

Toward a New Precedent in Open Grants: An Exploration of Shared Challenges and Benefits of Making Grant Proposals Open Access in the Academic and Public Spheres

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This environmental scan argues for the value in making grant proposals open access. Applying for and receiving grant funding is an important facet of research. However, accessing information on grant application, review, and award processes remains a particular challenge for early career scholars, researchers from smaller or under-resourced institutions, and traditionally marginalized scholars. While the open access movement has made research publications resulting from funded grants publicly available, grant proposals are rarely included. When proposals are shared, they are difficult to find due to variability in metadata implementation and quality. This work asks: What are central challenges in making grant proposals open access? How can increased access to grant proposals contribute to equity and transparency in funding distribution? What existing repositories contain grant materials? What standards and incentives can be established among grant-seeking and funding stakeholders to improve grant proposal accessibility? This work concludes with perspectives shared during a May 2022 advisory group meeting of stakeholders involved in the Institute of Museum and Library Services–funded project Planning for Open Grants, which focuses on potential solutions in grant seeking and funding processes for working toward an open grants standard across research communities.

Introduction

Over the last two decades, academia has shifted toward making scholarly materials open access. Recent public access mandates passed in the U.S. and Europe now require researchers who have received funding support from public sources or federal agencies to make their work openly available through published research results, data sets, and other relevant scholarly materials (White House Office of Science and Technology Policy [OSTP], 2022; Science Europe, 2021). Scholars are encouraged to make their work accessible through adherence to FAIR principles (findable, accessible, interoperable, and reusable). Today, these open access resources can be

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found through many online repositories and databases (Féret et al., 2020). This open access shift is believed to produce benefits like increased public involvement and understanding of scientific research, research that is more reproducible, and reduced barriers related to diversity and access in academia (OSTP, 2022; National Academies of Sciences, Engineering, and Medicine, 2018). Nevertheless, there are gaps in the current open access system, particularly in the types of materials that are made available and how they are organized and published through online repositories.

While grant proposals are central to the work of scholars in nearly all areas of academic and public research communities, they are rarely included in the shift toward open access. Published results from grant-funded projects may be available through online repositories, but successful and unsuccessful grant proposals themselves are not commonly published. Opponents of making these resources open access cite concerns like stolen research and competition from others in their discipline (Brennan, 2012). However, lacking open access to grant proposals has implications for early career researchers, under-resourced institutions, and traditionally marginalized scholars, and may contribute to barriers in funding, research accessibility, and reproducibility; transparency of the funding process; and representation among grant recipients (Hu, 2019; Hunt et al., 2012; Bosman et al., 2020; Freedman et al., 2017; Hawkes, 2012; Lang, 2021).

Even when grant proposals or proposal components (data sets, data management plans, research questions) are made publicly available, they can be difficult to find. Variable and incomplete metadata decreases proposal accessibility; often, there are no designated search categories to selectively identify grant proposals among other materials. Many repositories lack standards for what information should be included when publishing this type of resource (e.g., funding source, indication of the grant being successful or unsuccessful, which proposal components are included).

These challenges reflect the need to address issues of inaccessibility for grant proposals specifically. As this paper will argue, making successful and unsuccessful grant proposals publicly available benefits researchers and the general public, and is one step toward addressing inequality in who receives grant funding, creating transparency about the grant review and funding process among diverse stakeholders, and helping the general public understand and find value in scholarly research.

This work supports the goals of the ACRL *Open and Equitable Scholarly Communications* report, particularly in addressing equity issues and solutions in funding distribution, advocating for a broader scope in the type of scholarly content made open access, and creating more effective systems in making grant proposals discoverable. The authors hope to push forward a key goal expressed throughout “Open and Equitable Scholarly Communications”: to broaden participation in the access, evaluation, creation, and acknowledgment of academic work (Association of College and Research Libraries, 2019).

Research Questions

This work investigated the current state of open access publishing as it relates to grant proposals, the challenges and benefits to making grant proposal content open access, and gaps in existing repositories that make such resources difficult to find. This paper synthesizes results from one study that functions as a component of a larger Institute of Museum and Library Services (IMLS)-funded project, “Planning for Open Grants,” at the University of

Florida George A. Smathers Libraries (Ye et al., 2021). This environmental scan includes a comprehensive literature review and an analysis of selected online repositories containing grant proposals or proposal components.

The authors note this work is necessarily influenced by their respective identities and experiences at the time of writing. Hannah Toombs and Perry Collins are white female librarians. Hannah holds a PhD in the social sciences and has experience in applying for research funding and grants (Fulbright-Hays, NSF). Perry holds an M.L.I.S. and M.A. in the humanities, with experience as a grant recipient and reviewer, and as a former program officer for a federal funding agency. Hao Ye is a Chinese-American male librarian with a PhD in STEM, has applied for and received grants (NSF, NIH, IMLS), and has reviewed grants as a selection committee member for the Code for Science & Society Event Fund (2020–22). Having participated in the grant proposal process from multiple perspectives (as graduate students, independent researchers, reviewers, funders, and now librarians), the authors recognize, and have experienced firsthand, the challenges many applicants face when seeking research funding. Drawing on this experience, a central goal of the broader planning project is to create greater clarity in the grant seeking, review, and funding process by making proposal resources accessible, and working toward a new standard in sharing open grants.

