Best Practices for FAIR Research Software

ESIP Summer meeting 2021

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Paula A. Martinez - Community Manager, Research Software Alliance

July 19, 2021

Collaborative notes: tinyurl.com/ESIP-FAIR

Land acknowledgement

Recognizing our connection to the land, water, and planet as a community, but also personally where we each live and work.

In the US, the Native American nations Peoria and Tongva, Patwin and Miwok people.
In Australia, the lands of Walubara Yidinji, Yirrganydji and Yuggera people.

Welcome

- Collaborative notes: tinyurl.com/ESIP-FAIR
  - Attendance, Session notes, Questions
- These slides: tinyurl.com/4pcau6v7

- By participating in this session, you agree to adhere to the ESIP Community Participation Guidelines
- Report an Issue: https://www.integritycounts.ca/org/esip

FORCE11
The Future of Research Communications and e-Scholarship

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Research Software Alliance

RDA
RESEARCH DATA ALLIANCE

Session aims

- Present updates on the FAIR principles to research software
- Provide opportunities to become involved in this evolving policy development
- Identifying examples of best practice in earth sciences in developing FAIR/sustainable software for research in groups
- Enable participants to meet like-minded colleagues
- Identify ESIP champions for FAIR4RS

Time	Description	Presenter
00:00	Welcome and introduction	Paula Martinez
00:05	Research Software Alliance: Introduction to FAIR4RS	Michelle Barker
00:15	Science Gateways Community Institute US-Research Software Engineering (US-RSE) US Research Software Sustainability Institute (URSSI)	Sandra Gesing
00:30	Q&A from attendees and introduction to breakouts	Lorraine Hwang
00:45	Breakout: identifying local examples of best practice in creating FAIR research software	Michelle Barker Sandra Gesing Paula Martinez Lorraine Hwang
01:12	Report back from breakouts	Lorraine Hwang
01:25	Conclusion/ Takeaways	Michelle Barker

Research software: recognised and valued as a fundamental and vital component of research worldwide

Learn more

Our mission

To bring research software communities together to collaborate on the advancement of research software.

With thanks for support form

- Alfred P. Sloan Foundation
- Wellcome Trust

FAIR 4 Research Software (FAIR4RS)

A joint **RDA** Working Group, **FORCE11** Working Group, and Research Software Alliance (**ReSA**) Task force.

Coordinating a range of community discussions to:

- Define FAIR principles for research software
- Provide adoption guidelines and use cases

www.rd-alliance.org/groups/fair-4-research-software-fair4rs-wg

Motivation - *Software is not just another type of data*

FAIR (Findable, Accessible, Interoperable, Reusable) Principles, are intended to apply to **all digital objects** (Wilkinson et al. 2016). But software is different from data.

Recommendation n°5 :

*Recognise that FAIR guidelines will require **translation for other digital objects** and support such efforts.*

2020: 'Six Recommendations for Implementation of FAIR Practice'

(FAIR Practice Task Force EOSC, 2020)

Recommendation n° 2 :

*Make sure **the specific nature of software** is recognized and not considered as "just data" particularly in the context of discussion about the notion of FAIR data.*

2019: the **Opportunity Note** by the French national Committee for Open Science's Free Software and Open Source Project Group (Clément-Fontaine, 2019)

Draft FAIR Principles for Research Software

Findable: The software, and its associated metadata, should be easy to find for both humans and machines.

F1. Software is assigned a globally unique and persistent identifier

- F1.1. Different components of the software must be assigned distinct identifiers representing different levels of granularity
- F1.2. Different versions of the same software must be assigned distinct identifiers

F2. Software is described with rich metadata

F3. Metadata clearly and explicitly include the identifier of the software they describe

F4. Metadata are FAIR and are searchable and indexable

Accessible: The software, and its metadata, must be retrievable via standardized protocols.

A1. Software is retrievable by its identifier using a standardized communications protocol

- A1.1. The protocol is open, free, and universally implementable
- A1.2. The protocol allows for an authentication and authorization procedure, where necessary

A2. Metadata are accessible, even when the software is no longer available

Interoperable: The software interoperates with other software through exchanging data and/or metadata, and/or through interaction via application programming interfaces (APIs).

I1. Software reads, writes and exchanges data in a way that meets domain-relevant community standards

I2. Software includes qualified references to other objects

Reusable: The software is both usable (it can be executed) and reusable (it can be understood, modified, built upon, or incorporated into other software).

