

# Memorandum of Understanding

**for Maintenance and Operation of the Error! Reference source not found.**

**Detector**

**between**

The EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH,  
hereinafter referred to as CERN, Geneva, as the Host Laboratory

on the one hand

**and**

a Funding Agency/Institution of the **Error! Reference source not found.** Collaboration

on the other hand.

## Preamble

- (a) A group of Institutes from CERN Member and non-Member States, and CERN, has agreed to collaborate to form the **Error! Reference source not found.** Collaboration. This Collaboration has proposed to CERN an experiment to study particle interactions at the highest possible energies and luminosities to be reached with the Large Hadron Collider (LHC). These Institutes have secured the support of their Funding Agencies to enable them to participate in the **Error! Reference source not found.** Collaboration.
- (b) Agreement to this Collaboration has been effected through the signature of Memoranda of Understanding (**Error! Reference source not found.** RRB-D 2000-24 Rev.) between each Funding Agency or Institute, as appropriate, in the Collaboration and CERN as the Host Laboratory. These Memoranda of Understanding for construction (Construction MoUs) collectively define the Collaboration and its objectives, and the rights and obligations of the collaborating Institutes in construction matters during the construction period. In the case of late joining institutes that do not participate in the construction, the equivalent Memorandum of Understanding covers operation and upgrades.
- (c) In their Article 6.6, the Construction MoUs specify that the responsibilities for the maintenance and operation (M&O) of the **Error! Reference source not found.** detector are to be laid down in a separate Memorandum of Understanding on maintenance and operation procedures (M&O MoU), to be signed by all the Parties. Agreement is effected as for construction, i.e. through Memoranda of Understanding between each Funding Agency or Institute, as appropriate, in the Collaboration and CERN as the Host Laboratory. While the Construction MoUs remain valid, their provisions take precedence over those of the M&O MoUs.
- (d) The Resources Review Board (RRB) referred to in Preamble (g) of the Construction MoU is defined therein to have the following roles with respect to M&O :
  - reaching agreement on a maintenance and operation procedure and monitoring its functioning

- endorsing the annual maintenance and operation budgets of the detector

The management of the Collaboration reports regularly to the RRB on technical, managerial, financial and administrative matters, and on the composition of the Collaboration.

- (e) The present M&O MoUs are not legally binding, but the Funding Agencies and Institutes recognise that the success of the experiment depends on all members of the Collaboration adhering to their provisions. Any default will be dealt with in the first instance by the Collaboration and if necessary then by the RRB.

### Article 1 : Annexes

- 1.1 All the Annexes are an integral part of this MoU.
- 1.2 Annexes 1, 2, 4, 5 and 6 shall be identical to Annexes 1, 2, 3, 5 and 6 (including any amendments thereto) of the Construction MoU. When the latter ceases to be valid, amendments to these Annexes shall be made in accordance with the provisions of this M&O MoU.

### Article 2 : Parties to this MoU

- 2.1 The Parties shall be all the Institutes of the Collaboration as listed in Error! Reference source not found. and their Funding Agencies, and CERN as the Host Laboratory. Error! Reference source not found. lists the Funding Agencies and their duly authorised representatives. The Funding Agency may be an Institute or an established institution acting on behalf of one or more Institutes.
- 2.2 The collaborating Institute(s) and the **Error! Reference source not found.** Collaboration will hereinafter be referred to as “Institute(s)” and “Collaboration”, respectively.

### Article 3 : Purpose of this MoU

- 3.1 This MoU addresses the pre-exploitation and exploitation phases of the **Error! Reference source not found.** detector. Its purpose is to define the procedure for determining the maintenance and operation (M&O) costs in these phases along with the mechanisms by which they are reviewed and by which the charges and responsibilities for the execution of this work are distributed amongst the Parties. It sets out organisational, managerial and financial guidelines to be followed by the Collaboration. It does not address the offline computing needs of the Collaboration. These will be the subject of a separate Memorandum of Understanding for LHC Computing as described in the document "Proposal for Building the LHC Computing Environment" (CERN/3279 Rev.).
- 3.2 Exploitation refers to the time after data-taking for physics has commenced at the LHC. Pre-exploitation refers to the time before this and in particular, for individual sub-detector/system components of the **Error! Reference source not found.** detector, to the time after they have been commissioned.

