Digitization in the ePIC software stack
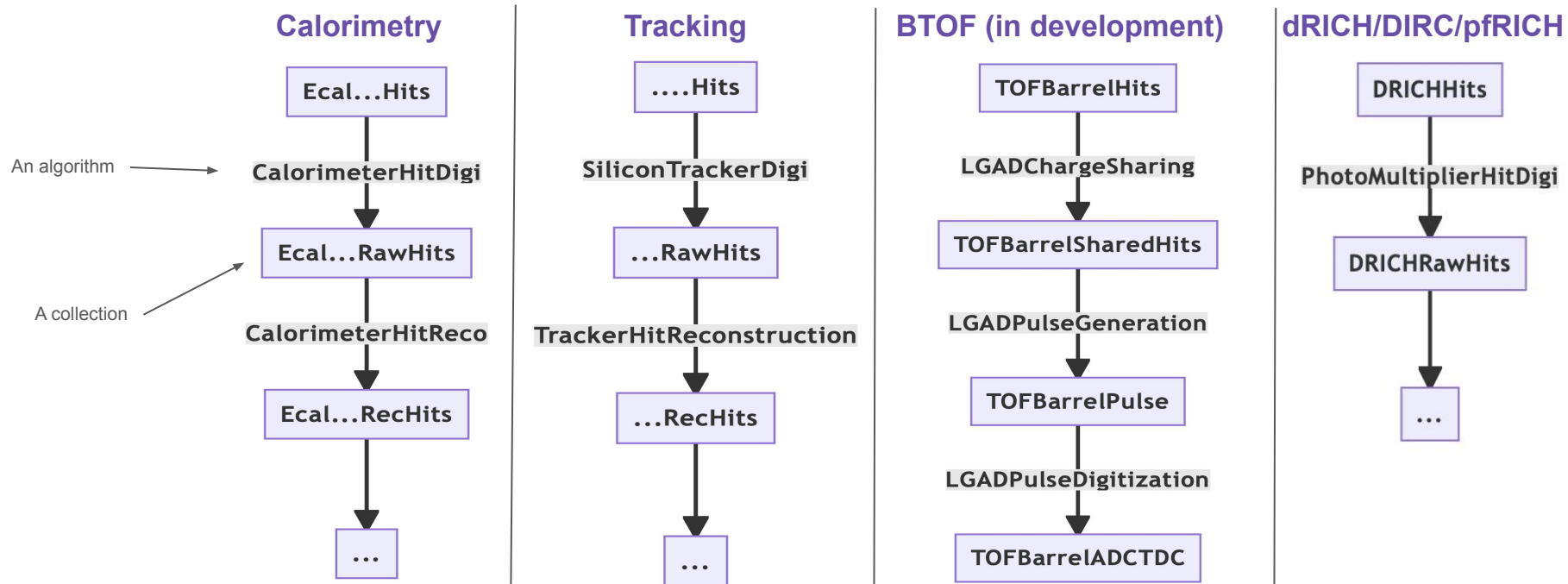
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Software framework for simulations and beyond

- ePIC software framework is based around careful **data structure** design co-developed with a set of *modular* "**algorithms**"
- Reusability is highly encouraged in design of both
- **Data structures** are developed as [EDM4eic](#)
- Reconstruction framework is [EICrecon](#) contains **algorithms**
- Some of the algorithms are implementing final simulation steps (after Geant)
- The framework *must* be able to operate on both real data and simulated inputs, and also do the reconstruction of events from full frames (possibly with backgrounds) using timing
- Another requirement is that we must be able to produce simulated output that mimics data (simulation separated from reconstruction)
- Framework *must* be able to support ongoing beam tests
- One of the goals is to develop and maintain a knowledge base, not just the software

Algorithmic flow in EICrecon

- Some generic digitization implementations are available
  (value → convert to ADC → apply threshold → convert to value)

Calorimetry

Ecal...Hits

An algorithm → CalorimeterHitDigi

Ecal...RawHits

A collection → CalorimeterHitReco

Ecal...RecHits

...

Tracking

....Hits

SiliconTrackerDigi

...RawHits

TrackerHitReconstruction

...RecHits

...

BTOF (in development)

TOFBarrelHits

LGADChargeSharing

TOFBarrelSharedHits

LGADPulseGeneration

TOFBarrelPulse

LGADPulseDigitization

TOFBarrelADCTDC

dRICH/DIRC/pfRICH

DRICHHits

PhotoMultiplierHitDigi

DRICHRawHits

...

Digitization-specific approaches

- What can we do to ensure that
    a. software adequately reflects the processes going on inside the hardware
    b. the effort is sustainable
- Data structures that can be used to support ongoing hardware tests?
- Use some captured signals as golden references for testing digi algorithms?
- Dedicated effort for documenting what is implemented in electronics?
- During this meeting identify
    a. what are ongoing efforts
    b. what digitization models do we need
    c. what commonality exists between different subdetectors