



SLHC-PP

DELIVERABLE REPORT

EU DELIVERABLE: 4.1.2

Document identifier: **SLHC-PP-4.1.2-1133536-v1.1**

Contractual Date of Delivery to the EC of **End of Month 36 (March 2011)**

Actual Date of Delivery to the EC of **18/4/2011**

Document date: **18/4/2011**

Deliverable Title: **Cost book and MoU for the upgrade and installation phase**

Work package: **WP4: Coordination for the CMS2 experiment implementation**

Lead Beneficiary: **CERN**

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Document status: **Released**

Document link: <https://edms.cern.ch/document/1133536/1>



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Date: 18/4/2011

History of Changes

Version	Date	Comment	Authors
1.0	March 2011	Initial Version	J. Nash
1.1	April 2011	Minor final editing	D. Abbaneo

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The Preparatory Phase of the Large Hadron Collider upgrade (SLHC-PP) is a project co-funded by the European Commission in its 7th Framework Programme under the Grant Agreement n° 212114. SLHC-PP began in April 2008 and will run for 3 years.

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1. EXECUTIVE SUMMARY

A detailed costing of the CMS2 upgrade project has been prepared as part of the work done for the Technical Proposal submitted to the CERN LHCC (The scientific review committee for LHC experiments). First steps towards a Memorandum of Understanding have been taken with the presentation of the costs of the proposal to the CERN LHC Resource Review Board, and an agreement in principle as to the format for the MOU agreements.

2. INTRODUCTION

During the final year of the SLHC-PP project, the CMS collaboration produced a detailed Technical Proposal outlining the scientific justification for the upgrades, as well as the scope and conceptual design of each piece of the upgrade project. This document is described in report on Deliverable 4.2.3. As part of this process a detailed estimate of the costs of each piece of the upgrade was prepared. The methodology for the cost book has been defined, and first steps were taken towards the agreement of the sharing of costs with the funding agencies.

3. THE COST BOOK

A cost book has been compiled for the upgrades of CMS which are to be constructed during the years 2011-2020 and are described in the CMS Technical Proposal (the full document, "Technical Proposal for the Upgrade of the CMS Detector Through 2020", is appended to the report on Deliverable 4.2.3). The main figures are summarized in the following table.

Detector	cost (M&S Only) KChF
CSC	5,570
DT	2,200
RPC endcap	4,220
HCAL	5,817
HF - Phototubes	1,990
Pixel Tracker	17,350
Trigger	4,600
DAQ	6,700
Beam Instrumentation	1,540
Magnet, Power, and Cryo	1,330
Infrastructure	6,315
Test Beam facilities	610
Safety Systems	964
Electronics Integration	1,575
engineering Integration	3,666
Total	64,447
10% of which, Common Fund	6,445

Costs which appear in this table were prepared with an agreed methodology for the “cost book”. Such methodology allowed different funding agencies which are involved in the project to compare in a uniform way the costs that they might be expected to bear.

The top level cost table shown was presented to the CERN LHC Resources Review Board in October of 2010. This board is chaired by the CERN director of research, and is attended by representatives of each agency which funds CERN.

Follow on discussions with the agencies will take place during the bi-annual RRB meetings. The next meeting is scheduled in April 2011, and will provide a first opportunity to look at proposed cost sharing “matrices” which look at both what fraction of the total project a funding agency is responsible for, as well as what areas of the project they will contribute funding to.

4. THE MOU

The Memorandum of Understanding (MOU) is a document signed by CERN, CMS and the funding agencies which outlines the agreements the funding agencies have for providing materials, effort, and cash to the project. The CERN research director examined possible models for MOU documents for the upgrades of LHC detectors, and has now proposed a model based on extending the currently existing agreements. It is expected that the new model will be agreed in a forthcoming CERN LHC RRB meeting.

5. CONCLUSIONS

The methodology for costing the CMS upgrade project has been agreed. A first estimate of the costs of the projects foreseen for the period 2011-2020 has been prepared and



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presented to the CMS funding agencies. For such projects a framework agreement (MOU) is in preparation, and is expected to be finalized towards the end of 2011.