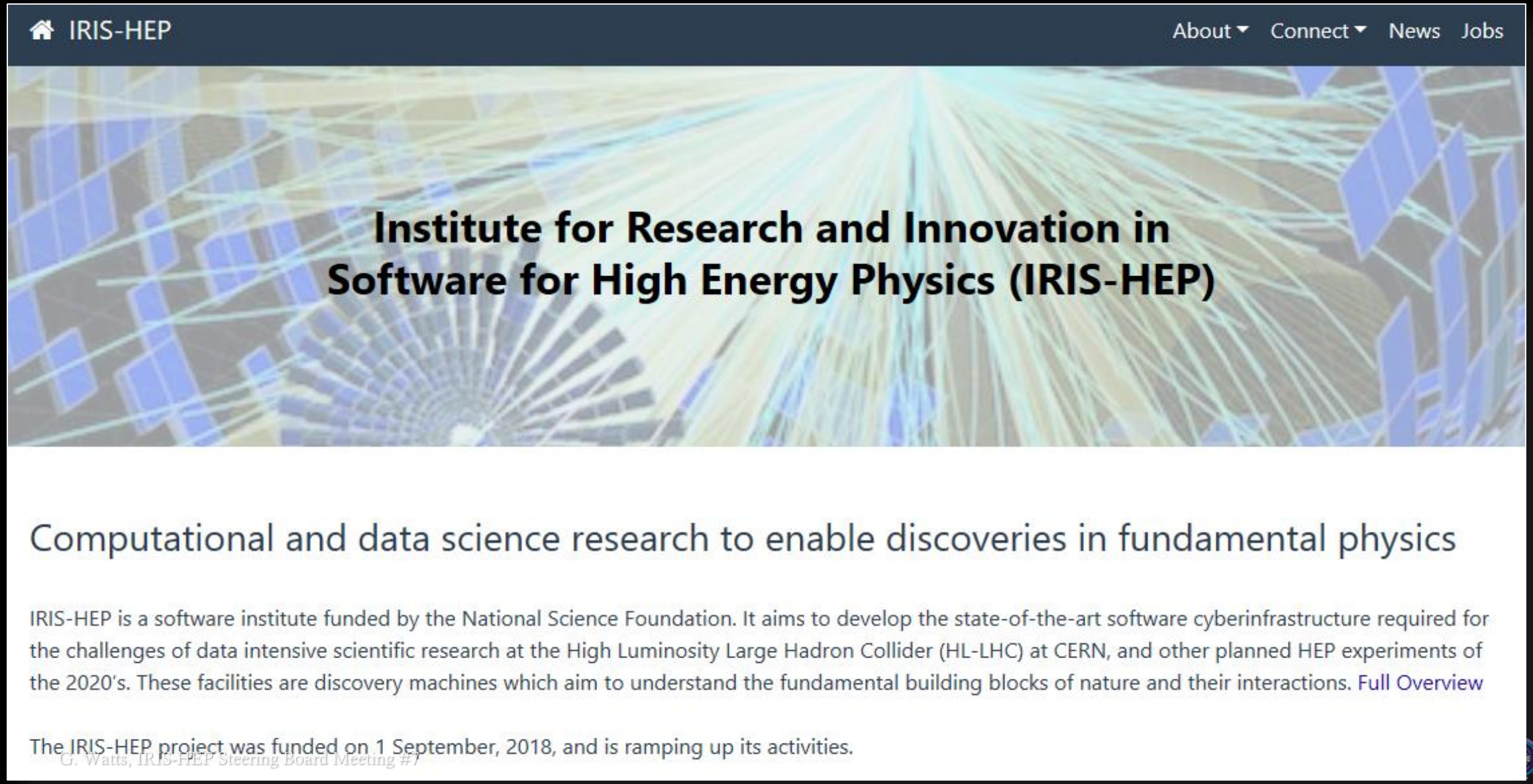
IRIS-HEP
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Institute for Research and Innovation in Software for High Energy Physics (IRIS-HEP)
Computational and data science research to enable discoveries in fundamental physics
IRIS-HEP is a software institute funded by the National Science Foundation. It aims to develop the state-of-the-art software cyberinfrastructure required for the challenges of data intensive scientific research at the High Luminosity Large Hadron Collider (HL-LHC) at CERN, and other planned HEP experiments of the 2020's. These facilities are discovery machines which aim to understand the fundamental building blocks of nature and their interactions. Full Overview
The IRIS-HEP project was funded on 1 September, 2018, and is ramping up its activities.

