

ROOT Plan of Work 2020

Axel, ROOT Godparents 2020-01-22

Plan of Work?

- List of items we want to accomplish
 - See <https://root.cern/program-work> for previous ones
 - 2019 detailed items here: <https://docs.google.com/spreadsheets/d/1u5R-YIOMDb-SXqVa4acUFOIcIn2U4thH-Aa0l0kG-ag/edit?usp=sharing>
- To discuss with experiments what we will work on
- To agree and with contributors who does what

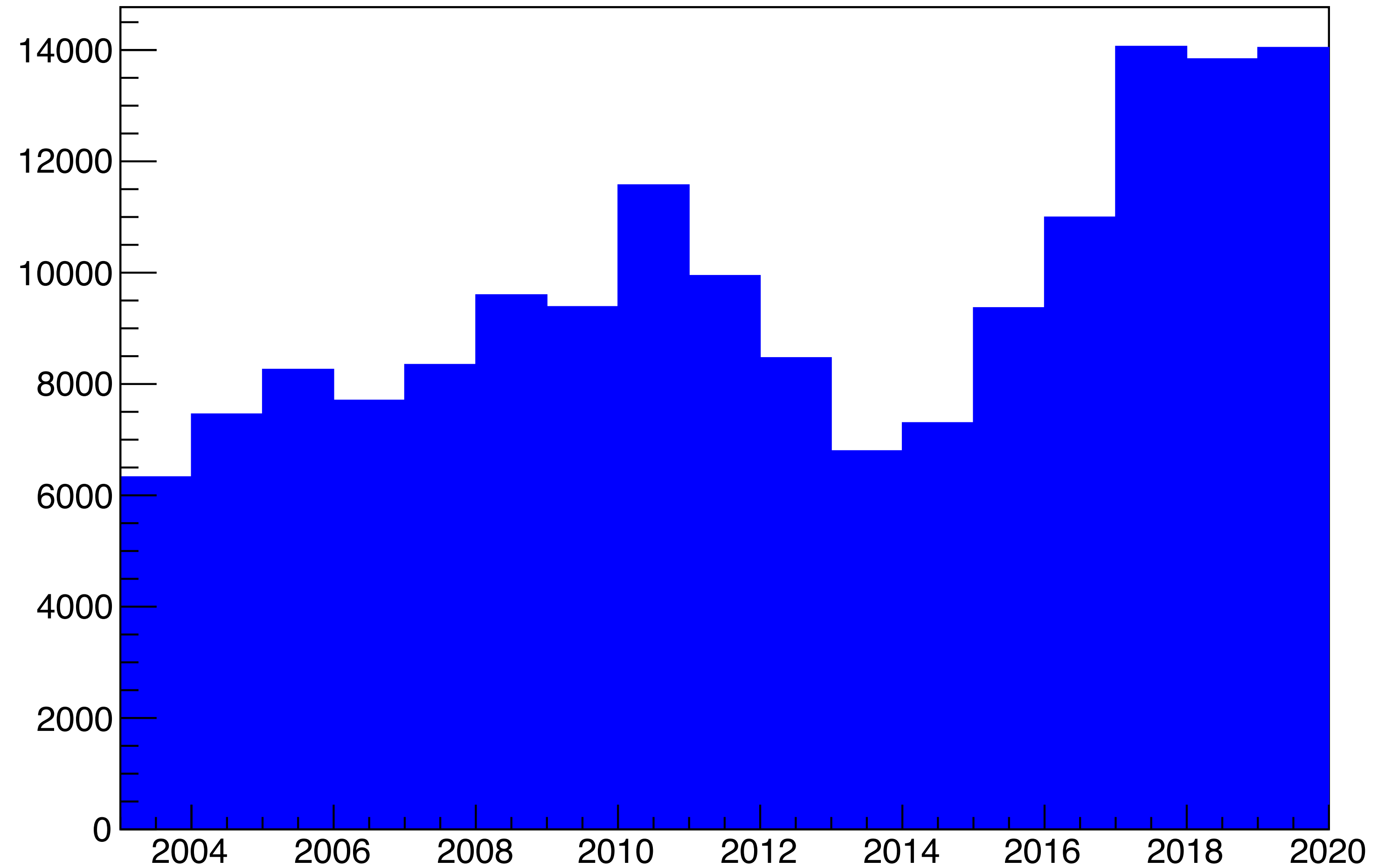
2019

What does a ROOT dev's work
life look like?

