

## Implementing Open Science Principles through Research Partnerships

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### Abstract:

*The paper highlights partnership initiatives underway by the Association of Research Libraries (ARL) to apply the recommendations in the U.S. National Academies of Sciences, Engineering, and Medicine’s “Open Science by Design” to research and library partnerships. It presents several initiatives including (1) the partnership on research data management policy implementation with the Association of American Universities (AAU) and the Association of Public and Land-grant Universities (APLU); (2) partnering with scholarly societies and research communities on a shared agenda to move towards open scholarship; and (3) strategic collaborations within institutions to advance research integrity as scholarship and information transform.*

*Following a 2018 workshop on public access to research data—attended by 30 institutional cross-functional teams from US and Canadian universities, and sponsored by the National Science Foundation—ARL, AAU, and APLU agreed to work with the institutional teams on FAIR data implementation within and across institutions of higher education. This paper will highlight the specific areas we are focused on, progress to date, and next steps.*

*In 2018 ARL and the Social Science Research Council (SSRC) convened several scholarly societies in the social sciences, resulting in five projects among research community stakeholders to advance open scholarship. The report can be found [here](#). In 2019 the Association will work with societies in STEM fields on developing guidance on research data appraisal and retention, and with societies in the Humanities on aligning digital stewardship guidelines with scholar-created evaluation guidelines. The paper will highlight the principles behind these efforts, and the opportunity presented by bringing together scholars, societies, research libraries, library publishers, university presses, and investors.*

*Ultimately, the value of research is judged on its integrity, its dissemination and reuse. As collaborative partners, research libraries are integral to knowledge creation and barrier-free and*

*enduring access to information. The paper highlights emerging roles and types of institutional partnerships as research libraries transform with the changing conditions of scholarship.*

*The paper concludes with a reflection on where we are in partnerships for open science, and what we seek to achieve in the next 2–3 years.*

**Keywords:** Open Science, Research Partnerships, Research Integrity, Stewardship

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## 1 INTRODUCTION

The Association of Research Libraries (ARL) is a membership organization of 124 research libraries in Canada and the United States, including academic, national, and public institutions. ARL’s mission is to advance research, learning, and scholarly communication by fostering the open exchange of ideas and expertise, promoting equity and diversity, and pursuing advocacy and public policy efforts that reflect the values of the library, scholarly, and higher education communities. Comprised of leaders, the ARL is a catalyst for action.

The Association’s 2019–2021 Action Plan<sup>1</sup> focuses on library leadership at the nexus of research institutions and their policies, public policy, and critical changes occurring in the research and learning community. One of our priorities is to advance collective efforts to achieve enduring and barrier-free access to information in partnership with the scholarly community.

This paper highlights three partnership initiatives underway to accelerate the amount of high-quality scholarship openly available, improve the institutional policy environment for sharing research data, and transcend institutional boundaries and geographic borders through direct engagement with the scholarly disciplines. Together these objectives apply some of the recommendations of the US National Academies of Sciences, Engineering, and Medicine (NAS) report *Open Science by Design* to research and library partnerships.<sup>2</sup> ARL’s partnerships include the following:

1. Strategic collaborations within institutions to advance research integrity, as scholarship and information transform and research processes become more visible on the network
2. A partnership on research data management policy implementation with the Association of American Universities (AAU) and the Association of Public and Land-grant Universities (APLU); and
3. Working with scholarly societies and research communities on a shared agenda to move towards open scholarship

This paper concludes with a reflection on where we are in partnerships for open science, and what we intend to achieve in the next two to three years.

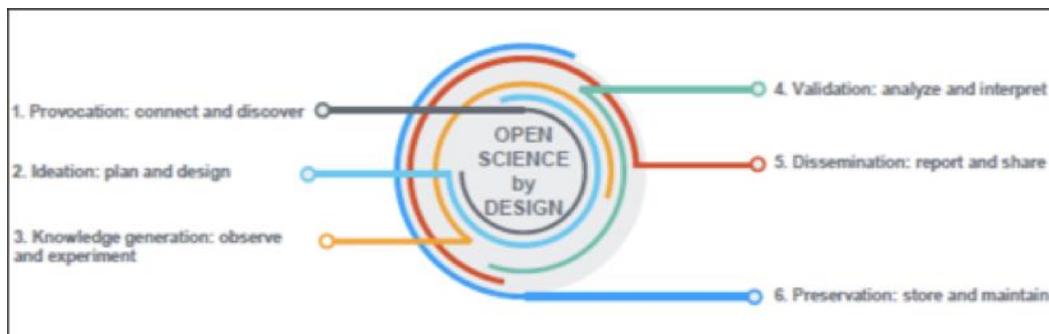
## 2 OPEN SCIENCE BY DESIGN: SIGNIFICANCE AND MANDATE

In 2017 the NAS appointed an expert committee to “evaluate more fully the benefits and challenges of broadening access to the results of scientific research, described as ‘open

