Chapter 4 Project Planning

4.1 Organization of the Collaboration

Details of the LHCb organization are described in [1]. The **Collaboration Board** is the forum for decision and policy-making and represents the ultimate authority of LHCb. It has one member per institute (Table 4.1).

The Collaboration Board strives to reach consensus whenever possible. It elects its own Chairperson, as well as the Spokesperson (in consultation with the CERN Management) and the Technical Coordinator (in accordance with the CERN management). They are ex officio, non-voting members of the Collaboration Board. The present appointments are:

Spokesman:	T. Nakada
Technical Coordinator:	H.J. Hilke
Chairman of the Board:	N. Harnew

Major Collaboration decisions, such as for the appointment of the Spokesperson, the Collaboration Board Chairperson and the Technical Coordinator, for the admission of a new institute, and for any change to the Constitution, require a 2/3 majority, others a simple majority.

The executive responsibility rests with the Spokesperson and the Technical Coordinator. They are advised by the **Technical Board**, presently composed of the conveners of the major subsystems who have coordinated the work for the Technical Proposal [1]. The Collaboration has recently seen a substantial influx of new groups and expects others in the near future. The Collaboration Board will, therefore, decide on a new composition of the Technical Board after the approval of the experiment, once final responsibilities have been assigned. The Technical Board will then include the new project leaders of each subsystem.

The **Plenary Meeting**, chaired by the Spokesperson, is open to everyone in the Collaboration. Physics and technical issues are discussed in the Plenary Meeting before any major decision is taken. Decisions taken by the Collaboration Board are reported at the Plenary Meeting.

[1] W.Ruckstuhl (Tracking), R.Forty and T.Ypsilantis (RICH), G.Carboni and B.D'Almagne (Calorimetry), B.Cox (Muon), S.Conetti and U.Straumann (Trigger), J.Harvey (Computing), F.Harris (DAQ) and A.Tsaregorodtsev (Simulation).

4.2 Responsibilities for detector construction

Since the Collaboration is still experiencing substantial growth, the Collaboration Board has decided to postpone a detailed assignment of the responsibilities until after the approval of the experiment. The capabilities and resources of the institutes will constitute the major criteria, and are largely in line with the interests already expressed by the institutes and with their R&D activities in preparation for the Technical Proposal. These interests are summarized in Table 4.2.

4.3 Cost

The design of LHCb, described in this proposal, has evolved from the one presented in the Letter of Intent (LOI) [2]. A re-evaluation has produced some changes in the costs of the subsystems. However, the Collaboration has endeavoured to optimize the layout imposing the total cost given in the LoI as an overall ceiling. A summary of the investment cost for each component is given in Table 4.3. More details will be presented in a document which has been prepared for the Cost Review Committee (CORE).

The Collaboration intends to set up a Common Fund for about 28% of the total investment, i.e. 24 MCHF. This will include the cost of the magnet (16.5 MCHF), the computer farm and readout network (5.5 MCHF) and the long-distance cabling and piping (2.0 MCHF). Contributions to the Fund should be pro rata to the total investment contributions, with a fixed minimum amount.

Table 4.1: Present LHCb Collaboration Board members.

Institute	**Contact Person**	**Institute**	**Contact Person**
Bucharest	Coca C.	MPI, Heidelberg	Schmelling M.
Cambridge	Gibson V.	Nanjing	Yao N.-G.
CERN	Forty R.	NIKHEF - FOM	Ruckstuhl W.
Clermont-Ferrand	Perret P.	NIKHEF - Univ. of Amsterdam	Kooijman P.M.
CPPM Marseille	Aslanides E.	NIKHEF - Free Univ. of Amsterdam	v. d. Brand
Freiburg	Königsmann K.	NIKHEF - Univ. of Utrecht	Merk M.
Glasgow	Brook N.H.	Northwestern, Evanston	Rosen J.
Hefei	Yin Z-J.	Oxford	Harris F.
Humboldt, Berlin	Lohse T.	Paul Scherrer Institut (PSI)	Nakada T.
IHEP-Serpukhov, Protvino	Dzhelyadine R.I.	Heidelberg	Straumann U.
IHPE Beijing	Jiang C.	PNPI St. Petersburg	Vorobyov A.
INFN-Bologna	Piccinini M.	Rice University, Houston	Crosetto D.
INFN-Genova	Sannino M.	Rio De Janeiro/UFRJ	Marechal B.
INFN-Milano	Matteuzzi C.	Santiago De Compostela	Adeva B.
INFN-Roma I, La Sapienza	Martellotti G.	Shandong	He M.
INFN-Roma II, Tor Vergata	Carboni G.	Tech. Univ. Dresden	Spaan B.
INR Moscow	Kravchuk L.	Massachusetts, Amherst	Kreisler M.
ITEP Moscow	Golutvin A.	Virginia, Charlottesville	Cox B.
Kharkov	Ranyuk Y.		
Kiev	Pugatch V.	Ex-Officio Members	
LAL Orsay	D'Almagne B.		
Lausanne	Bay A.	Spokesman:	Nakada T.
Lebedev, Moscow	Govorkov B.	Technical Coordinator :	Hilke H.J.
Liverpool	Bowcock T.	Collaboration Board Chairman :	Harnew N.
Imperial College, London	Websdale D.		