Specific questions pursued in this study and explored in this article include the following: What is the current state of open access? What are the central challenges in making grant proposals open access? How can increased access to grant proposals contribute to equity and transparency in funding distribution? Which existing repositories contain grant materials? What standards and incentives can be established among grant-seeking and funding stakeholders to improve grant proposal accessibility? This work concludes with perspectives on these questions from various stakeholders in the grant seeking, review, and funding process who participated in a May 2022 in-person convening on this topic, and with suggestions for working toward new standards in grant proposal sharing that contribute to open science.

Methodology

Data for the environmental scan was collected in two phases: (1) a literature review and (2) a repository analysis of existing online databases or resources containing grant proposals and proposal components.

For the literature review, project team members created an initial shared library of relevant sources on open access and grant funding processes through Zotero, followed by a thematic analysis to code and annotate selected sources (Grant & Booth, 2009). Using an inductive approach, each article selected in the study was coded to identify overarching points or significant topics related to open grants (e.g., open scholarship policy and movements, challenges in seeking funding, inequality among funding recipients, etc.), and broad themes were determined based on these codes. The final product was an annotated bibliography, organized in four key topics: the current state of open access publishing, making scholarly materials (particularly grant proposals) open access, examples of open access grant proposals, and information on existing repositories.

Phase two of the environmental scan involved analysis of selected online repositories containing grant proposals and proposal components (data sets, statement of the problem, etc.). The researchers intentionally chose repositories representing a wide range of subject areas and scope to determine representation of grant proposal materials across institution-specific

repositories, general use repositories, and field-specific repositories. The scan's preliminary scope and potential repositories for review were identified with support from the Planning for Open Grants UF-based project team (<https://www.ogrants.org/about.html>). Repositories reviewed included Zenodo, Dryad, Figshare, Octopus, Open Science Framework, University of Florida Digital Collections (UFDC), Institute of Museum and Library Services (IMLS), MSU (Montana State University) Dataset Search, Data Management Training (DMT) Clearinghouse, and Europe PubMed Central (PMC). Eight dimensions for analysis were chosen based on overarching project goals (table 1). These selected measures considered not only the usability of online repositories and discoverability of grant proposals on these platforms, but also their potential to set a standard for proposal sharing and to create an accessible, sustainable community for sharing scholarly work.

TABLE 1
Metrics used in Repository Analysis

Dimension	Definition
Workflows for data ingest	Manual upload, Application Programming Interface (or API, a type of software interface allowing for two or more computer programs to communicate with one another) (Lane 2019), Data sharing
Descriptive and technical metadata standards	Rights and licensing, specific metadata standards
Efforts to engage and sustain user communities	Professional organizations, meetings, events and conferences, communication standards
Roles and responsibilities of the project team	Staff roles and function
Institutional support and financial sustainability	Board members, funding agencies and donors, membership system
Challenges or reasons for obsolescence	Accessibility of site and findability of grant proposals based on search options, under-resourced or small project team, limited funding, infrequent data ingest, etc.
Sustainability and archival duration	How long are materials guaranteed to be available through the online repository?
Public access requirements	Who can use the site to post or access materials, and are there different levels of usership? (i.e., institutional affiliated users, independent researchers, students, etc.?)

Environmental scan results were further explored during a two-day, in-person advisory group meeting in May 2022 at the University of Florida George A. Smathers Libraries. The over 20 participants included members of the "Planning for Open Grants" project team, as well as a group of external advisors, some of whom agreed to participate prior to initiation of the project, and others who applied through an open call (<https://www.ogrants.org/call-for-advisors>) that was shared across social media and email listservs. Among the group were advisors invited because of their experience or affiliation with specific repositories included in the scan.

The participants included faculty and staff from higher education institutions (R1, R2, and SLACs), librarians, representatives from major funding institutions (US Federal agencies and private foundations), and researchers and educators making use of openly shared grants data. Attendees brought expertise in grant proposal writing, seeking and review, and existing efforts to share grant data, as well as diverse disciplinary perspectives in humanities, social science, and STEM fields. These participants committed to participate in the broader planning project, including subsequent virtual conversations to be held in 2023; however, this meeting was their most substantive contribution and investment of time as they came together in person to document opportunities and challenges across disciplines, professional roles, and institutional types.

The meeting was primarily discussion-based. Topics were determined ahead of time by the authors of this article, centering on shared challenges or friction points in dealing with grants (social and technical barriers for individual researchers and organizations), potential solutions to making proposals available (incentives for individual researchers, how funders can facilitate proposal-sharing, shareable components of proposals), useful metadata for making grant proposals more discoverable, and creating research communities and partnerships to facilitate grant proposal writing and sharing. Prior to the meeting, attendees were instructed to bring a laptop computer or other suitable device to participate in collective note taking. During the meeting, attendees collaborated on scaffolded pages in the Google Docs online application. Participants were separated into groups and instructed to brainstorm and document answers to a pre-posed question assigned to their group. After a specified amount of time, groups “rotated” and were instructed to answer the next question and/or provide elaborating comments to preexisting answers. After all groups had a chance to answer all questions, the authors facilitated a short sharing and discussion session with all groups combined. As a result of these discussion portions, the authors synthesized several summary themes.

Results: Literature Review

Through a comprehensive literature review of scholarly materials related to open access, repositories, and open grant proposal examples, the authors annotated and coded these materials into four overarching categories (see **Methodology** above) through thematic analysis.

