Project Summary AccelNet: Community of Open Scholarship Grassroots Networks (COSGN) NSF 19-501

Overview. The **Community of Open Scholarship Grassroots Networks** (COSGN), includes 120 grassroots networks, representing virtually every region of the world and every research discipline. These networks communicate and coordinate on topics of common interest. We propose, using an NSF 19-501 Full-Scale implementation grant, to formalize governance and coordination of the networks to maximize impact and establish standard practices for sustainability. In the project period, we will increase the capacity of COSGN to advance the research and community goals of the participating networks individually and collectively, and establish governance, succession planning, shared resources, and communication pathways to ensure an active, community-sustained network of networks. By the end of the project period, we will have established a self-sustaining network of networks that leverages disciplinary and regional diversity, actively collaborates across networks for grassroots organizing, and shares resources for maximum impact on culture change for open scholarship.

Intellectual Merit. The open scholarship community is fueled by recognition that the social structure and culture of research does not promote practices and reward behaviors in line with scholarly values. Networks promoting open scholarship represent a variety of aims, including: increasing the transparency and accessibility of research processes, content, and outputs; improving the rigor and reproducibility of research practices; and advancing inclusivity of who can contribute to scholarship and how to diversify reward systems to encourage their contributions. The challenges and opportunities to improve research practices exist in every scholarly discipline, every region of the world, and every stakeholder group (e.g., researchers, institutions, publishers, funders, consumers of science).

An essential component of the open scholarship movement is that much of the culture change is occurring via grassroots networks with strong representation of early-career researchers. These networks identify problems relevant to the communities they serve, and organize disciplinary, topical, or regional communities to solve them. The networks provide training, change norms, help internalize new practices within their research communities, and accelerate the pace of discovery. Bottom-up culture change via grassroots networks is an essential complement to top-down policy changes toward open science to build the capacity, skills, and internalization of the new norms and behaviors. *The problem is that grassroots networks face the fundamental challenges of under-resourcing, lack of coordination, and lack of content and knowledge sharing across networks. These reduce the effectiveness of grassroots movements. COSGN will solve these challenges. A successful network will leverage resources to tackle the global challenge of reforming the research culture, prepare early-career researchers with skills to succeed in the reformed culture, and, ultimately, accelerate the process of scientific discovery.*

Broader Impacts. Reducing dysfunctional incentives and accelerating research progress requires bottom-up work that improves inclusion, training, norms, research, and solutions. It also requires coordination across disciplines, geographies, and stakeholder communities. COSGN will have substantial impact beyond the network itself. Advancing open scholarship will facilitate *Harnessing the Data Revolution* by improving research rigor, and by opening training pathways for advancing reproducibility. Advancing open scholarship supports *NSF INCLUDES* by embodying inclusivity and identifying new paths and rewards for diversity in who and how contributions are made to research. And, particularly, COSGN will facilitate early-career researchers' rigorous and transparent research practices and leadership in shaping the research culture. Finally, advancing open scholarship helps catalyze *Growing Convergence Research* by addressing the foundational questions about the social, cultural, and methodological issues for how scholarly work gets done that are common across research disciplines. Open scholarship is fundamentally interdisciplinary and the network will open opportunities for collaboration across domains.

Project Description AccelNet: Community of Open Scholarship Grassroots Networks (COSGN) NSF - 19-501

Intellectual Merit

Network of Networks Theme, Vision, and Goals

The scholarly community recognizes that some core values of research--rigor, transparency, sharing, inclusivity--collectively called *open science* or *open scholarship*, are not operating ideally in practice. Across disciplines, topics, and geographies, there are dysfunctional norms, incentives, and policies that create friction in the pace of discovery and accumulation of knowledge.

Much research is never reported, particularly research producing negative or null outcomes, resulting in publication bias (Fanelli, 2012; Rosenthal, 1979; Sterling, 1959). Incentives promoting novel, positive, and clean results combined with substantial flexibility in reporting leads to guestionable research practices including p-hacking, selective reporting, and overfitting that undermine the credibility of reported findings (Simmons et al., 2011; John et al., 2012; Nosek et al., 2012). Lack of incentives for transparency and rewards for sharing leads to significant barriers to reproducibility because of unavailability of data (Wicherts, et al., 2006), code/software (Stodden et al., 2018), and incomplete reporting of protocols and materials (Kidwell et al., 2016; Igbal et al., 2016). Insufficient training for open research practices leaves researchers, particularly early-career researchers, with little opportunity to improve the rigor and transparency of their research (Allen & Mehler, 2019). The dominance of a vertically integrated research model in which resources are centralized to few people, labs, and institutions inhibits more inclusive research systems that enable and reward contributions of many based on the skills, resources, and interests that are available to them (Uhlmann et al., 2019). And, finally, the skewed allocation of research resources across researchers inhibits opportunity for those receiving fewer resources to gain access, develop skills, and make contributions commensurate with their abilities and interests. These realities create inefficiencies in science by interfering with: learning from failures, aggregating evidence, managing motivated reasoning, reusing research artifacts, making scholarship accessible, and leveraging the broad, diverse talents of the available workforce.

The pessimism that this summary might invoke is countered by the emergence of grassroots networks to promote open scholarship and transform the research culture. For example, here are 5 of the 120 grassroots networks in this proposal promoting culture change in their communities:

- *UK Reproducibility Network*: Peer-led consortium of 47 local networks at UK universities and institutions supporting rigor, reproducibility, and transparency.
- *Humanities Commons*: An open-source, open-access, academy-governed network for scholars and practitioners in the humanities making the work of the humanities available to the world.
- *ANZORN*: An Australia/New Zealand network of networks directed at supporting local grassroots community activities on open scholarship.
- *Brazilian Reproducibility Initiative*: A systematic replication initiative of published experiments in Brazilian biomedical science with online meetings, webinars, and social networking.
- Young Academy of Europe: A pan-European bottom-up initiative of outstanding young scientists for networking, scientific exchange, and science policy.

Researchers, particularly early-career researchers (ECRs), recognize the opportunity to change the research culture toward scholarly values of rigor, transparency, sharing, and inclusivity. Grassroots researcher networks are directly addressing the dysfunctional norms, incentives, and policies that create friction in the research process, and promoting new behaviors that accelerate discovery. The researcher networks are highly diverse by discipline, topics, and geography. The networks are also highly diverse on strategy, priorities, resources, scope, and progress. Amid this productive diversity, the researcher networks are highly aligned on core values and purpose. The 120 networks in this proposal share the goal to make scholarly research more rigorous, transparent, open, and inclusive.

