Trigger Report

Wesley H. Smith

CMS Trigger Project Manager

Report to Steering Committee

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Outline:

Calorimeter Triggers
Muon Triggers
Global Triggers

The pdf file of this talk is available at:

http://cmsdoc.cern.ch/cms/TRIDAS/tr/0402/smith_SC51_feb04.pdf

Drift Tube Trigger Front End
(Padova)

Sector Collector (60 Boards on Balconies):

- **Prototype used successfully in the structured beam test**
- **Production now scheduled for Sep '04 - Mar '05**

Control Boards:

- **After QPLL delivery (just now):**
- **CAEN needs 3 months to deliver the first 40 prototypes**

Drift Tube Track Finder

Phi Track Finder:
- **Prototype tested (Vienna)**
- **Production planned for Jul '04**

Eta Track Finder:
- **Prototype under test (Vienna)**
- **Production planned for Jul '04**

Wedge Sorter (12 Boards in USC55):
- **Prototype under test (Bologna)**
- **Production now planned for completion Dec '04**

Barrel Sorter (1 Board in USC55):
- **Design underway (Bologna)**
- **Plan for 1st proto Nov '04**
- **Production now planned for Mar '05**

CSC Trigger

Trigger Mother Board (UCLA):

- **PPP in fabrication, test next month**

Clock & Control Board (Rice):

- **PCB done, pre-production prototype in 2 months**

Muon Port Cards (Rice):

- **PPP fully tested stand-alone**
- **Holding production for final tests with SP, CCB**

Sector Processor (Florida):

- **PPP: all individual functions tested**
- **Full Trackfinder Firmware now being incorporated**

Muon Sorter (Rice):

- **PPP: all inputs fully tested, integration w/SP next**

RPC Trigger

Trigger Board (Warsaw):

- **Prototypes done & Tested**
- **Work on Pre-Production Boards started**

Readout Board (Warsaw):

- **Prototypes done & Tested**
- **Work on Pre-Production Boards started**

Link Board (Helsinki/Lappeeranta) :

- **Prototypes done & Tested**
- **Work on Pre-Production Boards started**

Splitter Board (Lappeeranta):

- **Prototypes done & Tested**
- **Work on Pre-Production Boards started**

Pattern VHDL code underway

Ready for 25 ns beam tests in 2004:

- **Pre-production Splitter, Trigger, DCC Boards**

Calorimeter Trigger Primitives

ECAL (CERN/Lisbon/LLR):

- **Serial Link Board being prepared for tests with Regional Calorimeter Trigger this spring**

HCAL(Boston/FNAL/Maryland/Princeton):

- **TPG implemented in firmware for HTR Rev 4**
  - Scheduled for production in early '04
  - Tests with RCT planned for later this spring

Latency:

- **6 crossings over budget for both.**
- **Investigating improved cable routings**

Regional Calorimeter Trigger
(Wisconsin)

Pre-Production full-function full-crate prototype tests

- **All cards validated**

Production Underway

- **All Receiver Mezzanine Cards in hand (1422) and tested**
- **All ASICs made**
- **Production Begun for RC, EIC, CCC, Backplane, Crate**

Activities

- **Full production tests underway**
  - Full production Electron Isolation assembly now
  - Clock and Control Card Production finished, cards being tested
  - Production samples of Backplane, Receiver being checked
- **Plans for Integration and surface test beginning 2004**
  - Serial Link Test cards at CERN and Princeton/Maryland
  - Integrated JSC output with GCT last August
  - Ship full crate to CERN for HCAL surface test

Global Input Triggers

Global Calorimeter Trigger (Bristol):

- **Trigger Processor Module Prototypes under test**
  - Running Data Links and TPM algorithms on real hardware
- **Prototype Input Module in operation for 9 months**
  - Used for Integration with Regional Calorimeter Trigger and Global Trigger.
- **Prototype Clock/Control Module under test**

Global Muon Trigger (Vienna):

- **FPGA firmware close to completion**
  - MIP & ISO assignment, GMT Logic done & verified
- **FPGA choices made**
  - New Mezzanine Card for larger Xilinx chips (Spartan-3) at input
- **ORCA simulation available: bit-wise compatible**

Global Trigger
(Vienna)

Backplane:
- **6U prototype tested, 9U version being assembled**

Pipeline Synchronization Board:
- **6-ch prototype tested, 12-ch is conceptual design**

Global Trigger Logic Board:
- **20-ch prototype tested, 32-ch is conceptual design**

Timing Board:
- **6U version tested**

Final Decision Board:
- **9U version under design**

Trigger Control Board:
- **9U version board received**

Trigger Concerns - Time!

