Performance DPDs and trigger commissioning

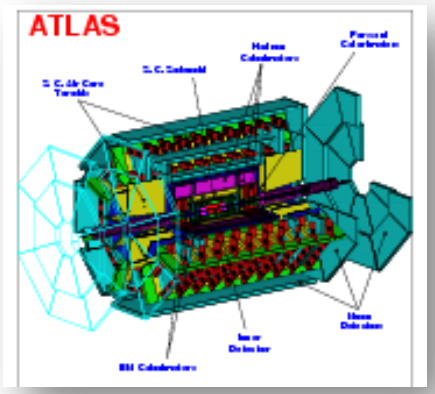
DPD Task Force meeting – 29th May 2009

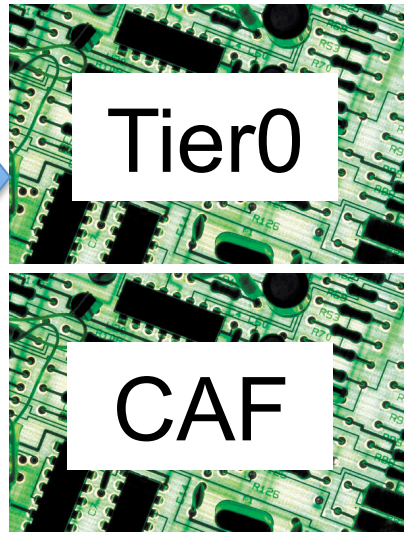
Ricardo Gonçalo on behalf of the Trigger

Questions & answers

- The main issue for this meeting:
  - Should “commissioning” and “performance” DPDs (i.e. cosmics- vs collisions-oriented DPDs) be merged?
    - No objections to merging DPDs from the trigger side
    - The trigger commissioning will need RAW bytestream at the initial (cosmics/early collisions) stage of commissioning

- Questions & answers:
  - What the commissioning DPDs are used for?
    - No use in the trigger as far as we know
  - What this requires in terms of event selection, and what does this require in terms of contents?
    - More complicated question: see next few slides…





ESD/DPD prod. Monitoring histos Few dedicated ntuples for commissioning	Monitoring histos essential for trigger commissioning Will not produce ntuples later
Express and debug/ trigger calibration stream processing Re-run trigger on RAW to verify result	Priority is menu and bug fix testing Also ad-hoc ESD/ ntuple production for subset of data

- Commissioning with cosmics and early collisions will need RAW bytestream
- High Level Trigger starts by running in skeleton form online and needs to be re-run offline in the CAF
- Part of the data is used for this, initially a large fraction, notably debug stream
  - Long stable runs, with stable detectors and conditions, will be most useful
- Dedicated ntuples needed for fast reaction to problems
  - BS ➔ BS w/HLT ➔ ESD ➔ Ntuples (e.g. TTP)
- Easy access to data is essential:
  - Fast access essential for problem solving: <24h (ideally 1 night ~ 8h) between run and ESD production
  - Also essential to have access to data until problem is solved

Code validation before online use

- Emphasis on CAF usage
- Again need big enough samples of RAW BS from specific streams e.g. MinBias or L1Calo and in some cases from all streams
- Usually means O(10M) events from a group of streams
  - Again long stable runs are more useful than short runs with varying conditions
- Use as "control sample" for code testing, development and tuning
  - Can use same sample for longer periods (~1 month) but may need to update regularly
- Same procedure: RAW ➔ESD ➔Ntuples

Missing ET slice

- Need access to ALL events in ALL streams
  - Biased samples are not useful for efficiency studies
- Will increasingly move routine analysis to Tier0 monitoring histograms for fast problem finding/diagnosing
- Will need ad-hoc analysis on CAF using small samples of AOD/ ntuple (TTP)

Tau slice

- Again biased DPD samples not useful for tau commissioning
- Will rely on online/Tier0 histograms for problem finding/ diagnose
- Will need dedicated ntuple production in CAF for commissioning and later
  - Using latest runs or reference control sample in RAW format (for clusterization studies at Event Filter) and ESD/AOD for other initial performance studies

