1. Discretionary Award - Open Research application
Reference number UNS118587
Applicant name Dr Michelle Barker
Title of application Discretionary Award - Open Research UNS118587

2. Application summary
Proposed duration of funding (months): 13 months (until 31 Dec 2021)

Proposed start date 30/11/2020

Are you applying through an organisation? Yes
Address where the grant will be held
Organisation: Code for Science & Society
3439 SE HAWTHORNE BLVD
Portland Oregon 97214-5048
United States

3. Lead applicant
Full Name Dr Michelle Barker
Organisation Research Software Alliance

4. Other participants
List any others who will be participating in this proposal (name and organisation). Provide a very brief outline of their role in the proposed activity.

The Research Software Alliance (ReSA) Steering Committee members will play a key role in the strategic planning for this work:

- Neil Chue Hong, Director - Software Sustainability Institute, University of Edinburgh, UK
- Catherine Jones, Energy Data Centre Lead, Science & Technology Facilities Council (STFC), UK
- Daniel S. Katz, Assistant Director for Scientific Software and Applications, National Center for Supercomputing Applications (NCSA), University of Illinois, USA
- Chris Mentzel, Executive Director, Data Sciences, Stanford Data Science Initiative, Stanford University, USA
- Karthik Ram, US Research Software Sustainability Institute (URSSI) lead, University of California, Berkeley, USA
- Andrew Treloar, Director, Platforms and Software, Australian Research Data Commons, Australia

It is proposed that Dr Michelle Barker, ReSA Director, be employed as the project director for this project, and that a community manager be recruited. Dr Barker will report to the ReSA Steering Committee. As ReSA Director, Dr Barker is a member of the FAIR For Research

Software Working Group[1] (FAIR4RS WG) Steering Committee, who the project director and community manager will support in this work. This Steering Committee will continue to be responsible for the development of the content of the FAIR4RS work, with this proposal providing project management. The FAIR4RS WG Steering Committee is comprised of:

Name	Gender	Institution/s	Country
Michelle Barker	Female	Research Software Alliance	Australia
Leyla Garcia	Female	ZB MED Information centre for life sciences	Germany
Daniel S. Katz	Male	University of Illinois at Urbana-Champaign	US
Neil Chue Hong	Male	Software Sustainability Institute / EPCC, University of Edinburgh	UK
Paula Andrea Martinez	Female	The University of Queensland / National Imaging Facility	Australia
Morane Gruenpeter	Female	Inria/ Software Heritage	France
Fotis Psomopoulos	Male	Institute of Applied Biosciences, Centre for Research / Technology Hellas / ELIXIR-GR	Greece
Jen Harrow	Female	ELIXIR-Hub	UK
Carlos Martinez-Ortiz	Male	Netherlands eScience Center	Netherlands

Dr Barker and the community manager will work with the FAIR4RS WG Steering Committee to ensure all milestones are reached, by providing leadership and support for the development of key documents and the extensive community consultation required.

Dr Barker's leadership will bring extensive expertise in open science, research software, digital workforce capability and digital research infrastructure. She is a former Director of the Australian Research Data Commons (ARDC), where she led the strategic planning for the Australian government's AUD$180 million, five-year investment in ARDC, and directed the AUD$40 million national research software infrastructure investment program. She recently chaired the OECD expert group on building the digital workforce for research and was a member of the OECD expert group on social-economic impact of research infrastructures.

ReSA's fiscal sponsor, Code for Science & Society, will provide administrative, legal, and tax support for salaries, as well as project strategy consultations. Code for Science & Society are a

[1] https://www.rd-alliance.org/groups/fair-4-research-software-fair4rs-wg

US-based 501(c)(3) nonprofit supporting open collaboration in public interest technology through fiscal sponsorship and other programs supporting sustainable open source.

I confirm that those named above have agreed to be involved, as described, in the proposed activity and are willing for their details to be included as part of this application.
Confirmed

5. Proposal summary (200 words)

Research software is a critical component of open research, and an increased focus on research software challenges will further the objectives of Wellcome Trust's Open Research programme to maximise research impact. The Research Software Alliance (ReSA) advances the vision that software is valued as a fundamental component of research. This proposal will support ReSA to bring research software communities together to collaborate on the advancement of research software, utilising application of the FAIR principles as a catalyst for this global endeavour.