iris hep

Institute for Research & Innovation in Software for High Energy Physics

IRIS-HEP Steering Board Meeting #7

G. Watts

For the IRIS-HEP Executive Board

2020-09-08

"The IRIS-HEP Steering Board represents the Institute's stakeholders to provide, to the Executive Board, the stakeholder's input on the priorities, execution, and strategy of the Institute."

Thank You

Danilo Piparo (CERN)
CMS

Paolo Calafiura (LBNL)
US ATLAS Ops Program

Simone Campana (CERN)
WLCG

James Catmore
ATLAS

Oliver Gutsche (FNAL)
US CMS Ops Program

Patrick Koppenburg (NIKHEF)
LHCb

Graeme Stewart (CERN)
HSF

Ken Bloom (U. Nebraska-Lincoln)
The OSG Council

Welcome

steering-board@iris-hep.org

(you)

exec-board@iris-hep.org

(us)

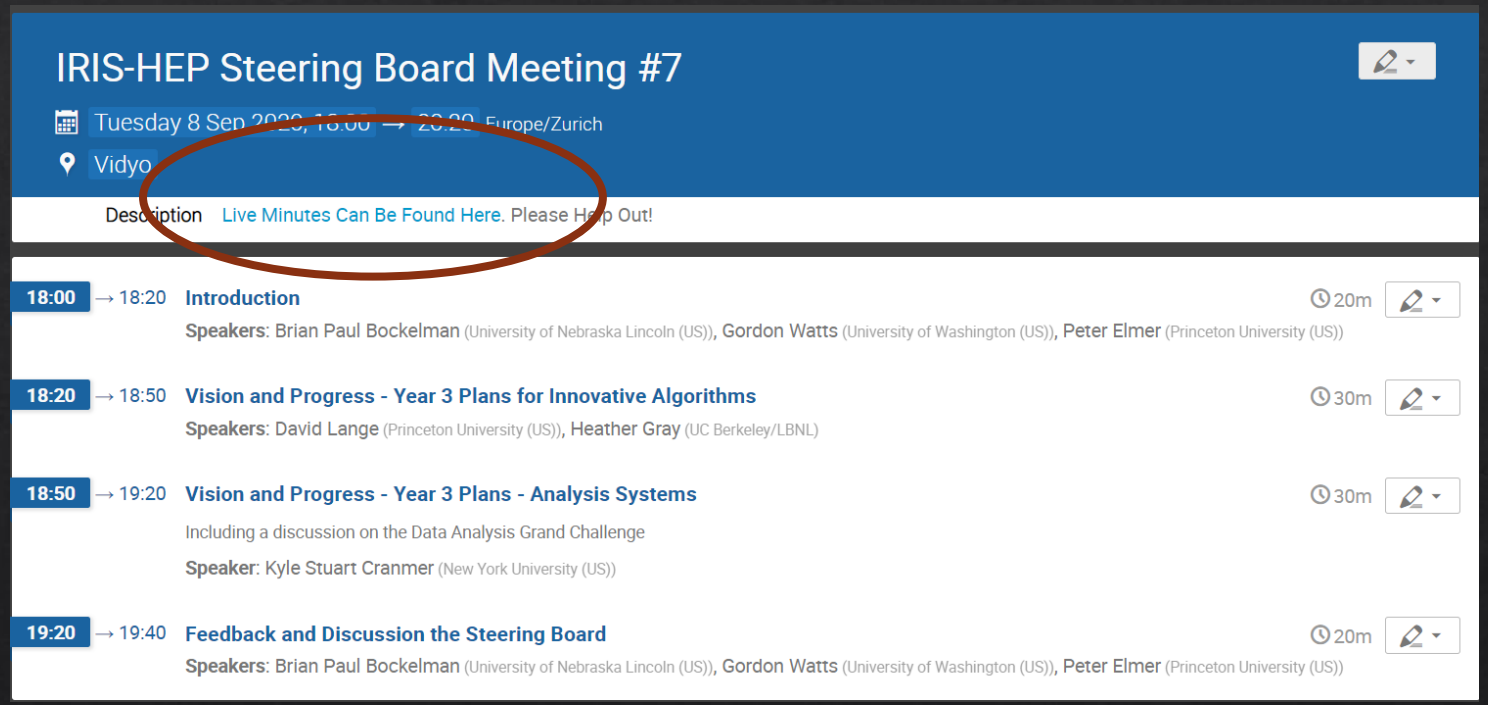
Next Meeting Dates

November 24, 2020
Feb 16, 2021

Early in the new year will fill out 2021 meeting dates after the HSF community calendar is updated

Today

- Year 3 plans
- Y3 Plans from Innovative Algorithms and Analysis Systems
- Discussion



A few highlights

Closing out Year 2

OSG-LHC demonstrated a prototype of an entire GSI-free site and is driving the worldwide transition from GSI/X.509 and GridFTP technologies.

U.S. LHC site (the U.S. CMS Tier-2 at University of Nebraska) has been able partially migrate its production bulk data transfers from GridFTP to HTTP-TPC; approximately 20% of the CMS production traffic to Nebraska is over HTTP.

For the first time in HEP, the full likelihood for an ATLAS search was uploaded to HEPData. This used the pyhf data format and was featured on the CERN homepage

This work also touches on DOMA and WLCG, of course (web tokens, etc.)

Efforts in Analysis Systems to both improve tools used by analyzers and increase ways to preserve physics analyses.

A few highlights

Closing out Year 2

The `func_adl` language has been integrated into DOMA's ServiceX project and tested on a 9.5 TB ATLAS xAOD sample. It was able to transform the sample in 2 hours into columns suitable for analysis in the python ecosystem. It was run on the UChicago SSL cluster, River. The bottleneck was the ability for an external system to furnish ServiceX with files to transform at a high enough rate.

The LHCb experiment chose the GPU-based Allen framework, to which IRIS-HEP is contributing, for its Run 3 high-level trigger facility.

Work with US ATLAS, Analysis Systems, DOMA, and SSL.

