

# The HEP Software Foundation

Torre Wenaus (BNL)  
for the HSF Startup Team

APS DPF meeting, Ann Arbor, Aug 6 2015

# Motivations

- Much of our HEP software is now old ( > 20 years) and needs to be adapted to more modern standards
- Paradigm-shift resulting from the evolution of CPUs
- Use of all resources available to our community such as HPC, commercial clouds, volunteer resources
- Must attract people with the required advanced skills and experience
- Ensure interoperability with software developed by other scientific communities
- Opportunity for sharing software between different experimental programs

# Objectives

- **Share expertise**
- **Raise awareness of existing** software and solutions
- **Catalyze new common projects**
- Promote **commonality and collaboration** in new developments to make the most of limited resources
- **Aid developers and users** in creating, discovering, using and sustaining common software
- Support **training & career development** for software and computing specialists
- Provide a framework for **attracting effort and support** to S&C common projects
- Provide a structure to **set priorities and goals** for the work
- Facilitate wider connections; while the HSF is a HEP community effort, it should be open enough to form the basis for **collaboration with other sciences**

# History

- Initial Workshop: 3-4 April 2014 at CERN
- **10 White Papers**: scope, goals, process, governance,...
- **Interim Foundation Board (iFB)** with WP authors and other interested people, started meeting from mid July 2014 and favored a **bottom-up approach**
- Assembled **startup team** of volunteers with a broad representation and expertise interested in getting the HSF started
- Contacts and discussions with the HEP community
- HSF Workshop, 20-22 January in SLAC
- Session at CHEP 2015, 17 April in Okinawa, Japan
- Startup team meets weekly (now on summer hiatus)
- Open HSF meeting (iFB) ~monthly
- Meetings, meeting notes: <http://hepsoftwarefoundation.org/events>

# HSF Website

- <http://hepsoftwarefoundation.org>
- Main pages:
  - **Foundation**
  - **Events**
  - **Activities**
  - **Technical notes**
  - **Get involved**
  - **Community**
  - **Jobs**
- Hosts the **software knowledge base**
- Supported by BNL

## Activities

View Edit What links here Outline Revisions Track Access control Nodequeue

### Working groups

The HSF initiates, plans and coordinates activities via Working Groups. Those so far established or being established are as follows. All are welcome and encouraged to participate.

- [Training](#)
- [Software Packaging](#)
- [Software Licensing](#)
- [Software Projects](#)
- [Development tools and services](#)
- [Communication and information exchange](#)

### Discussion Fora

- [Concurrency Forum](#)
- [Reconstruction Algorithms Forum](#) (under discussion)

### Projects

HSF seeks to serve new and emerging common projects through a project incubator activity. Templates to guide and aid new projects are being established. The Projects WG is working to establish project membership/participation/life cycle levels and for the principal focus of incubator projects, put together useful templates. Projects with a declared interest in involvement with the HSF include the following. If you'd like your project to be involved just let us know. Talk to any member of the startup team or email [hep-sf-startup-team@googlegroups.com](mailto:hep-sf-startup-team@googlegroups.com).

- [ROOT](#)
- [Geant4](#)
- [xrootd](#)
- [Gaudi](#)
- [pyroot](#)
- [rootpy](#)
- [GenFit2](#)

### Services

The HSF is establishing services identified at the SLAC workshop and in consultations as useful to the community, including

- [HEP Software and Computing Knowledge Base](#) hosted at this website
- [Software development and build services](#) leveraging the resources at our major Laboratories

# Mailing lists

- HSF Forum
  - <http://groups.google.com/d/forum/hep-sf-forum>
  - 114 members
- HEP S&C community website
  - <http://groups.google.com/d/forum/hep-sw-comp>
  - 222 members
  - Please encourage your communities to sign up!
- New lists added as activity levels warrant
  - Training
  - Packaging
  - General HSF technical discussion forum
- Self-signup to lists
  - Simply send mail with 'subscribe' as the *subject* (not content) to <listname>+subscribe@googlegroups.com, e.g. for the list above, [hep-sw-comp+subscribe@googlegroups.com](mailto:hep-sw-comp+subscribe@googlegroups.com)
- See the '[Get involved](#)' page on the website for details

# Working Groups

Working Group	Objectives	Forum - Mailing list
<a href="#">Training</a>	Organization of training and education, learning from similar initiatives	<a href="#">hep-sf-training-wg</a>
<a href="#">Software Packaging</a>	Package building and deployment, runtime and virtual environments	<a href="#">hep-sf-packaging-wg</a>
<a href="#">Software Licensing</a>	Recommendation for HSF licence(s)	<a href="#">hep-sf-tech-forum</a>
<a href="#">Software Projects</a>	Define incubator and other project membership or association levels. Developing templates	<a href="#">hep-sf-tech-forum</a>
<a href="#">Development tools and services</a>	Access to build, test, integration services and development tools	<a href="#">hep-sf-tech-forum</a>
<a href="#">Communication and information exchange</a>	Address communication issues and building the knowledge base Technical notes	<a href="#">hep-sf-tech-forum</a>