This project seeks USD$157,250 to engage the research software community to apply the FAIR principles to research software. to achieve three aims:

1. FAIR4RS WG project direction to develop agreed FAIR for research software principles
2. FAIR4RS Roadmap leadership to map FAIR for research software projects into a longer-term strategic framework
3. People Roadmap to support the development of career paths and reward structures to complement the FAIR4RS Roadmap

This proposal will accelerate the development of an open research system that recognises and supports research software. This will provide researchers with the skills and resources to fully utilise research software, in a system where policy makers and funders value research software, and where organisations adequately reward staff with software expertise.

6. Details of proposal

Improved availability and use of all research outputs, including software, is needed to enrich the research enterprise and accelerate the delivery of societal and health benefits. The research challenges posed by COVID-19 is one of the many areas demonstrating the need to match the substantive efforts to increase open sharing of research data with similarly shared research software in both the health sector and beyond, as the benefits of open data cannot be fully realised without sustainable and reproducible software to analyse the data.[2]

[2] Pandemic response shines spotlight on coding in science (Times Higher Education); Barton et al., Call for transparency of COVID-19 models (Science); Chawla, Critiqued coronavirus simulation gets thumbs up from code-checking efforts (Nature).

The FAIR principles are generally viewed as an effective tool for advancing research outcomes in all disciplines, including the life sciences[3], and have been applied extensively to research data since their publication in 2016. With a 2020 OECD study showing that 25% of research produces new code, it is increasingly urgent to engage the research software community in working together to apply the FAIR principles to research software. This project will achieve that goal by enabling ReSA to facilitate and drive the major coordinating work in this field to achieve three objectives:

1. FAIR4RS WG project direction to develop community agreed FAIR for research software principles.
2. FAIR4RS Roadmap leadership to map existing FAIR for research software projects into a longer-term framework to improve strategic alignment and potential collaborators/leads for parts of the Roadmap.
3. People Roadmap to identify next steps in the development of the research software career paths and reward structures needed to complement the FAIR4RS Roadmap focus on infrastructure and standards development.

1. FAIR4RS WG project direction

The first aim of this proposal is to gain agreement on the application of the FAIR principles to research software by the international research software community, through coordination of the FAIR4RS WG. This is a critical first step for advancing recognition of research software, and the resulting adoption and implementation of FAIR research software principles will create significant outcomes for many stakeholders, ranging from increased research reproducibility for research organisations, to clarity for funders around their own requirements for software investments, and guidelines for publishers on sharing requirements. The outcomes of this work will be vital for initiatives like FAIRware by the Research on Research Institute, to ensure that research software is adequately integrated into funder expectations that researchers and institutions share data and related outputs in line with the FAIR principles. This cannot be achieved until the community agrees on the FAIR principles as applied to research software.

The FAIR4RS WG has been jointly convened as a ReSA Taskforce, RDA Working Group and FORCE11 Working Group, in recognition of the importance of this work for the advancement of the research sector. FAIR4RS WG is recognised in the EOSC FAIR Working Group's Six Recommendations for Implementation of FAIR Practice (2020) as the community forum for this work. This proposal will enable ReSA to ensure that the FAIR4RS WG completes the FAIR4RS WG project plan to deliver outputs developed with community support that define the FAIR principles for research software, and provide implementation guidelines and adoption examples. The FAIRsFAIR draft report on FAIRness of software (2020) strongly reinforces the importance of this work and includes as its third recommendation that "a large community forum MUST be

[3] Boeckhout, The FAIR guiding principles for data stewardship: fair enough?; FAIR4Health, Guidelines for implementing FAIR open data policy in health research; Wise et al., Implementation and relevance of FAIR data principles in biopharmaceutical R&D.

consulted when writing the [FAIR4RS] principles. This community forum MUST include stakeholders from different disciplines and with different roles, looking at software in all its aspects: as a tool, as a research outcome and as the object of research."