Grassroots networks provide an essential part of the movement to transform the research culture to embrace open scholarship. Stakeholder groups such as publishers, funders, and institutions can implement top-down policies that alter incentives and require changes to researcher behaviors. And, networks such as FORCE11 and Research Data Alliance can coordinate the updating of information technology and infrastructure to support open scholarship. Grassroots networks are complementary to these efforts by conducting "in the trenches" work fostering the development and internalization of new norms via peer influence and training to do the new behaviors, meet the new policy demands, and use new infrastructures.

Statement of purpose and shared vision. The Accelnet: Community of Open Scholarship Grassroots Networks (COSGN) fosters communication, coordination, and collaboration across a global community of diverse researcher networks for a concerted effort to promote culture change toward shared aims of improving research rigor, transparency, openness, and inclusivity with the ultimate goal of reducing friction and accelerating discovery.



Community of Open Scholarship Grassroots Networks An open exchange of researcher networks across topic, discipline, and geography

Figure caption: The top-down stakeholder influencers appear on top, and the research community appears on the bottom. COSGN is represented by three examples of topical interest working groups (Open Access, Open Data, Training) illustrating how COSGN connects grassroots networks on topics of shared interest. Those working groups are comprised of multiple networks, distributed by geography and discipline, with a shared topical interest. Each working group fosters communication and collaboration across networks and with the whole research community as denoted by the expanding circular arrows. COSGN also fosters communication and collaboration across working groups and networks, and with the broader research community, as represented by the large gray circling arrows. COSGN networks and working group activities may interact with publisher, funder, society, and institution stakeholders via

informal and proactive social and professional engagement as represented by the dotted lines connecting grassroots networks of networks with stakeholder groups.

Mapping COSGN's relationship with other networks. All stakeholders in the scientific enterprise have an interest in open scholarship. Journals and publishers are engaged in these issues via their role in scholarly communication, particularly peer review and dissemination of research findings. Funders are engaged via their interest in maximizing the return on investment of the research that they support. Research societies are engaged for setting the norms and standards for their disciplinary domain to accelerate discovery. Universities are engaged to advance their missions for promoting knowledge accumulation and dissemination in the public interest. COSGN is the bottom-up grassroots researchers complement to all of these stakeholder communities that have top-down opportunities to shape open scholarship. Whereas stakeholder communities and networks play a significant role in policy-making and setting incentives and requirements for research, COSGN networks operationalize the incentives and policies into daily research practice via training, conducting open research, and studying the implications of policies. Further, COSGN networks shape norms among researchers and collaborate or pressure the stakeholder communities or networks via grassroots organizing to change policies and practices that are creating friction in the pace of scientific discovery. The mapping of this relationship is illustrated in the Figure above.

Snapshot of COSGN Member Networks 86% (106) of participating networks responded to survey providing data cited in this and subsequent tables.

Staffing	47 staffed by volunteers; 11 staffed by leaders indirectly compensated as part of other professional roles; 13 staffed by leaders directly compensated for network activity; 34 staffed by mix of volunteers, indirectly, and directly compensated
Budgets	23 have no operating budget; 23 have budgets under \$10K; 33 have budgets \$10K+ (very substantial range)
Longevity	5 have existed for <1 year; 44 for 1-2 years; 27 for 3-6 years; 31 for >6 years
Languages	Huge variety of languages represented and supported across the global network
Size of Community Served	Networks estimated the size of the community receiving their services in the last year. The median community served was 300 and mean was 2,513.

Topical, geographic, disciplinary, and career-stage diversity of networks is addressed below.

Planned activities. The proposal aims to mature the existing open scholarship network activities as a full-scale implementation into the COSGN. This work will build on and strengthen existing network activities. The existing network activity include a curated database of more than 200 grassroots networks sharing priorities and contact information for informal collaboration, a Google Group to which network representatives subscribe to foster communication and collaboration across the networks, many ad hoc collaborative activities among subsets of the network of networks, and four active committees represented by a diverse membership of network members. Dedicated support for full-scale implementation of COSGN will dramatically improve its breadth, inclusivity, connectivity, and impact, and enable more effective sharing and curation of open resources for reuse across networks.

The primary purpose of COSGN is to enable networks to be more effective in their own grassroots efforts to advance open scholarship and to leverage the power of collaboration and share resources for maximizing impact. Fundamentally, COSGN is a collaborative framework of processes and standards to facilitate communication, coordination, and collaboration. The goals for the project period are to strengthen COSGN so that it becomes self-sustaining by ensuring that its value exceeds the resources contributed by the individual networks. The infrastructure of COSGN is a shared conceptual understanding of the norms, standards, and goals of the framework, a specified set of standing activities (working groups), and a collection of shared and open resources.

There are four activities of COSGN during the project period: (1) Formation and operation of the Steering Committee and the COSGN collaborative framework, (2) Growth and operation of the working groups (WG) with a knowledge hub for resource sharing, (3) Open Scholarship Symposium, and (4) Regional Open Scholarship Events.

Formation and Operation of the Steering Committee and COSGN Collaborative Framework

A Steering Committee comprised of representatives from the 120 networks will facilitate communication and coordination across committees, establish standards and norms for committee activities, manage recruitment of new networks to join COSGN, establish and enforce the network's code of conduct, refine COSGN's operating principles, and define committee formation, succession, and sunsetting principles. In Year 1, an Interim Steering Committee will establish by-laws including rules for representation, elections, and succession. By the end of Year 1, the interim steering committee will hold an election for the steering committee based on the established by-laws and then disband. Membership will be diverse with an emphasis on members that have experience with community governance to establish by-laws and operating principles aligned with the goals of COSGN. In Years 2-5, the Steering Committee will refine COSGN's operating policies and practices, regularly evaluate the progress and gualities of COSGN, onboard grassroots networks, and monitor progress on the stated objectives of this proposal. Interim Steering Committee Chair = Katie Corker (co-PI). Membership = Center for Open Science - COS (Nosek, PI), CASPER (Cook), Structural Genomics Consortium (Al Chawaf), Open Science Community Utrecht (Eerland), AUS-RN (Fidler), UK Reproducibility Network (Munafo), Sains Terbuka Airlangga (Zein), EcoEvoTransparency (Parker), and student representative (Sophia Crüwell, METRIC Berlin).

