Update on
tracker hit processing toolkit:

Object model
Virtual Segmentation
Algorithms

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Summary of changes

Previous version: org.lcsim.contrib.onoprien.tracking

Changes & additions (→ org.lcsim.contrib.vsegment):

New object model :

- ✓ flexibility
- ✓ LCIO Persistence / compatibility

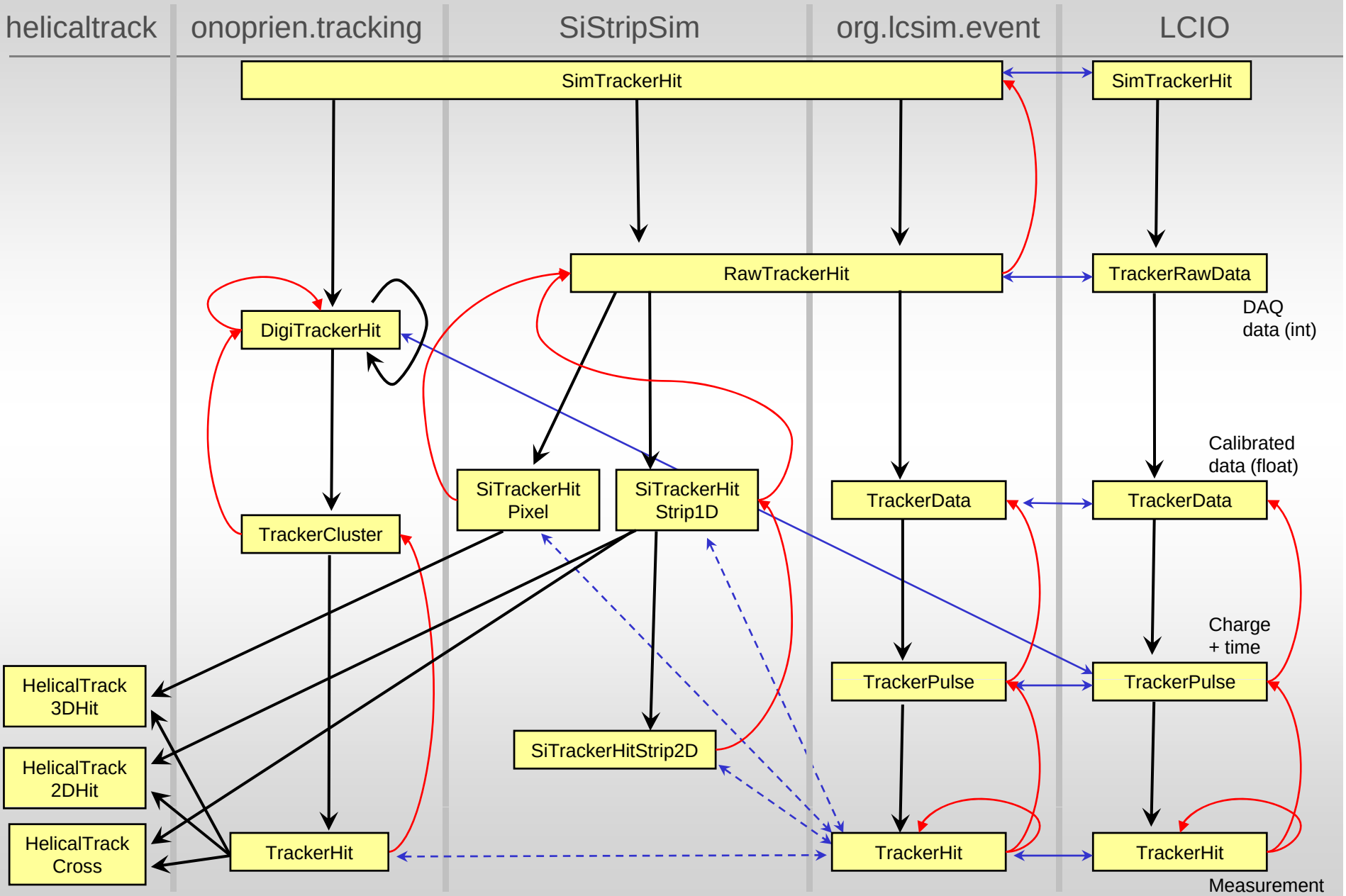
Enhancements to Virtual Segmentation :