A few highlights

Closing out Year 2

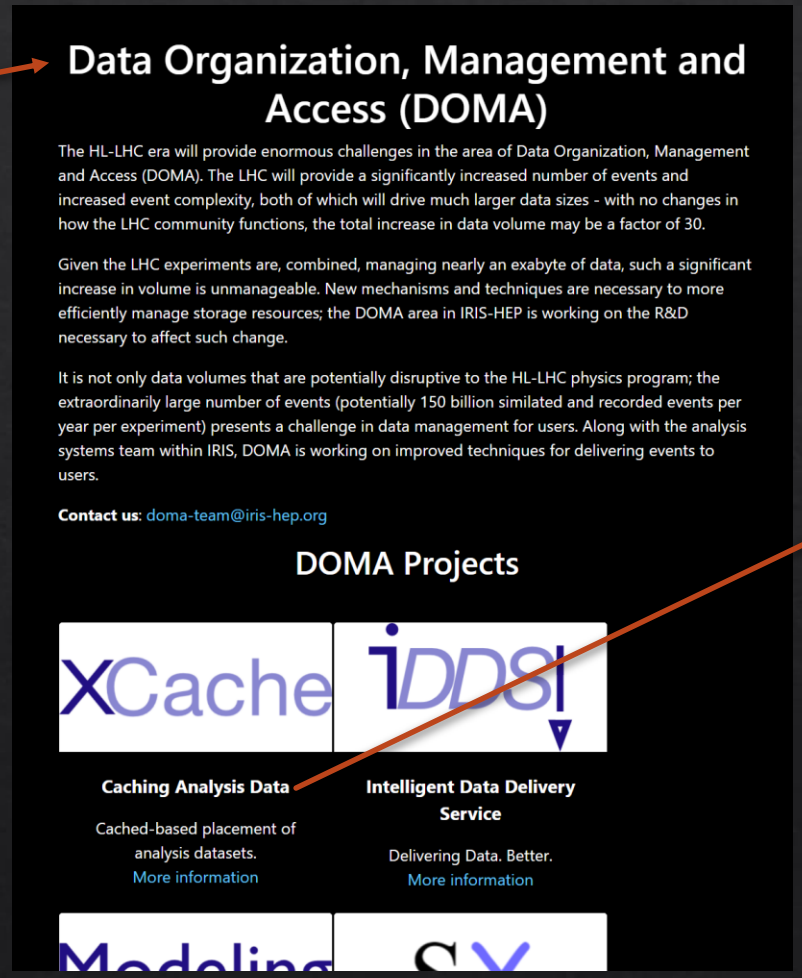
The `func_adl` language has been integrated into DOMA's ServiceX project and tested on a 9.5 TB ATLAS xAOD sample. It was able to transform the sample in 2 hours into columns suitable for analysis in the python ecosystem. It was run on the UChicago SSL cluster, River. The bottleneck was the ability for an external system to furnish ServiceX with files to transform at a high enough rate.

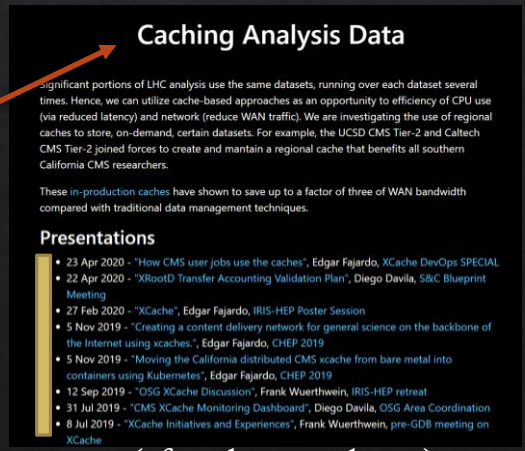
Work with US ATLAS, Analysis Systems, DOMA, and SSL.

IRIS-HEP collaborators hosted two international workshops on data reconstruction algorithms in HEP: on machine learning approaches to jets (ML4Jets) and on pattern recognition problems including tracking (Connecting the Dots).

We have also hosted a number of innovative training and tutorial workshops

Project Information





Per-project information is available on all IRIS-HEP projects.

(often, but not always)

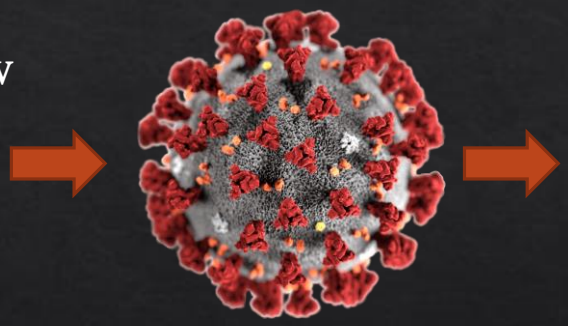
IRIS-HEP Summer

Blueprint Meeting: Sustainable Software in HEP (~90 registered)

Fellows Program

Normal Fellows Program:

- Goal: graduate students learn new stills from IRIS-HEP R&D
- Room & Board for 2 months
- Travel to an institute university



Class of COIVD-19:

- Goal: undergraduate and graduate students learn new stills from IRIS-HEP R&D
- Mostly located locally or remotely
- No travel, but pay salary
- Was able to support 13
- LHCb PV, LHCb GPU trigger, GNN on FPGAs, pyhf testing, ServiceX testing, compression on nanoAOD, SkyHook testing & Spark interface, OSG Monitoring, ACTS track seeding & fitting & integration, CMS HGCAL CAN fast sim, awkward1 on GPUs, GNN on FPGA's, REANA,
- See fellows page, final presentations.