science,”<sup>3</sup> based on the premise that openness and sharing of information are fundamental to the progress of science and to the effective functioning of the research enterprise. The committee report marks an important inflection point in the US open science movement.

The committee issued six principles mapped to phases of the research life cycle in the *Open Science by Design* framework:

1. Provocation: explore or mine open research resources and use open tools to network with colleagues
2. Ideation: develop and revise research plans and prepare to share research results and tools under FAIR principles
3. Knowledge generation: collect data, conduct research using tools compatible with open sharing, and use automated workflow tools to ensure accessibility of research outputs
4. Validation: prepare data and tools for reproducibility and reuse and participate in replication studies
5. Dissemination: use appropriate licenses for sharing research outputs and report all results and supporting information (data, code, articles, etc.)
6. Preservation: deposit research outputs in FAIR archives and ensure long-term access to research results<sup>4</sup>



**Figure 1:** Phases of open science by design in the research life cycle.<sup>5</sup>

Based on these six principles, the *Open Science by Design* report made five recommendations:

1. Research institutions should work to create a culture that actively supports Open Science by Design by better rewarding and supporting researchers engaged in open science practices. Research funders should provide explicit and consistent support for practices and approaches that facilitate this shift in culture and incentives.
2. Research institutions and professional societies should train students and other researchers to implement open science practices effectively and should support the development of educational programs that foster Open Science by Design.

3. Research funders and research institutions should develop policies and procedures to identify the data, code, specimens, and other research products that should be preserved for long-term public availability, and they should provide the resources necessary for the long-term preservation and stewardship of those research products.
4. Funders that support the development of research archives should work to ensure that these are designed and implemented according to the FAIR data principles. Researchers should seek to ensure that their research products are made available according to the FAIR principles and state with specificity any exceptions based on legal and ethical considerations.
5. The research community should work together to realize Open Science by Design to advance science and help science better serve the needs of society.<sup>6</sup>

As a result of the report and further conversations with ARL member representatives, research and learning community partners, and some of the Open Science by Design expert committee members, ARL prioritized its work to advance the recommendations in partnership with other members of the research and learning community.

### 3 HOW ARL ADVANCES OPEN SCIENCE

ARL focuses its programs and initiatives on the intersection of institutional, public policy, and research and learning community relationships that determine research policy and practice, and more specifically the role of research libraries in advancing both.



Figure 2. ARL Action Plan Infographic.

Given this context, ARL identified where collectively and in partnership with others we could make the greatest difference. Our focus over the next two to three years is on advancing recommendations 3 and 4, as we assess meaningful steps we might take to advance recommendations 1, 2, and 5.

### 3.1 Scholarly Societies

Research funders and research institutions should develop the policies and procedures to identify the data, code, specimens, and other research products that should be preserved for long-term public availability, and they should provide the resources necessary for the long-term preservation and stewardship of those research products.

—Open Science by Design recommendation 3

ARL works with scholars, societies, research libraries, library publishers, university presses, and funding agencies, using its convening capability to explore how these stakeholders can work together to advance open, equitable scholarship. In 2018 we began this work in the social sciences, relying on the very disciplines that routinely critique institutions and social relationships to bring a critical gaze to scholarly communication itself. In 2019–2020 the Association is working with societies in STEM fields on such open science priorities as developing guidance on research data appraisal and retention, and with societies in the humanities on aligning digital stewardship guidelines with scholar-created evaluation guidelines.

Fundamentally, the principles behind this work are:

- The Academy owns the results of its research.
- Research libraries are critical partners in advancing access to and preservation of scholarly research.
- Stewardship decisions should be based on a combination of good digital practice and good science.
- Professional societies convene disciplines, and disciplines transcend institutions.