Past & Current Trends in Open Access

In the last few decades, the academic community has shifted toward *open science*. In this article, open science is defined as the free circulation of scientific knowledge by making publications, research data and results open access (Féret et al., 2020). In the early to mid-2000s, online platforms that enabled open science, like institutional repositories, were just beginning to become more commonly used and recognized in the scholarly community. Making scholarly materials open access through these mediums was recognized as a way to break down barriers in scholarly communication, reduce power monopolies held by scholarly journals (Féret et al., 2020), and empower universities and research institutions to showcase the span and quality of their research outputs (Crow, 2002). This recognition of open science value expanded to the public sphere, leading to more widespread standards and legislative mandates for sharing results of publicly funded research.

In the U.S. and Europe, legislation has called for publicly funded research to become open access; in 2012, the UK government accepted recommendations from the Finch report to push

for a gold open access approach to publicly funded research (Lynch, 2003; Bosman et al., 2021; Elsevier, 2022; Hawkes, 2012). In the same year, Congress passed the similar Federal Research Public Access Act (FRPAA) in the U.S. (Freedman et al., 2017). Proponents of these changes argue that making scholarly publications open access results in greater transparency in use of taxpayer funds for research, improves connections between researchers and businesses, facilitates reproducibility and advancement in research, and increases public awareness and understanding of research (Lang, 2021). However, the shift toward widespread open access has not been as pronounced for other types of scholarly materials, including grant proposals.

Making Scholarly Materials Open Access

It has become common practice, and is now often required by grant funders, that research findings or published research results be made open access, either immediately or after a set embargo period (Bosman et al., 2020). Open access publications can promote transparency in public funding use and increase reproducibility of data and research methodology. While there has been progress in making research outputs publicly available, concerns remain about “quantity versus quality” and use of open access resources, particularly when it comes to the types of materials made openly available. While the amount of published open research outputs has increased, these outputs are typically limited to formal scholarly publications. In contrast, other materials that do not readily fit the mold of a scholarly publication are infrequently shared but could be useful to researchers building on existing work, designing their methodology, creating a grant budget, or completing another step in their research design process.

The grant proposal itself encapsulates many valuable research components. Sharing data sets, research questions, methodology, and more can contribute to transparency, reproducibility, and rapid dissemination of ideas. Lang (2021) argues that

grant proposals that meet basic requirements for scientific merit and rigor should be posted online, ideally in a standardized format, in a centralized (or several) database or clearinghouse (p. 1).

Making grant proposals available in this format could result in making research project-centric rather than funding-centric, placing greater emphasis on the value of a research project and its impact rather than just its potential to receive funding. Additionally, open grant proposals can promote more accurate budgets, increase collaboration across the sciences and humanities, and improve citation metrics (Lang, 2021).

Successful and unsuccessful open grant applications also illustrate a more complete picture of research initiatives, showing the life cycle of the project beyond what is found in individual, peer-reviewed publications. Grant proposals can also use more accessible language; while formal publications frequently use discipline-specific jargon, grant proposals ideally use clear, concise writing to explain methodology, research questions, and other project dimensions. This can be especially beneficial for increasing transparency in the use of public funding and making scholarly research accessible to a broader audience (Brennan, 2012).

Despite these benefits, dissemination of grant proposals and related scholarly materials through open access outlets remains somewhat limited. While platforms like institutional repositories have become more common, this does not necessarily mean all researchers take

advantage of them. As Neylon (2008) notes, institutional repositories have not always adapted “onto the social networks of the academic users” and can be “more closely aligned to discipline and possibly geographic boundaries,” potentially deterring academics from using them (p. 1). Further, institutional repositories may require users to enter a great deal of descriptive metadata for materials uploaded, requiring additional effort on the part of scholars sharing their work (Neylon, 2008).

These common concerns around open research are amplified where grants are concerned: researchers fear ideas will be stolen or otherwise used without permission by researchers in their field. Horbach et al. (2022) note that like other forms of scholarship, grant proposals offer a foundation for others’ research and should be cited accordingly. Sharing proposals ensures that “due credit is given to initiators of project ideas.” Later sections consider how some of these ongoing repository challenges might be addressed through institution-specific open grants resources and databases.

Increasing Diversity and Representation in Grant Funding

A large majority of respondents to the ACRL survey informing the *Open & Equitable* report indicated grant funding “is needed to create compelling research projects and outputs,” with 83% ranking “availability of grant or institutional funding for scholars and researchers from a wide range of backgrounds” in their top five ways to meet this need (Association of College and Research Libraries, 2019, p. 61). Of course, availability of funding does not guarantee equitable access to funding for those with limited institutional support, such as sponsored research staff, mentorship programs, etc. While providing access to proposals cannot overcome these systemic issues, it can offer grant seekers an opportunity to review examples of successful work as well as a deeper understanding of disparities in who and what are funded. Making grant proposals open access has the potential to create greater representation in terms of who receives funding, particularly among traditionally marginalized scholars, smaller institutions, and early career researchers.

For students, many opportunities hinge on receiving grant funding, such as access to higher education, education outcomes, and research feasibility (Hu, 2019). Undergraduate and graduate students comprise a large proportion of federal and institutional grant aid received each year: from 2020 to 2021, the total grant aid received by undergraduate and graduate students in the U.S. amounted to \$138.6 billion (College Board, 2021). However, student grants are competitive, and not all students have equal opportunity or institutional support when it comes to grant writing.