The main activities of COSGN occur in working groups (WG). Each WG is organized on an open scholarship topic and comprised of representatives from networks with interests in that topic. The WGs promote communication across networks, identify activities of common interest for collective action, share resources, and promote engagement on the topic across research communities. During the grant period, the PI and co-PI, with support from the Steering Committee, chairs of individual WGs, and others from the COSGN networks, will refine the structure and format of the individual WGs, communication between WGs, public reporting mechanisms about WGs' activities, and implement the operating principles defined by the Steering Committee.

Each WG will have a common workspace on the Open Science Framework (OSF) describing WG membership, structure, and operating principles -- including member selection and succession processes. The workspace will also describe the WG's objectives, activities, and contain links to public notes and reports about the WG's work. Finally, the OSF project will contain shared resources for members and the broader public to use. By default, all WG content and shared resources will be publicly accessible and openly licensed for reuse. Exceptions will be made for content that contains sensitive material (such as human subjects data that cannot be publicly shared).

Because the WGs' purpose is to facilitate communication and collaboration across networks, the WG size will be based on enabling representation from all networks that have activities related to that topic. For topics that have many interested members, WGs may form a steering group to maintain efficient operations or create subcommittees for specific topics. For example, many networks have activities related to Open Access of research outputs. The Preprints WG is likely to be a subgroup of that group to focus on preprints and green Open Access solutions in particular.

The purpose of the network is to foster communication and collaboration about research issues relating to open scholarship. With a dynamic research environment and a growing network of members, we expect there will be occasions to form new WGs for topics that are not represented. Conversely, some topics may fade in importance over time. Sunsetting WGs that are not meeting their intended value for the community will be important for maximizing the efficiency and value of member networks contributing time to sustain COSGN. In sum, we will establish criteria for the formation and sunsetting of WGs. This will include forming WGs based on emerging topical areas of interest, opportunities to connect communities serving a similar geographic region, and opportunities to connect communities serving a similar disciplinary space.

Creation of the collaborative framework will also include refining the mechanisms of communication across the network. So far, networks communicate via a Google Group discussion list, in

ad hoc conversations between small clusters of networks, and within the four existing WGs. We will expand the communication practices in the network by establishing a standing environment for open communication to complement the Google Group. We will also establish standards for taking minutes or recording WG sessions and making those widely accessible. The Steering Committee will bear responsibility for communicating news and events and emergence of new shared resources on a regular basis across COSGN.

Growth and Operation of the Working Groups with a Knowledge Hub for Resource Sharing

Most current and new working groups will focus on connecting networks by shared topical interests. Some of these are represented by the existing WGs in COSGN, others will be formed at the onset of this project. The Steering Committee will shepherd the process of forming additional committees during the project period to represent the breadth of activities across networks. Below are the existing and new committees that will be initiated at project onset with initial membership by networks.

Open Access Working Group (New). Open Access to scientific and scholarly works means that anyone, anywhere is able, as defined by the Budapest Open Access Initiative, "to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself." While the internet has been a valuable tool for creating greater access, barriers remain to equitable inclusion and and global dissemination. There are many communities working on different aspects of open access already, such as FORCE11 and SPARC. The work of the Open Access WG will be complementary to existing efforts with a focus on the role of grassroots community movements to promote understanding and adoption of OA and to identify and address barriers that researchers face in adopting open practices. Examples of resources that will be shared across networks include slide decks for education sessions about open access, survey findings on barriers to adoption of open access, and marketing material for promoting open access models. Membership = Open Engineering, Information and Communication Society of India (ICSI), LIBER, Harvard Open Access Project (HOAP), arXiv, FOSTER, Global Young Academy, Ubiquity Partner Network, Volcania, Association for the Promotion of Open Science in Haïti and Africa, Open Access Directory, Open Access India, SciPost, Izmir Institute of Technology, Australasian Open Access Strategy, and OpenAIRE Community of Practice.

<u>Preprints Working Group (*Existing*)</u>. Preprints are common in physics and economics and their allied disciplines, and they are emerging as common practices in other disciplines. There are now about three dozen preprint services supporting disciplinary, topical, or regional sharing of papers. The existing preprints WG coordinates on common interests relating to preprints including: best practices for moderation, operational standards, licensing, fostering innovation in peer review, and sustainability. Depending on network interests and objectives, this WG could ultimately become a subgroup of the Open Access WG. Examples of resources that will be generated and shared across networks of this committee are best practice models for operations of preprint services, documentation of preprint policies, and materials for fundraising for sustainability of community-operated preprint services. Membership = Representatives from AfricArXiv, AgriXiv, Arabixiv, BodoArXiv, EarthArXiv, EcoEvorXiv, EdArXiv, frenxiv, IndiaRxiv, MedRxiv, MedIArXiv, PsyArXiv, SocArXiv, and SportRXiv.

Open Content Working Group (*New*). Accelerating qualified research heavily depends on the open materials of published studies, such as data and code. The Open Content WG will coordinate specific, localized activities aimed at promoting: (i) best practices on how to structure research data and code following accepted guidelines (e.g., FAIR principles, language-specific coding conventions); (ii) familiarization (by means of hands-on tutorials and workshops) with tools that facilitate the organization and dissemination of Open Content; (iii) reusability and impact of Open Content by increasing their visibility. In its activities, the Committee will take into account differences within and across scholarly disciplines and prioritize the privacy, safety, and dignity of the living subjects of research. Examples of resources that will be shared via this WG includes training materials for principles and practices of data sharing, survey findings on barriers to open content across communities, briefs for researchers' ethical responsibilities for sharing content openly--particularly human subjects research, and curated lists of tools and services available for opening research content. Membership = FAIRDOM Association e.V., Open Science Initiative Leipzig, Open Science Community Rotterdam, Digital Library Services (Africa), Open

Science Initiative Leipzig, Taiwan Collaboration for Psychological Scientific Research (TCPSR), Open Knowledge Foundation, PhysioNet, Saint Louis University, Research Data Alliance, Africa Open Science, and Hardware Network.

Transparency and Openness Promotion (TOP) Guidelines Working Group (*Existing*). Improving research culture requires specifically addressing the key incentives that academic researchers face: getting published, funded, and hired. The TOP Guidelines are an output of a meeting in 2014 that consisted of researchers, journal editors, university administrators; and serve as a framework for implementing open science practices for these key stakeholder communities. Over 5,000 publishers, institutions, journals, and funders have become signatories of TOP, supporting the principles covered in the standards, and over 1,000 journals and funders are known to have implemented one or more TOP-compliant policy in scientific publishing. The current WG is responsible for maintaining the standards, evaluating proposed changes, and implementing improvements. Depending on network interests and objectives, this WG could ultimately become a subgroup of the Open Content WG. Membership = University of Ottawa, American Geophysical Union, Syracuse University, Indiana University, Johns Hopkins, University of California, San Diego, Queensland University of Technology, University of Liverpool, University of Virginia, University of Illinois, Whitman College, Rensselaer Polytechnic Institute, University of Washington, and National Information Standards Organization.

