



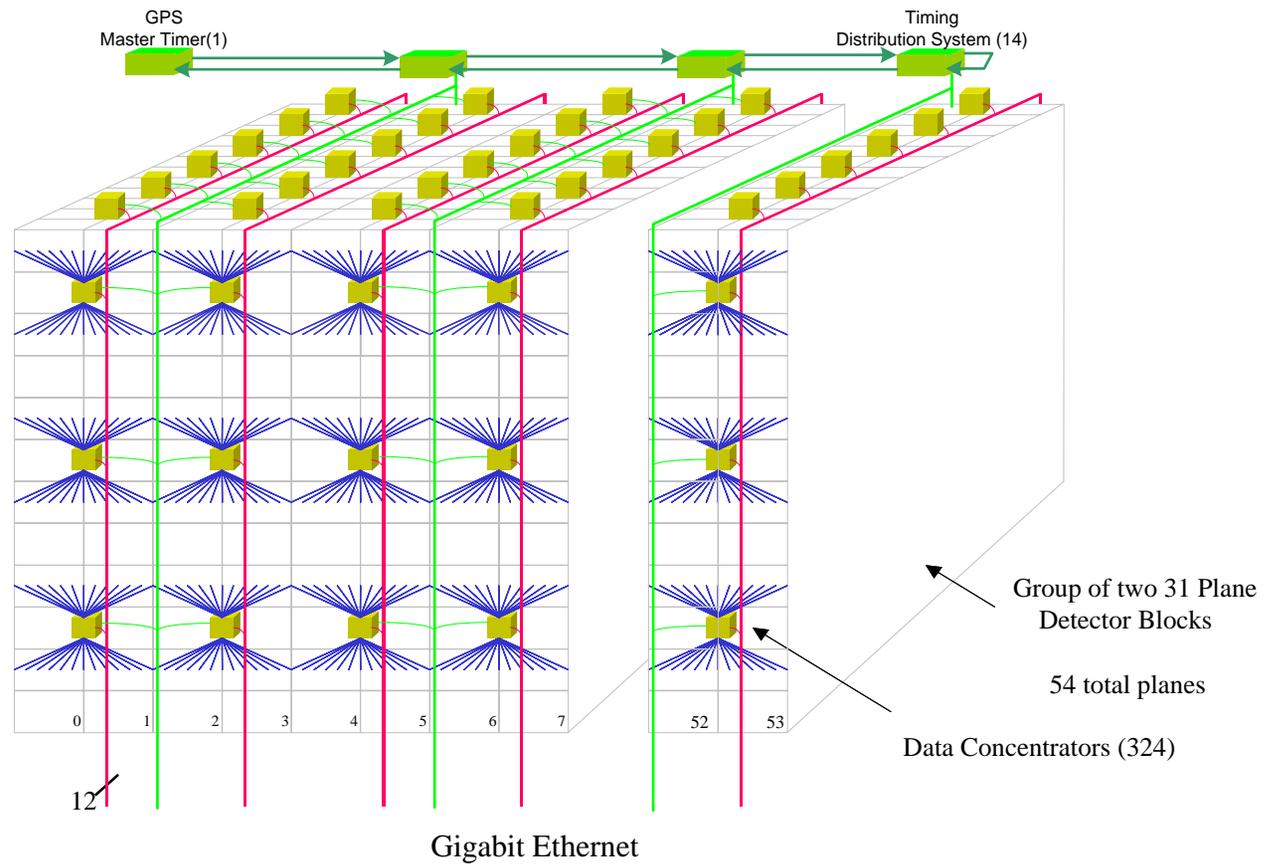
NOvA DAQ Hardware Data Combiner Module & Timing System

Richard Kwarciany, Bill Haynes

20-June-2006



DAQ on the Detector



Project Drivers & Scope



- Description
 - ESE is collaborating on the design the DAQ system for NOvA.
- Scope
 - Design consists of custom Data Combiner Module (DCM) and Timing Distribution System (TDS), commercial Ethernet based network components, processor and storage nodes. ESE will design and build the DCM & TDS, and specify the network components and network configuration.
- Schedule
 - Working DCM prototypes due this fall and TDS prototype by end of the year. Pre-production modules are due December 2007, and production modules before 2009.
- Effort
 - ESE providing approximately 1.5 FTEs now. The plan is to maintain this level at least into the pre-production phase.
- Stakeholders
 - Rick Kwarciany – DCM designer, Bill Haynes – TDS Designer.
 - Vince Pavlicek – DAQ Electronics level 3 mgr.
 - Leon Mualem – NOvA DAQ level 2 manager.
 - Mark Bowden – System architecture consultant.