Hu (2019) delves into inequities of student grant funding depending on institutional type. Among students who receive highly regarded grants (like the NSF graduate research fellowship), a disproportionate number come from top-ranked universities, which generally are highly-resourced and have existing programs and scaffolding in place to support students seeking such research awards. This could include courses focused on grant writing and development, available examples of previously awarded grants in institutional repositories, staff within departments and campus resource centers who offer grant writing support, and the general expectation and encouragement that students should apply for these prestigious awards. This stands in contrast to the far smaller fraction of recipients at community colleges, students in the early years of their graduate program, or scholars at smaller institutions who do not have this same level of access and support; in 2017, 86% of NSF awards went to recipients

at R1 universities, while only 0.3% went to HBCUs, and none to Indigenous or tribal colleges. Reasons behind this recipient inequality can be difficult to track because grant institutions like NSF do not always release data on applicants and their institutional affiliations, though common explanations include reviewer bias and overall ambiguity of the funding process.

Even when institutions (and university libraries) have available resources related to fund seeking, it is unclear how often students take advantage of these resources, or if they are well advertised to the university community. In a 2020 study on online guides for educational funding opportunities for students, Lundy and Curran found that in a sample of 38 university library research guides on funding, 17 guides included information on educational funding for students (mixed resources such as scholarship information, university-affiliated grants, etc.), and only one guide contained two distinct funding resources for students (grant-specific resources and guidelines). This lack of grant-specific resources serves as evidence of how ambiguity in the funding process and limited examples of open access grant proposals are a challenge not only for grant seekers, but also for library faculty and staff trying to create useful resources for the university community (Lundy & Curran, 2020).

Ambiguity in the proposal review process, particularly how recipients are reviewed and selected for funding, is also a major issue, and often results in a lack of diversity among grant recipients. Hunt et al. (2012) argue that while major institutional funders have tried to implement programs addressing these issues, success has been mixed. For instance, the NSF ADVANCE program (Organizational Change for Gender Equity in STEM Academic Professionals), introduced in 2001, focused on increasing gender, racial, and ethnic diversity among NSF award recipients. Yet, since its inception, award recipients of this initiative continue to be primarily white women, demonstrating a lack of consideration for intersectionality. Here, intersectionality is defined as a theoretical framework for understanding how different aspects of an individual's identity, including race, social status, gender, political affiliation, and other dimensions, collectively contribute to experiences of discrimination and privilege; consideration of these intersectional factors among grant applicants is essential to transforming exclusionary practices in seeking research funding within the academic and public spheres (Hunt et al., 2012).

Issues highlighted here point to several key informational and access gaps among grant stakeholders. Individual funding institutions (as seen in the NSF case study) may implement programs and revised proposal review processes to increase representation among recipients, yet when those measures ignore systemic, intersectional inequalities among applicants, the problem persists. Additionally, when "diversity and inclusion" measures are applied at the funding institution level, they do not necessarily translate to improved funding resource access at the university or community level. Applicants may come from under-resourced institutions or non-academic organizations with no existing grant-writing resources or resources to train faculty in teaching these skills. It is important to note that a majority of these historically under-resourced academic institutions in the U.S. include HBCUs and community colleges; limited grant resources at these institutions could perpetuate existing inequalities among funding recipients (Rascoe, 2023; Harris, 2021; Inside Higher Ed, 2019). Further, different funding institutions have variable application requirements, components, and discipline-specific writing styles. This lack of standardization can further complicate the proposal writing and review process.

The literature on inequality among grant recipients indicates that while making successful and unsuccessful proposals open access may not automatically impact equitability in funding

distribution, it has the potential to more explicitly reveal issues in inequitable funding access, which could in turn be directly addressed by stakeholders involved with the grant funding process.

Summary of Key Findings

These literature review findings reveal two overall gaps in grant seeking, review, and funding processes: First, there is currently no standard for making grant proposals available through existing online repositories. Additionally, not all academic institutions have resources to train faculty and students in grant writing or familiarize them with the application and review process. This creates challenges for small or under-resourced institutions, scholars with traditionally marginalized identities, and early career researchers who begin the grant-seeking process at a disadvantage. Second, ambiguity and lack of standardization in the proposal review and funding process reveals communication and collaboration issues among the many stakeholders involved in grant seeking and funding. This complexity also makes it difficult for librarians and other university personnel to create grant-specific guides and resources to support students and faculty. These challenges became clearer through conversations with stakeholders involved in the grant seeking, review, and funding process.

Results: Stakeholder Perspectives on Shared Challenges in Open Grants

In May 2022, the University of Florida George A. Smathers Libraries hosted an in-person stakeholder meeting of the planning project advisory group. Over 20 participants collaboratively generated notes on topics related to barriers for dealing with grants, sharing grants, incentives, metadata, and more. In discussing shared challenges within their respective positions and institutions, participants' collective work emphasized four overarching issues listed below. Advisory group and project team members were consulted throughout the editing process for this article and encouraged to provide feedback; no participants expressed disagreement with identified themes:

- Fear of sharing grant proposals
- Lack of standardization for proposal sharing
- Variability in legal restrictions or institutional regulations for grant sharing
- Inaccessible open grant repositories or repositories which are not user-friendly

Frequently cited challenges were consistent with ideas discovered in the literature review, particularly social barriers like the *fear of sharing grant proposals*. Concerns over “scooping” or stealing of work, vulnerability in making unfunded proposals open access, and fear of competition were mentioned as barriers affecting both individual researchers and funding organizations. Participants also recognized this issue as a potential barrier to diversity and inclusion among grant recipients: when traditionally marginalized scholars, researchers, and students from under-resourced institutions, and others are already under-represented in receiving grant funding, they may be further discouraged from applying for grants or sharing their work if there is a perceived danger of having that work stolen or appropriated. Additionally, as available open grant proposals are already limited, potential applicants may see a lack of representation among grant recipients sharing their work, leading to greater fear of competition (see appendix 1).