Latency:

- **Endcaps: HE, EE, RE**
- **Working on improved cable routings on detector**
- **Examining layout in USC55**
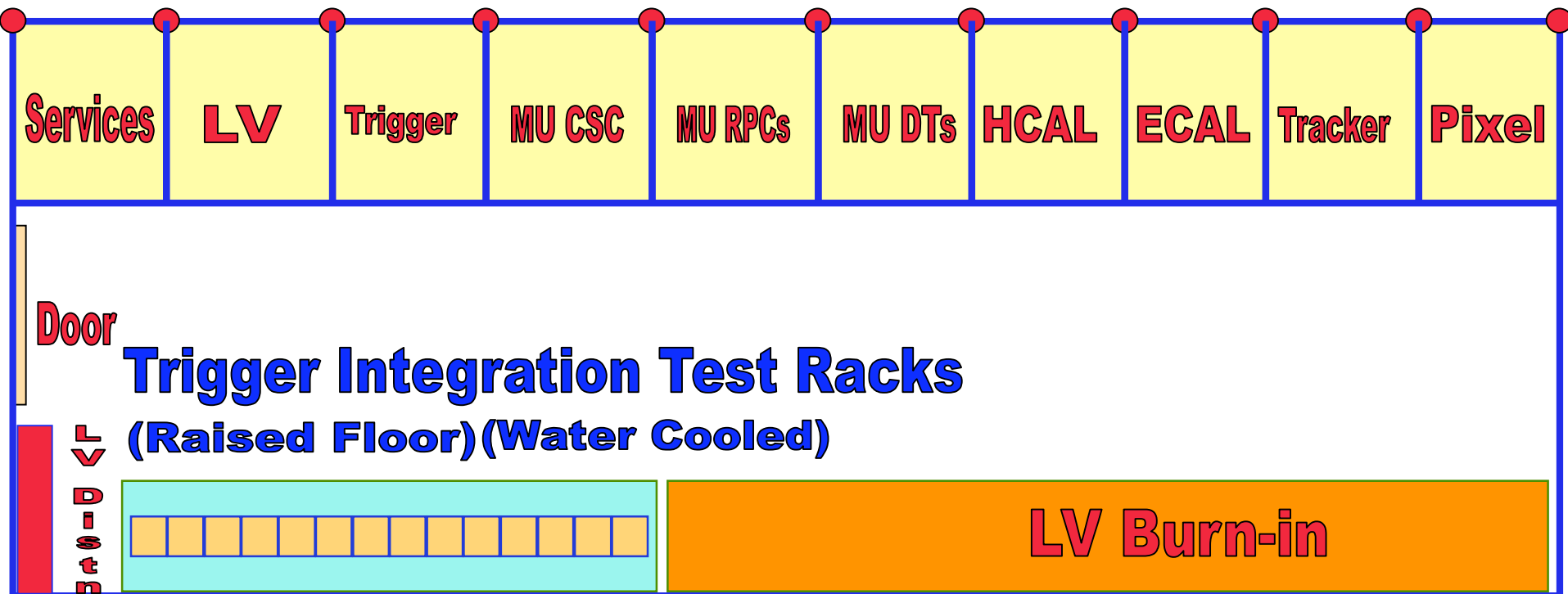 - Little improvement possible -already very optimized & very constrained

Schedule:

- **Further Slippage of Underground Schedule**
- **Solidifying plans for integration tests of trigger core in Prevessin 904**
  - Allows people to wheel crates out of testing labs into an integration testing facility in same building for dedicated tests and then back into the labs with as little disruption as possible.

Trigger Installation Preparation

Individual Testing Labs & Integration Test Area

Services	LV	Trigger	MU CSC	MU RPCs	MU DTs	HCAL	ECAL	Tracker	Pixel

Door

Trigger Integration Test Racks
(Raised Floor) (Water Cooled)

LV Distn

LV Burn-in

Assemble one each of critical racks in central trigger core in underground counting room

Contingency in case of further delays in occupancy

Trigger Conclusions

News:

- **Moving from Prototypes to production**
- **Confidence from successful integration and structured beam tests**

Concerns:

- **Latency -- hope for relief from shorter cable paths**
- **Installation time -- risks for further delays?**
- **Software & Planning needed for production/integration**

Actions:

- **Trigger Software Review March 17**
- **Electronics Systems Review May 5**
- **Plans for Trigger Core Rack Test in Prevessin 904**