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 Steering Board Meeting #1

G. Watts

2019-02-06

Thank You

Tommaso Boccali (INFN-Pisa)
CMS

Paolo Calafiura (LBNL)
US ATLAS Ops Program

Simone Campana (CERN)
WLCG

David Costanzo (Sheffield)
ATLAS

Oliver Gutsche (FNAL)
US CMS Ops Program

Gerhard Raven (VU/NIKHEF)
LHCb

Graeme Stewart (CERN)
HSF

David Swanson (U. Nebraska-Lincoln)
The OSG Council

Welcome

steering-board@iris-hep.org

(you)

exec-board@iris-hep.org

(us)

Meet quarterly – dates for the rest of the year coming

Today

- Short Introduction
- Visions & Progress from each Focus Area
  - Innovative Algorithms
  - Analysis Systems
  - DOMA
  - Scalable Systems Laboratory
  - Software Sustainability Core
  - OSG-LHC
- Feedback

IRIS-HEP Steering Board Meeting #1

Wednesday 6 Feb 2019, 18:00 → 20:00 Europe/Zurich

4-3-001 (CERN)

Description We will meet in the room 222-R-003 - David Lange has the room key and will make sure everyone has access.

Live Minutes Can Be Found Here. Please Help Out!

18:00 → 18:30 **Introduction** 30m

Welcome, Review of milestones, risks, and other things since last meeting, Review of external collaborations and talks and confernece presentations
Include the common date for future meetings
Include mention of the BluePrint activity

Speakers: Brian Paul Bockelman (University of Nebraska Lincoln (US)), Gordon Watts (University of Washington (US)), Peter Elmer (Princeton University (US))

18:30 → 19:30 **Vision and Progress** 1h

Vision and Progress and Directions of the IRIS-HEP Areas
Each gets equal time

Analysis Systems
DOMA
Innovative Algorithms
SSL
SSC
OSG-LHC

Innovative Algorithms 10m

Speakers: David Lange (Princeton University (US)), Heather Gray (LBNL)

Analysis Systems 10m

Speaker: Kyle Stuart Cranmer (New York University (US))

DOMA 10m

Speaker: Brian Paul Bockelman (University of Nebraska Lincoln (US))

DOMA-SB-1.pdf IDDS One-Pager.pdf

Scalable Systems Laboratory 10m

Speaker: Robert William Gardner Jr (University of Chicago (US))

Software Sustainability Core 10m

Speaker: Sudhir Malik (University of Puerto Rico (PR))

OSG-LHC 10m

Speaker: Frank Wuerthwein (Univ. of California San Diego (US))

