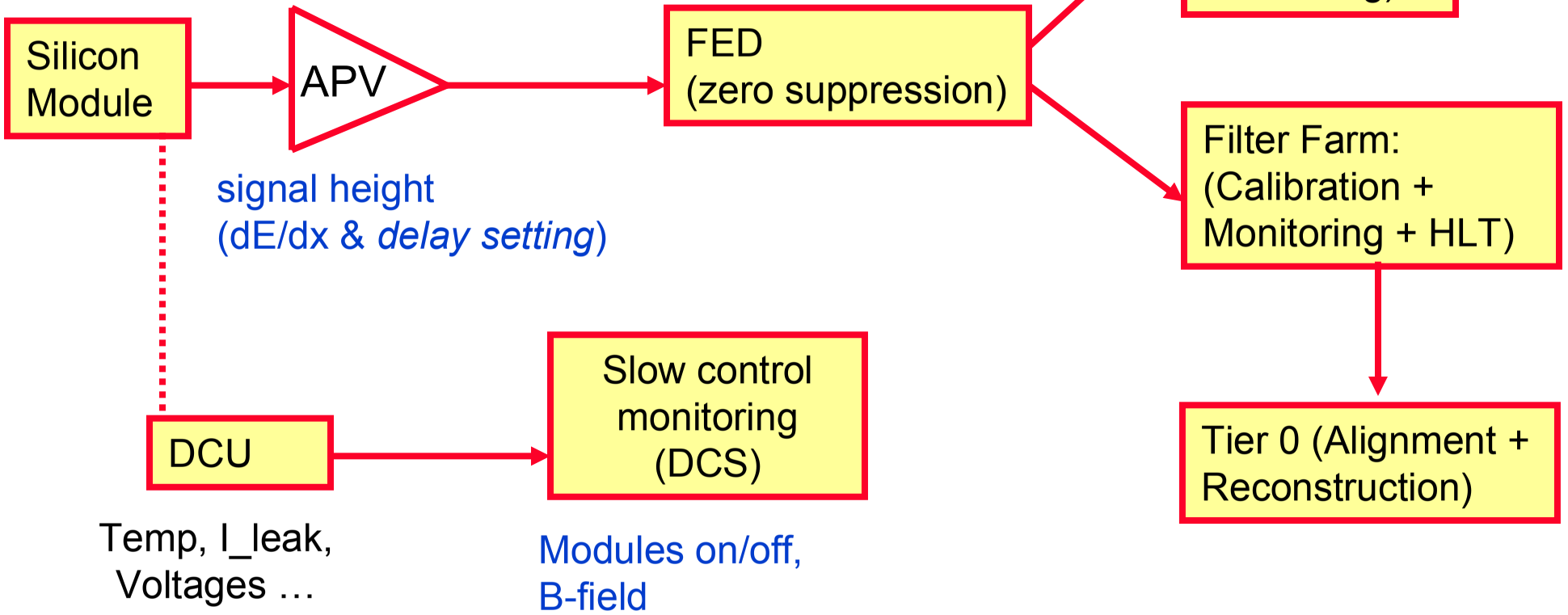
Tracker Monitoring

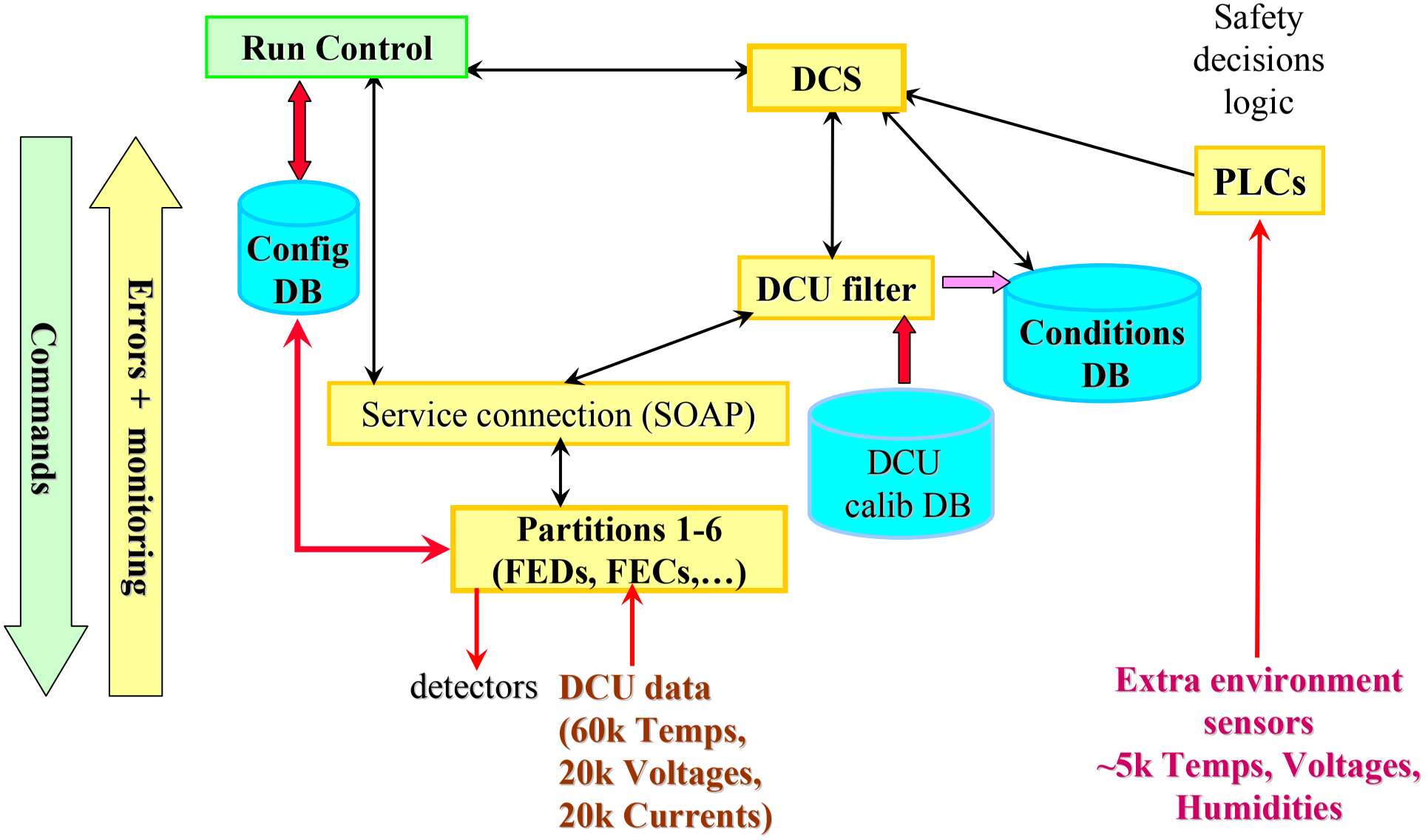
- Overview
  - Slow control monitoring, existing VME- and ORCA-based monitoring.
- Near Future:
  - ORCA-based monitoring on the Filter Farm. (COSINE, DaqPrototype …)
- Distant Future: Tracker monitoring requirements
  - Monte Carlo parameter tuning …

Tracker Monitoring Overview

~15k modules
~9M strips
Alignment, hit resolution, Lorentz angle, b tag tuning, residuals, mass peaks, occupancy, efficiency