IRIS-HEP Year 3

Some “dates” of interest

Nov 24, 2020	Steering Board Meeting #8
Feb 16, 2020	Steering Board Meeting #9
Late Feb (?)	NSF Yearly Review
End of April, start of May	Yearly Retreat

We would like to do experiment feedback again.

Other meetings being planned

Review and Y3 Planning

From SB#6 Talk

1. The NSF 18 Month Review Results
2. Focus Area Discussions
3. PI Discussions
4. US Ops Programs Discussion
5. Steering Board Meeting
6. Full-Team Retreat
7. PEP Draft

- Iterated over by PI's
- Given to the NSF
- Iterate until approved
- Year 3 starts Sept 1, 2020

PEP will be close to final at our next Steering Board Meeting – an obvious topic.

Year 3

Two comments from the IRIS-HEP NSF Review we've spent the summer working on

1. Now that we have run for 2 years, improve milestones and metrics

2. Grand Challenges to help tie activities at the institute and the US operations programs, and the experiments together.

Milestones & Metrics

All IRIS-HEP NSF milestones and metrics are public

We will post Y3 shortly

Type	Time	Description	WBS task	Risks	Metric
M	ongoing	**G1.1:** Host quarterly Steering Board meetings	1.3		
M	ongoing	**G1.2:** Community Engagement (topical meetings, news items on website, Letters of support)	1.3		M1.1, M1.4, M1.5
D	ongoing	**G1.3:** Execute on Quarterly/Annual reporting responsibilities	1.2		
D	ongoing	**G1.4:** Maintain project staffing	1.2		
M	Y3Q1	**G1.5:** Organize and execute a Blueprint Workshop on Future Analysis Facilities	1.2, 1.3		
M	Y3Q2	**G1.6:** Successfully pass IRIS-HEP 30 Month Review			
M	Y3Q3	**G1.7:** Organize and execute a Blueprint Workshop on FPGA Accelerators	1.2, 1.3		
M	Y3Q3	**G1.8:** Organize and execute the IRIS-HEP Y3 Institute Retreat	1.2, 1.3		
M	Y3Q4	**G1.9:** Organize and execute an IRIS-HEP/NSF/DOE Blueprint Workshop	1.2, 1.3		
M	Y3Q4	**G1.10:** Year 3 IRIS-HEP Fellows Cohort	1.3		
M	Y3Q4	**G1.11:** Host annual Advisory Panel meeting	1.2		
D	Y3Q4	**G1.12:** Execute Year 4 subawards	1.1		
M	Y4	**G1.13:** Blueprint workshops (Grand Challenges Planning & Progress)	1.2, 1.3		
M	Y4Q2	**G1.14:** Successfully pass IRIS-HEP 42 Month Review			
M	Y4Q3	**G1.15:** Organize and execute the IRIS-HEP Y4 Institute Retreat	1.2, 1.3		
M	Y4Q4	**G1.16:** Year 4 IRIS-HEP Fellows Cohort	1.3		
M	Y4Q4	**G1.17:** Host annual Advisory Panel meeting	1.2		
D	Y4Q4	**G1.18:** Execute Year 5 subawards	1.1		
M	Y5Q3	**G1.19:** Organize and execute the IRIS-HEP Y5 Institute Retreat	1.2, 1.3		
M	Y5Q4	**G1.20:** Year 5 IRIS-HEP Fellows Cohort	1.3		
M	Y5Q4	**G1.21:** Host annual Advisory Panel meeting	1.2		
M	Y5	**G1.22:** Blueprint workshops (Grand Challenges Progress)	1.2, 1.3		