19:30 → 20:00 **Feedback from the Steering Board** 30m

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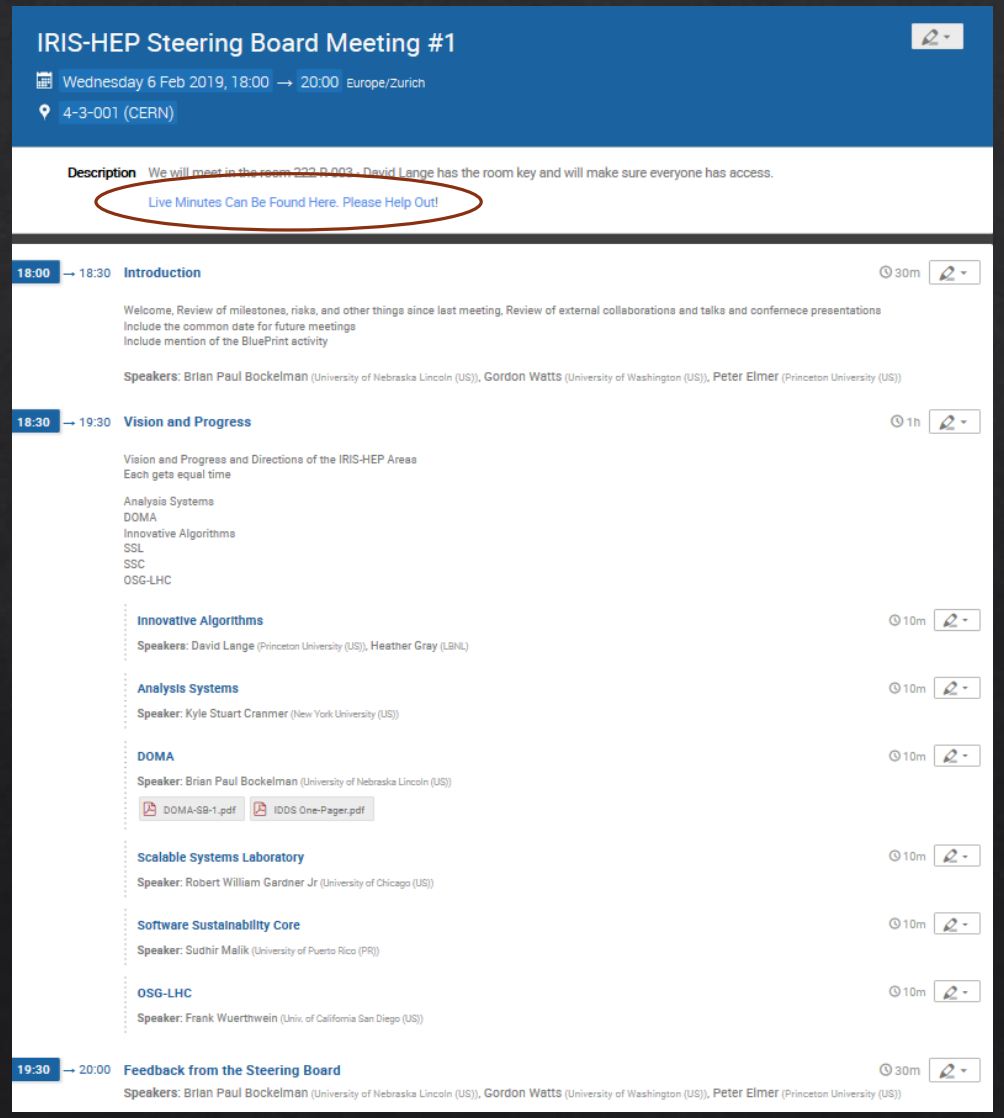

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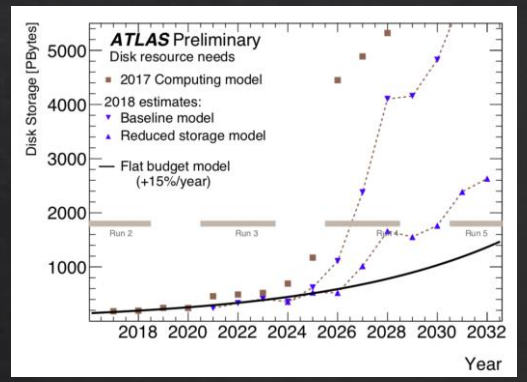
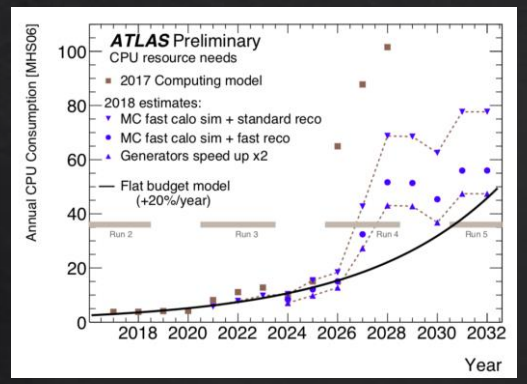
Introduction



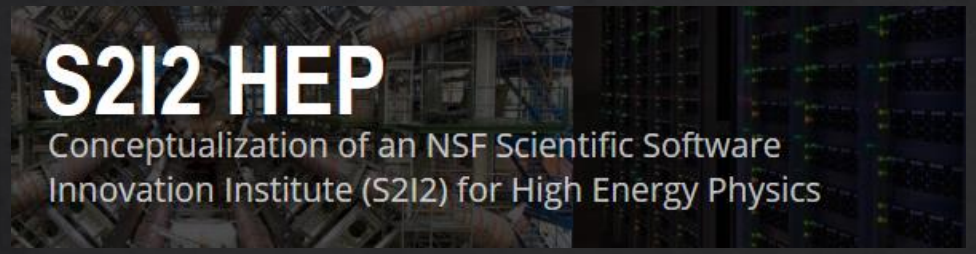


S2I2 HEP

Conceptualization of an NSF Scientific Software Innovation Institute (S2I2) for High Energy Physics

dianahep

S2I2



WLCG Charge:

- Anticipate a "software upgrade" for the HL-LHC
- Identify and prioritize the software research required
  - To improve efficiency, scalability, and performance
  - To enable new approaches to extend the physics reach of the detectors,
  - To ensure the long-term sustainability of the software throughout the lifetime of the HL-LHC