- 3.3 M&O comprises all of the actions needed to fulfil the **Error! Reference source not found.** Collaboration co-ordination function and to operate and keep in good working order the individual components of the **Error! Reference source not found.** detector, along with their respective infrastructure and facilities.
- 3.4 The **Error! Reference source not found.** project is executed in the normal framework of the CERN scientific programme, approved by the CERN Council and subject to the bilateral Agreements and Protocols between CERN and non-Member States.
- 3.5 In case of conflict between relevant Co-operation Agreements or Protocols entered into by CERN and the present MoU, the former prevail.

#### **Article 4 : Duration of this MoU and its Extension**

- 4.1 The initial period of validity of this MoU covers the pre-exploitation phase of the **Error! Reference source not found.** detector and the expected first five years of physics running, i.e. from 1 May 2002 to 31 December 2011.
- 4.2 The validity of this MoU will be extended automatically at its expiry for successive periods of five years beyond the initial period unless the RRB determines otherwise. This provision notwithstanding, the MoU will automatically cease to be valid when the LHC programme is declared closed by the CERN Council.
- 4.3 The provisions of this MoU will apply to elements of the **Error! Reference source not found.** detector as they begin to incur M&O costs, as distinct from the costs that belong to the construction phase and are defined in Article 2.2 of the Construction MoU.
- 4.4 Any Funding Agency may withdraw its support from the Collaboration by giving not less than eighteen months notice in writing to the Collaboration and the Director General of CERN. In such an event, reasonable compensation to the Collaboration will be negotiated through CERN and confirmed by the RRB.
- 4.5 Any Institute may withdraw from the Collaboration according to the procedures agreed by the Collaboration, subject to the General Conditions for Experiments Performed at CERN (**Error! Reference source not found.**), and by giving notice in writing to its Funding Agency.
- 4.6 Any Institute that joins the Collaboration in accordance with the Collaboration rules during the period of validity of this MoU shall accept the agreements in force and will be expected to make an appropriate contribution to the M&O. This will be negotiated by the Collaboration (which reserves the right to request additional contributions from such Institutes) and endorsed by the RRB.

#### **Article 5 : The Error! Reference source not found. Detector and Collaboration**

- 5.1 The detector for the **Error! Reference source not found.** experiment has been described in detail in the Technical Proposal submitted to the LHCC in February 1998 and in the subsequent sub-detector/system Technical Design Reports. It consists of a number of sub-detector/system units as listed in **Error! Reference source not found.**

- 5.2 The current management structure of the Collaboration is described in Error! Reference source not found..
- 5.3 The technical participation of the Institutes in detector construction, grouped by Funding Agency, is set out in Error! Reference source not found..
- 5.4 The Collaboration shall update Annexes 5 and 6 annually to reflect the situation on 1 January of the current year.

## **Article 6 : Responsibilities of the Institutes for the Maintenance and Operation of the Error! Reference source not found. Detector, and of CERN as Host Laboratory**

- 6.1 Responsibility for the M&O of the **Error! Reference source not found.** detector rests jointly with the Collaboration as a whole and with CERN as Host Laboratory, within the General Conditions for Experiments Performed at CERN. It is a fundamental principle that each Institute within the Collaboration shall participate in both maintenance and operation and contribute a fair and equitable share of common costs.
- 6.2 It is also a fundamental principle that an Institute, which has contributed a component of equipment, will also contribute to the necessary scientific and technical manpower support to operate that component and maintain it in good working order.
- 6.3 Within the fundamental principles set out in Articles 6.1 and 6.2 above, the Collaboration shall, for each M&O cost item, decide whether the cost is to be borne at the common expense of the Collaboration or not. The M&O cost items are thereby divided into two categories :
  - 6.3.1 Common Items, comprising those costs that the Collaboration has agreed to bear at its common expense, and
  - 6.3.2 Sub-detectors/systems that are the responsibility of individual Institutes or groups of Institutes.
- 6.4 Error! Reference source not found. lists the M&O cost items agreed by the Collaboration to be Common Items.
- 6.5 Error! Reference source not found. lists for the second category, by sub-detector/system, the deliverables provided by the Institutes, the CORE value of these deliverables and the sharing among Institutes. Also summarised are the CORE values of the deliverables for particular sub-detectors/systems by Funding Agency.
- 6.6 The general obligations of CERN in its role as Host Laboratory and of the Institutes (including CERN in this role) are contained in the General Conditions for Experiments Performed at CERN (**Error! Reference source not found.**), which in case of contradiction or ambiguity shall prevail over the main body of this MoU.

