Global gathering of research software funders sets the agenda for supporting sustainable research software

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DOI https://doi.org/10.5281/zenodo.7350199

Figure 1. Carole Goble presenting “Research Software Sustainability Takes a Village”. Photo credit: Annelies Verhelst

Introduction

Funding organisations and those that support research software came together to explore how to effectively support both new and existing research software during the International Funders Workshop: The Future of Research Software. The crucial role of software in research is becoming increasingly apparent, as is the urgent need to sustain it and to invest in the people who develop and maintain it. Increased focus on research software will accelerate innovation, reduce information-sharing gaps, encourage innovation, and promote reproducibility, amongst other benefits.

This event was organised by the Research Software Alliance (ReSA) and Netherlands eScience Center and held on 8 and 9 November 2022 in Amsterdam, the Netherlands. This workshop also contributed to the process of drafting the Amsterdam Declaration on Funding Research

Software Sustainability. The Declaration, which is being developed, builds on actions undertaken by ReSA, research funding organisations, and the surrounding community to further develop awareness about the role funders can play in developing and sustaining software in the longer term.

This report explains how this event came about, its outcomes and next steps, including how to contribute to discussion around the Declaration.

Rationale

Research software has become an essential constituent of research and is now seen as an equal partner of research data in key international policy documents created by organisations such as UNESCO and the OECD. However, support and recognition of the importance of research software and the people who develop and maintain it, has failed to keep pace with the scale of use of research software in research. As the importance of research software has become increasingly apparent, so has the urgent need to sustain it. Funders can play a crucial role in this respect by ensuring structural support. Over the past few years, a variety of methods for sustaining research software have been explored, including improving and extending funding policies and instruments.

In 2020 the Research Software Funders Forum formed as a collaboration of funding organisations committed to supporting research software and those who develop it as fundamental and vital to research. It provides a formal mechanism for funders to share practices and consider how to address common challenges to achieve the significant cultural change needed across the research sector globally, and has been supported by the Alfred P. Sloan Foundation.

The idea arose of an international declaration as a first step to establish, on a global level, the basic principles and recommendations related to funding the sustainability of research software, including the people needed to achieve this goal. As Rob van Nieuwpoort, Director of Technology at the Netherlands eScience Center, succinctly explained the crucial role of research software during the workshop: without software researchers cannot build and operate scientific instruments; model climate change, ecosystems, human bodies, virus outbreaks, social interactions, inequality, etc.; process research data; or automate, share, reproduce and reuse research methods. For the purpose of the Declaration, research software is defined as source code files, algorithms, scripts, computational workflows and executables that were created during the research process or for a research purpose.

Workshop details

ReSA and the Netherlands eScience Center hosted a two-day international workshop to set the future agenda for national and international funders to support sustainable research software. More than 60 representatives from 45 organisations attended the workshop, engaging in this opportunity to influence global discussions to draw due attention to a shared belief in sustainable research software, and explore how they can effectively contribute to making research software sustainable.

This workshop marks a further step in the development of the research software community. As Neil Chue Hong, Director of the Software Sustainability Institute, noted:

> "Ten years ago, I could never have imagined that a workshop like this would be possible. Open data had just been coined as a term. The visibility of software as part of the research ecosystem in the wider community was minimal, despite many large programmes funding research software in the 1990s and 2000s. But since then the Carpentries has taught workshops on all seven continents, a new professional society for Research Software Engineers has been born, and research software is everywhere. This has been amazing."

Videos and slides are available of all of the keynotes: Daniel S. Katz, Chief Scientist at the National Center for Supercomputing Applications (NCSA) and Research Associate Professor in Computer Science at the University of Illinois at Urbana-Champaign, USA, and Carole Goble, a Professor of Computer Science at the University of Manchester, UK, set the scene to enable attendees to form a better common understanding of the place of research software. Joeri van Leeuwen, Senior Astronomer at the Netherlands Institute for Radio Astronomy (ASTRON), Netherlands; and Fabio Kon, Special Advisor, São Paulo Research Foundation (FAPESP), Brazil, shared their researcher and funder perspectives (respectively), thoughts on why and how to care about research software and the people who develop and maintain it, and ideas for how to better recognise their importance.

Outcomes

A key observation about this workshop was that many participants attended because they want to change things, and have a genuine interest in understanding how to fund software even if their experience varies considerably. When this workshop was being organised, it was clear that there was wide diversity in the way that research software is supported and funded across the world, and across different communities and disciplines. This is more than just the size of budgets, it is also about where the programmes are situated; whether specifically focused on

research software, as part of open science, research data, open source software, etc.; and also what they target.

This workshop helped participants understand what they have in common, and what still separates them, and included extensive discussion across four breakout sessions on a number of key questions:

1. **How could research software be integrated better into (open science) funding policies**? The discussion was wide ranging, covering the language and audience of the Declaration and the challenges around assessment of implementation. There was a desire to ensure that ethics, environmental sustainability; and that diversity, equity and inclusion are not lost or assumed.

2. **How can funding instruments better support research software?** There was a strong feeling that the time was right to understand what needs to change, and for funders to work together to create policies for funding research software. It was acknowledged that international collaboration is needed because while funders typically work in a national or regional scope, research software is global.

3. **What cultural changes are required, particularly around rewards, recognition, and assessment?** It's clear that many funders are already working to recognise software by allowing researchers to better demonstrate their experience and expertise. A wide set of roles and career pathways in research software is needed, including technical specialists, but also community managers and knowledge transfer expertise. Funders should ensure that these and other roles can be included in funding requests

The workshop breakout session utilised these topics to discuss the content of the Declaration and next steps for its adoption. The resulting input will be used to create the next iteration of the Declaration and the adoption plan. There were also many ideas related to the implementation of the Declaration, which could be released as a toolkit. 10 simple rules for funding scientific open source software (Strasser, et al. 2022) provides a valuable summary of the subject, and ReSA's Overview of research software funding landscape (Barker & Katz 2022) provides examples of a range of funding instruments.

Next steps

Drafting of the Declaration will now continue; if you'd like to be kept up to date and potentially be involved in this process then email amsterdamdeclaration@esciencecenter.nl to request to be sent subscription details when available.

Funders of research software can also join the ReSA Research Software Funders Forum and any of its working groups, which are currently exploring three areas: a multilateral funding call for research software, funder implementation of the FAIR for Research Software Principles (Chue Hong, et al. 2022) and sustainable and co-ordinated funding approaches.

Neil Chue Hong provided a compelling summation at the end of the workshop of the current situation:

> "There is a common crisis: software is critical to research, and the current mechanisms we have for supporting it will not work long-term. Some countries and disciplines are better prepared because of historical reasons and privilege. But research software is global in scale. Consideration of equity, diversity and inclusion, ethics, and environmental impact, will be key to ensuring that this Declaration has traction. I am profoundly convinced that we can move forward through collaboration and coordination. The workshop has now finished, but it's just the start for the Declaration. Let's use this momentum to change research software for the better."