Funded by the NSF in 2016

Community White Paper

January 2017
UCSD

June 2017
Annecy

Involved A Diverse Group

- Computing Management from the Experiments and Labs
- Individuals interested in the problems
- Members of other compute intensive scientific endeavors
- Members of Industry

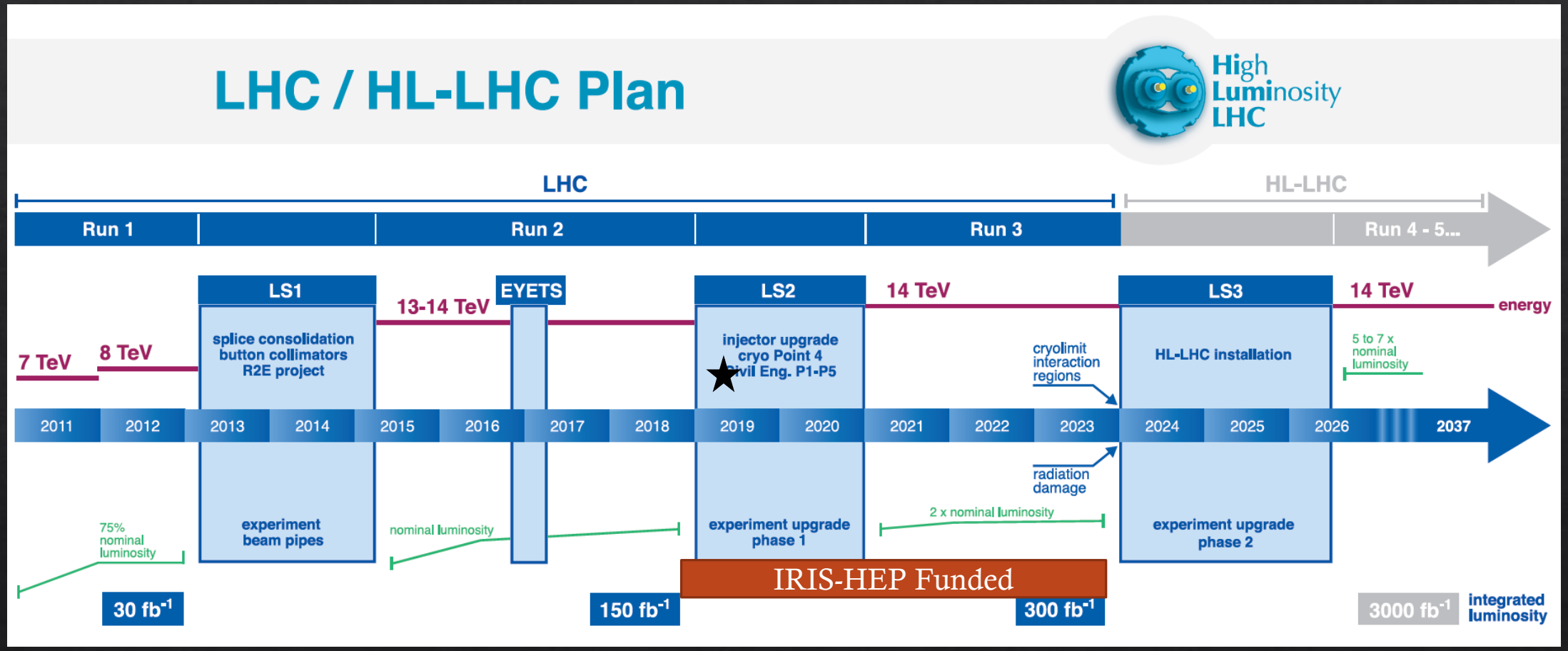
Individual Papers on the arXiv:

Careers & Training, Conditions Data, DOMA, Data Analysis & Interpretation, Data and Software Preservation, Detector Simulation, Event/Data Processing Frameworks, Facilities and Distributed Computing, Machine Learning, Physics Generators, Security, Software Development, Deployment, Validation, Software Trigger and Event Reconstruction, Visualization

Community White Paper & the Strategic Plan

IRIS-HEP

Funded!