Jet slice

- Performance DPDs ARE useful as a way to access calorimeter cells
- Useful streams:
  - L1Calo: for calorimeter activity
  - Minimum bias: needed for efficiency studies with low thresholds
  - Inclusive muon streams to get orthogonal sample for efficiency calculation
- Special case: forward jets need different selection
  - 2 jets with $p_T > 30$ GeV and $\Delta\eta > 4$
  - Test DPDs being produced by jet/Etmiss combined performance

B-jet slice

- Will produce a dedicated ntuple from ESD/AOD/DPD for LUT tuning, debugging, etc
- Will also use Tier0 monitoring histos from b-jet slice and InDet monitoring
- DPD_TRACKING will probably be useful as input data format for ntuple production – under evaluation
  - Useful to get full tracking info on a large sample of signal-enriched events
- Would need mu4_j10 trigger to be used for DPD event selection
  - Enrich sample in bb events
  - 10k events with this selection would already be useful

Muon slice

- Bias from skimming cuts in performance DPDs again makes them un-interesting for commissioning
- Looking into possible changes to the selection that would make DPD_MUON and DPD_SINGLEMU more useful
  - This looks feasible but would imply prescaling the DPD
- Need dedicated ntuple and lots of data for studies, notably for L2 muFast LUT tuning
  - Ongoing problem – ntuple production in Tier0 seems essential for initial collisions
  - An estimate is 5-10% of the whole inclusive muon stream would be needed

e/gamma

- Access to several streams (RAW) essential for first collisions
  - L1Calo/L1EMCalo, stream containing L1_EM3, minimum bias
  - Relying on running the HLT on L1-selected data
- E/gamma performance DPDs will be useful
  - Will need access to ESD/AOD/DPD and use same procedure as other slices: RAW ➔ESD ➔Ntuples
- Very important to be able to access ESD/AOD/DPD from all runs marked yellow by trig-egamma DQ within 24-48 hours

Overview of preliminary plans for trigger commissioning and performance studies

	Finding problems (hours)	Fixing bugs + testing (1-2 days)	Parameter tuning (few days)	Performance studies (>1-2 days)
Commissioning Some dedicated ntuple production in T0; maybe also in CAF for subset of data	Monitoring	ESD/ntuple RAW->ESD->AOD->Ntup @ CAF Needs smallish specific samples (e.g. 1 stream for N lumi blocks; dependent on problem)	ESD/ Dedicated ntuple More data, possibly from a given stream	ESD/Dedicated ntuple Even more data; need to consider bias with great care
Stable running No full ESD access No dedicated ntup CAF for small sets	Monitoring	ESD/DPD/D3PD + ad-hoc production in the CAF	ESD/DPD/ D3PD + dedicated production in the CAF	AOD/DPD/D3PD

Summary & comments

- Initial commissioning will need fast access to RAW BS and CAF/Tier0 resources
- Performance DPDs
  - Performance DPDs will be useful in some particular cases
  - In most other cases, bias from skimming cuts makes them inappropriate
- In the medium term, and for most cases, grid access to AODs look more useful for larger-scale studies (bias, efficiencies, performance, etc)

Other comments

- Fast access to DPDs:
- Commissioning/bug fixing, will need very fast turnaround
  - DPDs would need to be available in the CAF asap after they are produced
- Reliability and resources
  - There is a concern that the long chain leading to DPD and ntuple production (D3PD production at Tier1) followed by grid analysis may not work smoothly and fast in the beginning (will the grid be swamped by physics analysis requests?)
- Even after commissioning there will be a need for a centrally run D3PD/ntuple production outside Tier0, especially if no ntuples can be produced at Tier0
- Two turning points ("when" is not clear)
  - When the HLT with a significant menu starts running online
  - When the HLT starts rejecting events
  - When grid access to full ESD becomes unfeasible