Project Deliverables Status

- Data Combiner Module
 - Design of prototype DCM progressing. First pass at circuit design completed and internal review of schematics done 14-June.
 - PC Board layout progressing. Initial component placement is complete, and routing has begun.
 - Specifications required for firmware development are being developed by the collaboration.
- Timing Distribution System
 - Specifications of the TDS are being developed by the collaboration.
 - Currently investigating possible architectures of the TDS based on simplicity and cost.
 - Expect prototype testing complete by end of 2006.
- Both systems were discussed at the NOvA DAQ Workshop May 9-10.



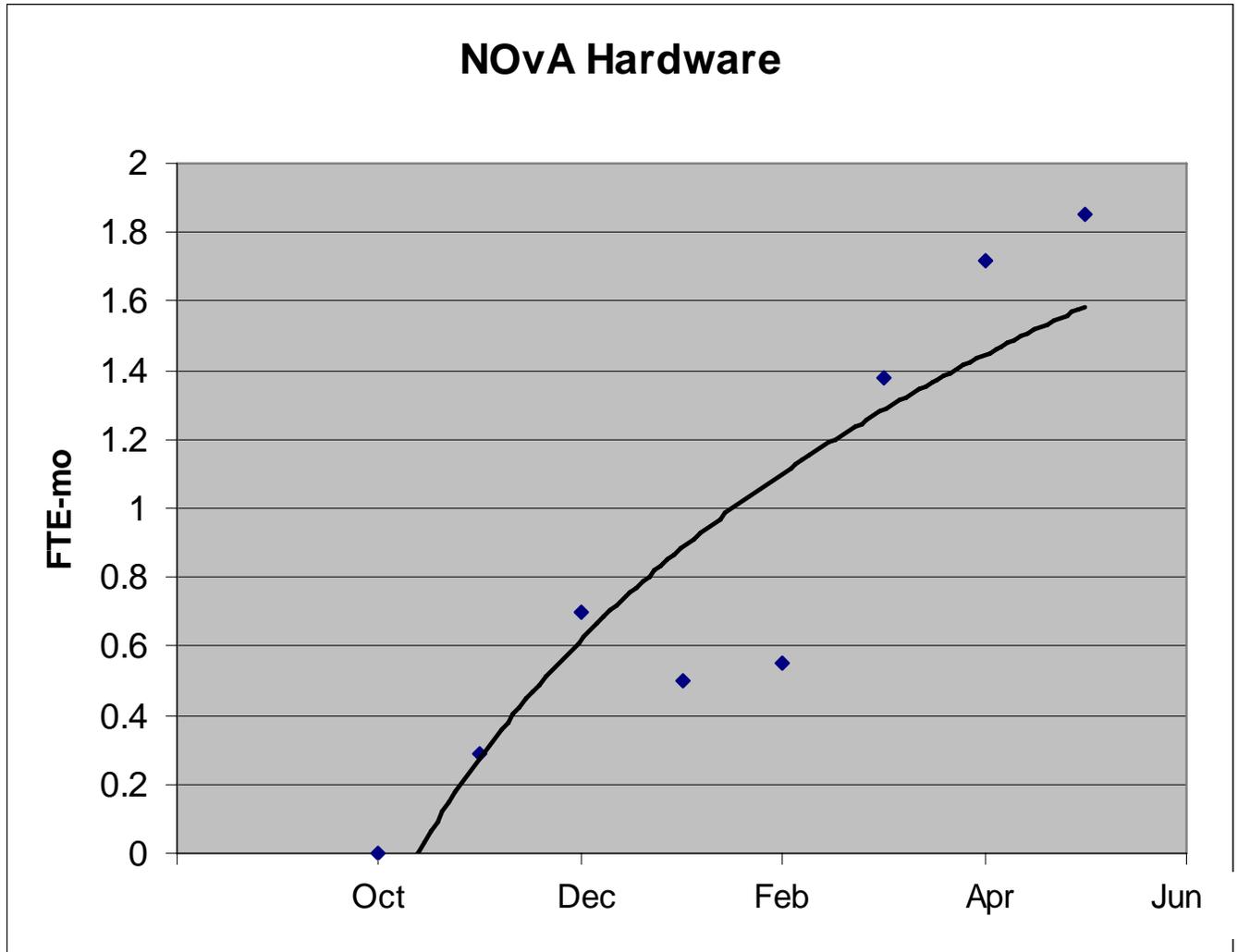
Project Milestones

- Data Combiner Board
 - Prototype DCM Internal schematic review completed on 14-June. Comments from reviewers are currently being incorporated.
 - Prototype design review tentatively scheduled for late July.
 - Prototype circuit board delivery three weeks following.
 - Assembly of first prototype should occur in late August or early September.
- Timing Distribution System
 - Specifications of the TDS by July.
 - Architecture of the TDS based on simplicity and cost selected by July.
 - Design completed by late September
 - Prototype test by end of 2006.
- The Prototype Near Detector is scheduled to be ready for testing Dec 2007.