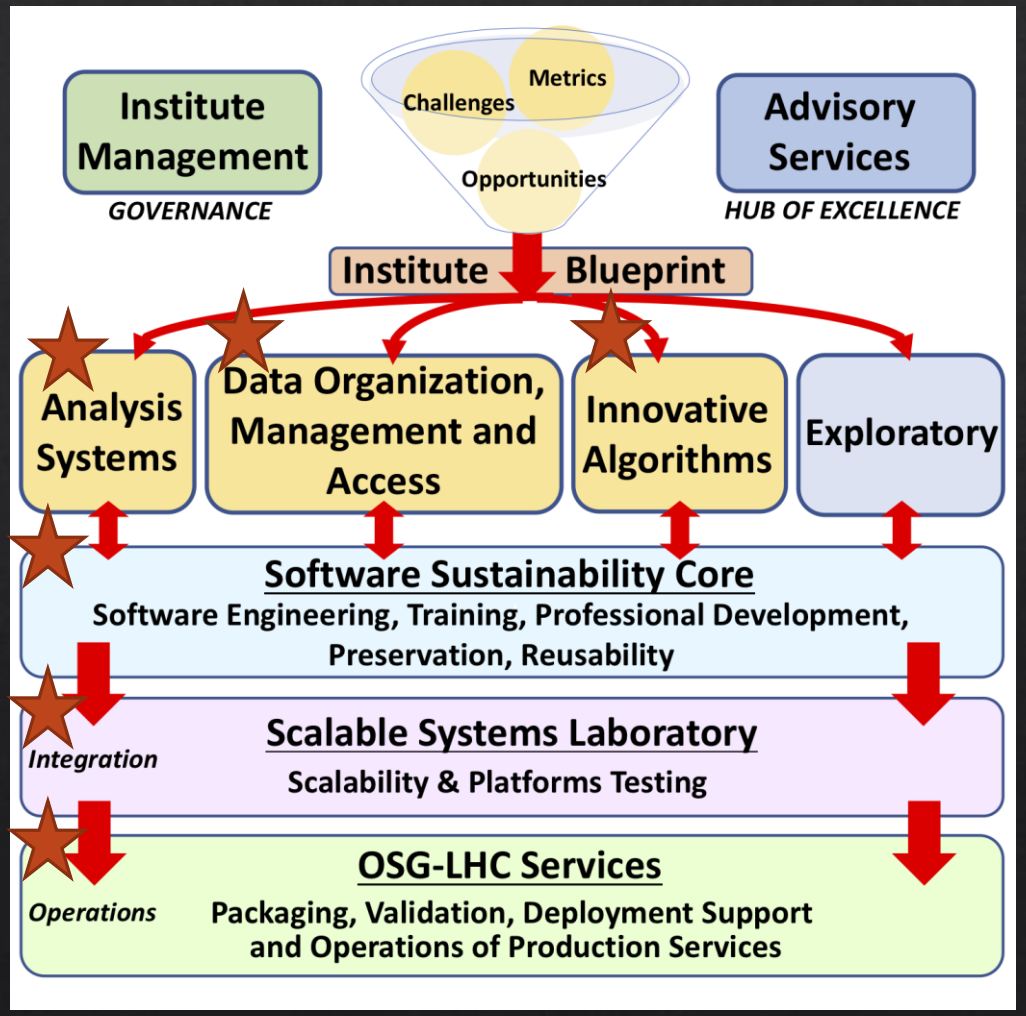

LHC / HL-LHC Plan
High Luminosity LHC
LHC
HL-LHC
Run 1
Run 2
Run 3
Run 4 - 5...
LS1
EYETS
LS2
LS3
7 TeV
8 TeV
13-14 TeV
14 TeV
14 TeV
energy
splice consolidation
button collimators
R2E project
injector upgrade
cryo Point 4
Civil Eng. P1-P5
cryolimit
interaction
regions
HL-LHC installation
5 to 7 x
nominal
luminosity
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2037
radiation
damage
75%
nominal
luminosity
experiment
beam pipes
nominal luminosity
experiment upgrade
phase 1
2 x nominal luminosity
experiment upgrade
phase 2
IRIS-HEP Funded
30 fb-1
150 fb-1
300 fb-1
3000 fb-1
integrated
luminosity

IRIS-HEP

Management
- Executive Board
- PI, co-PI's

Advisory Services
- Steering Board
- Advisory Board

Focus Areas
- Analysis Systems
  - Preservation, diversification, declarative analysis
- DOMA
  - Distributed Infrastructure & Storage
- Innovative Algorithms
  - Trigger & Offline