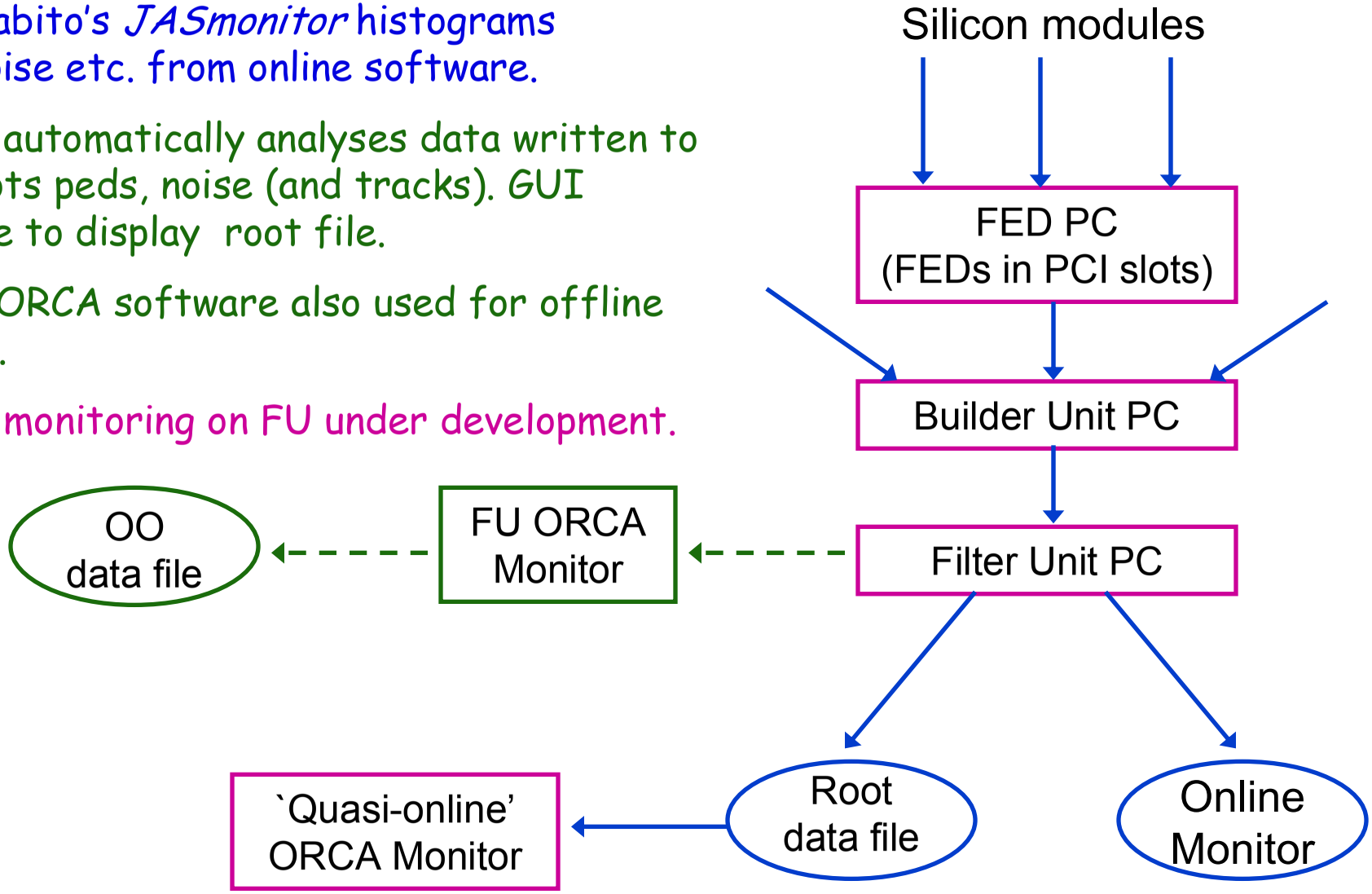


Slow Control Monitoring (R. Chierici et al)