In 2018 ARL and the Social Science Research Council (SSRC) held an invitational workshop on open scholarship in the social sciences. Leaders of scholarly societies, funding organizations, academic research libraries, and academic publishers identified projects that could be initiated now in order to advance open scholarship and simultaneously strengthen relationships across stakeholder communities. ARL and SSRC issued a report that describes the presentations given and the themes that emerged in discussion around shared interests, challenges to openness, and conditions for successful action.<sup>7</sup>

Five projects were identified at the ARL-SSRC workshop, and are in various stages of development, with leadership identified for each from across the stakeholder groups. After releasing the report in January 2019, project leads spent several months on scope and identification of additional partners and collaborative opportunities.

### 3.1.1 Explore Scholarly Society Finances by a Trusted Third Party

One project—to conduct an authoritative exploration of scholarly society finances by a trusted third party, as the basis for financial and business model conversations with societies and external stakeholders—directly responsive to the NAS *Open Science* report’s first recommendation. With significant pressure on scholarly society budgets, particularly with respect to funding models for open access and the implications for their overall financial sustainability, the project aims to identify the shifts that could be made to create alternative financing models and stakeholder investment for scholarly societies.

**Status:** We are identifying collaborators and defining scope.

### 3.1.2 Commission a paper on the role of scholarly societies and scholarly affiliation in a post-subscription environment

Beyond the financial model, scholarly societies must take into account broader research community changes such as the adjunctification of faculty, increasing engagement through social media, and the ongoing discussions on peer review. This commissioned paper will focus on the early-career researcher and their perspectives on society membership and other forms of professional sociality in order to inform how scholarly affiliation might evolve in the coming years.

**Status:** ARL has commissioned a study of scholarly affiliation among early career researchers in Canada and the US, to be published in December 2019.

### 3.1.3 Conduct a case study pilot on linguistics promotion and tenure (P&T)

The traditional criteria for P&T need to be reevaluated to better reward the way work is being done and to better reflect the values of the researchers and scholars doing that work. Linguistics is considered a very good field for a pilot program to examine what new disciplinary criteria might be because there is a longstanding commitment by linguists to open access, because the field itself is small but highly interdisciplinary, because at least some departments (such as at UC San Diego) are already beginning to rethink P&T, and because there are many high-profile linguists and departments that can be comparatively easily engaged.

**Status:** This work is converging with a US National Academies Roundtable on Aligning Incentives for Open Science.<sup>8</sup>

### 3.1.4 Explore implementing peer review in SocArXiv and PsyArXiv

A number of US preprint servers emerged in 2016–2017—many of them available freely through the Center for Open Science.<sup>9</sup> This project between SocArXiv and PsyArXiv is to further discuss and report on peer review system considerations such as providing scoring or annotation of different aspects of a preprint, as well as tagging items that are available for review by crowdsource, and the associated benefits to institutions, departments, scholars, and communities.

**Status:** Planning is underway.

### 3.1.5 Assess the value of the reporting relationship between university presses and university libraries

Academic research libraries and university presses are in new reporting relationships, with 35 ARL member representatives directly responsible for the university press at their institutions. In general these changing relationships are due to economic pressure on university budgets. The new reporting relationship brings together two very different cultures yet both cultures aim to increase access to and dissemination of research. Each year the members of this community meet at a Presses to Libraries (P2L) event co-sponsored by ARL and the Association of University Presses to discuss cultural and financial models aimed at ensuring there is an ongoing benefit to scholarship and the academic institutions that support them.

**Status:** This year's P2L theme is "A world not dependent on sales: sustainable, equitable OA monograph publishing." More specifically, we will initiate a conversation about the impact of the reporting relationship in the context of the benefit to scholarship and the academic institutions—particularly as it relates to open science.

## 4 OPTIMIZING THE INSTITUTIONAL POLICY ENVIRONMENT FOR DATA SHARING

Funders that support the development of research archives should work to ensure that these are designed and implemented according to the FAIR data principles. Researchers should seek to ensure that their research products are made available according to the FAIR principles and state with specificity any exceptions based on legal and ethical considerations.  
—Open Science by Design recommendation 4

Following a 2018 workshop on public access to research data—attended by 30 institutional cross-functional teams from Canadian and US universities, and sponsored by the National Science Foundation (NSF)—ARL, AAU, and APLU agreed to work with the institutional teams on FAIR data implementation within and across institutions of higher education.