<u>Open Process Working Group (New)</u>. Open and transparent research processes enhance research credibility, while also facilitating better evaluation of results and research outputs. This committee connects and coordinates networks that have a common interest in facilitating a dialogue about open processes, including - but not limited to - preregistration of studies, sharing of data and materials, and open peer review. Examples of resources shared by this committee includes metadata formats for preregistration of different types of research methodology, information guides about innovative models of peer review, and slide decks for familiarizing researchers with challenges and opportunities associated with open review and preregistration. Membership = PREreview, Lancaster University, Open Science Community Groningen, COS, Open Scholar CIC, Open Science Community Leiden, eLife Early Career Advisory Board, and eLife Innovation.

Registered Reports Working Group (Existing). Addressing publication bias and the incentive to present evidence in the most impactful manner possible requires addressing the publishing workflow. Registered Reports (RRs) are a publishing format in which peer review occurs before results are known; high quality studies are awarded in-principle acceptance to publish final results regardless of outcome. Now implemented in over 200 journals, RRs represent a fundamental shift in how research is conducted, evaluated, and disseminated. The existing working group sets priorities for annual efforts by the community, advocates for adoption, serve on editorial boards (often as the action editor specifically assigned to RR submissions), evaluates and monitors implementation, implements workflow changes when needed, and is working to expand the format by partnering with funders to join grant and article review for increased efficiency. Depending on network interests and objectives, this WG could ultimately become a subgroup of the Open Process Committee. Membership: Chair = Chris Chambers, Cardiff Univ.; George Banks, UNC Charlotte; Kate Button, Univ. of Bath; Zoltan Dienes, Univ. of Sussex; Agneta Fischer, Univ. of Amsterdam: Emma Henderson, Kingston Univ.; Kai Jonas, Maastricht Univ.; Sean Grant, Indiana Univ.; Betsy Levy-Paluck, Princeton Univ.; Evan Mayo-Wilson, Indiana Univ.; Marcus Munafo. Univ. of Bristol: Candice Morey, Univ. of Edinburgh; Brendan Nyhan, Univ. of Michigan; David Rand, Yale; Steven Rogelberg, UNC Charlotte; Pia Rotshtein, Univ. of Birmingham; Carien van Reekum, Univ. of Reading; Alexa Tullett, Univ. of Alabama; Simine Vazire, UC Davis.

Open Source Working Group (Existing: Research Software Alliance). A wide range of research software organizations and programs exist internationally to address the varied challenges in software productivity, quality, reproducibility, and sustainability. The Research Software Alliance (ReSA) (Daniel S. Katz, Univ. of Illinois) was founded to coordinate across the efforts of these research software organizations and programs to leverage their investments and activities to achieve the shared long-term goal of research software valued as a fundamental and vital component of research worldwide. Activities include: promoting the inclusion of software as a first-class research output; improving the ecosystem of research software from the technology through to the social structures that support it; and influencing decision makers to value research software and the people who develop it. ReSA's inclusion as a COSGN WG is to facilitate connections and communication with other WGs and communities with

interests in common with the open source community. Membership = Working Towards Sustainable Software for Science: Practice and Experiences (WSSSPE), rOpenSci, the Software Sustainability Institute (SSI), and the other organizations and projects that are represented by ReSA.

<u>Norms, Incentives, and Policies Working Group (New)</u>. Convincing policy-makers, funders, journals, and institutions to adopt effective open science policies requires informed advocacy and a clear understanding of current norms in a field. Once a decision has been made to adopt an open science policy, choosing specific policies can be daunting. This WG will serve as a contact and support network for grassroots communities attempting to advocate for or adopt these policies, and the WG will provide links to example policies, explain differences between specific policies (e.g., open science badges that focus on norms and encouragement vs. the TOP guidelines that focus on reporting requirements), and provide support for implementing open science policies while accounting for any unique aspects of a field's research practices. Membership = Swinburne Open Science Task Force, Young Academy of Europe (YAE), EURODOC - European Council of Doctoral Candidates and Junior Researchers, Free Our Knowledge, Transparent Statistics in HCI, AUS-RN, Academic Data Science Alliance, and Läpinäkyvää tiedettä.

Badges to Acknowledge Open Practices Working Group (Existing). Signalling that open practices are associated with specific research outputs with Open Science Badges accomplishes three specific tasks. First, they signal to readers and colleagues that these activities are occurring and serve as a model for peers to emulate. Second, they provide a direct incentive for such activities because doing so is no longer an obscure activity but is visible and recognized as a valuable, if often optional, activity that increases transparency into underlying evidence. Finally, the badges require specific criteria for being awarded, hence they generate precise definitions to the activities covered under the open science umbrella. Open Science Badges are used by 64 journals to signal that these practices are taking place. Depending on network interests and objectives, this WG could ultimately become a subgroup of the Norms, Incentives, and Policies Committee. Membership = Alicia Hofelich Mohr, Univ. of Minnesota Twin Cities; Andrew DeSoto, Association for Psychological Science; Ben Marwick, Univ. of Washington; Don Green, Columbia Univ.; Fiona Filder, Univ. of Melbourne; Gustav Nilsonne, Stockholm Univ.; Jon Grahe, Pacific Lutheran Univ.; Mallory Kidwell, Univ. of Utah; Stephen Lindsay, Univ. of Victoria.

Rigor and Reproducibility Working Group (New). The Rigor and Reproducibility WG will be responsible for activity relating to understanding the factors that contribute to poor research reproducibility and replicability, and to develop approaches to counter these and improve the quality of the research we produce. Such approaches are already suggested or even successfully implemented in some fields but systematic dissemination across fields is lacking. As a grassroots effort, this WG is particularly well-positioned to facilitate the identification, enrichment, and dissemination of information about the implementation of "idealized" research practices in reality. What challenges and solutions have researchers found and implemented for improving rigor? Resources shared and disseminated will include reports and training materials about implementation of specific research solutions for enhancing rigor, guides for reproducible research practices, and advice on social challenges for early-career researchers implementing new practices with (senior) collaborators. Membership = Reproducible Science @ Stanford, Mass prereg of classic findings in JDM. Center for Reproducible Science. Brazilian Reproducibility Initiative, UK Reproducibility Network, Erfurter Open Science Initiative (EFOSI), Strengthening the Evidence in Exercise Sciences Initiative (SEES), Innovations for Poverty Action, ReplicationWiki, Institute for Globally Distributed Open Research and Education (IGDORE), Open Science in Archaeology, The Replication Network, CREAting Transparent and Open Research, Chinese Open Science Network, and Edinburgh Open Science Initiative.