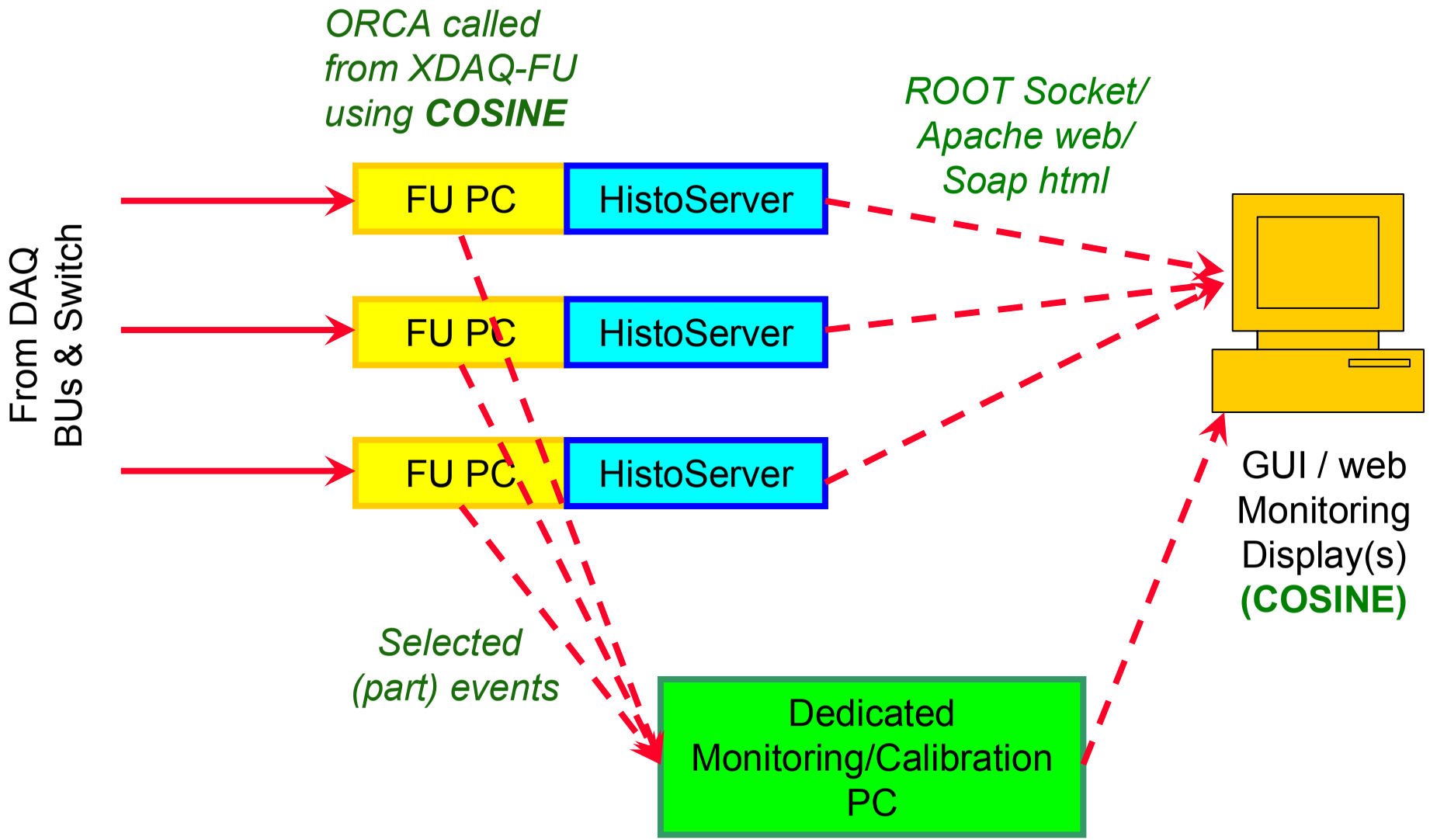


Existing VME- and ORCA-based Test-Beam Monitoring

- L. Mirabito's *JASmonitor* histograms peds/noise etc. from online software.
- ORCA automatically analyses data written to disk. Plots peds, noise (and tracks). GUI available to display root file.
- Same ORCA software also used for offline analysis.
- ORCA monitoring on FU under development.