Stakeholders also pointed out a *lack of clarity and standardization* in funding agency policies for sharing grant proposals, *variability in legal restrictions*, and internal variable

funding institution structure, which create uncertainty among grant recipients and applicants who want to share their proposals online. For instance, institution-specific regulations related to copyright, Freedom of Information Act (FOIA) policy, or concerns over potential IRB and HIPAA violations could discourage researchers from sharing unfunded and funded proposals online (see appendix 1). Participating stakeholders from funding institutions acknowledged that there is often no consistent or standardized process for top-down decision-making regarding grant sharing at their respective agencies; when there is no standard or norm for making grant materials openly available at individual funding institutions, it is difficult for staff to know best practices or guidelines for sharing proposals.

Participants also commented on the general *inaccessibility of existing open grants repositories*, which makes it difficult to find proposals even where they are available. Variability in descriptive metadata and citation metrics for proposals can make them difficult to find through online repositories, particularly if different components of the proposal (i.e., project summaries, budget, etc.) are separated. Further, among funding institutions that publish proposal examples on their own websites, there may be limited support for improvements (e.g., UX/UI research, site updates) to facilitate proposal discoverability.

These common challenges cited by stakeholders became clearer through analysis of existing online repositories where grant proposals or proposal components are published.

Results: Repository Analysis

Repositories analyzed included Figshare, Zenodo, Octopus, Dryad, Open Science Framework, the University of Florida Digital Collections, the IMLS, MSU Data Set Search (Montana State University), the Data Management Training (DMT) Clearinghouse, and Europe PubMed Central. While this list of online repositories is far from exhaustive, it spans a variety of repository types, including institution-specific resources, publicly accessible repositories, government repositories, and newly emerging repository platforms.

Repositories were evaluated based on eight dimensions (table 1):

- Workflows for data ingest
- Descriptive and technical metadata standards
- Efforts to engage and sustain user communities
- Roles and responsibilities of the project team
- Institutional support and financial sustainability
- Challenges or reasons for obsolescence
- Sustainability and archival duration
- Public access requirements

In this section, results from two examples (Figshare, a general use repository, and MSU Dataset Search, an institution-specific repository) are shared to demonstrate strengths and shortcomings related to grant proposal accessibility within existing repositories. Results from all ten analyzed repositories are available at [\[Supplemental Data\]](#).

Figshare

Figshare is a general use repository where users can upload and share research results, data sets, and other research outputs in open, citable, and shareable formats. It is free to join and use by any interested researchers. Each metric for analysis of this repository is described below, followed by a description of overall accessibility.

TABLE 2
Repository Analysis for Figshare

Dimension	Analysis
Workflows for data ingest	• The first version of Figshare's application programming interface (API) included a basic implementation allowing users to manage accounts and build applications on top of the Figshare platform • Later developments included resumable downloads of scholarly materials on the site, advanced search features, and other add-ons • The current Figshare API has capability for sending parameters, resource representations, authentication, errors, searching, filtering and pagination, rate limiting, conditional requests, cross-origin resource sharing (CORS) policy, endpoints, collections, items, and projects:
Descriptive and technical metadata standards	• 20GB of storage to upload individual files • Required descriptive metadata includes title, authors (including optional ORCID ID), category of file type or resource type (users can select more than one option), keywords, item type, description, funding information • For institutional users, resource title and digital object identifier (DOI) can be selected • License type can be selected to determine reuse permissions • Users choose how much or how little descriptive metadata to share
Efforts to engage and sustain user communities	• Blog with relevant opinion pieces, updates on issues related to open access, API, etc. • Social media (Facebook, Twitter, Vimeo) • In-person events like "Figshare fest," an annual conference for institutional clients, with presentations and discussions about Figshare functions, open access, and related research • "Ambassador" program: Figshare Ambassadors organize Figshare demos and presentations, lead training sessions at their own institutions, blog, host AMAs, participate in case study interviews, collect institution-specific data to be used by Figshare to develop new features, and receive user benefits (extra storage, slack channel, training course certificate, profile badge designating ambassador status)
Roles and responsibilities of the project team	• Coders, product designers and managers, engineers, several librarians with open access experience, outreach staff
Institutional support and financial sustainability	• Operated by Figshare LLP, part of Digital Science (a UK tech company) • Funded by US Dept. Of Homeland Security, Wellcome, National Heart Lung and Blood Institute, National Institutes of Health:
Challenges or reasons for obsolescence	• Effective for research sharing • Keep users informed on best practices in open access • Shortcomings in grant proposal access: Users control what information about their upload is shared • Findability varies based on metadata added by users; inconsistency could make grant proposals more difficult to find • No specific category or item type within Figshare settings for "grants", "proposals", etc.