- ✓ SimTrackerHit can now belong to multiple Sensors
  - overlaps
  - double sided sensors
- ✓ Extended library of Segmenters and SensorTypes
- ✓ Automatic conversion of any "planar" geometry
- ✓ Automated stereo partner lookup (several algorithms)
- ✓ Miscellaneous minor improvements

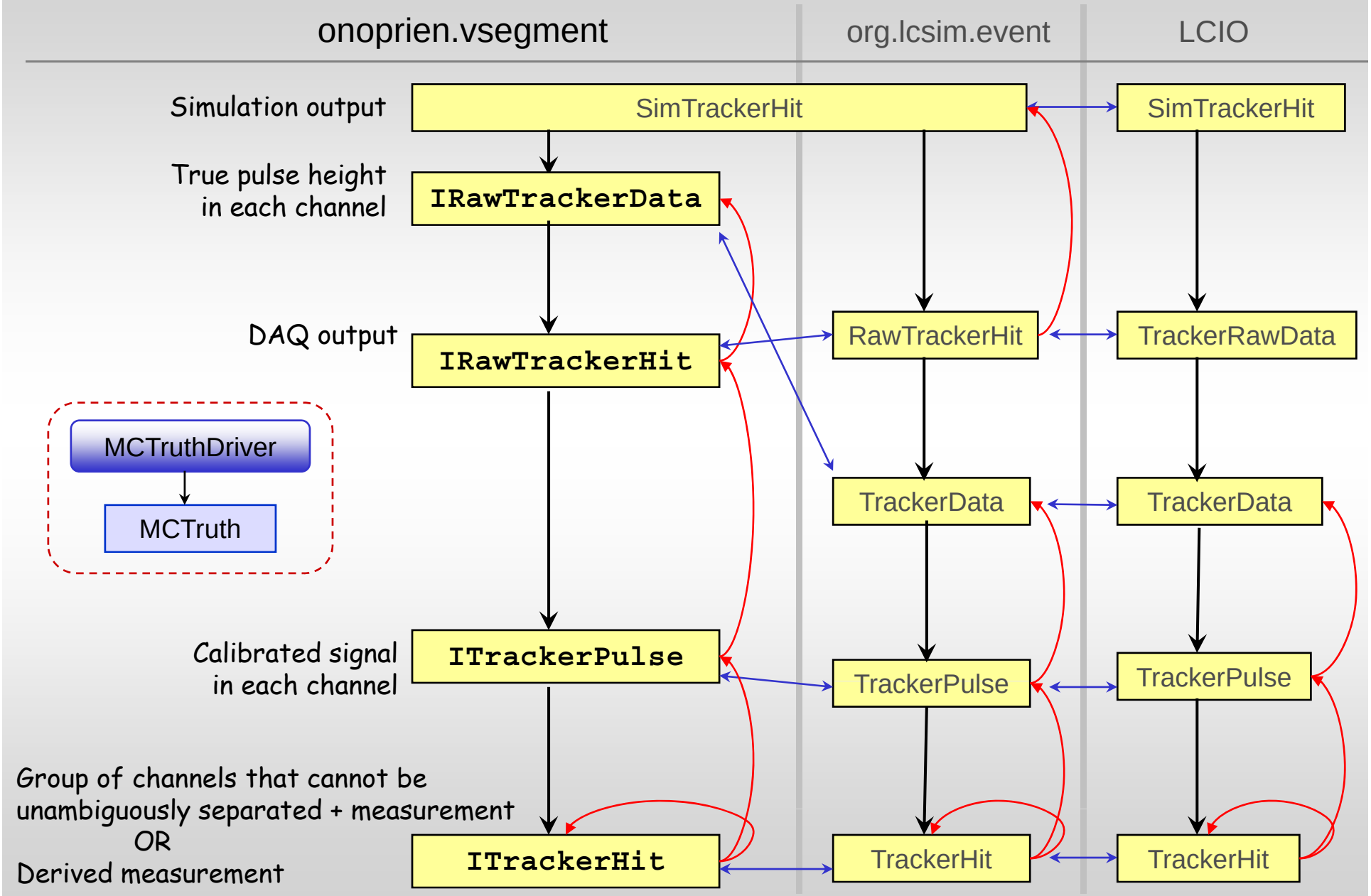
Several new algorithms :

- ✓ Clustering, cross forming, smearing, etc.
- ✓ Bridged to SiStripSim
- ✓ Configurable master Driver