The three associations are organizing a follow-on workshop that will reconvene the 30 institutional cross-functional teams to review their progress to date, to map key elements needed to ensure research data sharing to existing institutional policies, to review roles and responsibilities, and to develop strategies and messages for talking with associate deans for research or department heads who are responsible for institutional policy implementation. Along with the work on research data policies, ARL will work with research libraries to adopt FAIR principles throughout the research life cycle, in support of the broader set of open science principles.

Within the public policy arena, ARL is working with the US Office of Science and Technology Policy (OSTP) to identify how the work on research data policy can advance their priorities, particularly as they relate to reducing the administrative burden to institutions in implementing federal funding research data policies.

## 5 RESEARCH INTEGRITY

Ultimately, the value of research is judged on its integrity, its dissemination, and its reuse. Under dramatic changes in the research ecosystem, research libraries need to assess their role as a collaborative partner in ensuring research integrity throughout the research life cycle. As such, we need to partner with members of the research and learning community with a rigorous focus on research integrity as it relates to the six *Open Science by Design* principles.

By focusing specifically on the principles, ARL provides avenues for leaders in research libraries, research institutions, public policy, and the broader research and learning community to convene and act. Specifically we:

- Inform and convene our member representatives and the broader research and learning community on critical topics related to research integrity
- Deliver formal professional development programs through the ARL Academy
- Advocate for research libraries and research integrity, particularly to US public policy makers and usually as part of broader coalitions
- Engage with other research library associations in the United States and internationally
- Understand and communicate the ways in which research libraries contribute to research and learning outcomes and impact

While ARL is intentionally looking at research integrity in the context of research data management, licensing transparency, accessibility, and preservation, and while participating in sharing knowledge about open tools, there is a lot more to be done.

Furthermore, research integrity will depend on the work underway by others to advance recommendations not central to the current work of ARL. While we are not leading on any of these recommendations, we collaborate and engage as makes sense. Future emphasis will be on recommendation 2: “Research institutions and professional societies should train students and other researchers to implement open science practices effectively and should support the development of educational programs that foster Open Science by Design.” Specifically we will look at the research libraries’ role to date (which has been significant), and design professional development, including workplace experiences that support student and researcher open science practices as they relate to data science. The investigation into how we can advance open science practice more systematically is part of our Action Plan for 2020.

## 6 CONCLUSION

ARL and other research library associations have a long history of working with public policy makers and the research and learning community to advance enduring and barrier-free access to information. Within the United States that work has become even more intentional with the *Open Science by Design* report and recommendations.

By collaborating with associations of higher education, national agencies, scholarly societies, university presses, and funders, ARL seeks to catalyze systemic change that advances open science along each of the principles—further demonstrating the critical role of research libraries as collaborative partners in the research life cycle. We have just started on our 2019 Action Plan with initial steps underway, but no definitive results yet.

Over the next two to three years we will advance open science in our public policy advocacy, in our work with the research and learning community, and in our work to inform and support our member representatives who collaborate with other institutional leaders in implementing open science. Concretely our work will take the shape of public policy comments and legislative input, convenings and projects with the research and learning community to advance shared goals, standards and proven practice-sharing among members, and various forms of information sharing among key stakeholders—particularly highlighting impact stories and key statistics.

We look forward to sharing our work and collaborating with others.

## References

- 1 “Our Priorities,” Association of Research Libraries, accessed May 29, 2019, <https://www.arl.org/our-priorities/>.
- 2 National Academies of Sciences, Engineering, and Medicine, *Open Science by Design: Realizing a Vision for 21st Century Research* (Washington, DC: The National Academies Press, 2018), <https://doi.org/10.17226/25116>.
- 3 National Academies, *Open Science by Design*, viii.
- 4 National Academies, *Open Science by Design*, 4–6.
- 5 National Academies, *Open Science by Design*, 5.
- 6 National Academies, *Open Science by Design*, 7–13.
- 7 Meeting Planning Committee, ARL-SSRC Meeting on Open Scholarship in the Social Sciences: Summary and Next Steps (Washington, DC: ARL and SSRC, January 25, 2019), <https://www.arl.org/resources/arl-ssrc-meeting-on-open-scholarship-in-the-social-sciences-summary-and-next-steps/>.
- 8 “Project Information: Roundtable on Aligning Incentives for Open Science,” National Academies of Sciences, Engineering, and Medicine, accessed May 29, 2019, <https://www8.nationalacademies.org/pa/projectview.aspx?key=51293>.
- 9 Center for Open Science website, accessed May 29, 2019, <https://cos.io/>.