Health Research Alliance

KEY IDEAS

NASEM ToolKit for Fostering Open Science Practices
Proceedings of a workshop, 2021

National Academies of Sciences, Engineering and Medicine (NASEM)'s

Toolkit for Fostering Open Science Practices

This Toolkit, created by members of the NASEM Roundtable on Aligning Incentives for Open Science, was designed to help funders, universities and others accelerate the pace of discovery by promoting open science.

Appendix C: Toolkit Elements

Appendix C: Toolkit Elements enumerates six specific "tools" presented as individual chapters, linked to below.

I. Open Science Imperative. This essay compellingly communicates the benefits of open science.
II. Open Science Signaling Language Template and Rubrics. These resources provide specific language that can be adopted and adapted to signal that your organization values open science activities at points of high leverage (e.g., grant applications, progress reports, final reports, job postings, promotion/tenure, etc.).
See below for examples of potential application questions, and one example of an application stage rubric.
III. Good Practices Primers. These concise guides offer policy makers a high-level overview of open sharing, including recommendations on sharing Data, Protocols & Preregistration Analysis Plans, Registered Reports, and Software and Code.
IV. Open Science by the Numbers Infographic. This infographic communicates the benefits of open science in a graphic form.
V. Open Science Success Stories Database. This searchable database compiles research articles, perspectives, case studies, news stories, and other materials that demonstrate the myriad of ways in which open science has benefited researchers and society alike.
VI. Reimagining Outputs Worksheet. This table enumerates the range of research products stakeholders may choose to consider as they develop open science policies.

Open Science Signaling Language: For Grant Applications and Progress Reports

Question 1: Foundation XYZ values the open sharing of research outputs. If applicable, describe
(1) instances where you have engaged in "open" activities (such as making articles open access and sharing data/code according to FAIR principles [Findability, Accessibility, Interoperability, and Reuse of digital assets])
(2) examples of how *your* open research outputs have been used *by others* in your discipline, in other disciplines, and/or outside of academia (include DOIs if possible)

Question 2: For each of the categories below, provide r*epresentative examples* demonstrating how you have made research outputs openly accessible. If possible, provide the DOI and license terms under which the materials are available. It is also important to include negative and null results, which could be covered in a variety of information formats.

- Open access articles
- Open access books, book chapters, and/or monographs
- Copies of your papers, chapters, monographs, or other published materials in institutional or disciplinary repositories
- Preprints
- Datasets
- Software/Code
- Materials/Reagents
- Preregistration plans
- Other outputs (please describe)

Question 3: Enumerate your plans to engage in open activities in the future.

Question 4: Describe any impact your openly available research outputs have had from the research, public policy, pedagogic, and/or societal perspectives.

Rubrics to Evaluate Open Science Behavior:

Chapter II, Open Science Signaling Language Template and Rubrics contains four rubrics (displayed as 8 tables). The rubrics have language pertaining specifically to articles, data, and other forms of research outputs at both application and reporting stages. Tables 1 (application stage) & 2 (reporting stage) ask about ALL research outputs, specifically highlighting articles, data and code. Tables 3 & 4 (application and reporting stage respectively) ask about behavior with respect to articles, and Tables 5 & 6 evaluate data sharing behavior. Tables 7 & 8 ask about other research outputs, beyond sharing articles and data.

Table 1 Combined Version – Application Stage Rubric *(Abbreviated version - see original rubric for complete text, including specific activities and frequencies applicable to Beginning, Developing, Accomplished, and Exemplary categories*

Application Stage	Beginning	Developing	Accomplished	Exemplary
Describe when you have engaged in "open activities*"	The applicant has **not** engaged in open activities* recently *(<5 years).*	The applicant has **occasionally** made some recent research *(<5 years)* available openly for access and reuse and demonstrates some good open science hygiene.**	The applicant has **frequently** …	The applicant has **consistently** …
Provide examples of how your open research outputs have been used by others in and outside of your discipline. Provide DOIs, if possible.	The applicant **cannot provide evidence** that any of their recent (<5 years) open research outputs have been used by others.	The applicant can provide evidence that **at least one** of their recent (<5 years) open research outputs has been used by others.	The applicant can provide evidence that **some** …	The applicant can provide evidence that **a wide range** has been used… and/or fewer outputs have been used deeply.
Enumerate your plans to engage in open activities in the future.	The applicant **has not** articulated a clear plan.	The applicant has articulated a clear plan to make **some** outputs openly available.	The applicant has articulated a clear plan to make **most** outputs openly available.	The applicant has articulated a clear plan to make **all appropriate** outputs openly available.

*"Open activities" include making articles, data, and other research outputs openly available for access and reuse and sharing data/code according to FAIR principles.

** Good "open science hygiene" includes use of DOIs, ORCID iDs, Creative Commons licenses.

Additional Resources

- NASEM's Roundtable on Aligning Incentives for Open Scholarship, a multiyear project bringing together universities, federal agencies, nonprofits, and other organizations, to rethink research evaluation and better incentivize openness. The ORFG serves as the operational lead for the Roundtable.
- Open Scholarship Priorities and Next Steps: Proceedings of a Workshop–in Brief (2022)