Effort Profile

- Bill, Rick,
- JimF, Vince





Risks

- Component choices were made to allow ease of acquisition, however lead times on some components are increasing.
- People are working on multiple projects. Schedule could slip due to effort shortage if priorities change.
- Experiment is still negotiating CD1 with DOE.
 - CD2 is scheduled for Oct, 2006.
- Experiment has de-scoped from 30 kTon to 25 kTon and may need further reductions.

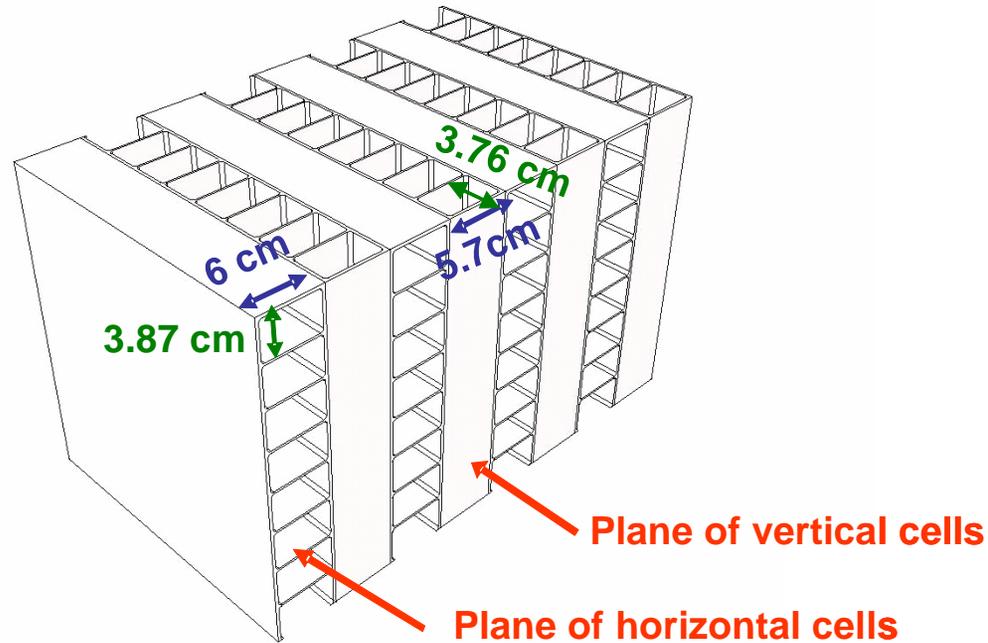


Background and Additional Information Slides



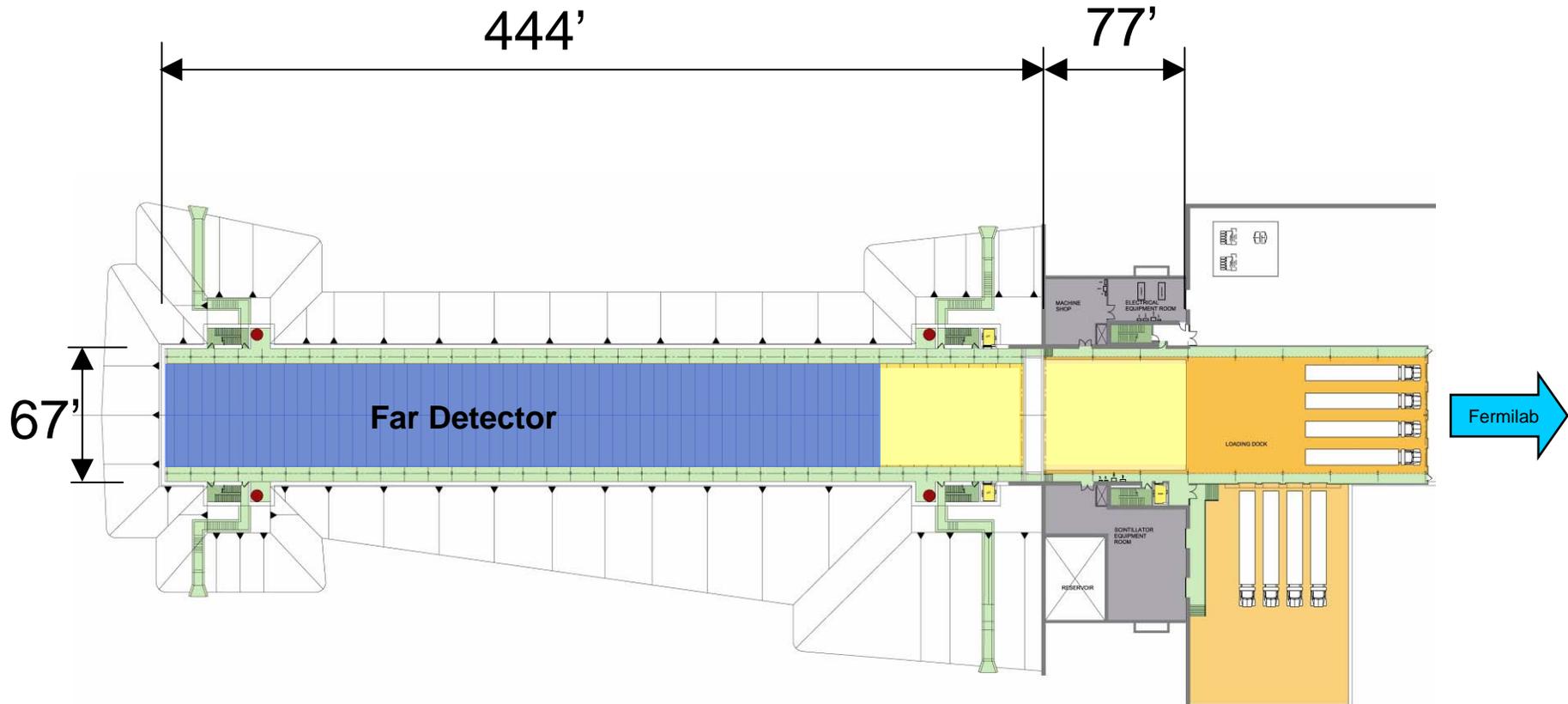
Assemble into planes

- 12 extrusions wide (= 15.7 m)
 - So the beam view is a square detector