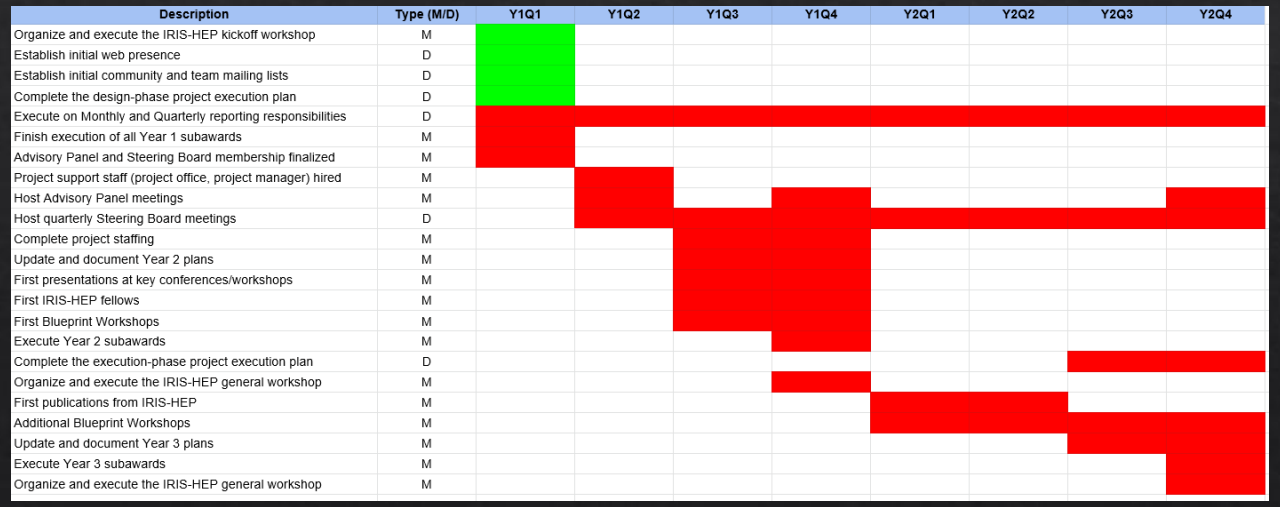


G. Watts, IRIS-HEP Steering Board Meeting #1

Project Execution Plan

Identifies all of our responsibilities to the NSF

MGMT | AS | DOMA | IA | SSC | SSL | OSG-LHC



Description	Type (M/D)	Y1Q1	Y1Q2	Y1Q3	Y1Q4	Y2Q1	Y2Q2	Y2Q3	Y2Q4
Organize and execute the IRIS-HEP kickoff workshop	M								
Establish initial web presence	D								
Establish initial community and team mailing lists	D								
Complete the design-phase project execution plan	D								
Execute on Monthly and Quarterly reporting responsibilities	D								
Finish execution of all Year 1 subawards	M								
Advisory Panel and Steering Board membership finalized	M								
Project support staff (project office, project manager) hired	M								
Host Advisory Panel meetings	M								
Host quarterly Steering Board meetings	D								
Complete project staffing	M								
Update and document Year 2 plans	M								
First presentations at key conferences/workshops	M								
First IRIS-HEP fellows	M								
First Blueprint Workshops	M								
Execute Year 2 subawards	M								
Complete the execution-phase project execution plan	D								
Organize and execute the IRIS-HEP general workshop	M								
First publications from IRIS-HEP	M								
Additional Blueprint Workshops	M								
Update and document Year 3 plans	M								
Execute Year 3 subawards	M								
Organize and execute the IRIS-HEP general workshop	M								

Milestones and Deliverables

For all areas

Run for first 2 years

Highlights

Management	Yearly IRIS-HEP meetings, Blueprint Workshops, Staffing, Topical Meetings (youtube)
Analysis Systems	Analysis System Prototype, Python analysis Prototype, Benchmarking, Integrating Preservation
DOMA	Data lake use cases & prototyping, intelligent caching, Intelligent Data Delivery Service
Innovative Algorithms	ML in tracking: ambiguity resolution, GPU integration, ACTS, Matriplex/mkFit
Sustainability Core	Carpentry Sessions, CoDaS-HEP school, Outreach workshops
Scalable Systems Lab	Infrastructure for SSC, Provide testbed for other areas
OSG-LHC	Globus migration, Cybersecurity integration, new OSG release

