

# Future of iLCSoft

Open discussion

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- all concepts have moved to common iLCSoft tools
  - DD4hep/lcgeo for the detector geometry
  - DDG4/ddsims for simulation
  - MalrinTrk/PandoraPFA for standard reconstruction
  - ...
- ILD and CLIC (SiD ?) plan to start large scale Monte Carlo Production

## what are the next steps ?

- finalize the preparation and get production going
- then we should have some free resource to improve our software tools
- should start **discussion** about future common direction for iLCSoft and common tools

- WP3 of AIDA2020: *Advanced Software*
  - develop efficient software tools that are applicable to HEP in general
  - e.g. DD4hep, aidaTT, PFA tools, . . .
- projects/deliverables that need to be addressed soon and might affect the future direction of iLCSoft:
  - **PODIO** Event Data Model Toolkit
    - implement LCIO EDM
  - Implement **parallelization** for *Marlin* (and *PandoraSDK*)
  - Advanced Tracking Toolkit aidaTT
    - evaluate use of **ACTS**

- PODIO (POD-I/O) generic HEP EDM toolkit
  - automatically create EDM code
  - use arrays of PODs: **fast I/O**
- developed in context of FCC (and HSF)
  - for details see: <https://indico.cern.ch/event/505613/contributions/2228322/>

## PODIO is an ideal candidate to evolve LCIO

- simplify EDM
  - make I/O a lot faster
  - benefit from larger developers community
- 
- potential issue: tradeoff between backward compatibility and *getting it right*

- committed ourselves to introduce parallelization in Marlin
  - already done by all LHC experiments
  - needed to make efficient use of future CPUs
    - less memory per core
- no concrete concept or design yet - current thinking:
- implement *event level parallelism* with *multithreading*
- will most likely affect existing `marlin::Processor` interface and existing code
  - will only get *const* pointer to EDM data
  - registering in-and output collections mandatory ?
  - ...

- ACTS: ATLAS track fitting code released as standalone package
  - used by FCC studies
  - interest from Belle-2
  - ATLAS will eventually use ACTS
- track fitting is *a lot faster* than our current implementation
  - have fast navigation in reconstruction geometry
  - interface to DD4hep exists (FCC)
- discussion at *Connecting the Dots Workshop* about future of *Common Tracking Forum*
- general agreement that **ACTS** would be a good basis for creating a *tracking toolkit ecosystem* for HEP
- not one common tracking software but modular tools that can be used in different experiments and frameworks

- ACTS is a very good candidate for the future standard track fitting tool in iLCSoft
- need evaluation to see if a smooth transition is possible
  - evaluate existing example implementation for CLIC-like detector
  - implement example for ILD-like detector
  - implement the *IMarlinTrk* tracking interface with ACTS fitters
- potential issue: interface to geometry
  - would need to replace `dd4hep::rec::Surface` with corresponding class from ACTS (parallel development by FCC)
  - need to understand the effort needed ...

- the above proposed changes to iLCSoft should improve our software considerably
  - all of them affect *Core Tools* and thus the whole code basis
- in principle now/soon would be the right time to address these
  - might lead to an extended period where the iLCSoft HEAD is *unstable*
  - need to understand the implications
- again: tradeoff between backward compatibility and *getting it right*



Other Topics, Ideas, Requests, ... ?