Support

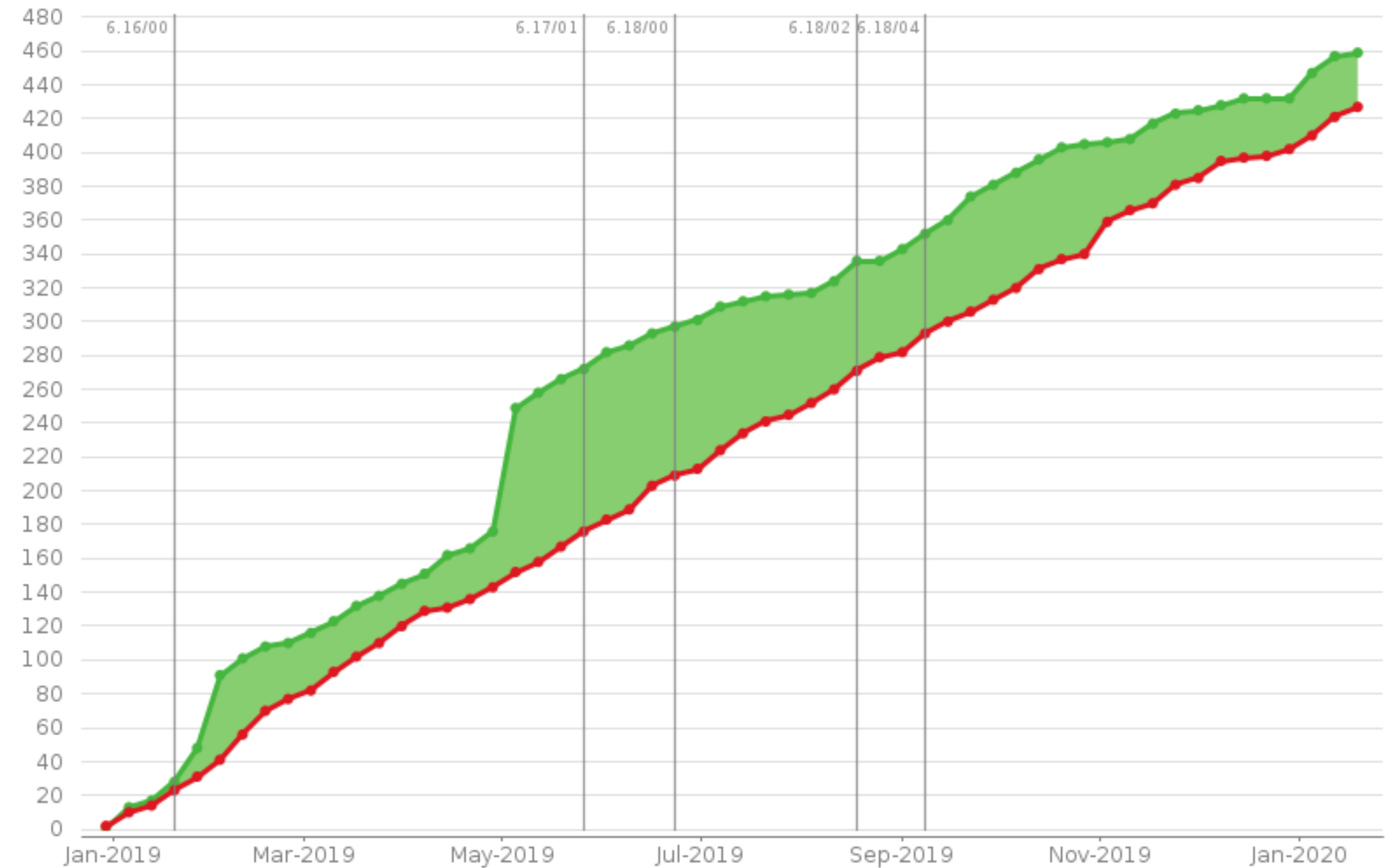
ROOT Support messages

- Main load is support:
 - Reply to posts



Support

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 - Fix bugs



Support

- Main load is support:
 - Reply to posts
 - Fix bugs
 - Training
 - *Train-the-trainer*
 - *Experiments' tutorials*
 - *Summer students*
 - *CERN School of Computing*

Train-The-Trainer

- First event of its kind
- Goal: grow ROOT ambassadors to help with