Creation of these outputs will require extensive community consultation but remains a volunteer effort of 135+ community members led by a 9 member Steering Committee. The first output due in November 2020 is already facing delays as the coordination of four subgroups involving 50 members is lagging as some subgroup leaders struggle to prioritise this work. This proposal would provide paid staff to work with Steering Committee members to ensure deadlines are met. The FAIR4RS WG is already engaging in more than a dozen community events in late 2020 to promote this work; this will increase when consultation begins on the principles in 2021. This will include both events that FAIR4RS WG convene directly, and FAIR4RS themed events that other organisations will facilitate[4]. ReSA has also applied for funding through Code for Science & Society to widen geographic inclusion in the consultation by translating key virtual workshops to engage Francophone Africa and Latin American communities.

2. FAIR4RS Roadmap leadership

The 2018 European Commission report, Turning FAIR into Reality, concluded that FAIR digital objects (including software) need to be supported by metrics, incentives, skills and FAIR services that provide persistent identifiers, metadata specifications, stewardship and repositories, actionable policies and Output Management Plans. Almost all of these are still to be created for software, to complement the significant FAIR data initiatives to improve use of research outputs, to increase reproducibility and to increase efficiency in research. The creation of these for software would maximise the impact of funders' investments in both research and open science, as both depend heavily on software.

This proposal will deliver Phase 1 of the FAIR for Research Software Roadmap. Phase 1 will identify key stakeholders in areas arising from the application of the FAIR principles to research software, to guide strategic planning and investment. Phase 1 will be developed through consultation with key organisational stakeholders to enable the following outcomes:

- Mapping of existing projects that look at applying some of the elements of the FAIR principles to research software[5] into a longer-term framework to improve strategic alignment and identify potential collaborators/leads for parts of the Roadmap.
- Identification of opportunities for existing FAIR data initiatives to incorporate a focus on FAIR research software.
- Identification of Roadmap elements that are specific (or that apply in a different way to) to research software and that have not been covered by FAIR data initiatives.

[4] These will include the Collaborations Workshop 2021 (CW21) and Workshop on Sustainable Software Sustainability (WoSSS).
[5] This includes projects listed in the Appendix of FAIR4Software reading materials.

Phase 2 of the Roadmap (the next phase, not funded under this proposal) will focus on implementation of the plan outlined in Phase 1. The Roadmap will enable the adoption and implementation of FAIR for research software to be fast-tracked in an efficient manner across the research community, with high-level coordination from its early stages to avoid duplication and divergent approaches. It will maximise investment outcomes, which is essential if FAIR for research software investments shadow the increasing FAIR data investments, such as the European Commission's €10 million, 3-year FAIRsFAIR initiative.

ReSA has begun preliminary consultation[6] to road-test the Roadmap approach and to identify existing work in areas such as FAIR software indicators, metrics, maturity models and certification; curriculums, competence centres and career profiles; certification of FAIR services; interoperability frameworks; etc. Progress in areas like this will fast-track the adoption of the FAIR software principles to support the significant cultural change needed across the research community to gain the benefits of recognition of a wider range of research outputs. Completion of Phase 1 of the Roadmap by mid-2021 will enable targeted work to begin on Roadmap elements after the finalisation of the FAIR for research software principles also complete in mid-2021.

To lead development of the Roadmap, ReSA will facilitate consultation with key organisations and programs including governments, disciplines and infrastructures, research organisations, research community organisations and publishers to identify potential partners in key areas. This will build on the efforts of organisations and initiatives that are leading the way to implement elements of FAIR principles for research software in their areas of focus.[7] Liaising with funders will also be a major part of this work, to encourage funders to align their future software investments with different parts of the Roadmap. This could align with Wellcome Trust's interests in working with other funders to develop consistent approaches to implementing and assessing FAIR, to embed expectation of FAIR principles in their grants.

This early draft of the Roadmap identifies a few players to illustrate the concept. After making initial contact with the initiatives to understand their focus and interest, this project would then aim to convene first meetings of major groupings to encourage self-organising of planning on how to apply the FAIR principles and to identify potential resources to undertake this work in Phase 2. A recent blog by Katz provides an exemplar of how a grouping on metadata could take shape through identification of the key issues not being addressed, and possible collaborations with key stakeholders. The aim of Phase 1 of the Roadmap is to empower these groupings to go forward with appropriate resourcing as part of Phase 2 of the Roadmap, to implement the Roadmap. Community engagement suggests that research software metrics is likely to be one of the first major groupings prioritised, involving groups such as Community Health Analytics

[6] FAIR4RS Roadmap workshops will occur at the RDA Plenary on 10 November and CODATA International Fair Convergence Symposium on 1 December 2020.
[7] FAIR4Software reading materials provides a list of some of these organisations.

