DAQ Development

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Project Drivers & Scope

- Provide data acquisition related software development, including extensions to existing systems and major upgrades
  - Proposed experiments (Minerva, SciBoone?)
    - Minerva using CAMAC from windows for teststand
    - No contact with SciBoone yet, have not seen a draft MOU
  - Small experiments (COUPP)
    - Want to run bubble search algorithm in camera cpu
  - Test beam experiments (RPD?, ...)
    - Unknown as they do not respond to queries

Project Drivers & Scope (Cont.)

- Run II experiments (CDF RDL)
  - 80 MB/s aggregate for 8 nodes to Mass Storage (nominal)
  - 30 MB/s single node to Mass Storage (nominal)
  - 1.5 times above rates for recovery of backlogs
  - More unified support for CDF and D0 raw data logging
  - Migration from IRIX systems to Linux

Project Drivers & Scope (Cont. 2)

- CMS Remote Operations
  - Interface between LHC@FNAL committee and CMS remote operations group (LHC@FNAL is the operations center that will be built on WH1; the CMS remote operations center is on WH11)
    - Help gather CMS-specific requirements for LHC@FNAL
  - Contribute to CMS work that needs to be done to enable remote operations
    - Testing various configurations of applications and monitors
    - Aid in development of the event server piece of the storage manager (analogue to the “server” part of the CDF consumer server logger)

Project Drivers & Scope (Cont. 3)

- Astrophysics experiments (SDDS-II, DES?)
  - None for DES at this time
  - SDSS-II
    - Motivations for the upgrade
      - » Improve the stability and reliability of the system
      - » Eliminate dependence on obsolete components
      - » Reduce operating costs
    - Hardware replacements
      - » The SGI host computer was replaced with a Linux PC
      - » The MVME167 processor boards were replaced with 5500s
      - » The PTVME link was replaced with Gigabit Ethernet
      - » The tape archive system was replaced with FTP and rsync transfers
- *Note: NOVA will be discussed separately*

Project Deliverables Status

- Proposed Experiments (watching *for warning signs)*
  - Minerva
    - No explicit request for development help at this time
  - SciBoone
    - No explicit request for development help at this time
- Small Experiments
  - COUPP
    - Summer student work onboard camera software
    - *May have to step in afterwards*
- Test Beam Experiments
  - RPD (T955)
    - MOU draft, but no response since December

Project Deliverables Status (cont.)

- Run II Experiments
  - CDF Raw Data Logger (CDFRFL)
    - Raw Data Logging to SAM Database and Mass Storage System
      - Able to run in parallel on 8 Linux machines
      - Based on D0 dlsam/dlcat mechanism
- CMS Remote Operations
    - Not really a DAQ effort, but challenges are similar for remote operations of DAQ systems for experiments like NOVA.
    - LHC@FNAL committee has morphed into LHC and CMS specific working groups now that the director has approved construction of the WH1 facility
    - Storage Manager work is ongoing. A prototype version with sufficient functionality is available for the CMS magnet test/cosmic challenge this summer.
    - *Note: Quantifying appropriate deliverables has been a challenge.*

Project Deliverables Status (cont. 2)

- Astrophysics
  - DES
    - No activity beyond workshop in February
  - SDSS-II DAQ Upgrade
    - Remaining tasks:
      - Understand cause of missed interrupts in spectro system at APO – Hope to simulate two VCI+ cards interrupting the processor board at the teststand
      - Improve the sky subtraction in the astro system
      - Replace two bad Peritek VCQ-M video daughter cards on spare video boards at APO
      - Update the documentation to reflect the new system
    - Support requests have been very infrequent. Mostly these are reports of bugs that are tripped in unusual situations. Of course, these are diagnosed and fixed promptly!

Project Milestones

The mission is to provide performant, robust, and well documented DAQ related software solutions to the Fermilab user community in a timely manner, appropriately reflecting Computing Division and Laboratory priorities.