<u>Metaresearch Working Group (New)</u>. This WG will connect researchers interested in conducting metaresearch, and will work with the other WGs in COSGN to identify gaps in knowledge and research priorities which could be addressed by new research projects. Metaresearch is an interdisciplinary field, but its practitioners tend to be siloed in their originating disciplines. This WG can facilitate breaking those silos by organizing, curating, and disseminating metaresearch activities and findings across disciplinary boundaries, and facilitating social and professional collaboration among metaresearchers across domains. Membership = Association for Interdisciplinary Meta-Research and Open Science (AIMOS) and Centre for Journalology.

<u>Open Collaboration Working Group (New)</u>. This WG will support open research collaboration including developing common resources such as template agreements for open science partnerships. The WG will also survey network participants on their open science practices and outcomes related to collaborations to benchmark progress. Further, one of the major challenges to be solved for open collaboration is appropriate incentives and credit for researchers to participate in large collaborative efforts. This WG is well positioned to engage early-career researchers on their motivations and needs for open collaboration and credit, and to facilitate organizing of mechanisms for credit that could be adopted by stakeholder groups to incentivize more collaboration. Membership = The Structural Genomics Consortium (SGC), Society for the Improvement of Psychological Science (SIPS), Consortium for the Advancement of Special Education Research (CASPER), ORION Open Science EU, Psychological Science Accelerator, UCT Libraries, Open Science Community Nijmegen, Open Science MOOC, and ManyBabies.

<u>Training Working Group (New)</u>. Training is a central component of grassroots work to change the research culture. Most of the grassroots communities in COSGN have a training component to their practices, and the symposia and events are likely to feature training elements. As primarily early-career serving networks, sharing training resources will dramatically accelerate the quality and impact of training efforts for open scholarship. The training WG will gather and share training resources and links, push training content into the knowledge hub, and facilitate exposure to training events. Membership = Open Science UMontreal, SOPSI, Open Science Sweden, No-Budget Science, Göttingen Open Science Meet-up, and Açık Bilim Topluluğu Türkiye.

Symposium Working Group (New). The Symposium WG will be responsible for managing the Open Scholarship Symposium described in the next subsection. Rotating membership across the networks will facilitate active engagement in the symposium across all disciplines, regions, and topics in the open scholarship movement. Membership = Open Science Community Utrecht, Humanities Commons, EarthArXiv, Open Science Federation, Open Science Community Eindhoven, LMU Open Science Center, Australia, and New Zealand Open Research Network (ANZORN).

Events Working Group (New). The Events WG will be responsible for reviewing proposals and administering awards for network strengthening events proposed by network members. Full description of the program is in the subsection after next. Rotating membership across the networks will facilitate shared responsibility and opportunity to administer these awards to strengthen the ties between networks and promote COSGN activities beyond the networks into the research communities that they serve. Membership = ReproducibiliTea, Open Science Community Amsterdam, Society for Open Science in Ecology and Evolutionary Biology (SOSEE), Helmholtz Open Science Office, Global Young Academy, Freie Universität Berlin Open Science Working Group, and Bullied Into Bad Science.

<u>Additional Working Groups</u>. We expect to add working groups during the project period to leverage the emerging interests and areas for collaboration and coordination in open science. Some WG that are likely to form: Alternative Metrics, Open Education, Diversity and Inclusion, and Citizen Science.

Individual networks possess resources that they have developed to advance open scholarship. These include training materials, scholarly reviews, outreach materials, research designs and data on metascience topics, and organizing frameworks or strategy documents. The committees will use their shared, open OSF workspaces to make this content widely available for adaptation and reuse. Also, COS has funding to build an Open Scholarship Knowledge Base. Work on this open, free service began in January 2020. All COSGN networks will be able to submit content for inclusion in this knowledge base for broad dissemination. The Knowledge Base itself will be community-run and part of COSGN (current funding from DARPA and Fetzer Franklin Fund). Sharing resources via the committee project spaces and the knowledge hub will extend the impact of grassroots community work to those that are part of the network, and anyone outside of the network that wishes to use the resources.

<u>The Open Scholarship Symposium (OSS)</u>. The aims of the individual COSGN networks are to influence, resource, and catalyze the research communities that they serve. And, as a global network-of-networks, COSGN will have its strongest impact by leveraging its shared resources, intellectual capacity, and access to communities to foster global engagement on open scholarship in a way that no one or subset of the networks could do on its own. The impact of COSGN will be enhanced by having regular activities that strengthen network relationships and intellectual exchange. However,

gathering all members to a single location would be extremely costly and have a significant environmental impact.

The OSS will be a year-round, virtual conference/seminar series. Approximately every other week (up to 20 events per year), the OSS will feature a presentation by an individual, team, or panel about their work relevant to open scholarship. The goals of the OSS are to:

- Establish a shared environment for persistent communication
- Foster social and intellectual connections between COSGN participants with a regular, ongoing series
- Elevate and disseminate the work of COSGN networks to the broader research community
- Advance collective community outreach at a scale not achievable by individual networks.

The COS webinar series provides proof-of-concept for the OSS. Managed via Zoom, representatives from COSGN networks have presented on a variety of open scholarship related topics with themes that are cross-cutting or are more likely to appeal to specific stakeholder communities. Branding the topics as part of a singular series helps to identify the interdependence of stakeholder communities and interests on open scholarship topics. An example of cross-network collaboration was a seminar led by the Tim Sains Terbuka/Sains Terbuka Airlangga network with presentations by representatives from 3 COSGN networks. More than 1,500 researchers from 29 universities across Indonesia participated in the event.

The OSS will be institutionalized as a collaborative activity of COSGN. A Symposium WG will include representatives from multiple networks. The WG will conduct the seminar series, solicit and select presenters (open to people inside or outside COSGN), moderate the sessions, and market the series. The scheduling of seminars will be sensitive to the global audience, rotating the timing of events so that everyone in the world has occasions to attend sessions during normal working hours. Also, all Symposium events will be recorded and be made openly available for later viewing. As a coordinated, branded effort with dedicated leadership, we expect that the OSS will become an innovative alternative for the standard conception of a disciplinary conference with the attractive features of increasing accessibility (free to attend, no travel required), minimizing environmental impact, and spreading events year-round rather than concentrated into a few days.

