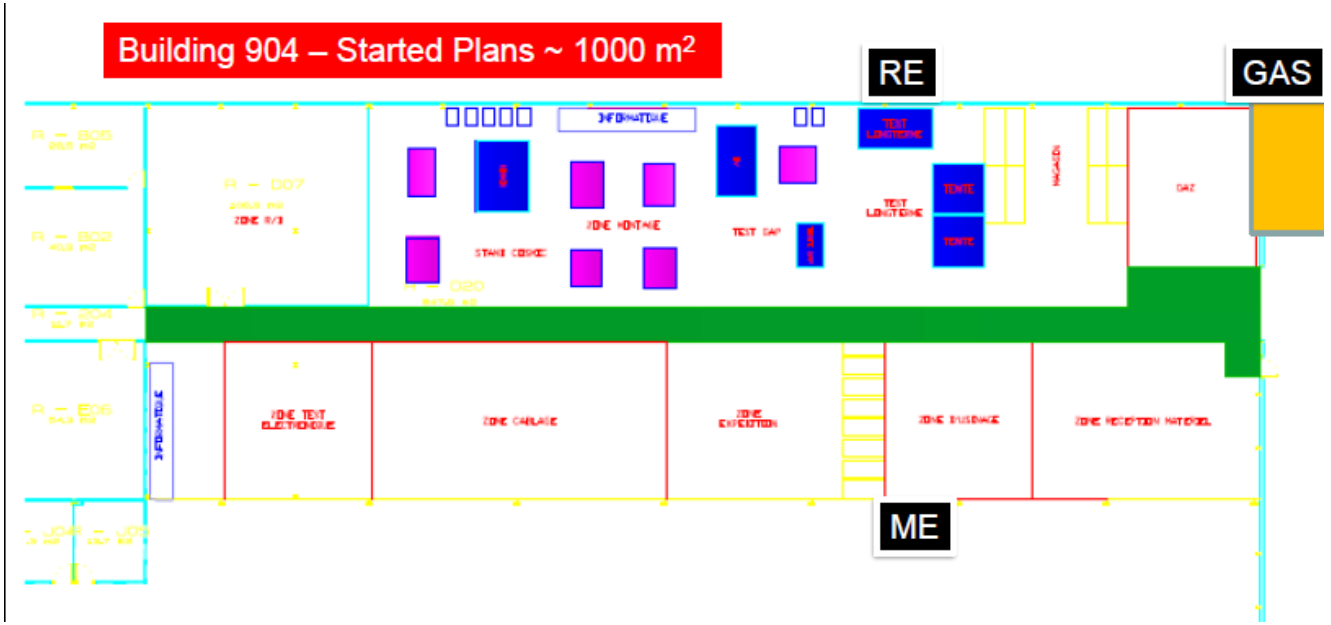
Ready to go into assembly and test in Autumn 2010
Local manpower available

Site readiness (BARC - India)



Ready to go into assembly and test at the end 2011
Local manpower available

Site readiness (904 – CERN)



Ready to go into assembly and test in February 2011

Task coordinated by Archana

Manpower: 2 physicists and 4 technicians needed for the full period. Local manpower to be established . Manpower from other institutions necessary

Front-end electronics

VLSI available

Pakistan expressed interest. Small preproduction already done by local producers

Envisaged the stage of a Pakistani engineer in Europe (CERN-Bari) for few weeks in order to validate the VLSI, review the project and design the board control test bench

Large preproduction in June

Hafeez will coordinate this task (Flavio has guaranteed help)

Off detector electronics

	RE4/3, RE4/2 on YE3		
	needed	spare	total
LB box	12	2	14
LB boxbackplane	12	2	14
Master LB	48	10	58
Slave LB	96	10	106
Control Board	24	6	30
Front Plane	24	6	30
Opto box	4	2	6

Table 3.1: list of LB system components needed for the restoration

	Trigger system in USC		
	needed	spare	total
Trigger board	10		10
Trigger crate backplane	0		0
Trigger interface board	0		0
Splitter board	12		12
Pac/Stratux 2S30	120		120
Pac/Stratux 2S60	20		20
RMB	30		30
VME interface	30		30
Sorter	30		30

Table 3.2: list of trigger components needed for the restoration

Transfer Link Board expertise to a group which could ensure the proper funds for the upscope (INFN). Re evaluation of the design and the cost. The trigger part should stay within the present trigger project (Warsaw)

Pigi and Marcin/Maciek will coordinate this task

Project partners

China, India, Belgium, Pakistan, Korea, Egypt have confirmed their participation and approved a preliminary budget

Other countries have expressed interest: Iran, Colombia

CERN_CMS has express interest in coordinating the 904 infrastructure operation and the production logistic. Further definition of responsibilities, tasks, and funds under way

Italy_CMS has expressed interest in coordinating the off detector electronics procurement. The trigger group is ready to guarantee the transfer of know out. Further definition of responsibilities, tasks, and funds under way with INFN (presentation of the project in May)

Procurement/Production matrix

HPL	Coordinated by CERN
Gap	KODEL/GT
Front end	Pakistan
Honeycomb panel/strip	China
Other mechanic components	Assembly sites
Off detector electronics	Italy
HV/LV system	India/Belgium
Cables	Coordinated by CERN

Cost/Funds (kCHF)

Project cost

Detector	725
Front end	160
Off detector electronics	600
HV/LV system	600
Service/infrastructure	350
Cable	280
Logistic CERN	700
Assembly/installation	150
	3565

Tentatively estimated, to be discussed →

Funds available

Korea	400
Pakistan	210
China	500
Belgium	800
India	800
Egypt	200
CERN	*700*
Italy	*600*
	4210

Cost/Funds (kCHF)

	Phase I
Detector components	725
Bakelite	80
Honeycomb panels	100
Single gaps	350
Strips	20
Mechanics & Assembly	155
Copper&mylar sheets	20
FE electronics	160
VLSI	37
FE boards	100
Strip connections to FE	8
HV connector	15
Assembly & Installation	120
Monitoring	30
Services	950
HV & LV system	600
Cooling system	50
Gas system	300
Cables	200
"Skew clear"	85
HV,LV,DCS	105
Fibres	10
Off detector electronics	600
Distribution Boards	10
Link Boards	500
Link Board Boxes	10
LV link system	40
Trigger Boards	40
Not in costbook	
Umbilical HV cable	80
Shipments & logistics	700
TOTAL	3565
	3565

Details of the cost.

However quotation have to be confirmed/updated during the pre production phase

Milestones for May

Ensure HPL production within the CMS specification

Review chamber design and validate new drawings

Review the integration/service needs. Steering group with CSC, integration office, gas group

Update the cost estimate with market enquires

Define migration of LB system responsibly to INFN

Consolidate responsibility and task of CERN group

>>>>>>>>>> **TDR addendum**