Open Source Software (CHAOSS), eLife and the Netherland eScience Center. A life sciences disciplinary focus could also be an early grouping based on ELIXIR interests in this area.[8]

ReSA is uniquely situated to lead this work as the only international body both representing and coordinating across the breadth of the research software community. ReSA's analysis of the research software community landscape revealed a complex ecosystem, composed of a wide variety of organizations and initiatives to address the varied challenges in software productivity, quality, reproducibility, and sustainability. Collaboration and coordination across these initiatives is important, to enable the broader community to work together to achieve bigger goals.

3. Research Software People Roadmap leadership

This is envisioned as the people-focused piece to complement the FAIR4RS Roadmap. There is an overwhelming need for substantive change to research culture around career paths and reward structures to appropriately support the people who enable open research, including those who develop and maintain research software[9]. Research software community initiatives that focus on these issues are mostly grass-roots organisations and are not well connected to broader initiatives on policy change or development of the infrastructure that will support explicit recognition of varied research outputs.

ReSA will convene a series of online culture cafes (workshops) to facilitate connection of research software initiatives with broader strategic work to guide development of a collaborative approach to improving research software career paths and recognition, and to answer key questions such as:

- What is needed to advance recognition of Research Software Engineers (RSEs)? National RSE Associations have done excellent work to bring together a community of RSEs and promote their importance. How can this be leveraged and linked with similar efforts for Data Stewards to influence adoption of frameworks such as the San Francisco Declaration on Research Assessment (DORA) and the Hong Kong Principles for assessing researchers, and to accelerate policy change by policy makers, funders, publishers and research institutions?
- How can identification of issues related to software source code attribution by the RDA Software Source Code Interest Group and others[10] be factored into design of infrastructure to support new reward structures, such as the Knowledge Exchange

[8] Including ELIXIR's OpenEBench and Biohackathon - Europe (which has included a FAIR 4 software session since 2018) and ELIXIR support for work including Lamprecht et al., Towards FAIR principles for research software and FAIR4RS WG.
[9] OECD, Indicator frameworks for fostering open knowledge practices in science and scholarship; European University Association, 2019 Research Assessment in the Transition to Open Science; and SPARC Europe, Insights into European research funder Open policies and practices; Cosden, 5 Challenges Currently Facing the RSE Career Path.
[10] Alliez et al., Attributing and Referencing (Research) Software: Best Practices and Outlook from Inria; Milewic,Characterizing the roles of contributors in open-source scientific software projects; and Katz et al., The importance of software citation.

Openness Profile to allow evaluation of currently ignored contributions that are essential for Open Scholarship, and the Open Science Registry to share outcomes of pilots and other initiatives taken by different actors that specifically address the academic reward system? As the FORCE11 Software Citation Implementation Group encourages increased software citation, how will this translate into ORCiD profiles and be taken into account in recognition structures?

The Wellcome Trust Cafe Culture tools could be adapted for use, enabling expansion of Wellcome's research culture focus to include open research issues. The Cafe Culture tools are particularly useful in ensuring discussion identifies which stakeholders can make changes and how. Additionally, participating initiatives could also be empowered to run their own café cultures to catalyse local change whilst also contributing to international conversations, as encouraged by the Wellcome Trust Cafe Culture toolkit, to contribute to long-term sustainability of this work.

Project outputs

This proposal will deliver the following key outputs:

Strand	Output	Due date
All	Engagement plan detailing webinars, workshops and conference sessions to engage the community in developing these outputs throughout 2021.	28 Feb 2021
People Roadmap	Document reporting on the People Roadmap cafes convened from Feb-April 2021.	31 May 2021
All	Interim report	30 June 2021
Roadmap	Document mapping existing FAIR for research software projects into a longer-term framework as base for Phase 2, based on consultations Jan-June 2021.	31 July 2021
FAIR4RS	Document summarising a community-agreed definition of the FAIR principles for research software, for broad dissemination (including publication), based on consultations Jan-July 2021.	31 Aug 2021
FAIR4RS	Document providing FAIR4RS adoption guidelines validated by the community.	31 Dec 2021
All	External evaluation of impacts and learning arising of the project. Oct-Dec 2021.	31 Dec 2021
All	Final report.	31 Dec 2021

These projects align with the ReSA 3 year plan to bring research software communities together to collaborate on the advancement of research software.