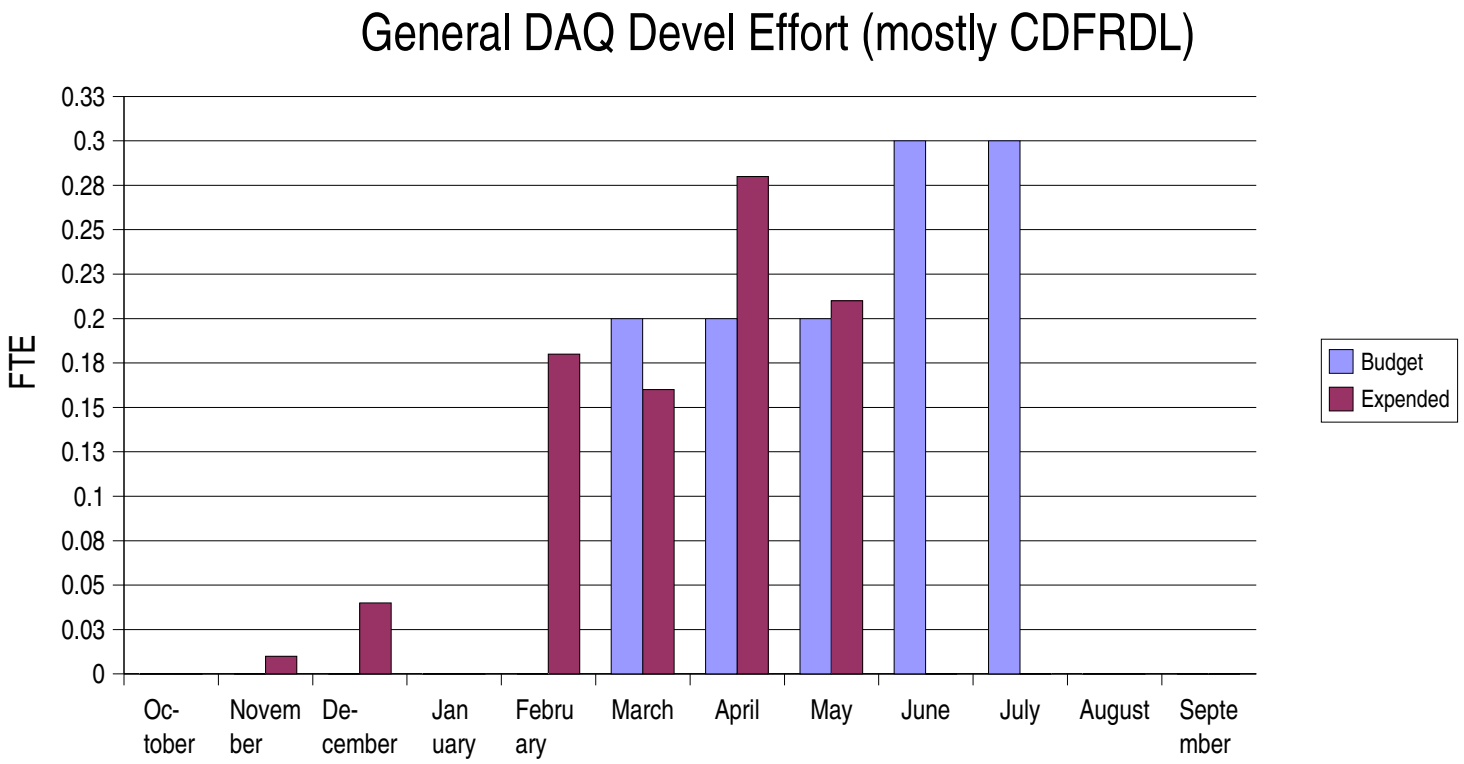
- Proposed Experiments (Minerva, SciBoone)
  - No specific milestones defined as there is no development work
- Small Experiments (COUPP)
  - No specific milestones but that might change come the end of the summer
- Test Beam Experiments
  - No specific milestones defined as there is no development work

Project Milestones (Cont.)

- Run II Experiments (CDFRDL)
  - Full BW with RDL & simulated CSL April 27, 2006 -- 50%
  - Full single node BW with RDL & CSL June 5, 2006 -- 0%
  - Full multi node BW with RDL & CSL June 19, 2006 -- 0%
  - Full BW with RDL & CSL on prod July 10, 2006 -- 0%
  - Stable operation September 11, 2006 -- 0%
- CMS Remote Operations
  - Elusive at this point, an ongoing struggle with the effort
- Astrophysics (SDSS-II Upgrade)
  - It would be good to complete the four remaining tasks by the end of the summer shutdown.

