

Introduction to User Learning: Spotlight on Discoverability and Resuability

Holly Szumila-Vance, FIU

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ePIC User Learning Workshop



Overview:

- Motivation
- User Learning
- FAIR principles
- ePIC Software & Computing Principles
- Goals and what we aim to achieve today
- Where we are now and what's next



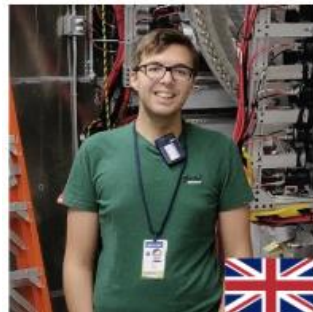
“The right tools should be easy to find and easy to adopt”

- Users can't contribute physics if they can't find the data, code, or workflows they need
- Balancing act to support rapidly evolving software development vs. analyzers who need stability and clarity
- This workshop is an open dialogue (not a status report)

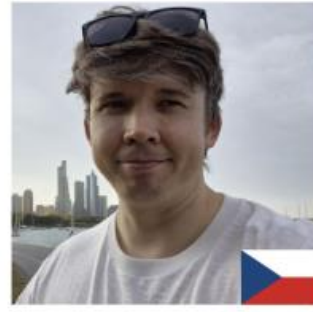
User Learning

Focus on how users encounter, learn, and adopt software.

- Supports the users by providing training, documentation and support
- Preliminary Technical Design Report (deliverable)
- User Learning supports the user's needs (i.e. simulation, analysis....)
- Organize hybrid (live/virtual) tutorials to support needs
- Support the trainers in developing engaging material and documentation
- Goal to have discoverable software → enable physics!



Stephen Kay



Sasha Prozorov

User Learning activities



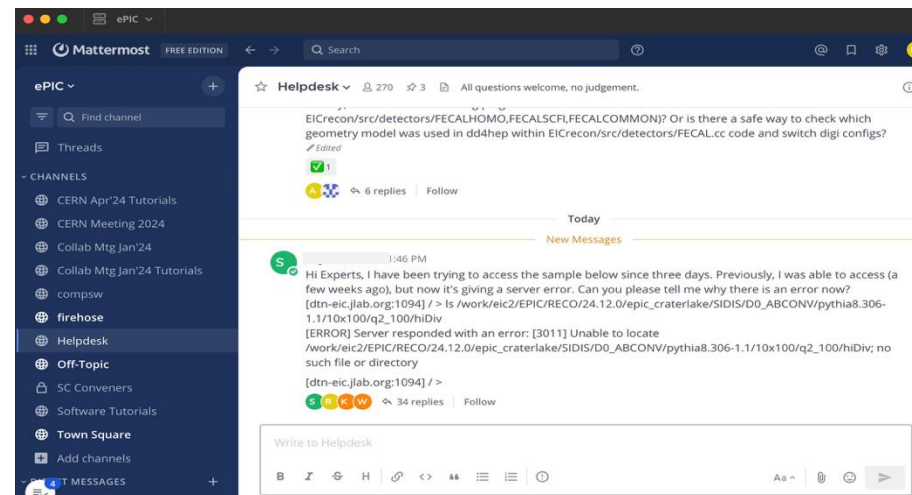
Trainings this year:

- March: Supported ePIC and EIC 2nd Physics Readiness Workshop
- April: Introduction to software tutorial, EIC Light Ion Physics Study Group (remote)
- May: Tutorial on ePIC file access with rucio (Tues, 5-May
<https://indico.bnl.gov/event/32515/>)
- June: Tutorials at 2026 CFNS Summer School on the Physics of the EIC, SBU
- July: Planning tutorials at the EIC Early Career Workshop, Glasgow
- Future TBD: Support next Physics Readiness Workshop, ePIC Software Scavenger Hunt



Other activities:

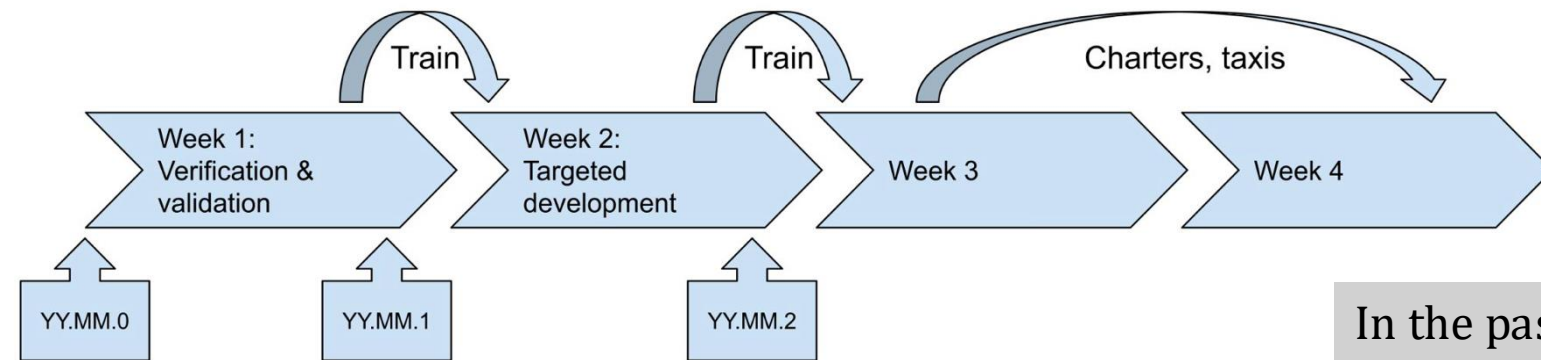
- Documentation and help desk support
(See eic.github.io)



ePIC strategy: Production-ready software

Objectives:

1. Achieve continuous deployment of the software used for detector and physics simulations
2. Ensure regular updates of simulation productions for detector and physics studies, and for geometry and algorithm development
3. Implement timely validation and quality control for simulation productions on datasets that require substantial time and resources

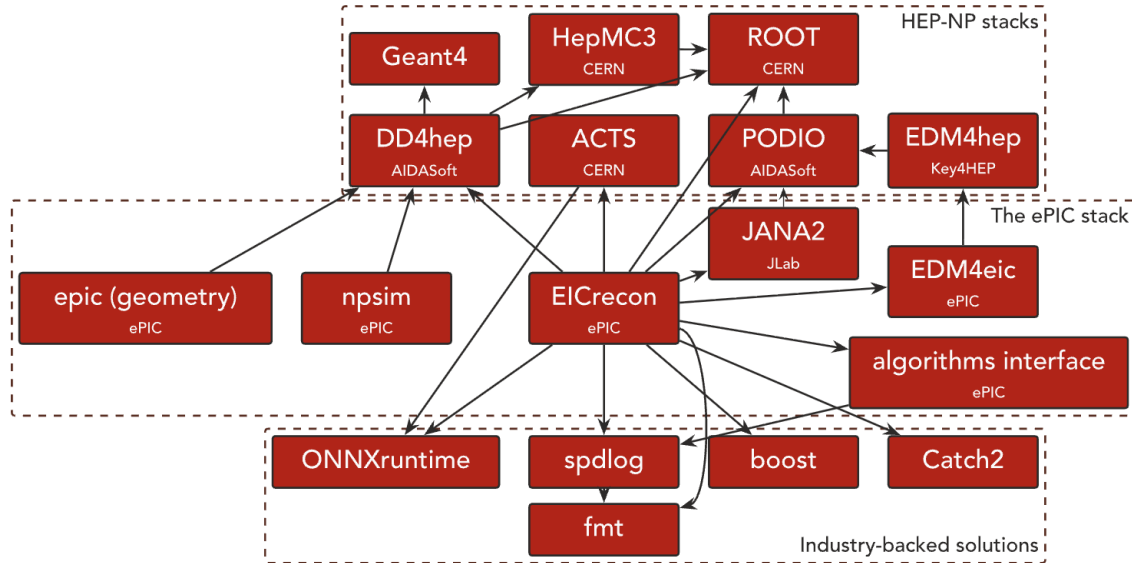


Tagged software releases

In the past year, monthly simulation campaigns consumed approximately 15 million core hours on the OSF, generating over 500 TB of simulation data.

