IRIS-HEP
SSC (Software Sustainability Core)
News/Status/Plans

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Mailing lists
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IRIS-HEP Retreat Fermilab, 9-13 Sep 2019
Goals

- Establish a *community framework for software training* in order to prepare the scientific and engineering workforce required for the computing challenges of HEP experiments.

- For sustainability, build “users” community as well as “developer” community.

- Instead of new curriculum development *leverage and build upon existing material* from the HEP and larger research community.

- *Build training activities and material into a “common good”* with a strong community of both instructors and participants, and with a feeling of *community ownership*. 
Vision

HEP Software Training

Mentors
Tier 3
Advanced Ph.D. Students, Postdocs, Senior

Developer training
Tier 2
Advanced Ph.D. Students, New Researchers

HEP domain training
Tier 1
Early Ph.D. Students

Experiment software training

University courses
Carpentries workshops tailored for HEP

Tier 1

Tier 2

Tier 3

CERN school of computing
MLHEP school (EU)
Industry (Intel, NVIDIA, ...)

Advanced ROOT
Geant4

Programming
Data science
C++

CoDaS-HEP (US)
GridKa school (DE)
INFN ESC school (IT)

CMSDAS
ATLAS tutorial series
LHCb starter kit

ROOT Data
Python
Git
Unix
### Milestones and Deliverables at a glance

**Software Carpentry/Training Events**

<table>
<thead>
<tr>
<th>Type</th>
<th>Time</th>
<th>Description</th>
<th>WBS task</th>
<th>Risks</th>
<th>Metrics</th>
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</thead>
<tbody>
<tr>
<td>M</td>
<td>3-9</td>
<td><strong>G5.1:</strong> Co-organize (with FIRST-HEP) introductory level Software Carpentry (bash/git/python) workshop at Fermilab with topical discussion on interoperability of ROOT for advanced PhD students</td>
<td>5.1</td>
<td>M.5.1, M.5.5</td>
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<tr>
<td>M</td>
<td>3-9</td>
<td><strong>G5.2:</strong> Introductory level Carpentry session for CMS/ATLAS at CERN</td>
<td>5.1</td>
<td>M.5.1, M.5.5</td>
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<td>M</td>
<td>6-9</td>
<td><strong>G5.3:</strong> Invite LHCB/ALICE to showcase Starterkit on pre and first analysis steps</td>
<td>5.1</td>
<td>R.5.1, M.5.6</td>
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<td>D</td>
<td>6-9</td>
<td><strong>G5.4:</strong> Carpentries curriculum for HEP for newcomers at a LHC/ FNAL Experiments</td>
<td>5.6</td>
<td>M.5.1, M.5.3, M.5.6</td>
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<td>M</td>
<td>6-9</td>
<td><strong>G5.5:</strong> Post-training co-survey with FIRST-HEP on better assessing training needs</td>
<td>5.3</td>
<td>R.5.1, M.5.3, M.5.6</td>
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<td>M</td>
<td>6-9</td>
<td><strong>G5.6:</strong> Retune next Carpentry workshop benefiting from above participant survey</td>
<td>5.3</td>
<td>R.5.1, M.5.6</td>
<td>M.5.7</td>
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<td>M</td>