Management

Blueprint meeting on Analysis Facilities

DOE/NSF/IRIS-HEP Workshop

Year 4 Milestones

- We've written them to indicate where we are doing
- Will refine as part of the Year 4 processes

DOMA

Type	Time	Description	WBS task	Risks	Metrics
M	Y3Q1	**G3.1:** Second major workflow implemented in iDDS.	W3.1	R3.3	
D	Y3Q2	**G3.2:** ServiceX can natively send columnar results into SkyHook.	W3.1	R3.1, R3.4	M.3.1, M3.2
M	Y3Q2	**G3.3:** Half of the transfer volume to one LHC site using HTTP-TPC (US internal transfers only).	W3.3	R3.2, R3.3	M.3.3
D	Y4Q1	**G3.4:** iDDS implements a DAOD preprocessing workflow.	W3.1	R3.3	
M	Y4Q1	**G3.5:** All XCache instances updated to XRootD version 5 and deployed with non-X509 client auth.	W3.5	R3.3	M.3.4
M	Y4Q2	**G3.6:** Demonstrate ability to sustain aggregate 100Gbps data flows from a source storage using HTTP-TPC.	W3.3	R3.2	M.3.3
M	Y4Q3	**G3.7:** Deploy SkyHook at an analysis facility at a U.S. LHC site.	W3.2	R3.4	M.3.1
M	Y4Q4	**G3.8:** ServiceX has a user community of 5 external analysis groups	W3.1	R3.1	M.3.2
D	Y4Q4	**G3.9:** Demonstrate hardware-accelerated ServiceX performance at 30Gbps.	W3.1, W3.4	R3.4	
M	Y5Q1	**G3.10:** One U.S. LHC site retires GridFTP servers.	W3.3	R3.2	M.3.3
M	Y5Q1	**G3.11:** Demonstrate ability to filter / process data at rate necessary for analysis challenge using SkyHook.	W3.2	R3.4	M.3.1
D	Y5Q3	**G3.12:** Deploy prototype accelerated ServiceX at an analysis facility targeting baseline performance from Year 4.	W3.1	R3.4	M.3.2

ServiceX and SkyHook integration

50% of one site transfers via HTTP

iDDS and DAOD preprocessing workflow (Y4)

SSC

Type	Time	Description	WBS task	Risks	Metrics
M	Y3Q1	**G5.1:** Review of basic carpentry non-HEP curriculum, material comprised of software carpentry modules/material taught at the past events	W5.6	R5.1	M5.6
M	Y3Q1	**G5.2:** Review of basic carpentry HEP curriculum material comprised of basic HEP related modules/material taught at the past events	W5.6	R5.1	M5.6
D	Y3Q1	**G5.3:** Website with carpentry curriculum (HSF Collab). The website (https://hepsoftwarefoundation.org/training/curriculum.html) is a reference for material for any future related workshop	W5.6		M5.7
M	Y3Q1	**G5.4:** Data/Software Carpentry outreach workshops for K-12 Physics teachers in Summer at UPRM	W5.1		M5.3 M5.5
M	Y3Q2	**G5.5:** Carpentries based on above curriculum. This will be a self-guided workshop where a group takes our material and uses/adds/modifies for their own needs	W5.1		M5.7
M	Y3Q2	**G5.6:** Evaluate outcome of workshops based on the curriculum by having the workshop organiser take our feedback survey	W5.3		M5.7
M	Y3Q1	**G5.7:** First Sustainability Blueprint in July to assess and guide future software efforts to include a strong element of sustainability to enable their adaptability to new challenges, longevity and efficiency	W5.5		M5.1
D	Y3Q1	**G5.8:** Community of instructors https://hepsoftwarefoundation.org/training/community.html	W5.2		M5.5
M	Y3Q1	**G5.9:** Programming Outreach Workshop in December 2020 on using google colab and CMS Data	W5.1		M5.3 M5.5
D	Y3Q2	**G5.10:** Review of Software Material for Programming Outreach, the material used couple of times would be reviewed based on survey and feedback from teachers who attend	W5.6	R5.1	M5.6
M	Y3Q2	**G5.11:** Programming Outreach Workshops based on reviewed material in Fall of 2020	W5.1		M5.3 M5.5
M	Y3Q4	**G5.12:** Second Training Blueprint workshop to assess the success of workshops based off of our basic training material , lessons learnt and focus on challenges, plan and design of HEP domain specific training topics	W5.5		M5.1
M	Y3Q4	**G5.13:** Brainstorming session with experts, fellows to revisit software and data challenges and correspondingly design future training material and workshops and domain specific topics	W5.3		M5.1
M	Y3Q4	**G5.14:** Organize and run CoDaS-HEP School (Parallel Programming, ML, Big Data Tools) at Princeton with experts and trained fellows	W5.1	R5.2	M5.2 M 5.4