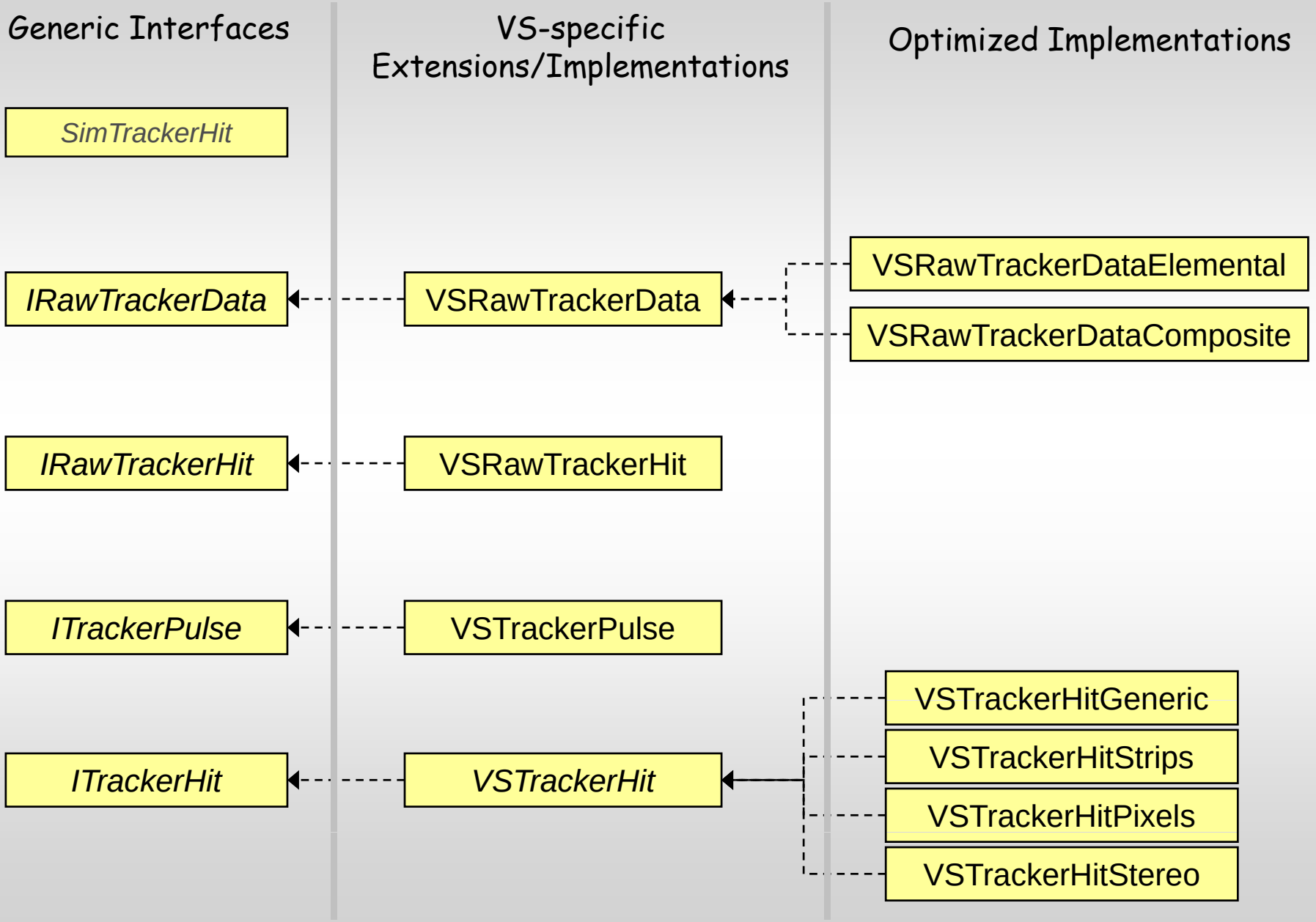
New object model - Why ?