# Training WG

- Significant gap between programming expertise acquired at university and what is required by physicists (scientist in general)
- Students would benefit from lessons aimed at bridging this gap
  - Webinars: lightweight, cost effective (no travel), volunteer based
  - Lessons covering broad spectrum of specializations (from C++ basic to in-depth Python)
  - Several sites offer this kind of tutoring: Software Carpentry (SC) (<http://software-carpentry.org/>)
  - Collaboration with them is a possibility to explore
- Developing [training and education plans](#)
- Adopting an existing site [WikiFM](#), specifically developed for university students in Italy as the basis for a first offering
- Goal to build a knowledge base
  - Collect and distribute information on available courses/tutorials
  - Design a ‘curriculum’ with all subjects to support our scientific work
  - Collect existing material and prepare missing modules
  - Knowledge base at the HSF website has the (bare) beginnings of this



# Software Packaging WG

- [Ongoing series of discussions](#) with experts on existing tools and solutions, try to find some consensus
  - identification of all required features
  - pros and cons of each solution
  - presentations from FNAL, CERN, BNL, LHC, IF, ...
  - <https://indico.cern.ch/category/5816/>
- Touching the topics of
  - Package Building
  - Package Deployment
  - Runtime Environment / Virtual environments
  - Role of new technologies like Dockers
- Agreement on the usefulness of common tools, which can be used to assemble individual software stacks
  - The tools should be layered to allow adoption by well established projects and new users
  - e.g. LHC experiments won't replace their entire system easily
- github presence established for interchange and eventually code?
  - <https://github.com/HEP-SF/packaging>

# Software Projects WG

## + Licensing

Initial set of Projects under the umbrella of HSF

Name	Description	License	Contact
DD4hep	Generic Detector Description toolkit for HEP	Unk	Markus Frank
fads	FAst Detector Simulation	BSD-3	Sebastien Binet
Gaudi	Event data processing framework	Unk	Marco Clemencic
HepMC3	C++ Event Record for Monte Carlo Generators	Unk	Witek Pokorski
ROOT	Data Analysis Framework	LGPL v2	Pere Mato
XRootD	High performance, scalable fault tolerant access to data	LGPL v3	Andrew Hanushevsky

- The essence of the HSF are the [Software projects under its umbrella](#)
- Each development team should keep its autonomy and ownership of their software
  - HSF should not enforce any particular software process, project management or methodology, however packages should conform to some standards to facilitate integration
    - e.g. required documentation, build procedures, dependencies declaration, version naming convention, test definitions, etc.
- A clear message from the SLAC workshop was that the notion of incubator projects -- cf the Apache Software Foundation -- is relevant
  - Support embryonic new projects with guidelines, templates, assistance, ...
- Defined preliminary [Project Guidelines](#)
  - Project name, public repository, web site, issue tracker, version naming, mandatory documentation, best practices,...
- Intense discussion on **licensing** (mainly in startup team, moving it to the open forum), iterating on draft recommendations

# Development tools and services WG

- Both CERN and Fermilab have expressed willingness to support some development tools and services for the HSF community, once technical issues are worked out
  - For example, access to TechLab resources at CERN
  - In other areas the HSF may provide guidance, recommendations, templates etc. for the use of open source tools
- Plan to set up services such as Coverity (static code analyser)
  - Provide analysis report for any HEP software project
- Thus far not much has happened

# Communication and Information exchange

- Website, email/web discussion forums
- Software catalog and knowledge base integrated with the Drupal website (for the moment)
  - software catalog, software categories, science fields, experiments, and events
- Event listings, HSF and other HEP S&C
- Community exchange, e.g. job postings
- Technical Notes
  - provides archived, versioned documents that can be referenced in software documentation and papers
  - HSF Technical Notes policy document being prepared
- Discussion Fora
  - Concurrency Forum, Reconstruction Algorithms Forum
- Planning an HSF Newsletter

# Summary

- HSF will be what participating people will make of it
  - A **do-ocracy** on the model of the Apache Software Foundation
  - Grass roots, open and transparent
- The HSF seems to be taking hold but the evolution is much slower than we hoped, ditto (and fully correlated) the level of involvement
  - Not a tremendous motivator for those who are involved
- Particularly in need of help/participation:
  - Engagement of some software projects and development of a project template: aid new projects with a 'project incubator'
  - A few projects have declared their interest and more are expected, but we're below critical mass right now
    - NSF and DOE supported activities, AIDA-2020 software projects in Europe, new development initiatives in the experiments
  - Software catalog and knowledge base needs direct contributions to (especially) content and (if you're interested) the system
- **Please join and contribute** to any of the working groups, the startup team (always open to new members), discussion fora
  - Subscribe to the mailing lists to follow progress and contribute