7. Costs requested and justification

Select the currency in which you want to apply USD

Submit costs in the currency you think will best enable you to undertake the activity. This will probably be your local currency; if not, explain why not.

Is this your local currency? This is the currency of our fiscal sponsor, Code for Science & Society, who will administer the grant.

Are you requesting salaries?	Yes
Are you requesting materials and consumables?	No
Are you requesting equipment?	No
Are you requesting travel and subsistence?	Yes
Are you requesting miscellaneous costs?	Yes

Justification for resources requested

Justify these costs under each of the above headings (for example, "Salaries"; "Equipment"; "Miscellaneous").

Budget item	Cost (USD)
Salaries: ● Project director, part-time for 13 months (based on total compensation). Responsibilities include: ○ Project leadership ○ Reporting and reviews of project progress ○ Staff management ○ Liaison for community consultations that other organisations are facilitating to support FAIR4RS WG ○ Consultations with Roadmap stakeholders and facilitation of first meetings of major groupings ○ Leadership of People Roadmap consultations ○ Contracting of external evaluator ● Community manager, part-time for 13 months (based on total compensation). Responsibilities include: ○ Coordination of community consultation events that project is convening directly ○ Project management of FAIR4RS to ensure outputs are developed in time	$99,000 $29,500
Materials and consumables: n/a	$0
Equipment: n/a	$0

Travel: ● Event registration (mostly virtual) and possibly technical support for convening virtual events ● Travel ● Carbon offsets for travel Event registration will support community consultation at multiple online events. If COVID-19 restrictions do permit international travel again in 2021 then some travel may occur, as it will be valuable to engage in a limited number of face-to-face meetings to renew relationships after a long period of virtual meetings.	$3,250
Miscellaneous costs: ● Project evaluation: Subcontract an external evaluator to assess the impacts and learning arising from the project. ● Indirect costs (overhead) for ReSA's fiscal sponsor, Code for Science & Society - 15% of direct cost total. CS&S comprehensive fiscal sponsorship of projects includes the necessary financial and administrative support but also provides strategic guidance and in-depth collaboration on technical development, community growth, and support of other project activities.	$5,000 $20,512
Total	**$157,262 (~£120,750)**

8. Freedom to operate/conflicts of interest

Describe any freedom to operate or other intellectual property related issues that might affect your ability to carry out the proposed research and/or to use, share or commercialise the research outputs. Explain how you will address these. In particular, consider the following:

- Will your research use technology, software, databases, materials or patented inventions that are owned or controlled by others and which you do not already have written permission to use?
- Will the ownership, use, commercialisation and/or sharing of research outputs with the wider research community, be subject to agreements with commercial, academic or other organisations? This includes arrangements with collaborators named in this application.

No.

Describe any conflicts of interest which might affect your ability to carry out the proposed research and/or to share or commercialise the research outputs. Explain how you and your organisation will manage these and how you will comply with your organisation's requirements in relation to conflicts of interest. In particular, consider the following: Does anyone involved in your project hold any consultancies, advisory roles, or equities in, or directorships of, companies or other organisations that might have an interest in the results of your proposed research? Confirm in each case whether the conflict has been disclosed to your organisation.

ReSA Steering Committee members are involved in a number of advisory boards and steering committees for projects, journals and funders in the research software community, but this will not cause conflicts in performing the work or sharing the results.

9. Carbon offset for travel
Are you requesting costs to offset the carbon emissions involved in your travel?
Yes, in line with the Wellcome carbon offset policy for travel, any airline travel that is undertaken will include payment of the carbon offsets.
Are you requesting costs for alternatives to travel, so you can travel less?
This project utilises online meetings extensively. A small amount is requested towards travel, as if COVID-19 restrictions do permit international travel again in 2021 then it will be valuable to engage in a limited number of face-to-face meetings to renew relationships after a long period of only virtual meetings.

10. Wellcome Trust supported facilities - n/a

11. Additional information
Additional information in support of your application
If you would like to include additional information in support of your application, upload it here as a single PDF.