TABLE 2
Repository Analysis for Figshare

Dimension	Analysis
Sustainability and archival duration	• Figshare public research data enter Amazon Web Services S3 storage • Also deposited into Chronopolis (digital preservation service run through UC San Diego)
Public access requirements	• Free to use through online account, but caters to the academic community • Works with publishers, institutions, corporations, labs, and governments • Users can choose to make data “private” based in their settings • Works with other organizations to allow them to harvest content from Figshare for their own sites (ORCID, GitHub, GitLab, Bitbucket, RSpace, Binder, and OSF) • Mark all uploaded content to be identifiable by Google, Google Scholar, and Google Dataset Search

Figshare Accessibility Summary

Figshare allows users to browse content based on subject matter, which can then be filtered based on category, content type, date, license, item type, and source. Among the filter criteria for item type, there is no option for grants or grant proposals. However, entering specific keywords based on funding agency will produce results that list which institution funded the published research or related data set (for instance, published theses including information on the research grant that funded the work). These results generally do not include the grant proposal itself.

Funded grant proposals are available on Figshare but can be difficult to find: for instance, several NSF grant proposals (including student proposals) can be found when searching “NSF” under the “online resource” category. Searching “funded grant” as a keyword under this category also brings up both funded and unfunded grant proposal examples from a variety of institutions and topical areas. Figshare also has a site guide discussing the importance of publishing funded and unfunded grant proposals on the repository (Gawne et al., 2021).

MSU Dataset Search

In contrast to Figshare, MSU Dataset Search is an institution-specific repository hosted by Montana State University. MSU Dataset Search is an index for academic research data intended to increase discovery, reuse, and citation of open research data. It is an open source, library-built system. Dataset Search is part of the Data Discovery Collaboration Project. Data sets deposited in the repository can be searched by keyword, creator, and title, and individual uploads can include topical categories and DOI.

MSU Dataset Search Accessibility Summary

As an institution-specific repository, scholarly materials on the site are limited to research outputs affiliated with MSU researchers or projects. In the context of the “Planning for Open Grants” project, institution-specific repositories such as this serve as a useful test case to illuminate benefits and challenges that come with developing an open grants repository. For instance, a major benefit of an institution-specific repository is its potential for supporting students and early career faculty at MSU, particularly as a library resource. With samples for data sets, problem statements, hypotheses, and other components available through the

TABLE 3
Repository Analysis for MSU Dataset Search

Dimension	Definition
Workflows for data ingest	• API: MSU Dataset Search adds unique descriptive metadata for individual datasets, determined through topic mining of scholarly profile sources (ORCID, Google Scholar profiles, etc.)
Descriptive and technical metadata standards	• Descriptive metadata for materials uploaded include DOI, keywords, categories, title, creators. Metadata varies based on data set location (some materials hosted by third party repositories, uploaded in different formats)
Efforts to engage and sustain user communities	• Primary user community is MSU library users. • Database users communicate with librarians through the site and social media channels (Facebook, Twitter, Instagram)
Roles and responsibilities of the project team	• MSU faculty and staff, data librarians, research informatics specialists, metadata specialists, research assistants
Institutional support and financial sustainability	• Receives funding through IMLS, NIH, and MSU
Challenges or reasons for obsolescence	• Scholarly materials limited to MSU researchers or MSU affiliated research, meaning results are limited. Access to some materials limited to MSU faculty and students. • Finding grant materials specifically is based on descriptive metadata, which does not always include funding information. Quantity of material is limited (fewer than 200 contributors and fewer than 50 datasets currently available on database)
Sustainability and archival duration	• Data sets shared on the site are also part of third-party repositories, stored in multiple settings,
Public access requirements	• Users able to share datasets are creators affiliated with Montana State University, though the general public can access open datasets uploaded to the site without university affiliation

repository, users have a model to support their understanding of the grant writing process. MSU Dataset search contains datasets contributed by researchers at the institution and indexes data from MSU researchers housed in third-party repositories (Mannheimer et al. 2018). This indexing strategy could serve as a strategy for overcoming researcher reluctance for contributing to institutional repositories.

However, there are some limitations to this resource. As an institution-specific repository, available materials are primarily research outputs from projects conducted by MSU researchers, which may limit the scope of content housed in this repository. As of April 2023, MSU Dataset Search houses 197 datasets, and has slightly over 300 contributors at MSU. For context, MSU is the largest research university in the state, with over 14,000 undergraduate students and nearly 900 faculty members (MSU Dataset Search, 2023). While a number of different departments have materials housed in the repository, some fields are underrepresented. Currently, Ecology, Land Resource and Environmental Sciences, and MSU research centers constitute a majority of datasets in the repository. Impact is often a key motivation for researchers to widely share materials, and so a more limited repository may be less appealing as a sharing platform compared to a well-known, general-use repository. Variability in

descriptive metadata may also be a limiting factor in discovering grant proposals on the site. While there is a complete list of keywords (an alphabetized list of broad subject terms like “land use,” “wikidata,” “forests,” etc.) available to search, information on specific funding agencies and other grant-specific metadata is not present for some materials.

Additional Repository Observations

While specific results from Figshare and MSU Dataset Search are outlined here, it is worth noting several general observations about other repositories analyzed in this study. Among general use repositories analyzed (Figshare, Zenodo, Dryad, Open Science Framework), Figshare appeared to have the most grant-specific materials uploaded, and this content was most discoverable through this platform. While the other general-use repositories did house some proposal materials (most notably datasets), these materials were often difficult to find, as no specific, descriptive metadata existed for them, and it was rare that complete proposals or multiple proposal components were present. Across all repositories analyzed, keyword searches and existing categories to filter search results did not include a “grants” or “grant proposal” option; Dryad allows users to filter by “funder,” but current content on the site appears to be limited primarily to STEM fields when using this search strategy.

