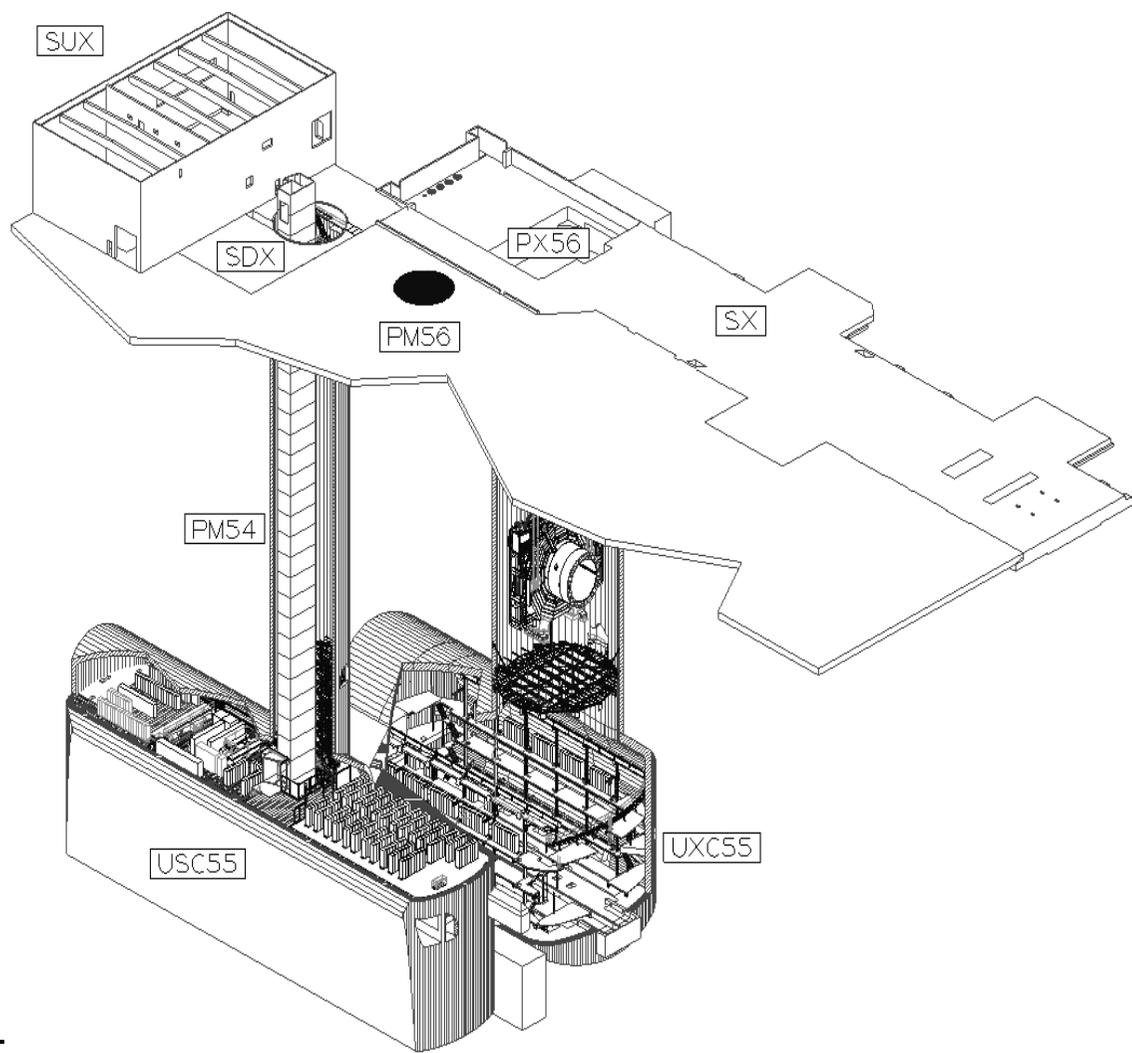

LHCC review of the CMS experiment INSTALLATION

- A review of the installation of the CMS experiment in the underground caverns at Point 5 of the LHC
- Two days 10-11 September 2002
 - Presentations by the management of the experiment on schedules, milestones and resources.
 - A visit to Point 5
 - Evaluation and preparation of recommendations by the experts including an assessment of risks.



Membership of the Review Committee

- Chairman: R. Cashmore, CERN Director for Collider Programmes,
- Representatives from the LHCC: W. Bartel, J. Dainton, P. Lebrun, K. Potter (rapporteur)
- LHCC Chairman and Secretary: M. Calvetti, E. Tsesmelis,
- CERN Technical Director: J. May
Representatives from the CERN Technical Sector:
P. Ciriani, A. Scaramelli,
- EP Division: J. Salicio-Diez, D. Schlatter, V. Vuillemin
- TIS Division : W. Weingarten
- External Reviewers: R. Kephart, P. Lazeyras

Aims of the Review

- installation schedules and milestones, details of the planned activities
- required resources and their origin, work packages
- identify any potential risks for the installation and assess critical path items
- in particular:
 - **survey and alignment**
 - **safety**

CMS INSTALLATION REVIEW

September 2002

- COMPACT
MUON
SOLENOID
- Engineered
for ease of
installation,
access,
maintenance

Installation Principles

- Magnet assembly and testing in the surface hall
 - Extended to include mounting and testing of detectors wherever possible
 - C&I foreseen to cover extra costs
-
- Reduced risks and greater flexibility to handle detector delays

THE CMS REVIEW

CONCLUSIONS

- The Review Committee was impressed by the well thought out installation plan of the CMS experiment.
- Progress so far on the heavy engineering of the magnet and the first detectors show that the Technical Coordination is working well, with a good team spirit between the local support and the sub-detector teams from collaborating institutes.
- The construction responsibilities of the MOU are being respected and there is a clear agreement on cost sharing between the LHC experimental area, the CMS infrastructure and the CMS sub-detectors.

THE CMS REVIEW CONCLUSIONS

- The installation still has a long way to go and much work remains to be done.
- The major concerns of the Review Committee, given below, will allow the LHCC to follow up outstanding issues and to monitor future progress.

THE CMS REVIEW

CONCLUSIONS

- It is recommended that the following issues should be addressed in greater detail:
 - a systematic and detailed cabling plan,
 - the reliability of electrical connectors,
 - quality assurance and change control,
 - early installation of monitoring and control systems,
 - the 'work package' approach,
 - availability of transport and handling resources,
 - occupancy of high risk areas, maximum numbers underground, safety and evacuation procedures and safety training,
 - the reliability of the magnet dump resistor system,
 - inner detector services, including high current cabling in the magnetic field and cooling,
 - trigger and DAQ integration and commissioning.

THE CMS REVIEW

CONCLUSIONS

- The over all planning has very few contingencies and this will make dealing with any possible sub-detector construction delay very difficult.
- Multiple shift working can be used to cope with some delays, but will often require additional resources and reorganisation of the C&I funding.

THE CMS REVIEW

CONCLUSIONS

- The construction and installation of the CMS experiment has started well.
- More work is needed on detector services and cabling particularly for the inner detectors and on the final stage DAQ commissioning,
- There is every reason to believe that CMS will have a working detector ready for first collisions in April 2007.