Improve the existing workshops with feedback, latest techniques

Using Google Collab and CMS Data – Training Workshop

SSL

Type	Time	Description	WBS task	Risks	Metrics
D	Y3Q1	**G6.1:** Split River cluster into model and development environments	W6.1		
M, D	Y3Q2	**G6.2:** Establish a second SSL site	W6.3	R6.1	M6.1
D	Y3Q3	**G6.3:** Provision user training environments with federated ID, job submission, interactive notebooks	W6.4	R6.2	M6.2
D	Y4Q2	**G6.4:** Provide federated scheduling of SSL clusters	W6.1, W6.2, W6.3	R6.2	M6.3
D	Y3Q4	**G6.5:** If cost/benefit relative to accelerated ServiceX on cluster baseline indicates, build prototype system and benchmark its performance	W6.5	R6.3	
D	Y4Q3	**G6.6:** Coordinate with AS, DOMA, and operations programs to benchmark performance of prototype system components to be used for Analysis Grand Challenge.	W6.1, W6.3	(R2.2)	(M2.2)
D	Y5Q2	**G6.7:** Coordinate with AS, DOMA, and operations programs to execute the Analysis Grand Challenge	W6.3		(M2.2)

Establish second SSL site

Federation of SSL sites

OSG

Type	Time	Description	WBS task	Risks	Metrics
D	Y3Q1	**G7.1:** Have at least 1 U.S. site each for ATLAS and CMS in a 100 Gbps perfSONAR mesh	W7.2	R7.5, R7.6	M.7.14
D	Y3Q4	**G7.2:** Define IRIS-HEP's role in networking for data challenge	W7.2, W7.5	R7.7	—
M	Y3Q2	**G7.3:** OSG 3.6.0 is released	W7.2, W7.4	R7.4, R7.6, R7.7	M.7.5, M.7.7, M.7.8, M.7.10
D	Y5Q1	**G7.4:** End support for the OSG 3.5 release series	W7.2, W7.4	R7.4, R7.5, R7.6	M.7.5, M.7.10
D	Y4Q2	**G7.5:** Have at least 5 instances of refactored XRootD monitoring in production use	W7.2, W7.5	R7.5, R7.6, R7.7	M.7.3
D	Y4Q2	**G7.6:** Complete the SDLC from engagement to production deployment for one IRIS-HEP software product	W7.2	R7.4, R7.5, R7.6	M.7.5, M.7.8
D	Y5Q2	**G7.7:** Have one example of an IRIS-HEP-supported service in production using the new container paradigm	W7.2, W7.5	R7.5, R7.6	M.7.4, M.7.6

Data Processing Challenge

OSG 3.5 -> 3.6

Grand Challenges

Review Committee: Global challenges to knit together disparate parts of the institute

- Demonstrate useful work for the LHC Run 4 Era
- Force building of tools for longer-term than just the challenge
- Span more than one area of the institute
- Have stakeholder participation
- Fine to span multiple years (encouraged)

