

Workshop Recommendations

National Institutes of Health (NIH), Office of the Director
(OD), Office of Data Science Strategy (ODSS)

July 2023



FHIR® is the registered trademark of Health Level Seven International (HL7). Use of the FHIR trademark does not constitute an HL7 endorsement of this workshop.

Overview

Intended audience:

- Instructors involved with the design and implementation of FHIR for research-related training.

Learning objectives:

1. Identify existing FHIR for research capacity-building resources
2. Understand the process for re-using existing resources for future capacity-building activities
3. Apply recommendations and best practices from past NIH workshops to future workshops

Topics

1. Existing capacity-building resources
2. Working with the FHIR for Research documentation website
3. Recommendations for live workshops
 - Compute environment
 - Synthetic data
 - Other recommendations

Existing Resources

1. FHIR for Research documentation website

- Website: <https://purl.org/fhir-for-research/web>
- GitHub: <https://purl.org/fhir-for-research/github>

2. Webinars

- Introduction to FHIR for Research: <https://purl.org/fhir-for-research/webinars/intro>
- FHIR Bulk Data Introduction: <https://purl.org/fhir-for-research/webinars/bulk-data>

3. Hands-on workshops

- FHIR Bulk Data: <https://purl.org/fhir-for-research/workshops/bulk-data>
- SMART on FHIR: <https://purl.org/fhir-for-research/workshops/smart-on-fhir>

[More on FHIR API programming: https://datascience.nih.gov/fhir-initiatives/researchers-training](https://datascience.nih.gov/fhir-initiatives/researchers-training)

Note: purl.org is a service provided by the Internet Archive for persistent URLs that can be updated if the actual URL changes. This is helpful to avoid dead links in webinar videos.

Documentation Website

Overview

- Website (<https://purl.org/fhir-for-research/web>) is generated from source code (<https://purl.org/fhir-for-research/github>) using Quarto (<https://quarto.org>)
- Quarto is a tool for generating static documentation websites that include R or Python code
- It's made by Posit (the company that makes RStudio)
Narrative content is written in Markdown

Structure

- Written documentation is broken up into self-contained “modules”
- Modules are organized into [sections](#):
 1. Overview
 1. FHIR for Research
 2. SMART on FHIR
 3. Data Modeling in FHIR
 2. Working with FHIR Data
 1. Tabular Analysis
 2. REDCap
 3. FHIR Bulk Data
 3. Advanced Topics
 1. Synthetic Data & FHIR Testing Servers
 2. Other Topics

Documentation Website /

Live Walk-Through

- <https://purl.org/fhir-for-research/web>
- <https://purl.org/fhir-for-research/github>

Setup

1. Install dependencies (R, Python, RStudio, Quarto)
2. Clone <https://purl.org/fhir-for-research/github>
3. Open as a project in RStudio (or another editor)

[Detailed setup instructions are found at
https://purl.org/fhir- for-research/web/setup](https://purl.org/fhir-for-research/web/setup)

Editing

- Narrative content can be edited as plain text Markdown, or using the WYSIWYG “Visual” mode in RStudio
 - More on Markdown: <https://quarto.org/docs/authoring/markdown-basics.html>
- Preview locally in a web browser via “Render” in RStudio, or running quarto preview from the command line
- Publish publicly via [GitHub Pages](#)
 - More: <https://quarto.org/docs/publishing/github-pages.html>

Contributing

- [Customization via “forking” \(https://docs.github.com/en/get-started/quickstart/fork-a-repo\)](https://docs.github.com/en/get-started/quickstart/fork-a-repo)
- You can contribute (“upstream”) your changes from your fork to the NIH/ODSS-managed open source GitHub repository
 - Submit a pull request: <https://docs.github.com/articles/using-pull-requests>
 - NIH/ODSS will review to intergrate into the main repository

Workshop Best Practices

Introduction

- Workshops are a useful approach to help attendees quickly climb the learning curve for a technical topic
 - Include a combination of lecture and hands-on participation
 - Pair with written documentation that participants can refer to later

Workshop Design

- Consider a brief pre-survey or lightweight capability assessment
- <https://purl.org/fhir-for-research/workshop-recommendations> has more information Tailor technical prerequisites to the anticipated audience
 - For example, our SMART on FHIR workshop requires basic HTML and JavaScript experience for hands-on participation
- Use the pre-survey to verify audience technical skills Provide learning objectives
 - <https://tips.uark.edu/using-blooms-taxonomy> is helpful