 - Broadcasting news
 - Collect feedback
 - Curate material



Outreach

CERN EP Software Seminar

Elisabetta Manca (INFN Pisa / CMS),
Enrico Guiraud (ROOT)

On RDataFrame

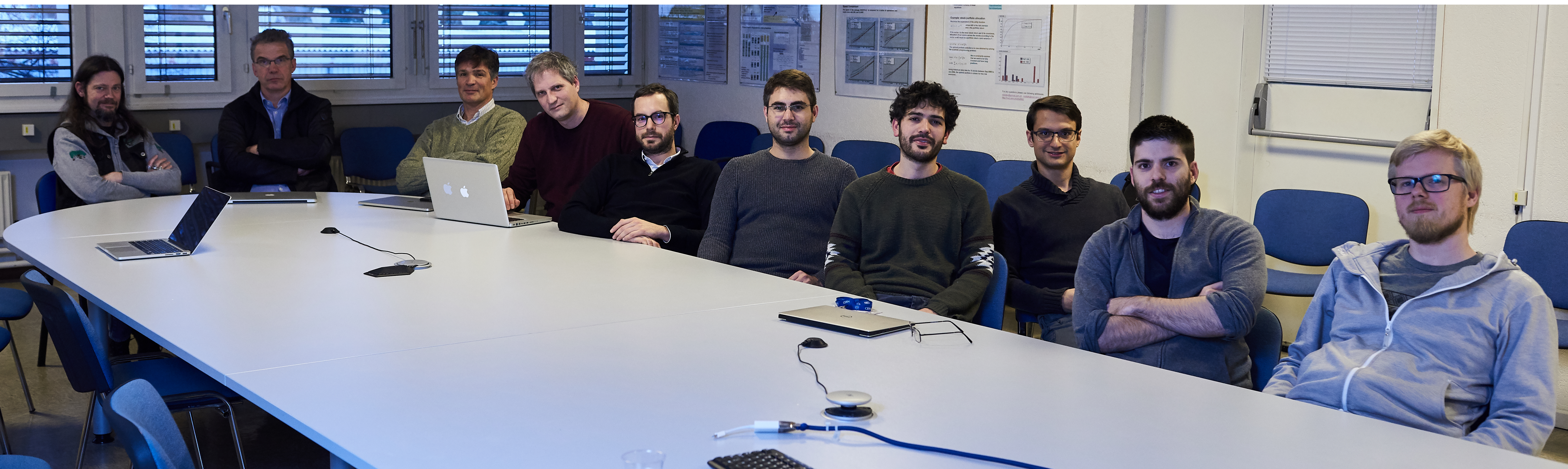
[https://indico.cern.ch/event/
849610/](https://indico.cern.ch/event/849610/)



Outreach

- CHEP!
- 13 contributions
- <https://indico.cern.ch/event/773049/contributions/>, search for "ROOT"

The Team @ CERN, 2019



The Team @ CERN, Summer 2019!



