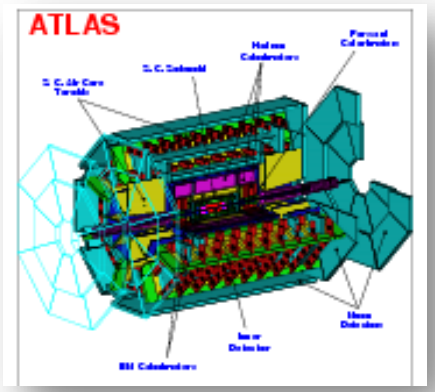
Performance DPDs and trigger commissioning

Preparing input to DPD task force



Tier0

CAF

ESD/DPD Monitoring histos Dedicated ntuples for commissioning	Runs over all streams and all runs Will not produce ntuples later
Test new menus Ad-hoc ESD/ntuple production for subset of data	Priority must be menu and bug fix testing No capacity for large scale data analysis

- In the long term, any analysis that requires large datasets will need the Tier0 results
- Full data access at ESD level of detail will not be possible – this is where performance DPDs come in
- CAF resources will be limited also by the priority of tasks
  - Testing new menus and urgent bug fixes will take priority over everything else
  - We don't have the resources (computing AND people) to run large ntuple productions in the CAF for long

Performance DPDs

- Performance DPDs have ESD-level information for in-depth performance studies
  - Complete set of trigger objects and navigation
  - No trigger navigation/object slimming in performance DPDs
- Currently, 9 performance DPDs are planned/produced
  - Each comes from a single trigger stream
  - A fraction of events from that stream are included in the DPD if randomly selected by a "prescaler" (passthrough, in trigger talk)
- Size is constrained to be 10% of the total AOD size for each DPD
  - Using combination of skimming (event selection) and slimming (reduction of information content)
  - Size targets were achieved in current DPD definitions based on FDR2 tests (so, take this with a pinch of salt…)
  - The exact value of the skimming cuts is likely to evolve significantly in early running (to adjust size estimates to reality)
- Currently: "commissioning/cosmics" DPDs and "performance" DPDs , but only performance DPDs to be produced
- The current definitions had no direct input from the trigger slices
  - Are they useful for us?
  - See: https://twiki.cern.ch/twiki/bin/view/AtlasProtected/PerformanceDPD

#	Stream Name	Trigger Stream	Selection	Content	Main Signal	Main Goal
1	DPD_EGAMMA	Egamma	All Events	ROI ESD near egamma objects	unbiased sample	egamma reco + ID, tau fakes
2	DPD_MUON	Muon	pT > 40 GeV OR dimuon OR prescale	AOD + thinned PrepRawData	dimuon resonances	mu reco + ID, tau fakes
3	DPD_CALOJET	Jet	list of trigger decisions AND prescales vs pT	Calo cells + basic tracks	all jets	clustering, jets, MET, lepton fakes
4	DPD_TRACKING	Jet	list of trigger decisions AND prescales vs pT	ESD-level Tracking info	all jets	tracking, b-tagging
5	DPD_SINGLEEL	Egamma	1 electron pT > 10 GeV, isEM = med	full ESD	Z to ee/tautau, J/psi to ee, W to enu	e/tau signal, MET
6	DPD_SINGLEMU	Muon	isolated muon, pT > 10 GeV	full ESD	Z to mumu/tautau, W to munu	mu/tau signal, MET
7	DPD_LARGEMET	Jet	1 loose hadronic tau, ET>30 GeV (prescaled) OR MET > 30 GeV	full ESD	W to l nu, Z to tautau	tau signal and fakes
8	DPD_PHOTONJET	Egamma	tight photon OR Z to ee	full ESD	gamma/Z + jet	jet calibration, lepton fakes
9	DPD_MINBIAS	Min Bias	isolated track OR prescale	full ESD	single pion	calibration, MET

Performance DPD use in the trigger

- Performance DPDs would be the natural choice for studies requiring large data samples
  - They will be the only way to access the full data set at ESD-level detail
  - Parameter tuning and performance studies
  - Must be careful to consider the bias imposed by skimming cuts
- This should NOT be an issue for very early data:
  - Initial commissioning will need dedicated ntuple production
  - Assume access to the full ESD will exist for initial data
- A big concern in the trigger is the skimming selection:
  - Must be able to look at all events from a given stream and be free from offline reconstruction bias
  - Bias-free “prescaled” (passthrough in trigger talk) events from performance DPDs may not be enough

Possible 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/Dedicated ntuple Needs smallish specific samples (e.g. 1 stream for 1 lumi block)	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	DPD/D3PD