Resources for supporting policy change in research institutions in practice: A report from Subgroup 2 of the ReSA & RDA Policies in Research Organisations for Research Software (PRO4RS) Working Group

June 2024

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1 Introduction

Advocating for, initiating and supporting policy change can be a major challenge. This is especially true in large organisations with longstanding structures and complex operational models that have been established over, sometimes, many years or even decades. Even when the underlying landscape on which such structures are based has shifted, engendering change can still be a daunting undertaking.

As software has become an increasingly important element of research across almost all domains, there is a need for better recognition of the importance and value of software to modern research processes and outputs. This includes the need for research organisations to provide guidance and policies relating to research software, as part of the institutional change to more effectively support the sustainability and impact of research software that is now critical to the research enterprise. The Policies in Research Organisations for Research Software (PRO4RS) Working Group is helping to support this shift by developing examples and recommendations for institutional policies.

This report presents one of the outputs of the Policies in Research Organisation for Research Software (PRO4RS) Working Group, which is co-convened by the Research Software Alliance (ReSA) and Research Data Alliance (RDA). The report highlights the challenges that the working group is addressing and our motivation for looking at them. It then summarises a variety of existing resources relevant to different stakeholders.

2 Challenges and Motivation

There are many examples of how research software, and those who develop and maintain it, can increase research impact, including:

- Research Software Engineering Accelerates the Translation of Biomedical Research for Health by David Horsfall et al.
- Better Research Software Tools to Elevate the Rate of Scientific Discovery -- or why we need to invest in research software engineering by Joran Deschamps, Damian Nogare and Florian Jug

- Advocating for Equality of Contribution: The Research Software Engineer (RSE) (Heliophysics Decadal Survey 2024) by Rebecca Ringuette et al.

This scholarship strongly demonstrates the benefits of research institutional support for this critical part of open science, alongside support from other parts of the research ecosystem. However, there are also many discussions on the need for institutional leadership to provide better support, including The urgent need to make the value of open source visible and quantifiable to university leadership by Carlos Maltzahn. This reflects challenges such as the relative lack of existing policy-related activity in this space, and a lack of recognition or awareness of the need for policies relating to research software.

It is important to provide members of the research community with the opportunity to improve the quality of the software outputs in their institutions, and policy development and associated culture change is a key component in supporting this. The PRO4RS Working Group is also extending ReSA's list of policies that support research software in research institutions, to provide a range of examples.

3 Summary of key resources

While policies on research software are still rare in research institutions, this is an area that is developing rapidly and there are already a number of related resources that can offer important input to the work being undertaken by the PRO4RS Working Group. The resources that have been collated in the table below include articles and reports relating to existing policy activities, research processes and guidance on supporting or raising awareness of policy, or policy-related developments. For each resource in the table below, a link to the content is included along with a brief summary of the key contributions offered by the resource. The main stakeholders who the resource is considered to be of use to are then highlighted.

Resource	**Summary**	**Stakeholders**
Approaches to scaling up reproducibility in research organisations by Michelle Barker and Neil Chue Hong. 2024.	Whilst on reproducibility, the framework and guidance on how to influence change (summarised here) could be applied to any topic, including developing research software policies. The framework focuses on meso-level factors, such as groups, organisations and communities, to understand the role of research organisations and the people	Researchers, policy makers, research supporters (the framework had different levels, so it can be of use to stakeholders at those levels).

	within them. The framework can be used by a range of internal stakeholders with differing goals, such as institutional leaders seeking to align organisational strategies, or managers wishing to provide the support that staff in their part of the organisation may be seeking. The intention is also to enable dialogue between managers and researchers to create collaborative and sustainable solutions for a wider uptake of reproducible research practices.	
Evaluate your RDM Offering by Lauren Cadwallader, Alastair Dunning, Hardy Schwamm, Marta Teperek, Angus Whyte, Jonathan Rans. 2018.	This includes analysis of policy (and other areas) in an interactive online questionnaire that maps to a radar chart (downloadable at the end).	Policy makers in institutions, particularly universities that have research data management policy in place.
Guidelines for Raising FAIR Adoption in Health Data and Health-related Research Performing Organisations (HRPOs) by Celia Alvarez-Romero, Anupama E Gururaj, Kristan Kang, Shanmugasundaram Venkataraman, & Raising FAIRness in Health Data and Research Performing Organisations WG Members. 2023.	This provides very brief principles, steps and some resources to support the complex change needed to implement a data policy, which could also be applied to research software policy change.	Policy makers, specifically health research performing organisations.
How to Introduce and Implement Policy in Your Institution and Still Have Friends After by Danny Kingsley and Sarah	“Much of the work in the scholarly communication space involves advocacy – working with many levels of the institutional hierarchy.	This course is aimed at people in institutions that provide the support infrastructure for research – research IT areas, research

