Editorial

Code sharing in the spotlight

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The Year of Open Science has highlighted the importance of sharing the code associated with peer-reviewed manuscripts. We at *Nature Computational Science* provide support — via policies and implementations within our submission system — to facilitate this task.

Earlier in January, the White House Office of Science and Technology Policy (OSTP) declared that this would be the Year of Open Science, delineating a series of actions across the federal government to advance the national open science policy[1,2]. As part of its policy guidance, the OSTP determined that federal agencies should develop new or update existing public access plans to ensure that the scientific data underlying peer-reviewed scholarly publications — resulting from federally funded research — are made freely available and publicly accessible at the time of publication. Making research processes and products reproducible would become a priority — and not just a mere recommendation — across more than 15 federal agencies, including the National Institutes of Health (NIH), the National Aeronautics and Space Administration (NASA), the Department of Energy (DOE), the Centers for Disease Control and Prevention, and the National Science Foundation, among others.

Since then, agencies have made their updated plans publicly available or published opportunities for public comment, as well as taken action to promote open science across various fronts. Notably, the NIH Policy for Data Management and Sharing went into effect, requiring the submission of a data management and sharing plan for NIH-funded or conducted research that maximizes the sharing of scientific data and ensures the reproducibility and reliability of research findings[3]. The NIH is also collecting feedback from the research community on best practices for sharing computer code and executables[4], in an effort to better support research software sharing. NASA has released the Transform to Open Science initiative to develop incentives for and to increase the adoption of open

science practices. It is worth noting that the agency has also been requiring sharing of data and software since last year[5]. The DOE's Office of Scientific and Technical Information has started to offer support for assigning and using persistent identifiers (PIDs) for data and software, in order to facilitate reuse of research outputs, to provide appropriate credit through citation, and to foster the longevity of the reproducibility of the scientific results.

Undoubtedly, these plans have been raising awareness of the importance of data sharing for the reproducibility of research findings. In particular, the clear mention of software in many of these policies is a refreshing reminder of the crucial role that computer code plays in science and in ensuring reproducible results within different domains.

Nature Computational Science has been focusing on the sharing of the software associated with published manuscripts since our launch in January 2021. Essentially, this means that our editorial policies ensure that authors funded by the aforementioned federal agencies can be straightforwardly compliant with sharing policies. For instance, our journal requires authors to make their code available — unless there are justifiable reasons not to do so — via public repositories, such as GitHub or GitLab, or via Code Ocean, a cloud-based platform that provides researchers with an easier way to share executable code. At the time of publication, we also require authors to deposit their code in a PID-minting repository — if they have not done so already — and to cite the code with its persistent identifier within the manuscript, which echoes the DOE's efforts discussed earlier.

Last year, we took our commitment to support open research practices one step further by partnering with Code Ocean and integrating sharing and peer review of code within our submission system. Ultimately, the goal is to make it easier for authors to provide the details on how to access their code, to deposit code to Code Ocean if they choose to do so, and to publish and cite their code with a PID; for reviewers, the integration aims to facilitate the code peer review process. One year later, we are happy to report that the integration has been going strong, with every primary

research article since then reporting — within our systems and via PIDs — details about the associated code, 40% of the manuscripts choosing to use Code Ocean for code sharing, and nearly 30% of the referees helping us to verify the extent to which results are reproducible and the level at which code is complete and reusable.

It is worth mentioning that we are not the only ones developing policies to mandate code deposition. In addition to other Nature Portfolio journals — such as *Nature Machine Intelligence* — journals at other publishers have also started to require code sharing to improve reproducibility and increase understanding of research. An example is *PLOS Computational Biology*, which introduced its mandated code sharing policy in 2021.

It goes without saying that we will continue to improve our editorial policies and processes to ensure that our authors can be compliant with their funder requirements and that their scientific results are reproducible and reusable by the research community. With that in mind, we will soon be integrating Figshare into our manuscript system in order to facilitate data sharing and deposition, following the successful implementation of this effort at other Nature Portfolio journals. As we move towards an increasingly open science world, we hope that our policies and integration strategies will help to improve open research practices and provide effortless support to all of our authors.

References

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