<u>Supporting Regional Open Scholarship Events (ROSEs).</u> The strengths of the OSS do not eliminate the fact that in-person interaction can be highly productive for social bonding, intellectual exchange, and advancing collaboration. During the project period, COSGN will strengthen and mature the collaborative bonds across networks by administering small awards for regional events that advance open scholarship. With these grassroots communities, modest funds for food or space can make a dramatic difference in the ability to host events and attract participants. With a regional focus, financial support can enable many events to complement the virtual collaboration activities and provide avenues for many to participate. Also, leveraging regional connections among the network will be a cost efficient and environmentally sensitive way to solidify network activity and connectivity. \$60,000 of the yearly budget is dedicated to supporting in-person events that involve two or more COSGN networks.

The awards will support training, research collaborations, or other mini-meetings that connect regionally proximal COSGN networks or link to existing conferences (e.g., supporting a preconference). A COSGN Events WG will administer the awards. Following an open call for event proposals from members of the network, the WG will select events for support based on the relevance of the event for COSGN objectives, the extent to which the event strengthens connections of COSGN members, the potential impact on advancing open scholarship in the broader research community, the responsible use of funds for maximizing that impact, and, particularly, the extent to which the events support the research and leadership opportunities for early career researchers and researchers from groups under-represented in scholarship. All use of funds will conform to NSF restrictions for supporting meetings and travel. We estimate that awards will be \$500 to \$2000 per event, and 45 meetings per year would receive support.

Expected outcomes. By the end of the project period, the networks and WGs will have produced and shared a large amount of training, knowledge, best practices, and social coordination resources for advancing open scholarship. These resources will be shared via public OSF projects operated by WGs,

integrated into a curated knowledge hub, and disseminated via a symposium series and regional events for all researchers, not just members of COSGN. Moreover, there will be a mature framework for a self-sustaining COSGN. That framework will leverage freely available infrastructure for organizing, managing, and sharing resources; it will have a steering committee that maintains the committee framework, by-laws, and operational standards; it will have clear criteria for membership and succession planning; it will have clear criteria for starting and sunsetting committees for advancing issues of shared interest in open scholarship; it will have clear criteria for joining COSGN; it will have matured social and intellectual bonds between networks with its events program; and, it will have a prominent, externally facing, maintainable symposium series that strengthens the network and amplifies the networks' impact on the broader research community.

During the project period, active management of the creation and maturation of the COSGN framework will be intense at first with significant personnel time, and then incrementally decline as the framework matures. Dr. Katie Corker (co-PI) will oversee daily management of COSGN while on sabbatical leave from her institution, Grand Valley State University (GVSU). GVSU is providing voluntary cost-sharing through her sabbatical period.

By design, our proposal anticipates the end of centralized funding by fostering a network that is self-sustaining by leveraging free technologies and whose unique infrastructure is the conceptual definition of its operating principles, the manifestation of those principles in its WG structure and process, and the resources produced and shared by the member networks. To succeed with this lightweight approach, the benefits of membership for each network must exceed the costs of contribution. Achieving such a state requires a highly competent definition of a framework that is easy to understand and maintain and a succession planning process that facilitates continuity in leadership and maintenance of the network's operating principles. Evaluation and tracking of the achievement of these objectives is described subsequently in the Evaluation section.

Activity area	Year 1	Year 2	Year 3	Year 4	Year 5
Steering Committee	Form interim committee; Establish by-laws; Elections for Committee	Form Committee	Review and update by-laws		Review and update by-laws
COSGN Collaborative Framework	Define committee structure; Define operating principles	Define succession process	Revise committee structure; Revise operating principles	Revise succession process	Revise committee structure; Revise operating principles
Working Group (WG) Formation	Transition existing WGs to new structure	Form 3 new WGs	Form 3 new WGs	Form 3 new WGs; Sunset 2 WGs	Form 3 new WGs; Sunset 2 WGs
Open Scholarship Symposium	Form WG; Launch solicitation/selection process; 6 symposia	16 symposia	20 symposia	20 symposia	20 symposia
Events	\$60,000 awards (45 events)	\$60,000 awards (45 events)	\$60,000 awards (45 events)	\$60,000 awards (45 events)	\$60,000 awards (45 events)
Evaluation	Baseline survey of networks and network members;	Pre/post surveys of symposia	Pre/post surveys of symposia	Pre/post Concluding surveys of survey of symposia networks and	

Timeline for outcomes and milestones

Annual report from interim steering committee	participants and regional event attendees; Annual report from all committees	participants and regional event attendees; Annual report from all committees	participants and regional event attendees; Annual report from all committees	network members; Annual report from all committees
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International Collaborations and Contributions. The COSGN has broad coverage of grassroots networks across scholarly disciplines, topics of focus, and geographies. In the table below, we provide a general mapping of the networks on these dimensions. Networks identified the *Regions served*, *Disciplines served*, and *Topics served* of their work. If the network had substantial participants or activities in more than one region, discipline, or topic area, they could select multiple. "Applied Sciences" is inclusive of education, business, public policy, and other "non-basic" research domains.

Region	Primary (Total)*	Discipline	Primary (Total)*	Торіс	Primary (Total)*
Global	48 (100)	Multiple/All	60 (60)	No Single Highest Priority	12
Africa	4 (9)	Applied Sciences	1 (2)	Alternative Metrics	0 (24)
Asia	6 (12)	Arts, Humanities	4 (4)	Citizen Science	1 (21)
Australia & Pacific Islands	5 (10)	Engineering	1 (2)	Diversity & Inclusion	1 (39)
Europe	34 (70)	Exercise Sciences or Sports Sciences	1 (1)	Metaresearch	2 (30)
North America	7 (17)	Human-Computer Interaction	1 (1)	Norms, Incentives, & Policies	8 (50)
South America	3 (6)	Life Sciences	11 (18)	Open Access	25 (68)
		Medicine	3 (6)	Open Collaboration	9 (58)
		Natural Sciences	6 (7)	Open Content	10 (79)
		Research Libraries	1 (1)	Open Governance	2 (25)
		Social and Behavioral Sciences	15 (16)	Open Process	6 (58)
				Open Source	5 (53)
				Rigor & Reproducibility	15 (61)
				Training	7 (63)

*Networks citing primary region/discipline/topic served (networks citing total primary and multiple secondary regions/disciplines/topics served (combined))

Coordination Plan. COSGN leverages as much freely available infrastructure as possible to facilitate coordination and collaboration to serve its longevity. And, for infrastructure that is not freely available, COSGN leverages existing service agreements with network members to minimize costs. A Google Group is a listserv for broad communications among network members. A Zoom account enabling virtual meetings of up to 5,000 participants is maintained by COS. The open-source and free OSF serves as the collaborative management tool for committees. OSF and other freely available repositories will be used for sharing resources among network participants and more broadly. Individual networks will continue to use their own services and resources for sharing content as widely as possible.