## **Article 7 : Maintenance and Operation Categories**

- 7.1 The M&O expenses can be divided into the following three categories :

- 7.1.1 **Category A.** M&O expenses that are shared by the entire Collaboration (cf. Article 6.3.1 above). Error! Reference source not found. lists the headings under which Category A costs are categorised.
- 7.1.2 **Category B.** M&O expenses that are borne by part of the Collaboration, i.e. by single Institutes or groups of Institutes, and their Funding Agencies (cf. Article 6.3.2 above). The headings in this category are defined with reference to the distribution of responsibilities amongst the various Institutes for the construction of the **Error! Reference source not found.** Detector as given in **Error! Reference source not found.**. Error! Reference source not found. lists the headings under which Category B costs are categorised and the Institutes concerned.
- It is agreed that an Institute having responsibility under a Category B heading will contribute to providing the necessary financial, scientific and technical support, as well as replacement or spare parts, for normal operation of that equipment and for the routine maintenance needed to keep it in good working order. If problems arise that require major modifications, responsibility will lie with the Collaboration as a whole. The Collaboration will propose on a case-by-case basis the events to which this provision will apply. The proposal will be submitted for approval to the next RRB meeting, which will also be asked to approve the provision of the necessary resources.
- 7.1.3 **Category C.** General maintenance and operation expenses that are provided to the Collaboration by CERN, acting in its role as Host Laboratory. Subject to the General Conditions for Experiments Performed at CERN (**Error! Reference source not found.**), these are more precisely described in the list given in Error! Reference source not found..

### **Article 8 : Approval and Oversight**

- 8.1 Oversight of the M&O costs for the **Error! Reference source not found.** detector shall lie with the RRB, which will meet normally twice per year, in spring and autumn. The RRB shall have the responsibility for approving the levels and sharing of the Category A costs. It shall also approve the overall level of Category B costs and the sharing of these costs as proposed by the Collaboration.
- 8.2 The RRB shall be assisted in this aspect of its work by a Scrutiny Group that it shall appoint. The role of the Scrutiny Group is to analyse critically the Collaboration's M&O reports and estimates, refine the Category A estimates in consultation with the Collaboration and advise the RRB on the course of action to take.
- 8.3 The Scrutiny group shall operate according to the procedures set out in Error! Reference source not found..

### **Article 9 : Cost Sharing**

- 9.1 Subject to exceptions that may be agreed on a case-to-case basis by the RRB, the following guidelines are agreed for the sharing of M&O costs :
- 9.2 For Category A, the costs are to be shared amongst the Funding Agencies or Institutes in proportion to the number of their scientific staff holding PhD or equivalent qualifications who

are entitled to be named as authors of scientific publications of the Collaboration. To this end, the Collaboration shall maintain a list, by Funding Agency and Institute, of these persons (Error! Reference source not found.). The Collaboration shall update this list annually to reflect the situation on 30 September. The updated list is to be ready in time for the autumn meeting of the RRB (see Article 10.1 below).

9.3 Funding Agencies or their Institutes must normally pay their share of Category A costs in cash. In exceptional circumstances some of the Category A costs could eventually be paid in kind with the agreement of the RRB, subject always to a minimum fixed cash amount per Institute. In such cases the cash value attributed to the in-kind contribution shall also be agreed by the RRB. The Collaboration shall propose annually to the RRB the minimum fixed cash amount to be applied in the following year.

9.4 CERN will pay from its operating budget the energy costs falling on Member States. In recognition of the contributions made to the construction of the LHC machine by some non-Member States, CERN will treat these countries in a manner analogous to Member States and will partially pay the energy costs that fall on their Funding Agencies and Institutes.

The non-Member States for which CERN will partially pay the energy costs are listed in Error! Reference source not found..

CERN Management shall propose annually in its Medium Term Plan (The Scientific Activities of CERN and Budget Estimates for the Years  $n - n+3$ ) the overall size of these energy payments for the following year, so that they may be incorporated in the M&O budget presented to the RRB for approval in October. The payments are shared amongst the countries concerned according to a formula, the current version of which is explained in Error! Reference source not found.. Any modifications to the arrangements for these payments will also be proposed in the context of the Medium Term Plan.

9.5 For Category B, the costs are to be shared by the Funding Agencies and Institutes concerned in a manner that the Collaboration shall propose to the RRB.

9.6 For Category C, the costs are paid by CERN from its operating budget.

9.7 The boundary between Category A and Category B costs is determined by the Collaboration as explained in Article 6.3 above. Category C costs are determined by the CERN Director General, having regard to the General Conditions for Experiments Performed at CERN and, in particular, the need to provide a safe and secure environment for the operation of the **Error! Reference source not found.** detector.