The Teamwork

Thanks for your help, I wouldn't have made it... 😊

16:50

Together we're strong 😊

- From team's anonymized feedback:
 - Everyone in the group can speak their mind and even newcomers' opinions are listened to
 - People always available for help, everyone is friendly and helpful
 - Constant feedback about our work among the members of the team
- Energetic, creative, open-minded set of people

2019 Main Development Lines

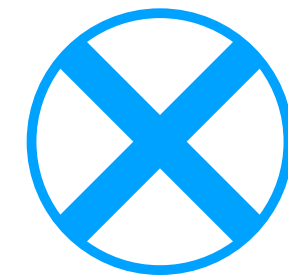
- PyROOT
- WebGUI + graphics, Eve7
- I/O: RNTuple, Compression
- C++ runtime modules for dictionary
- Math: RooFit acceleration, TMVA interface

- > 100 authors, > 4000 commits

ROOT Project in 2020

Driving Factors

The best ROOT, as quickly as possible



Limited by available people and expertise

The Limits

- A question of
- Compromises?

The Limits

- A question of
- ~~Compromises?~~
- Optimization!

Optimization

- We can decide on priority and relevance
- We need convincing arguments
 - To **not do** something
 - But even more to **do** something

Raison d'être (1)

- LHC and CERN as a whole is a physics production machine
- ROOT is a main engine in that clockwork
- ROOT's impact
 - Experiments' data, 1Exabyte and counting
 - High energy physics' central standard library, from framework to analysis, from histogramming to graphics

Raison d'être (2)

- Experiments' frameworks benefit from ROOT
- ROOT's most relevant impact is with approx 30'000 physicists
 - Improves physics results: uncertainties, parametrizations, convincing peers of the best analysis approach
 - Makes physicists more productive: less coding or debugging, more thinking and trying approaches
 - CERN Senior Staff ("The Nine"): "proliferation of different software tools and frameworks for scientific and non-scientific workflows"

Cost

- Whenever we invest we need to know **why**
- Physics is what counts, not lines of code
- Bugs that silently give the wrong result are a disaster
- OTOH, each new line / feature introduced will incur **30 years** of integrated maintenance

ROOT Project in 2020: Feedback from Team

Strengths

Support. Forum. Stability. I/O. @ the heart of HEP. Dedicated to HEP.
Large Datasets. Heavy-duty C++. Interpreter. Closeness to experiments.
Analysis and stat tools. Coherence. Versatility.

Project-level Tasks

- Need more developers.

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Project-level Tasks

- Need more developers.
- Succession planning (see also: "need more developers")
- Balance priorities of development versus:
 - Bugs, maintainability, tests / testability, benchmarking, tooling R&D
 - ROOT Trainings

Plan of Work 2020

Main Development Lines

- Make new PyROOT default
- RDataFrame: **bulk** processing, **RNTuple** interplay
- WebGUI + graphics review, add functionality, and tutorials
- Eve7: **fireworksWeb** for LHC Run3; ILC prototype
- I/O: progress with RNTuple, Compression
- C++ runtime modules for dictionary: MacOS, Windows, optimizations
- Math: RooFit acceleration, TMVA inference, **RHist**

Work Items

- https://docs.google.com/spreadsheets/d/1h_6t8cTCACNApQQgCoLI8GjrlhmcqDT46nceVCTE1Zg/edit?usp=sharing
- Please comment!

I/O

- RNTuple: TTree -> RNTuple, hadd, efficient RDF integration
- Compression
- std::variant, std::optional, limited std::shared_ptr

Math

- TMVA inference
- RooFit speed-up, e.g. through architecture-specific code
- New minimizers, PRNGs

Graphics, GUI

- Finalize crucial features: legend, palette,...
- Make them "teachable"
- Basis for getting feedback

Conclusion

ROOT Team @ CERN?

- ROOT development largely de-centralized:
 - I/O, Web graphics + GUI, Time Series, RHist, C++ modules, RooFit
 - All rely crucially on team members not located at CERN
- Several sources support ROOT: Thank You!

ROOT in 2020

- Lots of work ahead of us
- Need more hands:
 - Actively scouting, ensuring productive and welcoming environment
- Expect several major improvements in 2020
 - Release new PyROOT, show-case RHist and graphics!