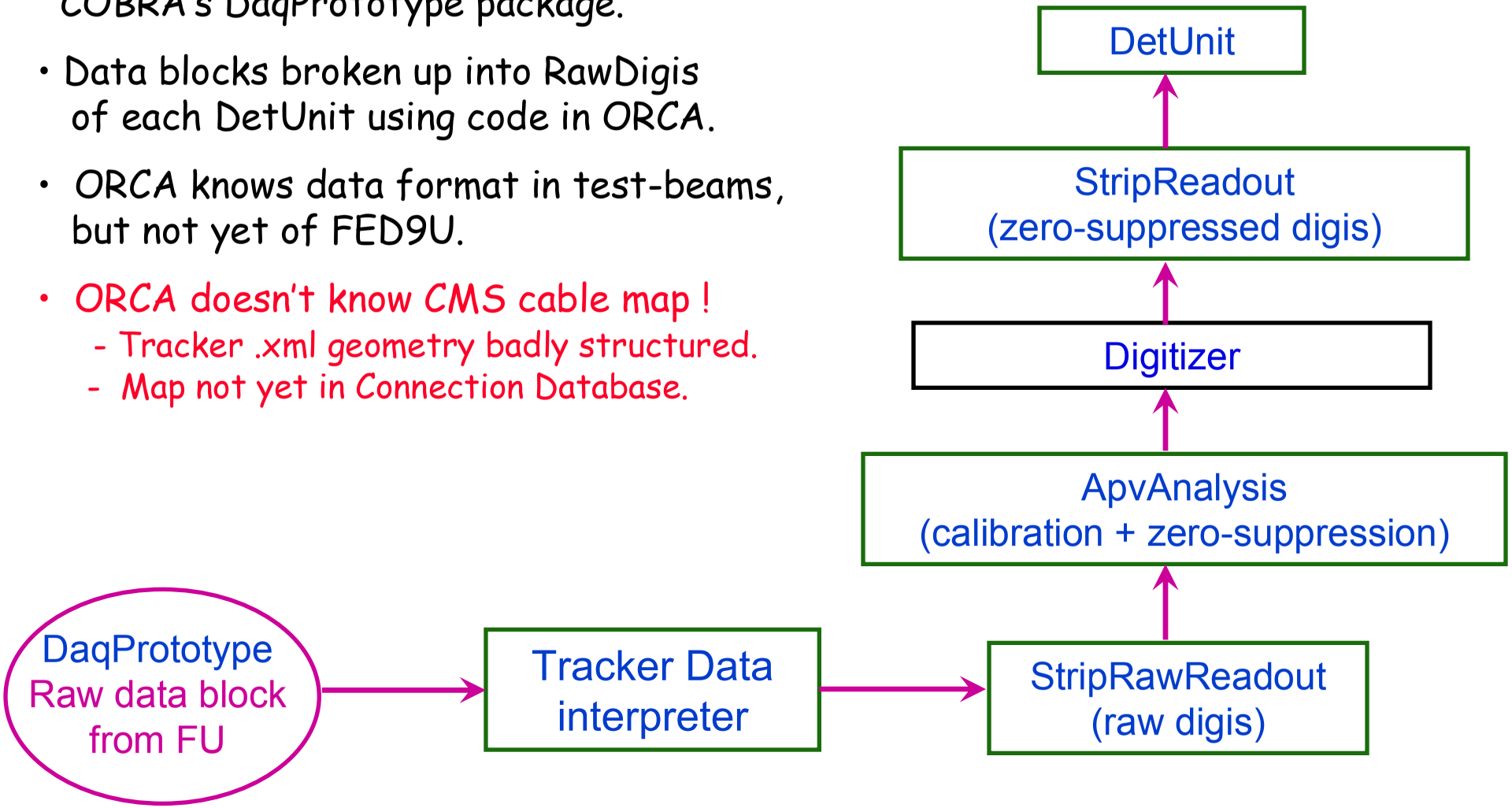


Near Future: Running ORCA on Filter Farm (Meschi/CDF framework)



Tracker Raw Data Path into ORCA on FU

- COSINE FU passes FED data blocks to COBRA's DaqPrototype package.
- Data blocks broken up into RawDigis of each DetUnit using code in ORCA.
- ORCA knows data format in test-beams, but not yet of FED9U.
- ORCA doesn't know CMS cable map !
  - Tracker .xml geometry badly structured.
  - Map not yet in Connection Database.



Tracker Monitoring Requirements ?

- Need a histogram display, error messages, event display.
- Histograms stored in Conditions Database.
- Remote monitoring (+ rapid access to problem datasets ?)
- GUIs should display info for large scale Tracker structures, but let one drill down to finer scales. *How ?*
- Automatic error detection essential:
  - Compare to reference histograms (previous runs)
  - Compare similar parts of Tracker in current run.
  - CMS framework needed for checking consistency of histos.
- Can plot info vs. geometrical position, electrical component.
- Can plot last 5 mins, entire run, last 6 months. *How ?*
- Error logger should mask known problems …
- Correlate problems with others to understand cause:
  - Geographical region, power grouping, cooling loop, module, APV, FED, FEC … , DAQ error etc.
- Monitoring software can be run offline.
- Monitoring gives run quality flags.
- Special data streams ? CPU requirements ? Run on FU or Tier 0/1 ?
- CMS Monitoring framework supports VME-based monitoring !?

Monte Carlo Tuning …

Monitoring display should let one view histograms in Conditions DB, summed over long time periods …

- Tune Monte Carlo by plotting yearly average of:

  pulse height, noise, common-mode noise, dead channels, alignment, hit resolution, time resolution, Lorentz angle, zero-suppression thresholds.

Note that MC doesn't allow these parameters to be tuned for each individual module …

Summary

- We are responsible for ORCA-based monitoring, not for slow control or VME-based monitoring.

- Existing test-beam monitoring uses online JasMonitor and quasi-real time ORCA monitor.

- Near future – run ORCA on single FU using COSINE.
  Medium future - run on multiple FUs, and use COSINE display GUI.
  Longer term - encourage DAQ group to implement our requirements !

- Urgent for this year: Improve structure of Tracker .xml geometry !
- For next year: Persuade hardware people to complete Connection Database !