Shreeves, a FORCE11 Scholarly Communication Institute (FSCI) course. 2021, 2020, 2019.	This course discusses the practical aspects of developing policy and navigating it through an institution – a lengthy and complex process. Participants will consider who the stakeholders are within their institution and collectively will look at the perspectives they might bring to the discussion."	office administrative staff, librarians, policy writers, research/library information technology specialists.
Getting Attention and Bringing Others on Board: Applying Basics in Marketing and Communications to Advance Open Research by Jennifer Gibson and Rowena Walton, a FORCE11 Scholarly Communication Institute (FSCI) course. 2023.	This course connects open science advocacy with community building, positioning, and social marketing. It provides support from outside research organisations to people who are generating culture change within their organisation.	Individuals with the responsibility to promote and advocate for open research practices in the academic community, targeting faculty, students, librarians, publishers, administrators, and disciplinary communities. These may include librarians, community managers, start-ups, publishing staffers, and others.
Recommendations for the Implementation of Guidelines and Policies on Research Software Management by Helmholtz Open Science Office. 2019.	This is a specific and actionable resource for research software management policy development. This guide explicates the benefits of policy in this domain, implementation strategies, as well as outlining the possible content of such a policy document. The result is a comprehensive and informed perspective on research software management and how to support this work at research organisations.	People advocating for and creating research software management policies.

Research Software Policy: On the Road to Find Out by Dan Rudmann. 2023.	This resource is focused on research software policy creation and adoption within a university setting. It notes that community is key and consideration should be given to those who do not always participate/have diverse perspectives. It explains the importance of community building first, with https://researchsoftware.pubpub.org/ providing an exemplar.	Those who wish to start a process to create research software policy.
Rules for Radicals: A Pragmatic Primer by Saul Alinsky. 1971.	This identifies some key messages to enable change through community engagement and advocacy. Domain independent.	Community supporters/builders.
Strategy for Culture Change by Brian Nosek. 2019.	This identifies five requirements/stages to enable change to frame thinking about behaviour change. From making it physically possible to setting requirements (policy) for the desired outcomes	Those responsible for leading change or wishing to start a process to create policy.
The 8 Steps for Leading Change by John Kotter. 2021.	This model identifies 8 steps to lead change; from identification, through community building to change occurring. It is domain independent.	Those responsible for leading change programmes.
(the struggle) Towards an open source policy by Y.G. Grange, T. Jürges, T.J. Dijkema, R. Halfwerk, G.W. Schoonderbeek. 2019.	This is a useful paper for contextualising shared challenges, developing a framework for points of discussion, and understanding research software policy advocacy	Researchers and software engineers advocating for clarity and policies at their organisation.

	within a research organisation. This resource particularly deals with the issue of licenses for open software at a research organisation.	
Toolkit for Aligning Incentives 2.0 by Michael R Dougherty, Caitlin Carter, Erin McKiernan, and Greg Tananbaum. 2024.	This toolkit was developed to support the efforts of individuals who recognize the issues with the current academic rewards system and wish to address those issues through formal policy development, but don't know where to start in their research organisation. Page 6 includes a tip sheet on how to achieve change.	Researchers (as they are the agents of change at universities) and policy makers (specifically universities, as they are the ones who need to change the system of incentives).
Want to speed up scientific progress? First understand how science policy works by Matt Clancy, Dan Correa, Jordan Dworkin, Paul Niehaus, Caleb Watney & Heidi Williams. 2023.	A discussion on the different priorities and understandings of research organisation policies from the standpoint of researchers and administrators. This article seeks to find points of correspondence between the two stakeholder groups in order to enact culture change at a research organisation.	Researchers and librarians advocating for research software policies.

4 Conclusions and Next Steps

The resources identified in this report provide a range of approaches targeted at a variety of different stakeholders. These various models/lived experiences represent different approaches to tackling or addressing similar challenges and it is recommended that stakeholders looking to implement or benefit from the resources highlighted here choose the model that works best for them and their situation.

A common thread in the resources is to identify a key success factor, and then to identify the target community/stakeholders to engage, to enable organisational change. Policy is about

setting out the expected behaviours that are going to be rewarded (or should be deprecated) and supporting the necessary shift through procedural and behavioural changes. If there isn't any buy-in from stakeholders in these processes, then positive change won't happen.

Following on from this activity to collate a set of resources, the outputs from Sub Group 2 detailed in this report will feed into PRO4RS Working Group Sub Groups 3 and 4 which will undertake an analysis of existing policies and identification of areas where policies are lacking, respectively. The resources collated in this report will help to better understand existing approaches to research software policy and ensure that the PRO4RS Working Group can effectively develop the planned case studies in Sub Group 5 which will ultimately help to increase adoption of policies within research institutions.

If you'd like to stay engaged with this work, become a member of the PRO4RS Working Group. This will help you keep up-to-date with group activities, including opportunities to be involved. You can also receive updates through the ReSA newsletter. Please spread the word by sharing details of this work with peers, collaborators and institution management.