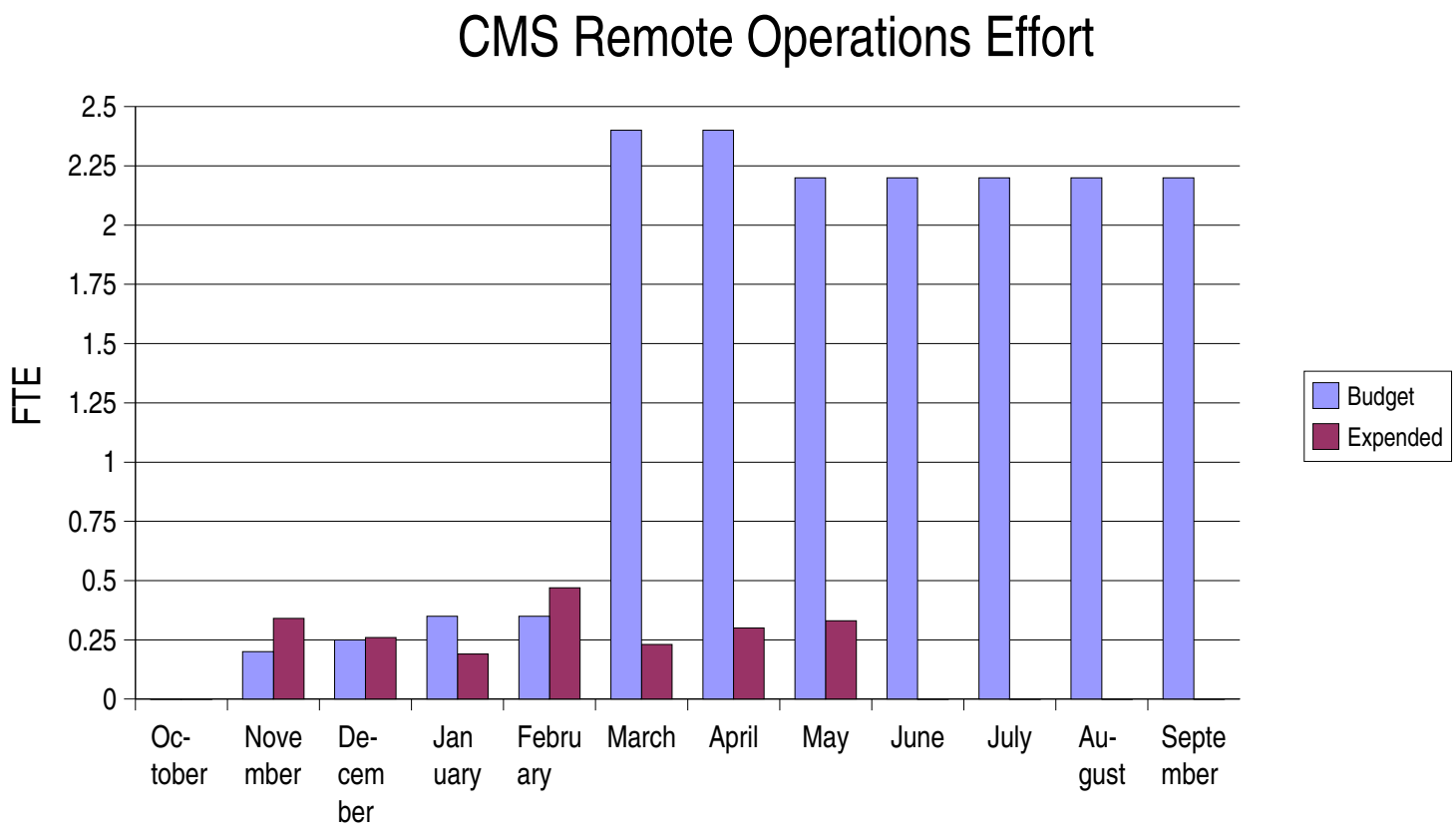
Effort Profile General DAQ Devel (Mostly RunII)