Structure

- Provide an “on ramp” introducing the topic at the beginning so less technical participants can still get value from the beginning
 - In general, order content from least to most technical Consider a mini-webinar introduction
 - Verbally identify the “drop points” where people who are not interested in the technical content can safely leave
- Provide a walk-through to introduce hands-on participation
 - Provide sample code/template that participants can run themselves
 - Consider having the presenter fill in the sample code/template live, or give participants time to work themselves and ask questions
- Keep the total length under 3 hours
 - Consider 1-2 hours of content, and an optional “lab” hour if there is substantial hands- on content to allow participants to work independently and ask questions
 - Include 5 minute breaks every hour

Running a Workshop

- Plan for “preflight” if technical setup is necessary
 - Strategize to reduce setup as much as possible (e.g., use cloud Jupyter environment rather than requiring participants to run it locally – more on this below)
- Include at least one TA to help with technical issues and questions during the workshop
 - For virtual workshops, use breakout rooms if participants need 1:1 help

Promotion & Registration

- Require registration to attend
 - Allows for monitoring and adjustment of outreach strategy if the desired mix of people don't initially sign up
- Start registration at least 2 weeks ahead of the event
- Include learning objectives and prerequisites in registration promotional materials
 - Consider the Introduction to FHIR for Reserach webinar as a prerequisite if your [potential audience doesn't have prior FHIR experience \(https://purl.org/fhir-for-research/webinars/intro\)](https://purl.org/fhir-for-research/webinars/intro)
 - Identify any technical skills are required for some/all of the workshop

Recording & Accessibility

- Use Zoom local recording (or similar) to record screen and audio Share recording with subtitles for accessibility
 - Modern transcription applications like [MacWhisper](#) can generate subtitles that are quite accurate, requiring fairly minimal manual editing
 - Subtitles can be in a .srt “sidecar” file – this is a plain text file that can be easily edited by hand
- Provide slides and other materials on a single webpage at the time of the event e.g., <https://purl.org/fhir-for-research/workshops/bulk-data>
 - Consider “upstreaming” any materials to the main open source GitHub repository
- Use URLs in slides that can be updated later if the destination URL changes (e.g. from <https://purl.org>) to avoid broken links in video recordings

Environment & Data

Compute

- If possible, provide a cloud compute environment with dependencies pre-installed
 - This will save on setup time and avoid participants getting stuck on technical issues during the workshop
- Run on your own server:
 - Python/Jupyter: <https://tljh.jupyter.org> for up to 100 users
 - R/RStudio Server: <https://posit.co/download/rstudio-server/>
- No server required:
 - Free, some additional complexity: <https://mybinder.org>
 - \$15/month, more reliable: <https://posit.cloud/plans/instructor?option=instructor>

Running a Server

- Typically memory is the main constraint, which scales linearly with the number of simultaneous users
 - Our FHIR Bulk Data workshop using JupyterHub (via TLJH) required around 600MB/user minimum
 - Run your code ahead of time to estimate memory needs
- CPU usage will likely be low unless your workshop includes a lot of CPU-constrained code (e.g., training machine learning models)
- TLJH: <https://tljh.jupyter.org/en/latest/howto/admin/resource-estimation.html>
- NIH-funded researchers may take advantage of the STRIDES Initiative for cloud computing. For more information, visit <https://datascience.nih.gov/strides>

Synthetic Data

- Using synthetic data avoids privacy issues with patient data
- <https://synthea.mitre.org> provides synthetic data in FHIR format
- <https://purl.org/fhir-for-research/synthea> provides more information on customizing Synthea for your specific use case

FHIR Test Server

Workshops that use the FHIR API will need a test server

- Options for this:
 - <https://sandbox.logicahealth.org>: free test server with both open and authenticated endpoints, as well as SMART on FHIR and CDS Hooks support
 - Allows you to bring your own data
 - <https://launch.smarthealthit.org> for SMART on FHIR testing
 - <https://bulk-data.smarthealthit.org> for FHIR Bulk Data testing
 - <https://hapifhir.io> if you want to run your own FHIR server
 - Or use their public sandbox: <http://hapi.fhir.org>

Wrap-up

Wrap-up

- [Materials from this webinar:
https://purl.org/fhir-for-research/workshop-recommendations](https://purl.org/fhir-for-research/workshop-recommendations)
- ODSS FHIR for Research website:
<https://datascience.nih.gov/fhir-initiatives/researchers-training>