- Alternate cell orientations and readout from layer to layer
 - Left, Top, Right, Top
- Epoxy the planes together into blocks 31 planes thick
 - So all horizontal extrusions are supported by two verticals



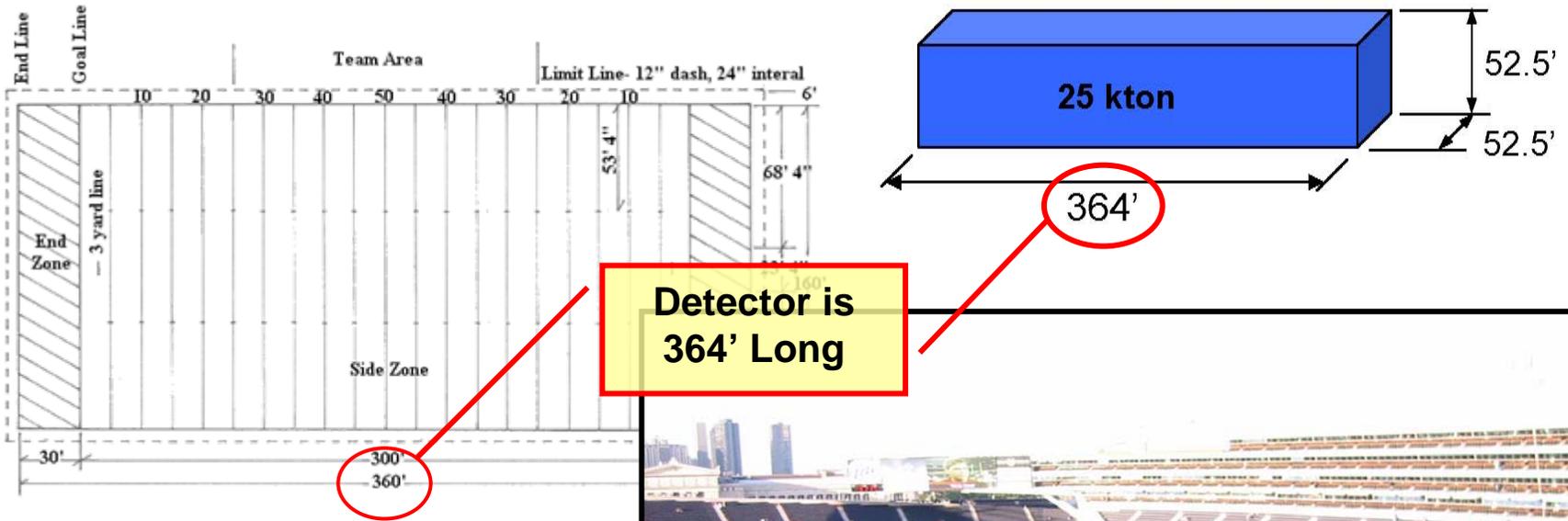


Building





Scale





Electronics and DAQ

- DAQ/Elec Workshop (May 9-10)
 - Defined interface and data flow between FEB, DCM, and DAQ
 - Get pulse height and time bin (62.5ns bins)
 - Defined data rates, startup procedures
 - Segmentation issues, run control
 - Began slow control definition
 - Data rates expected to be lower by about 4x
 - (more realistic simulation of muons)