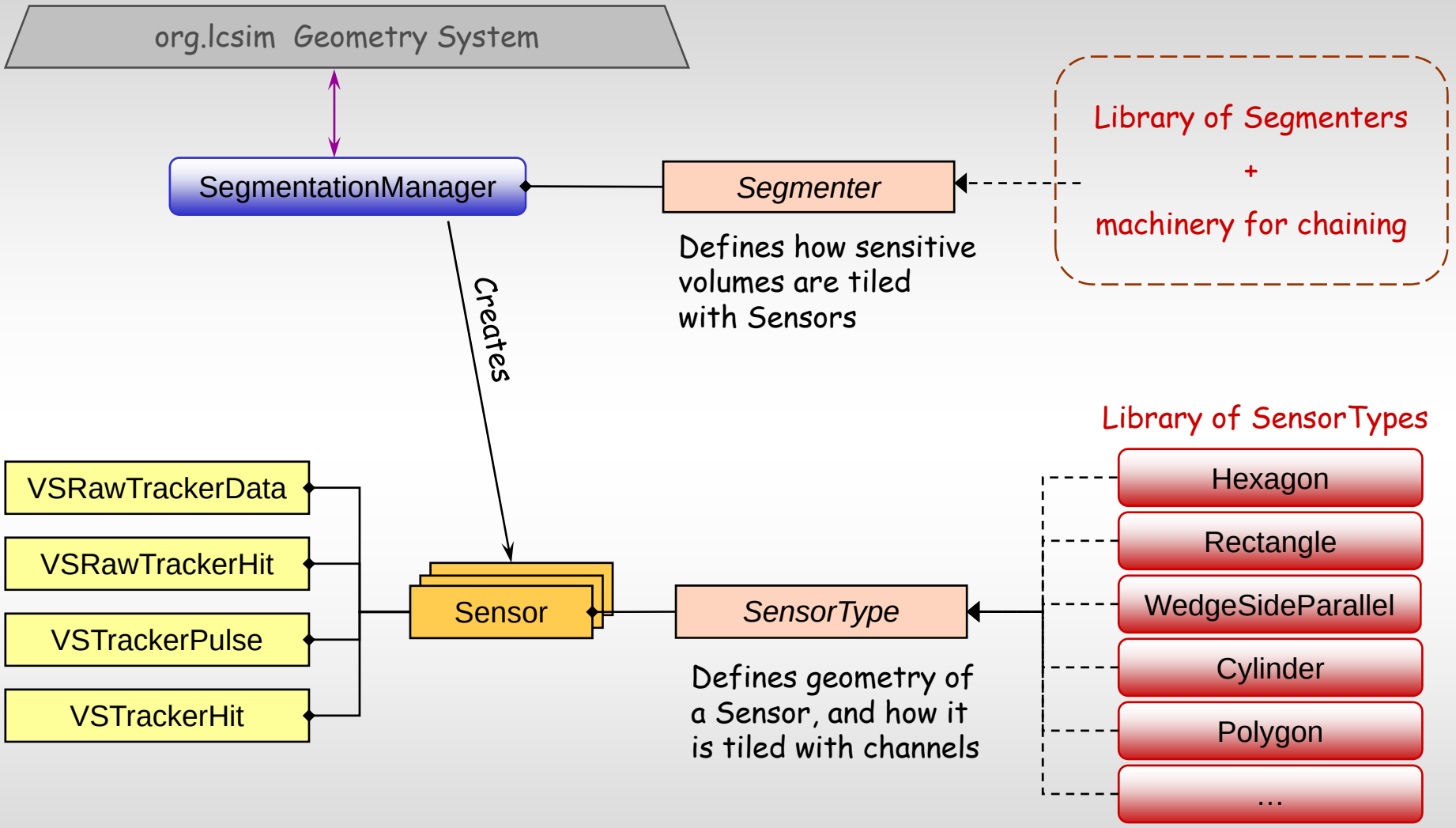
New object model



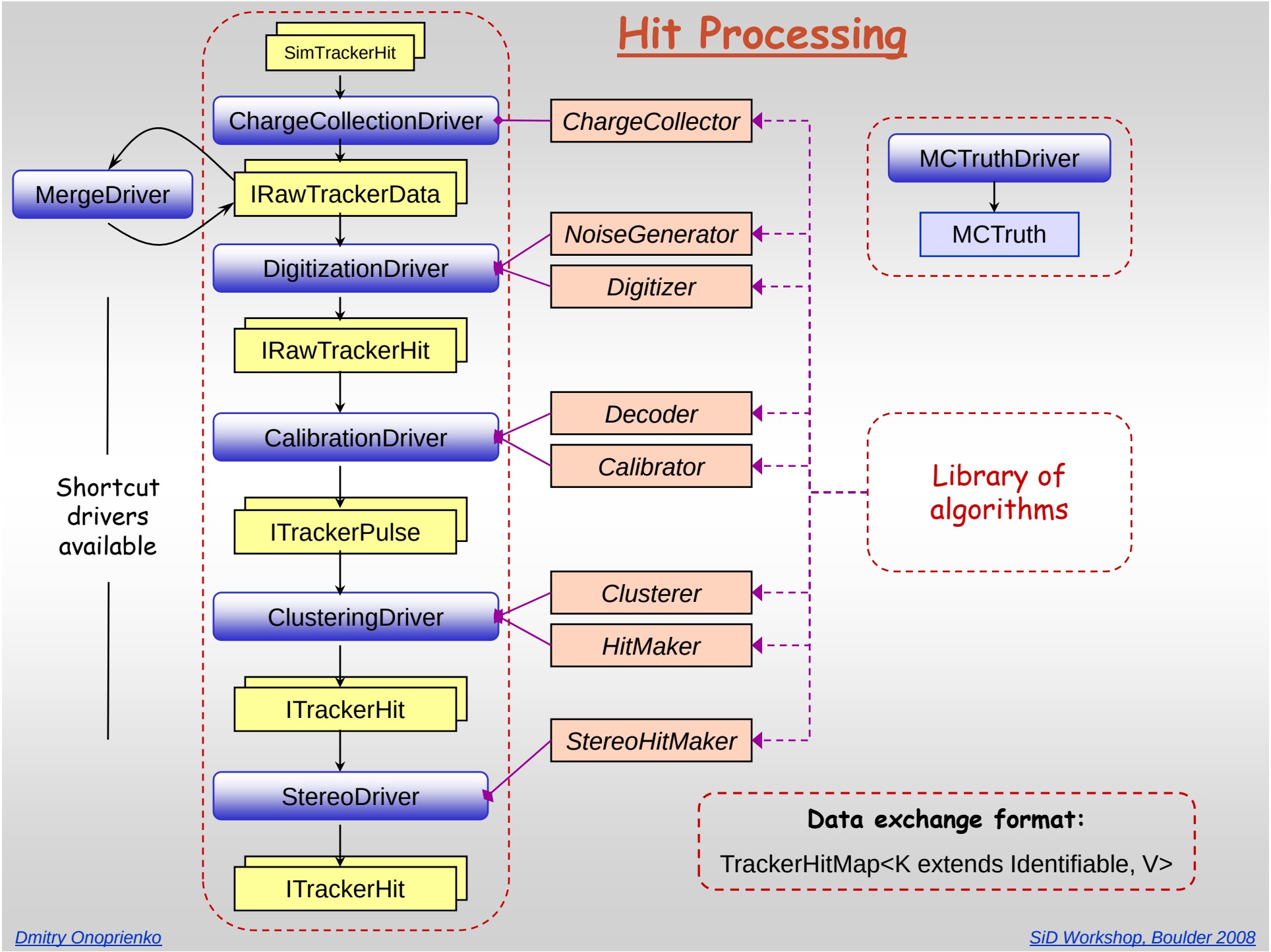
Object model implementation



Virtual segmentation



Hit Processing



Algorithms overview

ChargeCollector

ChargeCollectorDemo

All charge from a SimTrackerHit is deposited into a single channel

ChargeCollectorSmear

Gaussian smearing over several channels

SiStripSimAdapter

Bridge to org.lcsim.contrib.SiStripSim.SiSensorSim

NoiseGenerator

NoiseGeneratorGaussian

Adds Gaussian noise to existing RawTrackerData, creates new RawTrackerData on all sensors using Gaussian tail above threshold.

Algorithms overview

Digitizer

ReadoutBasic

Simulates dynamic range, pedestal, bit depth.

ReadoutCheapAdapter

Bridge to org.lcsim.contrib.SiStripSim.ReadoutCheap

Decoder

ReadoutBasic

Converts back to double.

ReadoutCheapAdapter

Bridge to org.lcsim.contrib.SiStripSim.ReadoutCheap

Calibrator

CalibratorBasic

Gain/Pedestal

Algorithms overview

Clusterer

ClustererNearestNeighbor

Simple nearest neighbor clusterer.

HitMaker

HitMakerBasic

Assigns signal-weighted average pulse position and preset errors to the hit.

HitMakerSmear

Smears position around Monte Carlo truth in measured directions, uses center-of-channel position in unmeasured and fixed directions.

StereoHitMaker

StereoMakerBasic

Assumes track is perpendicular to the sensor if not no Track argument is specified.