All COSGN members are committed to open scholarship. Content created collaboratively among COSGN members will be shared openly and licensed to maximize its reuse (e.g., CC0 or CC-BY). No exclusive intellectual property will be generated in the context of this network (though individual networks are free to pursue other activities that might generate IP). By mission, open scholarship is open.

The Steering Committee will coordinate formation, operation, and communication among the WGs. It will also maintain the process for creating new WGs, sunsetting WGs, and on-boarding new networks to COSGN. As an open network, COSGN will welcome all networks that agree to abide by its operating principles and code of conduct. In the early phases of the grant period, there will be substantial funded personnel time devoted to creating and maturing the collaborative framework. Over time, the active personnel time will decline and the WG framework will be self-maintaining.

Student and Early-Career Development Plan. Early career scholars are essential contributors and leaders in COSGN networks. A key priority of COSGN will be to facilitate those contributions, and support training and professional development of early career scholars more broadly. First, we will prioritize full integration of early career scholars in the activities and governance of COSGN, including the Steering Committee. Second, the OSS and ROSESs will be organized with an eye towards maximizing professional development opportunities for early career scholars. Third, COSGN networks place a high priority on including and serving students and early-career researchers. The Table below illustrates the networks' distribution of career stages in the communities they serve. For example, most networks serve graduate students: 4 serve grad students almost exclusively (76-100% of their community), 10 mostly serve grad students (51-75%), 35 substantially serve grad students (26-50%), and 47 partially serve grad students (1-25%). Just two do not serve graduate students. Most networks serve a highly diverse community by career-stage, and very few are exclusive or near exclusive to any specific stage.

	Number of Networks Serving Each Career-Stage (Split by Percent of Community Served)					
	0%	1-25%	26-50%	51-75%	76-100%	
Primary/secondary school students	63	12	0	0	0	
Undergraduates	17	53	9	3	4	
Graduate students	2	47	35	10	4	
Postdocs	2	50	28	16	4	
Junior faculty	2	50	33	7	6	
Senior faculty	4	59	21	5	8	
Non-academic researchers	22	46	21	3	7	

Non-academic/non-researcher professionals	26	42	15	1	3
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Committee Membership

COSGN will have designated positions for early career representatives on the network steering committee and all network committees. We will accomplish this by building in roles for early career scholars when the interim steering committee establishes operating principles and procedures. We will scale the amount of involvement and commitment for these early career roles to maximize the benefits for early career scholars to participate (while minimizing costs).

We have consciously opted to integrate early career scholars into all committees rather than create a stand-alone early career committee. The reasons for this are twofold. First, early career perspectives can valuably inform work in all areas of the network of networks. Issues that affect early career scholars permeate the COSGN's work. Second, early career scholars benefit from increased interaction and connections with later career scholars. Rather than separating individuals of different career stages into distinct committees, we will structure the committees to allow them to fruitfully work together.

Early Career Training and Professional Development in the Open Scholarship Symposium (OSS) and Regional Open Scholarship Events (ROSEs)

The OSS and the ROSEs are opportunities to enhance early career training and professional development. In the symposium, sessions may be organized on topics such as open sharing of data and materials, managing the research workflow for reproducible results, establishing and managing international collaborative and open research, the latest metaresearch findings, and more. Dissemination and marketing of the OSS will target existing member networks with heavy early career participation (for instance, ReproducibiliTea). Calls for presenters will also target early career audiences, and the symposium can therefore highlight and amplify valuable early career scholar led initiatives.

For the ROSEs, early career scholars will be encouraged both to participate in the meetings and to take a leadership role in organizing them. Events with opportunities for early-career participants will be priorities by the Events WG for receiving resources. In terms of training and professional development, events will be organized keeping professional development goals (for both early- and later-career scholars) at the forefront.

Broadening Participation Plan. COSGN is comprised of networks that are diverse by target audience, regional/national reach, and disciplines served (see table above in International Collaborations and Contributions section). Network members are also diverse in terms of gender, racial, and other social identities. COSGN (like NSF) seeks to support training and mentorship opportunities for members of groups that are demographically underrepresented in academe. COSGN has a number of strategies to support and broaden diversity along these many dimensions.

First, the interim steering committee has been formed with diversity and broadening participation in mind. In particular, we have representation from three/four continents, members with a range of sociodemographic backgrounds, and student representation. The interim steering committee members represent networks that serve with distinct audiences and have different organizational structures. The interim steering committee will lay the basic groundwork for the tasks of COSGN, so having this committee formed with diverse representation and with the goal of broadening participation as much as possible is important.

The interim steering committee will establish a governance structure of a membership-led WGs, each representing a community of practice. The steering committee will formalize and iteratively improve the distributed, self-governance model over the course of the project period. The governance and WG structure will be formed with the goal to well represent the diverse makeup and needs of member networks. A stand-alone diversity and inclusion WG is planned, and it will address issues of diversity and inclusion within open scholarship, as well as to inform the activities of COSGN itself to improve its own diversity and inclusion. Additionally, WGs will be encouraged to consider issues of diversity and inclusion throughout their work.

Outreach by COSGN is planned with the goal of inviting additional networks to join the collaboration. The steering committee, or designated WG, will identify, evaluate, and invite new member

networks. New member networks that address communities that are missing from COSGN (e.g., topics, regions, individuals served) will be prioritized for incorporation into the collaboration.

Broader Impacts

Connection to NSF Big Ideas. The COSGN is closely aligned with multiple NSF Big Ideas. Advancing open scholarship will facilitate *Harnessing the Data Revolution* by improving research rigor, and by opening education and training pathways for advancing reproducibility. Advancing open scholarship supports *NSF INCLUDES* by embodying inclusivity and identifying and by implementing new paths and rewards for diversity in who and how contributions are made to research. And, particularly, COSGN will facilitate early-career researchers' rigorous and transparent research practices and leadership in shaping the research culture. Finally, advancing open scholarship helps catalyze *Growing Convergence Research* by addressing the foundational questions about the social, cultural, and methodological issues for how scholarly work gets done that are common across research disciplines. Open scholarship is fundamentally interdisciplinary and the network will open opportunities for collaboration across domains.

