

HSF Feedback for IRIS-HEP

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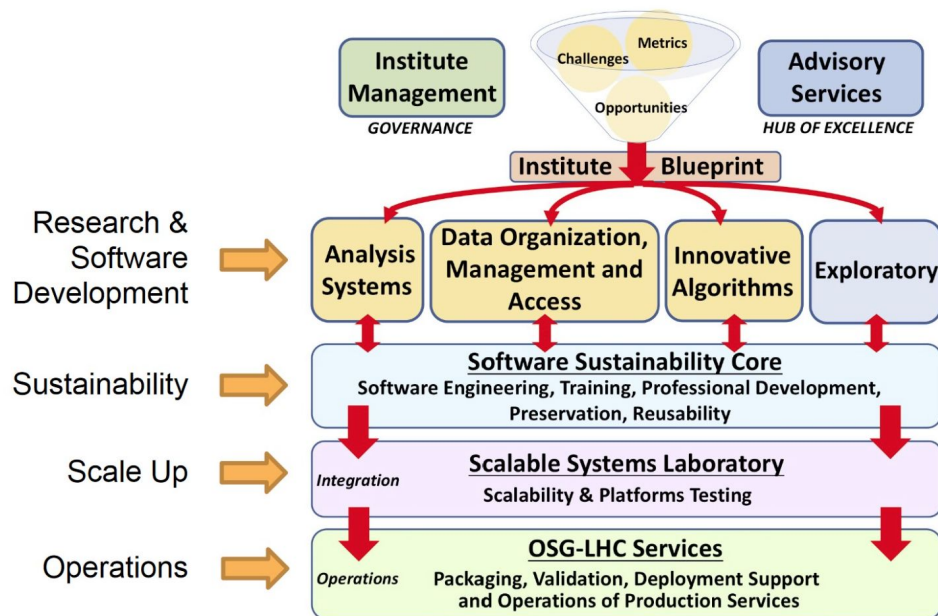
Thanks!



- We now see more and more R&D projects in software starting
 - HEP-CCE
 - DOE funded
 - SWIFT-HEP
 - STFC funded
 - EP R&D
 - CERN funded
- The successful funding of IRIS-HEP has clearly had a positive impact
 - It's much easier to argue that other funding agencies should play their part as part of a global software upgrade effort
- Ongoing success of the Community White Paper, in which IRIS-HEP colleagues played a major role
 - Closely related to continuing LHCC review of HL-LHC computing

Areas to comment on...

- Concentrating on the main areas where the HSF and IRIS-HEP overlap
 - Analysis Systems
 - Innovative Algorithms
 - Training
- Blueprint Meetings
- Grand Challenges





















Training

- Training events in 2020 were (like everything) upset by the pandemic
 - However, we also managed to adapt to online training very successfully
- Support of IRIS-HEP (and FIRST-HEP) for training is very important
 - The most important thing is people!
 - Sudhir's continuing role as HSF Training WG coordinator drives this cooperation
 - Training model relies on material, [trainers and tutors](#)
 - *Encourage people to help here, reward this contribution*
 - Development of training material underlies sustainability (see [The Curriculum](#))
 - *Material support and incentives could significantly increase both number and quality of available training modules (see "pay to teach" [proposal](#))*
 - Henry's [CMake training material](#) is exemplary; *C++ is surely a vital target*
 - We would strongly support redirecting travel money
 - Link to *The Carpentries* was not so clear last year - *scope to reforge this now?*
 - E.g. best pedagogical practice (espc. remote) and training evaluation
- Strategic Training Engagement
 - Blueprint meeting was very helpful (good that it also went to Snowmass)
 - Putting the practical actions that we can into practice - *so see above for concrete steps*
 - Conference presentations and papers can be a great way to engage more widely and advocate

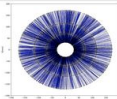






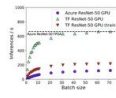
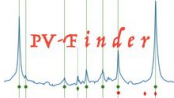
Analysis Systems

