Users and the DØ Trigger simulation

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User's trigger simulation goal:

1) Study efficiency vs rejection to design and tune triggers/filters for data collection

2) Get trigger efficiencies for physics analysis

3) Implement and test new triggering software and hardware algorithms.

Central Fact of the DØ run 1 trigger simulation:
It models the real trigger system.

Triggerlist must be parsed, "downloaded"

Level 1 framework and calorimeter simulation emulates hardware.

Level 2 results depend on level 1 results.

The Advantages of the current system:

- ☆ Every user is a potential verifier of the trigger system at all levels.

- ☆ Dependences between the trigger levels are flushed out and understood.

- ☆ Potential exists for detailed studies of actual triggering scenerios. Timing studies, checking online against simulation results, looking for trigger list dependence. Software and hardware changes are checked and tested in a realistic enviroment.

- ☆ Promotes the understanding of how the trigger system works, at least from the mechanical sense.

- ☆ Having programmable triggers adds to the flexiblity for efficiency vs rejection studies.

- ☆ Production release provides archival information and a way of simulating changes to code and hardware. Offsite use

- ☆ Online and offline enviroment is similar leads to maintance ease.

The Disadvantages:

- **The user must "emulate" the t–miester, the daq_expert, the global monitor...**
- **Interlocked system leads to frustration if one part is broken.**
- **Simulation often must be run multiple times for code and trigger changes, different times for different physics objects, often for changes that made no difference to the MC.**
- **Getting the correct triggers and l2 production versions not always trivial.**
- **Getting trigger efficiencies is disconnected from reconstruction process.**
- **For any complex system, figuring out why something went wrong almost always involves intervention, even for pilot errors.**
- **Tough enviroment for debugging and testing. Even with procedures, linking against a production release is a nightmare.**
- **The text output file is designed to provide information for experts. It tends to baffle users.**
- **Need Geant output.**

Disadvantages, cont.

- **The documentation tends to be diverse and scattered. And why not, since so many systems are involved.**

  A recent example: Student wants to know what "eis,," means, exactly. The reponse involved:

  1) The trigparse file for the definition
  2) The trigparse document for defaults values of the isolation cone
  3) The L2_EM document for the definition of the algorithms
  4) Additional interpretation from me since the user didn't want to pour through two documents.

- **Additionally, it's not easy to concoct and keep current recipes when every single user wants to be told (verbally) what to do.**

- **The documentation is fairly comprehensive (by DØ standards), but got relatively little use on the user's first encounter with the system.**

- **Users also seemed to me to have too much blind trust in the simulation.**

General comments and personal opinions:

The current system is necessary to meet two of the three user goals. However, most users are interested mainly in one goal, for which this system is usually overkill. Maybe have an algorithmic only simulation for efficiencies for run 2? Put knowledge into a fast simulation?

The current system of emulation is essential for experts.

Although I sympathize with the l2 experts not wanting to spend too much time dealing with raw users, I felt that the system of l2 reps isolated users from the expertise and resulted in many cases in the run around and it was very frustrating for users.

Programming new/different trigger condition seemed to cause special problems. This got better with Trigparse, but not great.

Despite 3000 DØ notes, there is a very oral tradition on the experiment. Will that change with information on the Web?

Some problems with running the simulation are technical, some the result of design choices. But many are sociological.

Comments on monitoring

Another way non–expert users interacted with the Level 2 output was with the Trigger Examine and other monitoring data on Global Monitor shift.

Trigger Examine–– too many histograms, too hard to understand for the casual shifter, in part because of trigger list dependences. Trigger list dependences make it hard to set up automatic procedures.

More graphical information on trigger rates?

What to do? I would really like to see a better job done all round on monitoring the experiment in Run 2. Not an easy problem and I have no solutions. Few dedicated, highly trained shifters (like daq_experts) at all stations? Fewer people with more responsiblity in the control room? More acountablity?