Table 4.2: Interests expressed by the institutes in the construction of LHCb components.

Component	**Institutes**
Magnet	CERN, PSI
Vertex D./ Veto C.	CERN, Free Univ. of Amsterdam, Glasgow, Heidelberg, Imperial College, Kiev, Lausanne, Liverpool, MPI Heidelberg, NIKHEF-FOM, Roma I
Inner Tracker	Heidelberg, MPI Heidelberg, PNPI, Santiago de Compostela
Outer Tracker	Dresden, Free Univ. of Amsterdam, Freiburg, Humboldt, IHPE/Beijing, NIKHEF-FOM, Utrecht
RICH	Cambridge, CERN, Genova, Glasgow, Imperial College, Milano, Oxford
ECAL/Preshower	Bologna, Clermont-Ferrand, INR, ITEP, Lebedev, Milano, Orsay, Roma I, Roma II
HCAL	Bucharest, IHEP, Kharkov, Roma I
Muon Chambers	Beijing, CERN, Hefei, Nanjing, PNPI, Shandong, Rio, Virginia
DAQ/ Trigger/ Offline	Bologna, Cambridge, CERN, Clermont-Ferrand, Heidelberg, Lausanne, Lebedev, Marseille, NIKHEF-FOM, Orsay, Oxford, Rice, Virginia

4.4 Resources and schedule

Negotiations with the funding agencies are in very different stages of advancement: some firm commitments have been obtained, some negotiations have only just started. Preliminary estimates indicate, however, that the funding likely to be confirmed in the near term will fall short of the total cost estimate for the proposed detector. LHCb has therefore undertaken the following actions:

- The Collaboration is having discussions with potential new collaborators and will remain open in future.
- Possibilities for cost reductions not entailing serious deterioration of the performance are being investigated.
- Assuming that additional funding can be obtained in a few years' time, LHCb has started to elaborate "stretching scenarios", which permit late addition of substantial fractions of the various subsystems and are based on the latest dates for which funding is required to still guarantee completion and commissioning of the whole detector for first LHC beams. The Collaboration is confident that it will be able to convince the funding agencies by rapid construction progress (in particular on the LHCb-specific components like the vertex trigger and the RICH detectors), that additional funding for the experiment would be well placed.
- For the worst case, where no additional financing might be obtained in time to complete the detector as designed for "day 1", LHCb has started to look into "staging scenarios", which would minimize the loss in physics and still permit subsequent completion of the detector.

It is the firm intention of the Collaboration to be well prepared for efficient data taking on "day 1". LHCb has a unique chance to provide exciting physics immediately after LHC startup, since the experiment requires less than 5% of the LHC design luminosity for collecting about two orders of magnitude more B mesons than the earlier experiments, within the first year of operation.

The global schedule foresees:

1. about two more years of R&D and prototype studies,
2. the start of construction in early 2000,
3. the start of installation in autumn 2003.

Table 4.3: Estimates of investment costs.

Subsystem	**LoI**	**Updated Cost(*)**
	MCHF	MCHF
Magnet	15	16.5
Vertex D./Veto C.	5	5.1
Outer Tracker	9	8.5
Inner Tracker		4.0
RICH	9	7.0
ECAL	10	10.5
Preshower		1.9
HCAL	7	4.5
Muon Chambers	9	10.0
Data Handling	17	10.3
Trigger		3.7
Infrastructure	5	4.0
Total	**86**	**86.0**

(*) in 1998 prices

References

[1] Organizational Structure of the LHCb Collaboration, LHCB 96–13.

[2] LHC-B, Letter of Intent, CERN/LHCC 95-5 LHCC/I8.