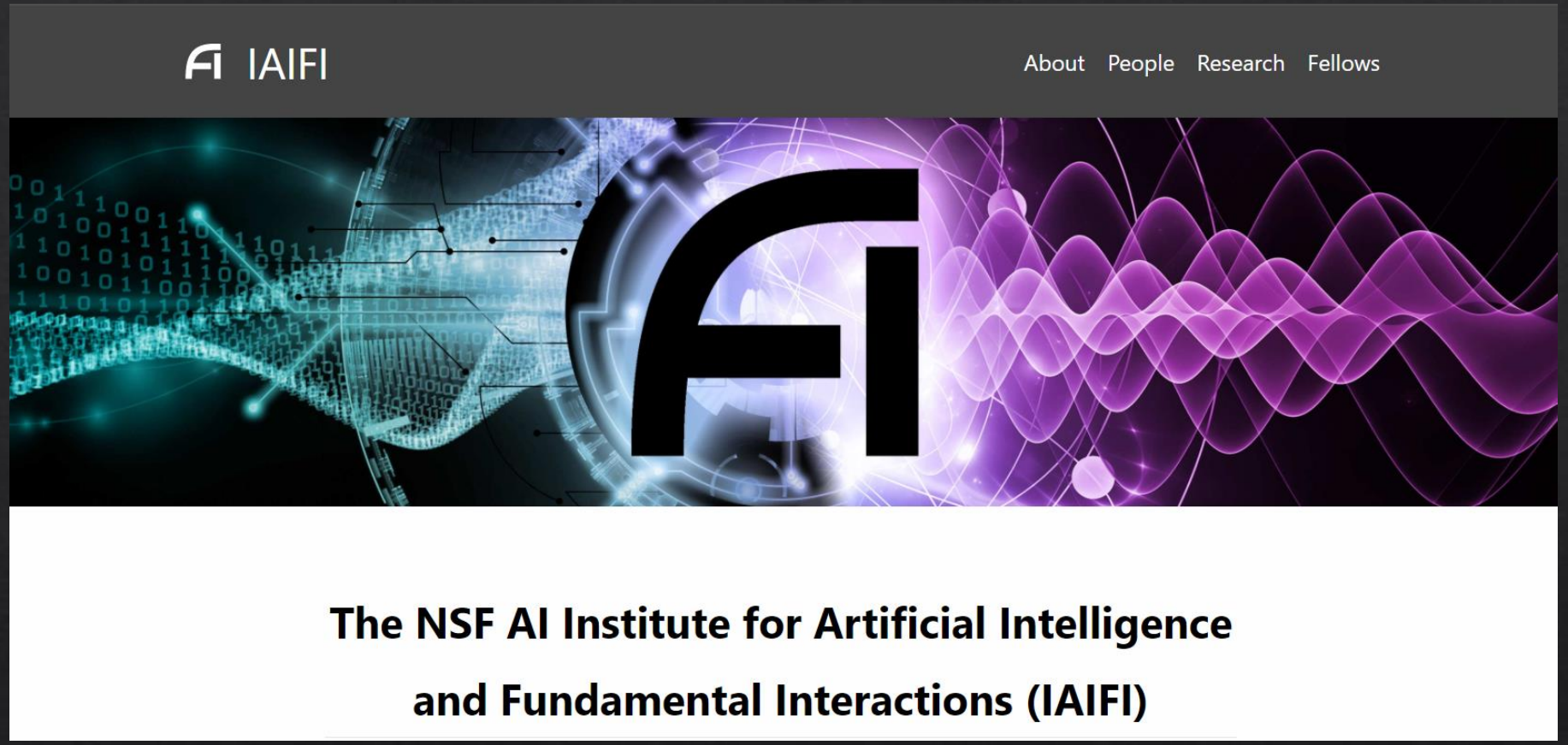
Analysis Grand Challenge

In today's Analysis Systems Talks

Data Processing Grand Challenge

Next Steering Board Meeting

NSF: IAIFI



- Two members of IRIS-HEP are founding members of IAIFI
- As they spin-up we will look for points of collaboration

Questions? Comments?