Among institution and discipline-specific repositories (IMLS, UFDC, Europe PMC, DMT Clearinghouse, MSU Dataset Search, Octopus), the primary limitation is that contributors to these platforms represent projects or grants funded through these individual institutions (e.g., MSU and UF researchers, for their respective institutional repositories). Other smaller repositories are intended for sharing specifically smaller proposal or publication components, or specific pieces of broader research outputs. For example, Octopus is meant to be an alternative to journals or papers as a primary research record, namely, to remove high prices for academic publications and the time it takes to publish and share work (Octopus, 2022). While this certainly contributes to greater accessibility of research outputs, it again indicates the broader limitations in how larger funding institutions and academic spaces make grant proposals and scholarly materials available to researchers outside their institutions and to the general public.

Summary of Key Findings

The repository analysis results revealed several shortcomings in grant proposal accessibility. First, there appears to be an overall lack of standards or consistency when it comes to sharing funded and unfunded grant proposals through these online platforms, and inconsistent metadata for these materials, which make them difficult to find even where they are available. While several larger repositories like Figshare, Dryad, and Zenodo did feature some proposals or components of proposals, availability of this content varied widely across these repositories. When components of proposals were available (e.g., data sets, data management plans, project abstracts, etc.), they were not linked to other components of the proposal or labeled under a “grant” or “proposal” category within the descriptive metadata. These results support key challenges identified by stakeholders during the in-person meeting, particularly the lack of standards or precedent for proposal sharing, and variability in metadata.

Analysis of Stakeholder Perspectives: Solutions

Given the many challenges in making grant proposals open access, what are some actionable next steps in working toward a new standard in open grants? How can grant proposal examples

become more accessible to those seeking funding, and how might traditionally underrepresented applicants access such funding opportunities? How can stakeholders involved in the funding process, including applicants, universities, repository personnel, and funding institutions better collaborate to address these disparities? During the May 2022 stakeholder meeting, participants sought to answer these questions. Participants discussed potential solutions to the shared challenges they had identified, particularly how they might work toward building community and contributing to greater representation and mutual benefits among funders, grant applicants, and recipients through their respective roles in working toward open grants.

When reflecting on potential benefits of having all grant proposals openly available, common ideas emerged among stakeholders in relation to *creating communities of grant resource-sharing*, or establishing collaborative, open strategies for setting social norms or standards of grant proposal-sharing. Stakeholders discussed how individual researchers, funders, repositories, and other institutions might individually support such initiatives.

Stakeholders suggested that funders might contribute by *publishing previously funded or unfunded proposal examples on their websites*, communicating with other funding institutions to *create proposal templates* or common outlines for proposals, and creating *incentives* or requirements for students and other researchers to make their proposals open access. To more directly address disparities in who receives funding, funders can collaborate with universities or other research institutions to analyze common issues found in unfunded versus funded proposals to offer more specific guidelines in proposal design that can be shared on funder websites, incorporated into LibGuides or other institutional resources, and shared with potential applicants. Individual funders can also conduct research to determine which applicants may be at a disadvantage or underrepresented in receiving particular grants. Such analyses might also allow funders to compile potential projects to redirect toward funding opportunities at other organizations or donors who may better fit the project scope and goals.

Among universities or research institutions where students and others are applying for grants, individual academic departments can offer incentives to students for sharing their proposals, such as including proposals as publications on CVs, fulfilling a department-specific *professional development requirement*, or *contributing to citation metrics* for researchers' work. Additionally, universities and libraries can work toward the creation of *grant-writing resources or courses for proposal design* that also incorporate these incentives. Courses might also involve *using proposal examples in "best practice" workshops* through teaching and outreach opportunities with potential grant applicants.

Repository and database personnel can also play a role by *creating knowledge graphs and running analytics to better understand grant proposal trends over time*, and ultimately demonstrating the value of particular grants or types of publicly funded research on a larger scale. In line with creating a common template or standard for particular grants, repositories could collaborate in establishing common metadata. Where possible, repositories might consider hiring specific staff members to focus on implementing these new standards to facilitate discoverability of grant resources. Additional stakeholder perspectives related to these themes can be found in appendix 2.

Conclusions and Next Steps

This paper has made a case for the potential value of making successful and unsuccessful grant proposals open access through online repositories. Environmental scan results suggest

that making proposals more widely available has the potential to increase funding access and transparency at smaller, under-resourced research institutions and communities, while also bringing attention to persisting gaps in representation among grant recipients. These results, combined with perspectives brought forward during the advisory group meeting, offer a clearer picture of current issues in funding accessibility and several concrete ideas in terms of how diverse stakeholders can directly address these challenges by creating communities of grant-resource sharing within and beyond their respective institutions.

Both the environmental scan and perspectives expressed during the advisory group meeting revealed that while existing repositories (both general-use and institution-specific) may feature grant proposals or materials from grant proposals, these resources are limited and lack standardization. Issues like variability in metadata across repositories (e.g., categorical search terms, user accessibility), variable technical and legal standards across funding institutions, and overall lack of precedent in terms of making grant proposals available on repositories as a resource limit the availability of this scholarly material. Further, social barriers to proposal sharing, such as fear of “scooping,” and privacy and copyright concerns related to sharing grant proposals complicate existing challenges in open grants.