- Continuing support for the developing Pythonic ecosystem is extremely important
 - Impressive list of projects!
 - Allows the community to link to and explore new tooling options
- The Grand Challenge for Analysis is very welcome
 - End-to-end test brings essential facility input
 - Multi-user scaling* is the real challenge for HEP
- Common work with HSF Data Analysis working group would be very fruitful
 - Analysis benchmarks*
 - Declarative analysis languages*
 - Metadata for analysis capture and reuse*
- Ensuring tracking and interfacing with important developments in the ROOT ecosystem is vital
 - Nothing is standing still on the road to HL-LHC
 - RNTuple in particular*
 - Great to see an IRIS-HEP fellow active here

 ADL Benchmarks Functionality benchmarks for analysis description languages More information	 AmpGen Generation and fitting for multibody hadron decays More information	 awesome-hep A curated list of awesome high energy and particle physics software More information	 Awkward Array Manipulate arrays of complex data structures More information
 Cabinetry Building complex template fits More information	 DecayLanguage Describe and convert particle decays More information	 exploratory-ml Analysis Reinterpretation More information	 Functional ADL Functional Analysis Description Language More information
 HEP Tables Heterogenous Distributed Array Programming Environment More information	 Histogram projects Histogramming efforts More information	 MadMiner Likelihood-free Inference More information	 Particle Pythonic particle information More information
 ppx Cross-platform Probabilistic Programming eXecution protocol More information	 pyhf Differentiable likelihoods More information	 recast Analysis Reinterpretation More information	 ROOT on Conda-Forge Use ROOT in Conda through Conda-Forge More information
 Scikit-HEP Pythonic analysis tools More information	 uproot Read and write ROOT files in Python More information		

Innovative Algorithms

- Impressive list of projects that have support from IRIS-HEP
 - Many key pieces of software for HL-LHC and other upgrades
- Focusing on use of Machine Learning and Accelerators
 - ACTS on GPUs very notable contribution
 - As is ML on FPGAs
 - *Could there be a training dimension here?*
 - *Open datasets help R&D and testing (e.g., TrackML)*
- FastML Workshops were a success
- Relationship with HSF WG led by David (thanks!)
 - Co-advertised meetings last year
 - *Opportunity to have common meetings and mini-workshops?*

 Accelerated GNN Tracking accel-gnn-tracking More information	 ACTS Development of experiment-independent, inherently parallel track reconstruction. More information	 exploratory-ml Analysis Reinterpretation More information
 FastPID Fast PID simulation for LHCb More information	 GPU Trigger Project Allen: a GPU trigger for LHCb More information	 ML4Jets Machine Learning for jets Machine learning for jets More information
 mkFit Modernizing Kalman filter tracking for CMS More information	 ML on FPGAs Fast inference of deep neural networks on FPGAs More information	 PV-Finder CNNs to find primary vertices More information

Sustainable Software

- Blueprint meeting was very useful
 - Report going to arXiv and Snowmass is best practice
- A lot of synergy also with HSF Tools and Packaging Group
 - Excellent talk and discussion on CMake from Henry
 - *Can be a fruitful way to share best practice for software teams*
- Supporting events like PyHEP helps build communities around new HEP software
 - Many thanks for that!

Final General Remarks

- Generally we think IRIS-HEP is making a very positive contribution
 - And this is helping attract further support to the field
 - Working as a partner in projects is a good strategy - don't (and shouldn't!) own everything
- HSF and IRIS-HEP communities have a significant overlap
 - This is natural and a good thing
 - Two-way street, so of course we also welcome your feedback and input ([HSF Planning 2021](#))
- This can bring additional opportunities to widen discussion and involvement
 - HSF Working Group Meetings and mini-workshops
 - Compute Accelerator Forum series
 - Software and Computing Roundtable
 - *Sharing meeting slots also helps overcome meeting overload and Zoom-fatigue*
- This year in the HSF we put extra focus on common software projects
 - Could bring useful effort in via IRIS-HEP fellows

P.S. Website

- Just a few things that I noticed...
 - Only VC references are still to Vidyo (RIP), ([1](#), [2](#))
 - [Uproot](#) links to Uproot3, instead of Uproot4
 - [ML on FPGAs](#) HLS4ML link is broken