<td>9-12</td>
<td><strong>G5.7:</strong> Organize and run CoDaS-HEP School (Parallel Programming, ML, Big Data Tools) at Princeton</td>
<td>5.1</td>
<td>R.5.2, M.5.6</td>
<td></td>
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<tr>
<td>M</td>
<td>6-9</td>
<td><strong>G5.8:</strong> First brainstorming workshop in conjunction with CoDaS-HEP school to re-visit software and data challenges and correspondingly design future training material and workshops</td>
<td>5.3</td>
<td>R.5.1</td>
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<td>M</td>
<td>6-9</td>
<td><strong>G5.9:</strong> Summer Outreach Workshop(s) on building software skills at US universities</td>
<td>5.3</td>
<td>R.5.1, M.5.3, M.5.6</td>
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<td>M</td>
<td>6-9</td>
<td><strong>G5.10:</strong> Second HEP Software Carpentry Workshop at a US university/Lab</td>
<td>5.3</td>
<td>R.5.1, M.5.4</td>
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<td>D</td>
<td>9-12</td>
<td><strong>G5.11:</strong> Carpentries curriculum for HEP using best practices for HEP</td>
<td>5.6</td>
<td>R.5.1, R.5.2</td>
<td></td>
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<tr>
<td>M</td>
<td>12-15</td>
<td><strong>G5.12:</strong> Co-organize (with FIRST-HEP) boot camp on domain specific topics like advanced ROOT, Geant4 and other HEP-specific tools</td>
<td>5.3</td>
<td>R.5.1, M.5.2, M.5.4</td>
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<td>M</td>
<td>12-15</td>
<td><strong>G5.13:</strong> First Data Carpentry Workshop catered to HEP needs (expert input from CoDaS-HEP tutors and IRIS-HEP Fellows and field experts)</td>
<td>5.3</td>
<td>R.5.2, M.5.1, M.5.5</td>
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<td>D</td>
<td>12-15</td>
<td><strong>G5.14:</strong> Software and Data Carpentries Workshop for HEP community by IRIS-HEP program, IRIS-HEP Fellows form a community of tutors for workshops and future domain specific topics</td>
<td>5.3, 5.6</td>
<td>R.5.1, R.5.2, M.5.3, M.5.5</td>
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<tr>
<td>M</td>
<td>18-21</td>
<td><strong>G5.15:</strong> Summer Outreach Workshop(s) on building software and data analytical skills at US universities supported by IRIS-Undergrad Fellows and IRIS-Fellows in their own community, “Hack week” as a model for data science education and collaboration</td>
<td>5.3</td>
<td>R.5.1, M.5.3, M.5.5</td>
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<tr>
<td>M</td>
<td>18-21</td>
<td><strong>G5.16:</strong> Organize and run CoDaS-HEP at Princeton</td>
<td>5.3</td>
<td>R.5.1, R.5.2, M.5.5</td>
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<td>M</td>
<td>18-21</td>
<td><strong>G5.17:</strong> Second brainstorming workshop in conjunction with CoDaS-HEP school to re-visit software and data challenges preparedness in terms of training material</td>
<td>5.3</td>
<td>R.5.1, M.5.5</td>
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**Software Carpentry Workshop (1-2 April 2019, Fermilab)**
https://indico.fnal.gov/event/20233/