To address these issues, the researchers propose that stakeholders involved in the grant seeking, review, and funding process work toward the creation of grant-resource communities aimed at facilitating more open, accessible, and standardized resources for those seeking grant proposal access and support within and beyond the academic space. Diverse stakeholders can collaborate in order to establish incentives for making proposals open access at their respective institutions, establish consistent proposal writing and sharing standards, create more consistent or organized descriptive metadata for accessing grants through online repositories, and offer educational resources for grant applicants to work toward a new standard of grant proposal sharing across the open science community. Moving toward this new precedent in open grants has the potential to break down barriers between the academic and public spheres, and ultimately push for greater equality and accessibility within the scholarly publishing world.

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Appendix 1. Shared challenges and concerns in making grant proposals open access among stakeholders

Discussion Question	Common Challenges
What are social barriers preventing individual researchers from sharing grant proposals?	• Time and effort: Time lost in grant writing that could be used for research • Competition: R1s receiving disproportionate funding awards, self-preservation and in-discipline “rivals”; lack of equity and accountability, fear of getting “scooped” • Fear of sharing: Lack of experience or resources (fear of judgement / embarrassment, reputation damage, lack of clarity on research ownership, fear of project failure or “not keeping promises” made in proposals) • Diversity and inclusion: Lacking representation among funding recipients and reviewers, hesitance among marginalized scholars to share work beyond their community
What are legal and technical barriers preventing individual researchers from sharing grant proposals?	• Lack of Clarity or Precedent for sharing policies across funding institutions: Institutional and geographic variability in legal restrictions for funders and grant sharing, copyright and intellectual property restrictions, variability in FOIA policy among funded vs. unfunded proposals, potential compliance violations (IRB, HIPAA, etc.) • Uncertainty on where to share proposals: Lack of existing platforms to share research/proposals, subject-based repositories vs. general-use repositories vs. institutional repositories • Frequently changing funder policy and internal structure: Power dynamics related to proposal-sharing (students and PI or advisors, difficult to navigate sharing process), lack of top-down decision making on sharing guidelines at funding institutions
What are social barriers preventing organizations from sharing grant proposals?	• Security & Privacy Issues: Fear of plagiarism or “scooping,” perception of proposals as “intellectual property” with market value, loss of “exclusivity” or ability to share “insider knowledge” with peer funders, fear of sharing proposals which demonstrate “weaknesses” of funding institutions; fear of sharing budgetary information • Lack of Standard for Grant Proposal Sharing: Message of open access not coming from top tiers of leadership; not knowing what is important or relevant to share
What are the legal and technical barriers preventing organizations from sharing grant proposals?	• Legal & Copyright Issues: Fear of lawsuits or legal action after sharing unfunded proposals, differences in state laws related to privacy, legal barriers to sharing budgetary information • User Accessibility & Website Organization: Funder institution or repository website requires personnel to update and organize site or work on UX/UI research. Proposal components need to be linked on site. Standardization of metadata and citation metrics

Appendix 2. Stakeholder Perspectives on Potential Solutions & Benefits in making Grant Proposals Open Access

Discussion Question	Shared Perspectives
What incentives would encourage individual researchers to share grant proposals?	• Professional Development: Making proposals open access can contribute to service and publication components of tenure package, openly available proposals may be cited as publications on CV or resume, students or co-PIs can list open grants as publications • Citation Metrics: Having a record of who has viewed a proposal or number of views, DOI for published grant proposals, Incentives for sharing proposals on particular repositories • Collaboration and Research Sustainability: Potential to reach future project collaborators by sharing proposals on repositories; potential to reach students interested in research area or future collaboration, Opportunity to receive public comment on proposals or work
What might funders do to facilitate wider access to grant proposals, and what structure already exists to build on?	• Standardization: Funding institutions can agree on common or shared metadata for grant proposal sharing (i.e., search function to identify grant field, geographic location, etc.), Centralized structure for data use and sharing policies to prevent issues in “scooping.” Create common template or format for proposals, incorporate grant proposals into existing result-sharing requirements, create Beta test for several agencies to test common metadata and sharing standards, specific role or position within institutions for organizing these repositories and resources • Education & Grant Writing Skills: Make discipline-specific proposals available on organization sites for potential applicants to search, incentives or requirements for students to share grant proposals funded by particular institutions, ORCID ID shared with proposals to create potential for collaboration and research discoverability
What might disciplinary or subject-based communities do to facilitate access to proposals, and what infrastructure exists to build on?	• Incentives and Encouragement for Sharing: Making it a community “norm” to share proposals, seek institutional funding and support around grant proposal sharing, encourage professional societies and listservs to circulate interesting or successful proposals, awards for exemplary proposals • Education & Grant Writing Skills: Creation of discipline-specific repositories or sharing networks, creating knowledge or education resources on privacy, copyright and “scooping,” development of grant writing courses and programming within departments or fields of study
When it is not possible to share all components of a grant proposal, what individual components should we prioritize and how should they be shared?	• Most commonly suggested components to share: Data management plans, broader impacts or “lessons learned,” anonymized budget plans, peer review samples, all sections possible that are linked to each other on repositories

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