Topical Meetings

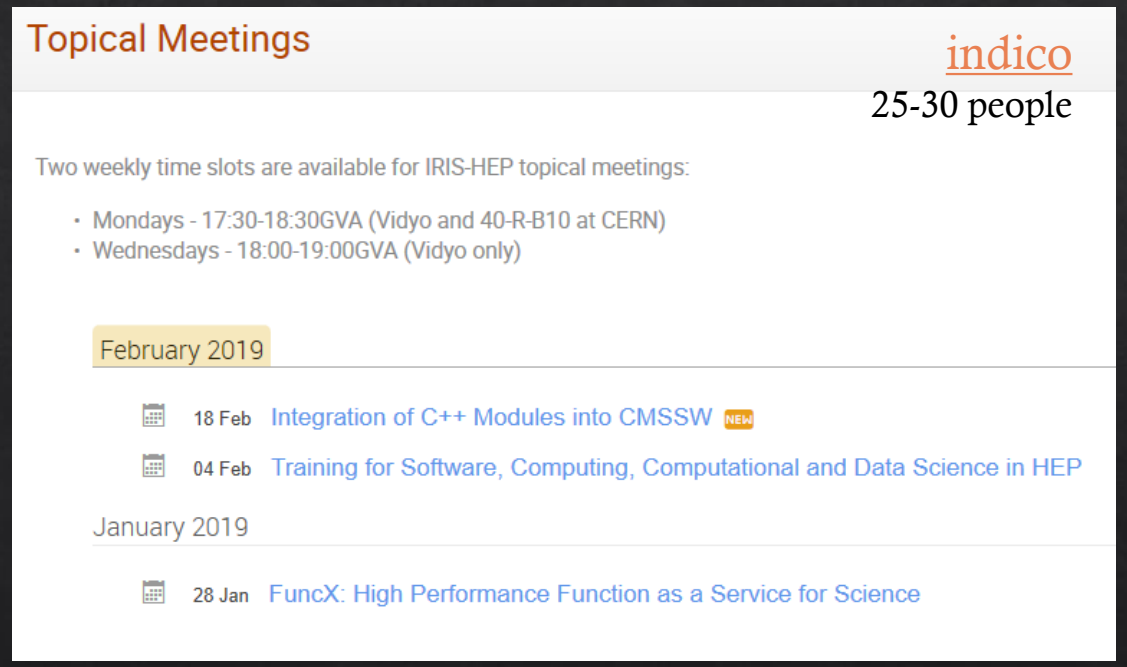
Designed to expose us to new tools and approaches.

- Break the HEP bubble
- Industry, unique approaches taken internally

All are welcome

- Announced on our announcement list (197 members)
- Please forward if you think communities are interested!

Archived on YouTube.



Staffing

Most positions are filled!

Full Team Listing

Fellows Program

Based on the DIANA Fellows Program

Aimed at graduate students to support direct collaboration with others developing software tools for general use

- They should already have a stipend from their home institution.
- Will cover cost of travel and subsistence funds for a 3 month visit.
- Undergraduate support also possible

IRIS-HEP's program is just starting
Obvious place for collaboration and integration

Current and past DIANA fellows

Pratyush Das, Institute of Engineering and Management (Kolkata) [Undergrad]

- Topic: Add write functionality to uproot - proposal
- Mentor: Jim Pivarski, Princeton University
- Dates/Location: *summer, 2018 (FNAL)*

Himadri Pandey, University of Cincinnati [Undergrad]

- Topic: Development of Machine Learning Algorithms and Software Implementations for Reconstructing Straigh
- Mentor: Mike Williams, MIT
- Dates/Location: Jan-Mar, 2018

Juan Baptista

- Topic: Numerical Integration Precision Studies for Maximum Likelihood Fits - proposal, final report
- Mentor: Henry Schreiner, University of Cincinnati
- Dates/Location:

Matthew Feickert, Southern Methodist University [Grad]

- Topic: Investigation of use of Tensorflow/Theano for realistic physics statistics models - proposal, final report
- Mentor: Gilles Louppe/Vincent Croft, NYU
- Dates/Location:

Computing Environment and Run 4

US Computing for Run 4

Hardware and Software

We are working on a joint
DOE/NSF blueprint workshop

Collaboration

Most of us are members of the experiments represented here (grass roots collaboration)

What is interesting, but with an adjustment might become very interesting?

What are the points of collaboration?

Next ~hour will be a quick outline of the startup projects in IRIS-HEP

Comments on our strategy going forward? Or topics you'd like to know more about in the future?