LHC STATUS REPORT

High Energy Physics Advisory Panel
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OUTLINE

U.S. LHC CONSTRUCTION PROJECT STATUS

- Percent Complete
- Contingency Status
- Project Schedule and Completion Strategy

CERN PLANS

- LHC Machine
- ATLAS and CMS Experiments
  - Cost-to-Complete
  - Maintenance and Operations (M&O)
- Computing

U.S. LHC Research Program

U.S. LHC CONSTRUCTION PROJECT

Cost performance is good.

Schedule performance is satisfactory.

Expect to meet our commitments to CERN and the experiments.

Percent Complete (performance through 2/28/02)

U.S. LHC Accelerator ($110.0 M)	~74 %
U.S. CMS ($167.25 M)	~67 %
U.S. ATLAS ($163.75 M)	~67 %
U.S. Industry/CERN Direct ($90.0 M)	~33 %

CONTINGENCY STATUS

Contingency is adequate to complete our deliverables.

Contingency as percent of "to go" costs (2/28/02)

	Project Cost ($k)	Contingency ($k)	%
U.S. CMS	$167,250	24,792	~50
U.S. ATLAS	$163,750	28,156	~50
U.S. LHC Accelerator	$110,000	5,588	~20

PROJECT SCOPE

U.S./CERN – International Agreement ($531 million)

Construction Deliverables:

ATLAS Construction MOU:	Letter - T. Kirk/B. Willis to L. Foa
CMS Construction MOU:	Letter – K. Stanfield/D. Green to L. Foa
Implementing Arrangement:	Signed by Lab Directors and L. Evans

Included in U.S. Construction Project Management Plans signed by DOE/NSF Joint Oversight Group.

Significant changes approved by DOE/NSF through change control.

PROJECT STRATEGY

Complete U.S. deliverables within our baseline cost & schedule.

- most cost effective use of funding supporting maximum deliverables
- no change to the U.S. total project cost of $531 million

Issues:

U.S. construction activities will ramp-down well before the LHC physics run.

- support for extended pre-operations period
- stable base program support

Schedule interfaces between U.S. and non-U.S. activities

- some construction work will be delayed due to issues with parts, installation, and the desire to postpone purchases for commodity items
- participation in staged or deferred items

U.S. PROJECT COMPLETION

Project completion defined by JOG is September 2005.

A review of schedules indicates that ~98% of our work will be completed.

- Machine Implementing Arrangement – Deliverables will be completed. There may be a small issue with cable testing.
- ATLAS MOU – U.S. work scope will be completed with the exception of the Trigger/DAQ subsystem (not yet baselined).
- CMS MOU – U.S. work scope will be completed with the exception of the DAQ subsystem and the Forward Pixel subsystem.

Developing strategies to address these activities.

LHC MACHINE

Machine status addressed by CERN Director General earlier this week.

- Overrun of 18% or 480 MCHF on the 2,600 MCHF for the machine hardware, installation, and civil construction work.
  - 1996 Estimate in 2001 prices 2,593
  - Cost Estimate of Sept. `02 3,068
  - Committed as of Feb. `02 2,474

- Contracts for assembly of the main dipoles approved in Dec. `01. Defined and signed with one of three firms (April `02).

- Handover for caverns: Apr. `03 for ATLAS and Jul. `04 for CMS.

LHC MACHINE SHEDULE

Completion Schedule

Ring Closed	Oct. `06
Machine Hardware Commissioning	Jan. `07
1st Beam Injection	Apr. `07
Collisions and Physics	

Machine schedule based on contract dates with some schedule contingency.

- Last dipole completed in June 2006
- Superconducting cable production recently reviewed (Strauss)

CERN is supplier and customer for many components.

Critical path includes cable/dipole production and QRL installation.

Schedule determined by technical rather than financial constraints.

CERN FINANCIAL PLANS

External and internal review committees recommend ways to improve efficiency.

- ERC interim report in presented in March and final report in June
- Internal Task Force results available at CERN website
- Examples of topics addressed: CERN organization and project structure, contingency, manpower analysis, and accounting

Solution to the financial crisis involves savings in the CERN program and extension of debt repayment. Current planning scenarios:

Scenario 1 No increase in Member State contributions with debt until 2010
Scenario 2 3-5% increase in MS contributions with debt until 2009

The first draft of the Long Term Projection (2003-2012) was presented to the CERN Council in March. The revised LTP and a Medium Term Plan will be presented to Council in June with goal of an approved Medium Term Plan.

ATLAS AND CMS

Resource Review Boards (RRB) address the resource needs of the experiments
- Chaired by CERN Research Director, Roger Cashmore
- Funding agencies representatives (U.S. - J. O'Fallon and M.Goldberg)

Both experiments request additional resources (~15% of "core costs") beyond those foreseen in the construction MOUs (supplemental and commissioning and integration costs).

Maintenance and Operations (M&O) costs also requested beginning in 2002.

ATLAS and CMS RRB results:
- Approved initial M&O requests and agreed to circulate MOUs.
- Agreed to provide additional resources for construction activities.
- CERN agrees to work with the management of the experiments to address cash flow issues.
- Experiments' schedules are consistent with machine schedule.

COMPUTING

LHC Computing RRB

- CERN has elected to treat LHC Computing as an experiment
- Separate Resource Review Board chaired by Hans Hoffman

LHC Computing Grid Project

- Phase 1 is the prototype
- Ends in 2005 with the publication of a Technical Design Report
- Success includes investments outside of CERN (Tiers 1, 2, 3…)

CERN has secured resources for less than half of the prototype phase materials

- Good progress on contributions from MS and nontraditional funding sources for personnel due to tremendous interest in grid computing and LHC as a test bed
- Hardware and infrastructure still well short of prototype phase needs

U.S LHC RESEARCH PROGRAM

U.S. LHC Software & Computing

- Mature process of scope definition w/ feedback from peer review
- Funding profile and project baselines established
- Semi-annual program reviews implemented

U.S. ATLAS and U.S. CMS Pre-Operations & Operations

- Scope definition, internal reviews, and external reviews (Apr `02) completed
- Funding well below the experiments' needs for the pre-operations phase
- Working on ways to reach closure on plans (Glen's talk)

U.S./CERN LHC Accelerator Collaboration

- Initial funding for planning provided
- Plans for internal advisory committee and agency review