Electronic Systems Engineering Section

Status of the Run 2 Engineering Support Projects

May 16, 2006

Run2 Engineering Support (50.02.04)

- D0 Projects
  - **D0 L1 Cal trigger upgrade integration.**
- CDF Projects
  - **Clock Clone Card**
  - **DOIM Receiver Investigation.**
  - **CAEN Power Supply Radiation Tolerance Investigation.**
- D0 Support
  - **VRB Controller (VRBC), Vertex Trigger Board Luminosity Monitor Firmware, Trigger Distribution System, Fiber Tracker Mixer System, VLSB module construction, VRB module consulting in support of ESD.**
- CDF Support
  - **Crowbar Module Support, SVX modules (6) consulting in support of ESD.**

D0 L1 Cal Upgrade Project

- Description:
  - D0 is replacing hundreds of modules that produce the L1 Calorimeter decision. The system installation and integration required additional effort so Ted Zmuda was recruited in February.
- Scope:
  - System debugging specifically data links. Also adding system diagnostics to allow better monitoring
- Schedule:
  - Tied to the shutdown. System must be operational when collisions start.
- ESE Effort:
  - Almost 1 FTE/month since February. Will drop after June.
- Stakeholders:
  - Ted Zmuda, Dan Edmonds (D0), Fred Borcherding (D0)

CDF Clock Clone Card

- Description:
  - The Silicon Readout Control module is very intolerant of accelerator clock glitches and was causing too many restarts. Bill adapted latley
- Scope:
  - Modify firmware in TGF prototype modules to recreate accelerator clocks and replace them during glitches and failures..
- Schedule:
  - Installed and operating. Waiting for beam to confirm operation.
- ESE Effort:
  - 30% FTE over the last six months. Move to support RSN.
- Stakeholders:
  - Bill Haynes, Silicon SPLS

CDF DOIM Receiver (Bit Booster)

- Description:
  - Radiation damage is reducing the light output of the fiber optic link transmitters. They can be turned up but that happens in groups of 9*5 and in 4 or 5 groups the brightest bit is too bright for the receiver. We are investigating making a new wide range receiver.
- Scope:
  - Small prototypes supported by CDF.
- Schedule:
  - Resource driven. Current prototype works. Starting production layout.
- ESE Effort:
  - 15% FTE for 10 months. Continue for 4-6 months.
- Stakeholders:
  - Ken Treptow, Silicon SPL

CDF CEAN Power Supply Radiation Tolerance

- Description:
  - CAEN High Voltage power supplies are in the collision hall and demonstrate problems indicative of single event upset (SET).
- Scope:
  - Investigate specifics of problems and possible mitigations including shielding, orientation and hardware or software changes.
- Schedule:
  - Low priority intermittent.
- ESE Effort:
  - About 1 day per month. Will become more important as the luminosity grows.
- Stakeholders:
  - Vince Pavlicek, Rick Tesarek (CDF), Silicon SPL.

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D0 VRB Controller (VRBC) Support

- Description:
  - ESE now supports the ESE-designed VRBC firmware currently at D0.
- Scope:
  - ESE does not support this module beyond patching our firmware. ESE will do necessary firmware ECO's and maintain a VRBC test stand.
  - We have been repairing suspect VRBC's on a time-available basis.
  - May require VRBC ECO's to increase the D0 trigger rate further.
- Schedule:
  - Interrupt driven on a management prioritized basis.
- ESE Effort:
  - About 10 FTE Days/Year decreasing, but will probably spike at startup.
- Stakeholders:
  - Ted Zmuda, Thinh Pham, Don Lincoln (D0)

D0 Vertex Board Luminosity Monitor Firmware

- Description:
  - ESE now supports the ESE-designed Luminosity Trigger firmware currently at D0.
- Scope:
  - ESE does not support this module beyond patching our firmware.
- Schedule:
  - Interrupt driven, on a D0 available and management prioritized basis.
- ESE Effort:
  - No recent activity.
- Stakeholders:
  - Rick Kwarciany, Dave Slimmer, Rich Partridge (D0), Brendan Casey (D0)

D0 Fiber Tracker Mixer System Support

- Description:
  - ESE designed new hardware & extensive firmware to reorder the inputs from the D0 Level 1 Central Calorimeter Detector.
- Scope:
  - Support the previously deployed Mixer system by diagnosing/repairing failed modules.
  - Assist D0 with the debugging and enhancing of the system.
- Schedule:
  - Support is interrupt driven, on a management prioritized basis.
- ESE Effort:
  - expect about 10 FTE Days/Year and decreasing (repairs). Major ECO's will have to be fed thru the approval process.
- Stakeholders:
  - Stefano Rapisarda & Neal Wilcer, Fred Borcherding (D0)

D0 Trigger Timing Distribution System

- Description:
  - Trigger hub for distributing over 1000 trigger signals and clocks to up to 128 front-end subsystems & returning status from them.
- Scope:
  - Firmware updates & broken module repair since this is not a PREP system.
  - D0 occasionally requests evaluation of firmware changes to utilize new information or add features.
- Schedule:
  - Latest firmware upgrade for a ‘keep alive’ signal remains in testing.
- ESE Effort:
  - Firmware Updates and repairs average about 15 FTE days/year.
- Stakeholders:
  - Ted Zmuda & Thinh Pham, Dan Edmonds(D0)
  - http://www-ese.fnal.gov/d0trig/default.htm

D0 AFE VLSB (VME LVDS Serdes Buffer)

- Description and Scope:
  - Test Module for the new D0 AFE2-t module. The same board is being considered for use by MICE.
- Schedule:
  - 6 boards are done and need testing. Firmware is complete.
- ESE Effort:
  - Needs approximately 30 days of Neal & Stefano to complete testing.
  - Support for MICE needs to be defined via MOU.
- Stakeholders:
  - Stefano Rapisarda & Neal Wilcer, Alan Bross (D0) & Paul Rubinov (D0).
  - http://www-ese.fnal.gov/D0_VLSB/

CDF High Voltage Crowbar support.

- Description:
  - CDF requested protection against beam incident overcurrents damaging the Port Cards. ESE responded with High Voltage Crowbar PC boards with picofuses for protection. Following deployment, ESE provided support of the crowbar boards within the scope of the ongoing diagnosis of these beam incidents.
- Scope:
  - Support the Crowbar boards by replacing blown picofuses.
- Schedule:
  - Interrupt driven.
- ESE Effort:
  - ~5 FTE Days/Yr.
- Stakeholders:
  - John Chramowicz, Silicon SPL.

THE END

ESE Section Personnel

- **Engineers & Engineering Associates - 15**
  - Jeff Andresen
  - Gustavo Cancelo
  - Guilherme Cardoso de Cardoso (GL)
  - Greg Deuerling
  - Bob Forster
  - Bill Haynes
  - Rick Kwarciany
  - Alan Prosser
  - Vince Pavlicek (SH)
  - Stefano Rapisarda
  - Ryan Rivera
  - Ken Treptow
  - Marcos Turqueti
  - Ted Zmuda

- **Technicians - 4**
  - John Chramowicz
  - Jim Franzen
  - Thinh Pham
  - Neal Wilcer