## Article 10 : Procedure

10.1 Proposals for providing and sharing Category A M&O costs according to the criteria set out in Article 9 above, including the proposal for the minimum fixed cash amount per Institute, will be drawn up annually by the Collaboration and submitted to the RRB at its spring meeting. At the same meeting, the Collaboration will report on Category B costs and on the proposed responsibilities and commitments for these, while CERN will report on Category C costs. The information for all Categories will comprise the M&O expenses for the previous year and the proposals for the following year, along with estimates for the three subsequent years. The Scrutiny Group will then operate during the summer, with the aim of agreeing the estimates

for Category A for the following year, so that they can be endorsed at the autumn meeting of the RRB. It will also make critical comment on the arrangements for Category B costs.

- 10.2 The RRB will approve the M&O budget for the following year at its autumn meeting.
- 10.3 Unless explicitly mentioned, all proposals and estimates are to be expressed in Swiss Francs, using the calculated CERN index for materials cost variations.
- 10.4 For Category A expenses, a common Maintenance and Operation account (M&O Account) will be opened in the name of the Collaboration. All payments made by CERN on behalf of the Collaboration and the related receipts will be shown in that account.
- 10.5 CERN will issue invoices in Swiss Francs to the Funding Agencies of the Collaboration for their M&O contributions. The detailed procedure for the payment of Category A contributions is set out in Error! Reference source not found..
- 10.6 For Category A, the Resources Co-ordinator (see **Error! Reference source not found.**) and other named individuals as necessary will be authorised by the Collaboration to sign commitments and payments relating to the above-mentioned account within the limits of the agreed annual budget for Category A. The authorised signature levels for these persons will be subject to the standard CERN rules for Team Accounts.
- 10.7 The Resources Co-ordinator shall report annually to the autumn meeting of the RRB on the functioning of the M&O arrangements for Categories A and B, and shall point out any cases of default (see Article 12.3 below). At the same meeting CERN Finance Division shall report on the status of the Collaboration accounts for Category A and those parts of Category B for which accounts exist at CERN.
- 10.8 If, for any reason, the RRB should fail to reach agreement on the M&O costs or on their sharing, the arrangements that it last agreed will continue to apply until agreement is reached.

### **Article 11 : Rights and Benefits of Institutes**

- 11.1 The Institutes participating in the Collaboration are entitled to join the pre-exploitation and exploitation phases of the project and to participate in the scientific exploitation of the data acquired. Further details are set out in the document "General Conditions for Experiments Performed at CERN" (**Error! Reference source not found.**).

### **Article 12 : Administrative and Financial Provisions**

- 12.1 General financial matters and purchasing rules and procedures for the LHC experiments, including the rules that apply for Common Fund operations, are dealt with in accordance with the "Financial Guidelines for the LHC Collaborations" (CERN/FC/3796).
- 12.2 Under the provisions of the CERN basic Convention dated 1st of July 1953 and revised on 17 January 1971, any Institute's staff and property located at CERN shall be subject to the authority of the CERN Director-General and shall comply with the CERN regulations.

- 12.3 Default on provision of the agreed contributions for M&O shall engage the procedure for resolution of disputes described in Article 14.1 below and may result in specific action against the defaulter. Should the outcome of the dispute resolution procedure imply a loss of M&O contributions to the Collaboration, the question of recovery from the loss is for the RRB to address.

### **Article 13 : Amendments**

- 13.1 The Collaboration will make every effort to ensure that the information contained in the Annexes to this MoU is kept up-to-date. To this end it shall review the information at least annually in time for the autumn meeting of the RRB.
- 13.2 This MoU may be amended at any time with the agreement of its signatories or of their appointed successors. Any such amendments will be subject to the prior agreement of the RRB.

### **Article 14 : Disputes**

- 14.1 As indicated in the Preamble (e), the primary mechanism for resolution of any disputes shall be negotiation within the Collaboration in the first instance and then if necessary in the RRB. Should these fail to conclude, the following three mechanisms shall apply, as appropriate. Any dispute between Funding Agencies shall be resolved by negotiation or, failing that, by arbitration through the President of the CERN Council, who will use defined arbitration procedures where they exist and will otherwise adopt one at his or her discretion. Any dispute between a Funding Agency and CERN will be resolved using standard CERN procedures for the resolution of such disputes. Any dispute between Institutes will be resolved according to Collaboration procedures.
- 14.2 It is understood that any issues that have arisen during the lifetime of the Construction MoU shall be without prejudice to the rights and obligations laid down in this M&O MoU. No party shall be entitled under this M&O MoU to reduce, retain or set-off any obligation due under the Construction MoU.