Discoverability in ePIC today

ePIC Software Stack



Challenges:

- Finding the right repository
- Avoiding duplicated efforts
- Keeping documentation current
- Knowledge in individuals, not in findable artifacts

The screenshot shows the GitHub profile for 'eic'. The profile name is 'Electron-Ion Collider (EIC) Software' with 212 followers. The profile description is 'Electron-Ion Collider (EIC) software, documentation and resources'. The profile statistics are: Overview, Repositories (227), Discussions, Projects (7), Packages, Teams (14), and People (363). The profile also includes a bio: 'On April 24 we'll start using GitHub Copilot interaction data for AI model training unless you opt out. [Review this update](#) and manage your...'. The profile also includes a logo for 'SOFTWARE' and a link to 'https://eic.github.io' and an email address 'eic-software-l-request@lists.bnl.gov'.

FAIR principles: a quick primer

F	-Findable:	metadata, indexing, repositories, Can I discover that this thing exists?
A	-Accessible:	standard retrieval, Can I get to it?
I	-Interoperable:	shared formats, data models, Does it work with other things?
R	-Reusability:	documentation, standards, Can someone else use it? Maybe extend it?

How does ePIC seek to address FAIR principles?

F	-Findable:	GitHub repository catalog, landing page with links, firehose channel
A	-Accessible:	rucio, eic-shell, XRootD, open file access
I	-Interoperable:	podio, EDM4eic, DD4hep
R	-Reusability:	benchmarks, workflow templates, tutorials

ePIC software & computing principles

EIC SOFTWARE: Statement of Principles

<https://eic.github.io/activities/principles.html>

accessible!

- 1 We aim to develop a diverse workforce, while also cultivating an environment of equity and inclusivity as well as a culture of belonging.**
- 2 We will have an unprecedented compute-detector integration:**
 - We will have a common software stack for online and offline software, including the processing of streamed data and its time-ordered structure.
 - We aim for autonomous alignment and calibration.
 - We aim for a rapid, near-real-time turnaround of the raw data to online and offline productions.
- 3 We will leverage heterogeneous computing:**
 - We will enable distributed workflows on the computing resources of the worldwide EIC community, leveraging not only HTC but also HPC systems.
 - EIC software should be able to run on as many systems as possible, while supporting specific system characteristics, e.g., accelerators such as GPUs, where beneficial.
 - We will have a modular software design with structures robust against changes in the computing environment so that changes in underlying code can be handled without an entire overhaul of the structure.
- 4 We will aim for user-centered design:**
 - We will enable scientists of all levels worldwide to actively participate in the science program of the EIC, keeping the barriers low for smaller teams.
 - EIC software will run on the systems used by the community, easily.
 - We aim for a modular development paradigm for algorithms and tools without the need for users to interface with the entire software environment.

5 Our data formats are open, simple and self-descriptive:

- We will favor simple flat data structures and formats to encourage collaboration with computer, data, and other scientists outside of NP and HEP.
- We aim for access to the EIC data to be simple and straightforward.

6 We will have reproducible software:

- Data and analysis preservation will be an integral part of EIC software and the workflows of the community.
- We aim for fully reproducible analyses that are based on reusable software and are amenable to adjustments and new interpretations.

7 We will embrace our community:

- EIC software will be open source with attribution to its contributors.
- We will use publicly available productivity tools.
- EIC software will be accessible by the whole community.
- We will ensure that mission critical software components are not dependent on the expertise of a single developer, but managed and maintained by a core group.
- We will not reinvent the wheel but rather aim to build on and extend existing efforts in the wider scientific community.
- We will support the community with active training and support sessions where experienced software developers and users interact with new users.
- We will support the careers of scientists who dedicate their time and effort towards software development.

reusability!

8 We will provide a production-ready software stack throughout the development:

- We will not separate software development from software use and support.
- We are committed to providing a software stack for EIC science that continuously evolves and can be used to achieve all EIC milestones.
- We will deploy metrics to evaluate and improve the quality of our software.
- We aim to continuously evaluate, adapt/develop, validate, and integrate new software, workflow, and computing practices.



Goals of this workshop

- **Present the current strategies**
Ensure Users know what exists and what's coming next
- **Generate discussion, gather feedback**
What's working, what isn't, what's missing?
- **Identify and refine priorities**
Strategy and focus, define a plan
- **Build shared ownership (vision)**
Support User-centered design!

We want your input

- **Participate actively**
Discussion is the real value of this workshop
- **Be specific**
- **Your use case is important**
New-user, developer... all perspectives matter.
- **Help us prioritize**
Not everything can be fixed now. Let's identify what's essential and when it's needed



Thank you

Please raise your hand or comment in the chat.
This meeting will use zoom note-taking features to ensure discussions are captured.