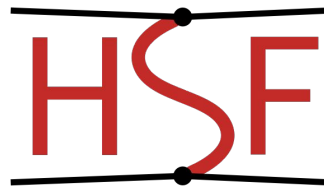


HEP Analysis Ecosystem Workshop Introduction and Goals

Elizabeth Sexton-Kennedy



HEP Software Foundation

hepsoftwarefoundation.org

Over the past 20 years the HEP community has developed and gravitated around an analysis ecosystem centered on ROOT.

ROOT and its ecosystem both dominate HEP analysis and impact the full event processing chain, providing foundation libraries, I/O services etc. that have prevalence in the field.

The analysis challenges of the next 10 years are large*. Is an evolution of ROOT the best answer? Is it just a part of the answer?

Can we all agree on where reconstruction stops and where analysis begins?

Large Challenges Looming

1. To achieve improvements in software efficiency, scalability and performance and to make use of the advances in CPU, storage and network technologies
2. To enable new approaches to computing and software that could radically extend the physics reach of the detectors
3. To ensure the long term sustainability of the software through the lifetime of the HL- LHC

This is a community building exercise.

We have a great mix of people:

- Analyzers from a number of experiments
- People who have been developing and supporting analysis tools for others
- Some who have developed systems for the pipeline from RAW to paper
- Some who have done all of the above

Our objective is to increase communication, coherence, and awareness among developers, users, *projects and their supporters* in the HEP analysis ecosystem.

Broad discussions are better than deep dives given the unique opportunity of the audience we have collected.

Documented answers to the following:

- How should our analysis models and tools evolve to achieve the analysis goals of the HL-LHC / DUNE Era?
- Are there other possible analysis models? If so we should catalog them and their elements (software, facility, sociological). How can we test these alternatives?
- What is nonoptimal in what we do in the analysis domain, and what can we do to fix it?

We have an opportunity to put big projects on the table:

- projects that can be tied to one or a number of common visions for analysis models.
- how can we improve collaboration at the project level?

The level of cooperation between the following could be improved:

- ROOT/CERN-SFT, FNAL
- DIANA/HEP (<http://diana-hep.org>)
- NL - eScience
<https://www.esciencecenter.nl/project/automated-parallel-calculation-of-collaborative-statistical-models>
- Big data openlab project (<https://cms-big-data.github.io>)
- Intel IPCC to modernize the ROOT Math and I/O libraries
(<https://ipcc-root.github.io>)

Is it possible to create a big project where all of the pieces of the puzzle of above funding sources are fit together? Can we use this workshop to make plans to expand the collaboration in this space?

Can we identify and isolate off the parts of the ecosystem that must be HEP specific? and rely on industry for everything else?

Report should contain:

- The workshop's collective input on the ROOT workplan, priorities, technical direction and future plans
- A survey of the tools and libraries making up the analysis ecosystem today
- An guesstimate as to the analysis landscape in 5-10 years
- Actions and Next Steps agreed at the workshop

The report can be used as input to the analysis chapter of the CWP.

How we accomplish that in Annecy should be discussed on Wed.

Complete consensus might not be possible, but we can document the disagreements.

In this document

<https://docs.google.com/document/d/1Q0Oh3gKi5sJBkXyXjXBkVNZ0yHyr4gh8mPaG-cLFUY0/edit#heading=h.dvdyu8qapju2>

Pete has suggested the following workshop document outline:

- ROOT roadmap feedback
- HEP Analysis Ecosystem
- Analysis Models/Vissions for Analysis
- R&D Projects
- Improving Collaboration
- Action Items and Next Steps