R1. Software is described with a plurality of accurate and relevant attributes

- R1.1. Software must have a clear and accessible license
- R1.2. Software is associated with detailed provenance

R2. Software includes qualified references to other software

R3. Software meets domain-relevant community standards

FAIR4RS WG. (2021, June). FAIR Principles for Research Software

Adoption guidelines - now being developed

Will aim to leverage existing adoption guidelines and best practices such as:

- 5 Recommendations for FAIR software, Howfairis - NLeSC & DANS
- The Turing Way - The Alan Turing Institute
- Top 10 FAIR data and software things - RDA
- Software Quality Assurance - GFZ
- Archive Reference Describe Cite - European Commission

What other adoption guidelines could we work with?

FAIR4RS Roadmap

FAIR4RS Roadmap outlines how to make FAIR research software a reality.

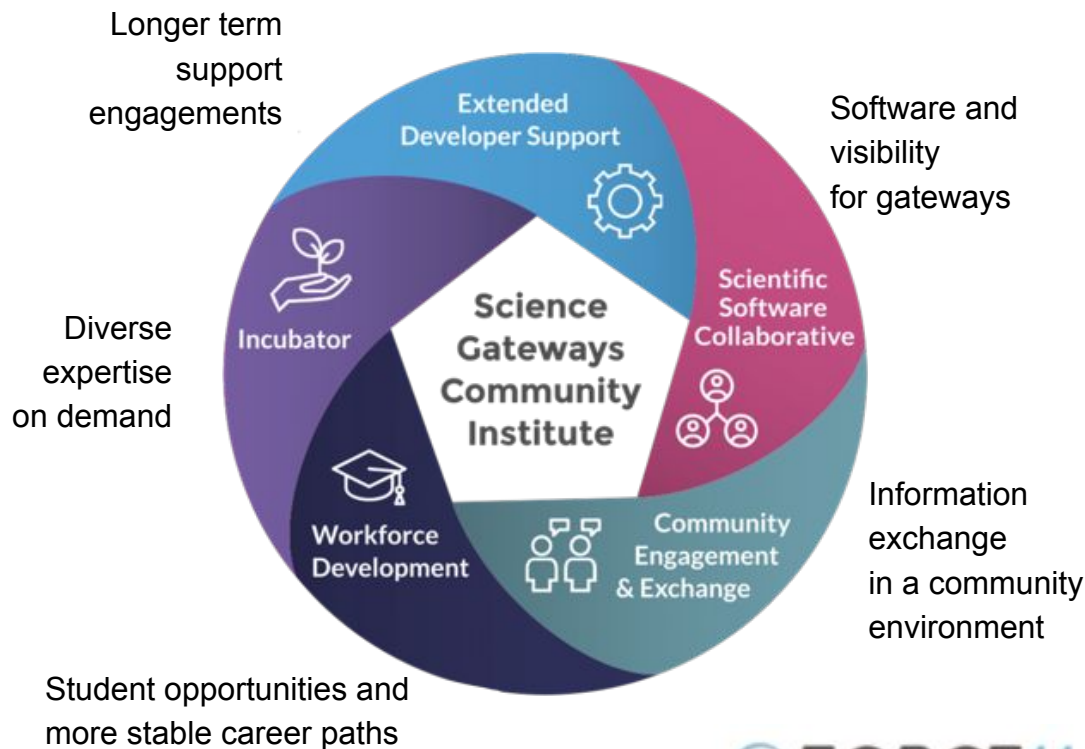**Maps** FAIR4RS projects into a longer-term framework and **guide** further investment; and **identify** potential **collaborators**/leads.

- [FAIR4RS Metrics Working Group](#)
- [Life Sciences Working Group](#)

Others under discussion: FAIR4RS curriculum/skills, metadata/interoperability, infrastructure/services (eg science gateways), governance

Can we form an ESIP FAIR4RS Working Group?

SGCI Partnering with GO FAIR US office

Longer term support engagements

Software and visibility for gateways

Diverse expertise on demand

Information exchange in a community environment

Student opportunities and more stable career paths

GO FAIR

Approach currently – open for discussion!