Final comments

Status :

- Mostly in CVS
- Limited amount of testing has been done so far

Performance :

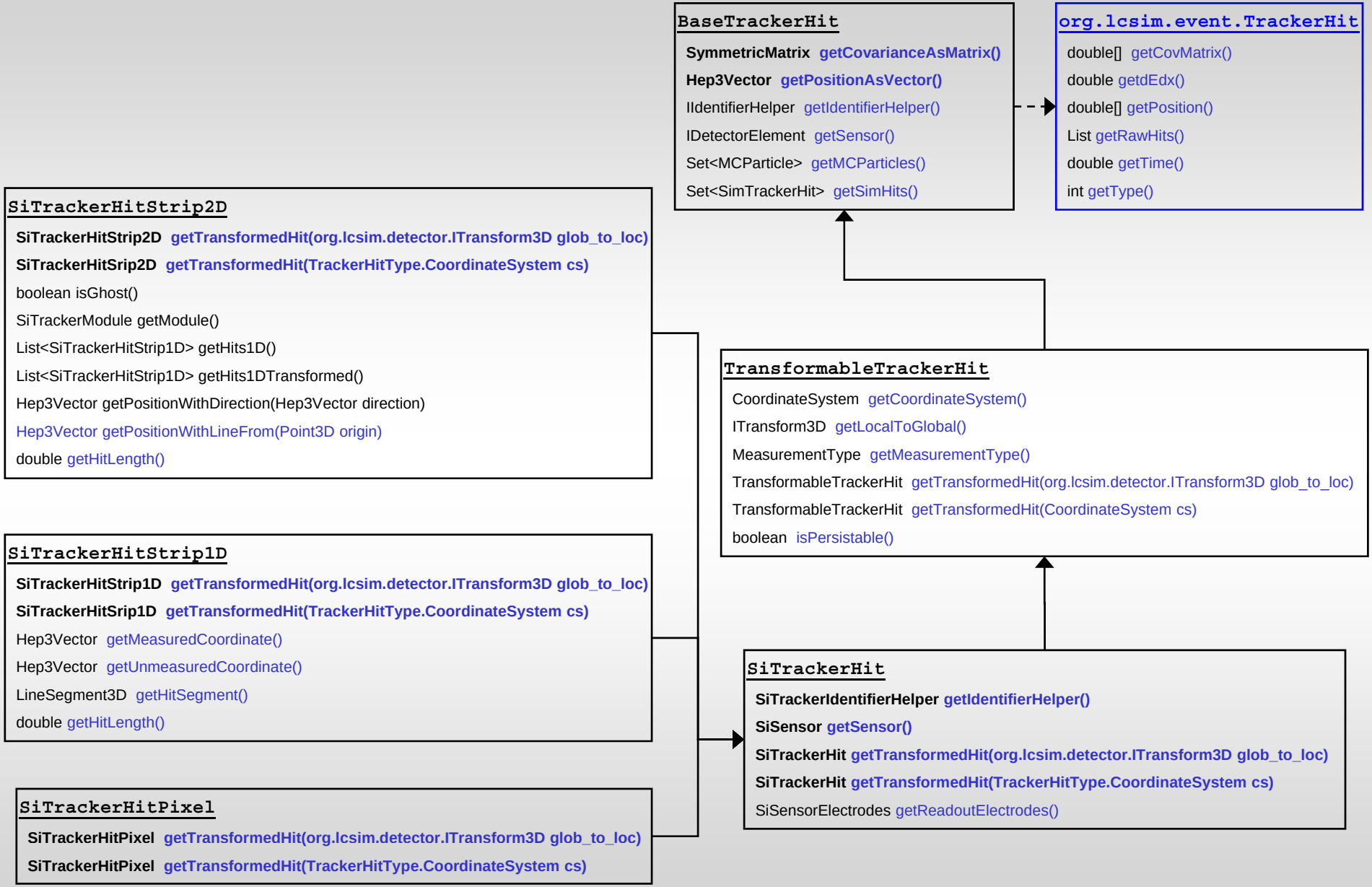
- Designed to be fast and memory efficient
- Current implementation emphasizes flexibility and ease of modification
- Various parts can be re-optimized independently for speed / memory footprint without affecting public API

Future :

- Functionality added as needed
- Will see if I can run seedtracker, CAT and PFA tools together using VS infrastructure.
- Detector independent toolkit

Backup Slides

SiStripSim hit classes



Virtual Segmentation - Segmenters