**Software Carpentry at CERN (27-29 November 2019)**
https://indico.cern.ch/event/834411/

**CoDaS-HEP (22-26 July, 2019, Princeton)**
http://codas-hep.org

**HEP Software/Computing Training Survey (Feb, 2019)**
LINK to the survey

**Brainstorming - IRIS-HEP Institute Retreat (12-13 Sept. 2019, Fermilab)**
https://indico.cern/event/840472/

**An introduction to programming for STEM teachers (3-4 June, UPRM)**
https://indico.cern.ch/event/817539/

**Machine Learning Workshop/Hackathon (24-26 April 2019, UPRM)**
https://indico.cern.ch/event/809812/

~ 180 people trained

More info on events: https://iris-hep.org/
IRIS-HEP Fellows Program

Promote the development of advanced research software skills by providing opportunities for undergraduate and graduate students to connect with mentors within the larger HEP and Computational/Data Science community.

Preparing for a more formal/organized call soon for projects and proposals for a round of fellows in the fall.

Software Sustainability

▷ What is it?

Software sustainability: the capacity of the software to endure, i.e., that the software will continue to be available in the future, on new platforms, meeting new needs.

▷ Who needs it

Should be everyone.

And people who want their software to be more sustainable:

- In IRIS-HEP, both infrastructure/processing developers (project teams) and analysis developer/users (PIs, postdocs, students).
Sustainability spectrum

**Software**
- Consultancy: 41 projects

**Advice**
- 92 evaluations
- 4 surgeries

**Training**
- Courses: 33 UK SWC workshops, 1000+ learners
- Guides: 50,000 readers

**Communication**
- Website & blog: 150+ contributed articles, 19,000 unique visitors per month

**Research**
- 740 researchers
- 50,000 grants analysed

**Policy**
- 272 RSEs engaged
- 1700 signatures

**Campaigns**
- BETTER SOFTWARE BETTER RESEARCH: 13 issues highlighted

**Workshops**
- 20+ workshops organised

**Community**
- Fellowship: 41 domain ambassadors

From Neil Chue Hong, Software Sustainability Institute (UK)
Plans

- Carpentries Instructor training
- Build a standard carpentry curriculum, scale the activities
- Expand activities (other labs/experiments/non-HEP) and cover the full training pyramid
- Prepare for a blueprint meeting about training/sustainability
Summary

- Training has picked up momentum
- Partnership with Software Carpentries: https://software-carpentry.org/
- First training event outside US (at CERN) 27-29 Nov
- Ideas to bring sustainability effort together - See slides by Dan Katz
Backup slides - with info in events, links
Input on training needs and current training practices for various topics in HEP related to software/computing and related software centric areas

~ 350 users (mostly postdocs, students, mostly LHC)

Areas that need for more training materials/courses to help your research

For more info - [HSF Training survey](#) - by David Lange
Software Carpentry Workshop (Fermilab)
(1-2 April 2019)

Agenda:
- Version Control with Git
- Python Foundations
- Building Programs with Python
- Data analysis - Numpy, Pandas
- Data analysis Cont. and Graphs
- Advanced Python and PyROOT, uproot
- Post-workshop Survey

https://indico.fnal.gov/event/20233/
ML Hackathon (Puerto Rico)  
(24-26 April, 2019)  
https://indico.fnal.gov/event/20233/  

Agenda: https://indico.cern.ch/event/809812  
Talks ML/Data science Applications - Physics, Computer Science, Math, Engineering  
Machine Learning, Deep Learning, ANN  
Hands-on exercises  
Hackathon on LHC Physics
An introduction to programming for STEM teachers (Puerto Rico)  
(4-5 June, 2019)

Agenda: https://indico.cern.ch/event/817539
- Introduction to Processing and p5js
- Python and Colab
- Basics of python, Jupyter notebooks, and Colab (hands-on)
- Data analysis with python
Agenda: https://indico.cern.ch/event/827231/
- A little Unix
- A lot of Git
- Numpy introduction
- PyROOT
- uproot
3rd CoDaS-HEP School (Princeton)  
(22-26 July, 2019)

Agenda: https://codas-hep.org/  
Parallel Programming  
Scientific Python Ecosystem  
Big Data Tools and Techniques  
Machine Learning  
Practical skills like performance evaluation, use of git
FIRST-HEP/ATLAS Training (LBNL)  
(19-21 August, 2019)

Agenda: [https://indico.cern.ch/event/816946/](https://indico.cern.ch/event/816946/)
- Version Control Essentials
- Jupiter
- Build Systems: From gcc to cmake
- Continuous Integration: Why and how?
Related Links/Info

  - General public announcement mailing list for IRIS-HEP events, talks, meetings, workshops, opportunities for training and job opportunities (subscribe to): [announcements@iris-hep.org](mailto:announcements@iris-hep.org)

- HSF (HEP Software foundation) - [https://hepsoftwarefoundation.org](https://hepsoftwarefoundation.org)
  - General Information about HSF (subscribe to): [hsf-forum@googlegroups.com](mailto:hsf-forum@googlegroups.com)
  - Discussions and activities in the HEP Software Foundation mailing lists can be found here (General and Dedicated Forums): [https://hepsoftwarefoundation.org/forums.html](https://hepsoftwarefoundation.org/forums.html)
  - You can contribute [https://hepsoftwarefoundation.org/cwp/cwp-working-groups.html](https://hepsoftwarefoundation.org/cwp/cwp-working-groups.html)
  - HSF Events/Workshops - [https://hepsoftwarefoundation.org/events.html](https://hepsoftwarefoundation.org/events.html)

  - Funding for participants and lecturer support for Training