Testing of FAIRness of source code

Maturity indicator tests via source code in repository

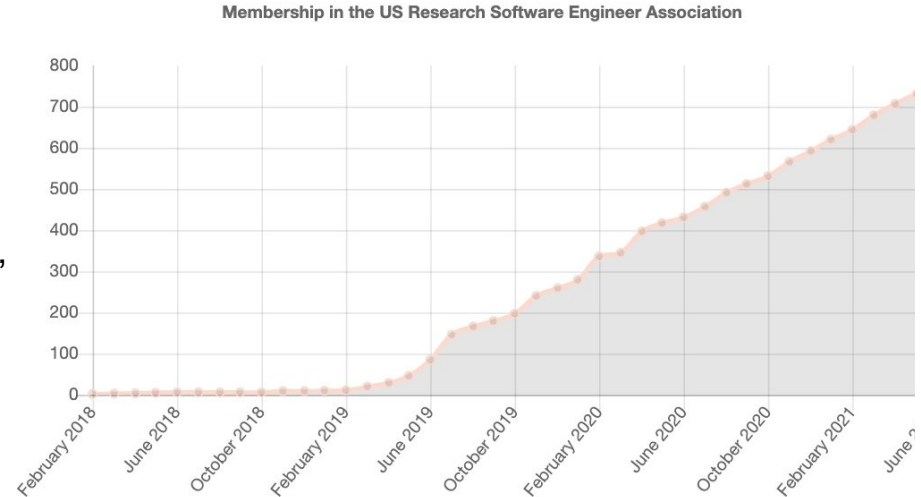Testing of FAIRness of data objects/tools in science gateways

Maturity indicator tests via science gateway allowing access to data objects

Looking into creating badges!

US-RSE

Membership growth influenced by
- Enthusiastic members to kick it off
- Workshops, Monthly Community Calls
  - Jumps in growth often after events (presentations at conferences, webinars, own events)
- Website
- Slack channel
- Newsletters
- RSE podcast
- Working groups
  - DEI working group
    - Speaker series
    - Book club
- Website

Membership in the US Research Software Engineer Association

https://us-rse.org/

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URSSI

URSSI Conceptualization Participation

5 co-PIs | **16** senior personnel | **9** advisory committee members

3 ethnographic studies

5 workshops
150 workshop attendees
90 institutions represented

30 winter school students
169 applications

47 public talks presented about URSSI

9 newsletters
36 blog posts

1200 survey participants from all 50 states + DC representing these areas

HUMANITIES, ARTS & DESIGN · ENGINEERING
EARTH, ENVIRONMENTAL SCIENCES & ECOLOGY
COMPUTER & INFORMATION SCIENCE · BUSINESS
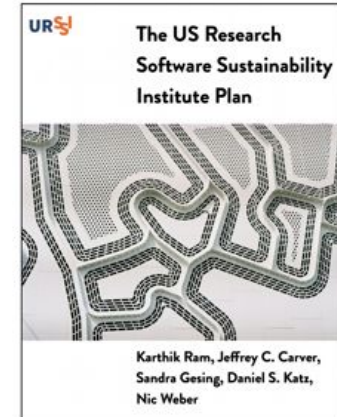LIFE SCIENCES · SOCIAL SCIENCES · EDUCATION
MATHEMATICS & PHYSICAL SCIENCES

URSSI Implementation Plan

Karthik Ram, Jeffrey Carver, Sandra Gesing, Daniel S. Katz, Nic Weber

2021-03-23

Welcome

The US Research Software Sustainability Institute Plan

Karthik Ram, Jeffrey C. Carver, Sandra Gesing, Daniel S. Katz, Nic Weber

This public document is a draft of the final URSSI plan. Empty sections are under internal review before being posted here.

https://plan.urssi.us/index.html

Breakout groups

Aim: Identify examples of best practice in developing FAIR/ sustainable research software

Time: 20 minutes

4 groups with specific topics in mind

Introduce yourselves, select a note taker, a time keeper and a reporter

Breakout groups

- Project Specific Software: software to do a computation using building blocks from the lower levels: scripts, workflows, computational notebooks, small special-purpose libraries & utilities. (Group 1 and Group 2 - Michelle Barker and Paula Martinez)
- Discipline Specific Software: tools & libraries and science gateways that implement disciplinary models & methods (Group 3 - Sandra Gesing)
- Infrastructure Software: libraries & utilities used for research in many disciplines / operating systems, compilers, and support code for I/O, user interfaces, etc. (Group 4 - Lorraine Hwang)

(3 minute report back afterwards)

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Q&A

Breakouts report

Conclusion

Discussion and progress on the topic will continue. Look at Resources section of the notes document.

Meeting highlights http://bit.ly/sm21takeaways