- (Tools) 0.05 FTE prior to Jan; 0.08 FTE Feb DES Workshop; rest is CDFRDL



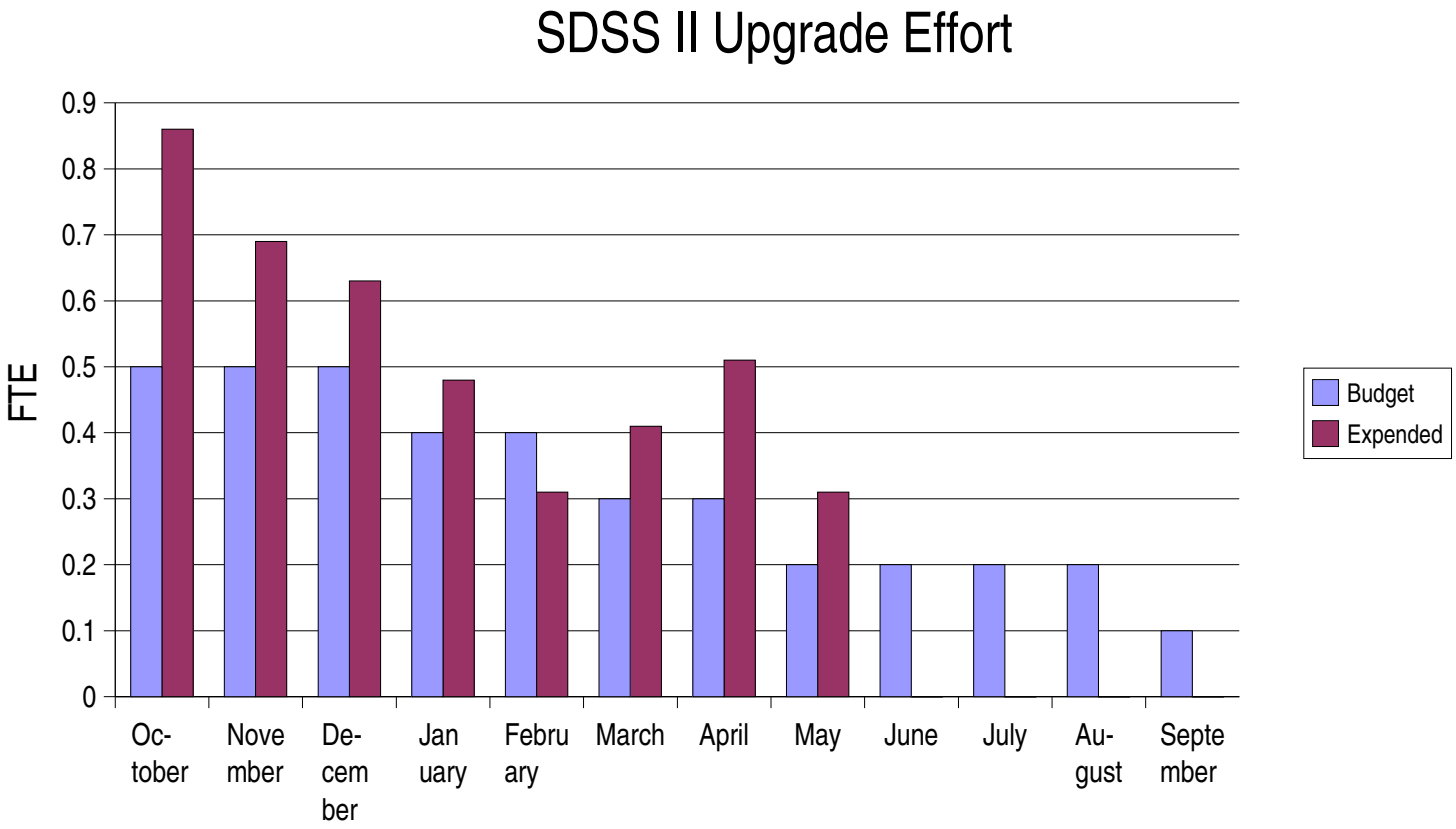
Effort Profile CMS Remote Operations

- In theory effort loaned to AMR for generic remote operations tasks



Effort Profile SDSS II Upgrade

- FY07 is mainly bug fixing, support, and less essential features



Risks

- General issue of available effort already over-subscribed
  - Not keeping pace in some areas forcing harder look at priorities
  - New requests mean effort must be squeezed from other projects
  - New requests can happen with little warning, hard to plan and optimize effort (often not in time for budget planning).
    - Forces some crystal ball gazing
  - Priorities can change over time forcing re-evaluation and re-allocation of effort
- Proposed Experiments (Minerva, SciBoone, etc.), Small Experiments & Test Beam Experiments
  - No requests currently, MOU process allows for some form of advanced warning but not always much
  - Time scales not always well defined given project approval process these days
  - May no longer have expertise in group for hardware (*e.g.* CAMAC)

Risks (Cont.)

- Run II Experiments
  - Generally expect support and not new development at this point
  - CDF RDL
    - Single node rate far higher than ever supported with software
    - Hand-shaking between various processes could be insufficient
    - Communication lapses and reconfigurations could result in need to re-install, re-configure or modify software unexpectedly
    - Often waiting on progress from other groups so next step can be taken
      - Test platforms commissioned; data source software; infrastructure debugging
    - Incorrect specifications causing re-write of sections of code
    - Short term load when significant testing begins
    - Long term support load
    - Monitoring not understood for CDF yet

Risks (Cont. 2)

- CMS Remote Operations
  - Difficulty in defining tasks and scope of effort (lack of agreement among players)
  - Conflicting requests unrelated to general remote operations
  - Multiple people trying to claim effort resources
    - Already had to wage this battle (report only to Patty)
  - Effort will not yield insights on general remote operations issues (too CMS specific)
  - Fuzzy boundaries between remote operations and CMS-specific work
  - Difficulty getting information from the CMS collaboration

Risks (Cont. 3)

- SDSS II Upgrade (in production)
  - Expending effort faster than anticipated (funding may be exhausted)
  - New feature requests or significant problems may arise
  - Final tasks may linger due to priorities or difficult nature (no end game)
  - Failures in hardware components that were not upgraded (e.g. Vigra video cards, 712M SCSI interface cards, VCI+ cards)