Potential impact on participants and U.S. and international research communities. Participating networks with COSGN--in the U.S. and internationally--are already making substantial contributions in their scholarly communities; some already becoming national networks (e.g., ANZORN, UKRN, and Open Science Communities in the Netherlands). A Full-Scale implementation COSGN will connect and elevate those contributions by improving visibility and sharing of effective strategies across networks by enabling collective action for interventions that will benefit from coordination and shared resources across stakeholders, and by harmonizing efforts for more efficient and effective use of resources and improved likelihood of success. The U.S. will benefit particularly from COSGN by improving the transfer of the rapid advancement in open scholarship policies and practices in other regions of the world to the U.S.

Benefit to U.S. scientific enterprise and societal value of the activities. True culture change in scholarly research is contingent on the success of bottom-up networks that provide the training, opportunities, norms, and collective action to encourage stakeholders to embrace change. COSGN exists to foster that grassroots movement. Shifting norms, incentives, and policies toward open scholarship will reduce friction in knowledge accumulation and accelerate discovery. And, with true culture change, the return on investment will continue to accumulate long past the project period and impact the entire research community, not just the members of the COSGN networks.

Unique opportunities provided by a network-of-networks for open scholarship. There is an enormous amount of knowledge, energy, and goodwill within open scholarship grassroots networks. COSGN will mature and accelerate the existing communication, coordination, collaboration, and resource sharing that occurs across these networks to leverage that capacity for collective benefit. Improving the framework and infrastructure of communication and coordination channels will foster efficient collaboration and will lead toward a self-sustaining network. The resources provided by NSF will facilitate the maturation of a committee structure and organizational framework that can be maintained with minimal on-going resource investment. The established framework, with clear charters, succession plans, and areas of practice will "institutionalize" COSGN as a network from which small in-kind investment of participation on working groups comes with outsized benefits for each network via its membership.

Evaluation. Each WG will define specific objectives for advancing open scholarship and then report a yearly assessment of progress on those objectives to the steering committee. Those objectives will be idiosyncratic to each WG and will evolve over the five-year grant period in relation to the grassroots movement to advance open scholarship. For example, the Open Access WG might have initial objectives to advance best practice standards for preprint services in years 1 and 2, but transition to tracking of open access solutions embraced by publishers in years 3 and 4 in response to Plan S and other initiatives. The purpose of COSGN is to connect and facilitate communication and collaboration by networks on topics of common and present interest as they emerge in the grassroots communities.

We can, however, predefine some objective criteria of evaluating whether COSGN is meeting its operational objectives with a survey that will be included in the yearly reporting by committees and by individual networks. We will assess: [1] committee/network activity: number of meetings, attendance, and

outcomes, [2] diversity: gender, career-stage (i.e., number and proportion of early career researchers), and other social identity diversity of committee members and meeting attendees, and [3] adherence by committees to COSGN operating principles. These are indicators of the health of COSGN. We will collect survey data from participants in the OSS and Regional Events, with a particular emphasis on accounting for the participation and growth of ECRs. In these surveys, we will evaluate impacts on participant knowledge and attitudes directly following their participation in these programs. In particular, for its role in facilitating culture change, COSGN aims to maximize the number of events, attendees at events, evaluation ratings of the quality of events by attendees, outputs of committees (papers, reports, datasets, support guides), and number of networks participating in COSGN.

We can define and track some general indicators of culture change in open scholarship across the networks. We will conduct a yearly survey of adoption of open behaviors corresponding to the topical areas of interest in COSGN such as sharing preprints, publishing open access, preregistering research, sharing data, sharing materials and code, open licensing, conducting metaresearch, participating in open collaborations. This survey will be administered across all networks, not just those directly participating in individual open scholarship activities, and our evaluation will highlight the preparation of students, postdocs, and other early-career researchers. The purpose will be to document the adoption of open scholarship behaviors and trends that may be observed across the five-year period. As a naturalistic, cross-sectional investigation, it will not be possible to identify the causal impact of COSGN on increased adoption of open scholarship. However, coupled with the direct indicators of COSGN activities above, these data will provide a broader understanding of the evolving cultural landscape of open behaviors.

In summary, measurement will assess the success of the network to impact a broad and diverse group of scholars. Outcomes will be tracked to monitor the maturation of COSGN through annual reporting by the steering committee and standing committees. Reports will be disseminated to the full COSGN membership to increase awareness and use of the products the standing committees have created.

Results from Prior NSF Support

NSF Award #1540440, \$399,984, 8/15/15-9/30/19. Title: Institutional Re-Engineering of Ethical Discourse in STEM (iREDS)

- PI: Kevin Esterling, University of California, Riverside; co-PI Brian Nosek, Center for Open Science (with other co-PIs)
- Summary of Results: The project is a randomized control trial (RCT) study of the efficacy of a new, project-based ethics training curriculum developed at the University of California, Riverside (UCR).
- For *Intellectual merit*, the project is a collaboration with the Graduate Division at UCR. The ethics training curriculum is fully integrated with the Open Science Framework (OSF), a free, open, online, cloud-based platform developed by the Center for Open Science (COS) to facilitate within-team communication. The study implemented the design for the RCT that randomly assigns PIs/labs in the UCR College of Natural and Agricultural Sciences (CNAS), Bourns College of Engineering (BCOE), and School of Medicine (SOM) to either a treatment arm, in which the lab receives training on the OSF and the ethics of data management and authorship, or to a control arm. Outcomes are measured by a specially developed survey on ethics practices and attitudes that is centered on developing scales for assessing the quality of ethics discourse within labs. The project enrolled a total of 34 labs with 113 study participants. The data collection is complete and the team is currently analyzing the data for reporting. *Broader impacts* include an evaluation of best institutional practices to enhance ethical and reproducible science and creation of a culture of ethical STEM which will serve to increase the credibility and trust of science among the public and policy makers.
- List of Publications from Award: To date, no publications have been produced under this award.
- Evidence of Research Products: Rectangular data set of 113 pre and post responses to the survey in the RCT, as well as qualitative ethnographic data collected from eight labs. The data are housed on the OSF and are currently being analyzed.

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Personnel and Partner Organizations AccelNet: Community of Open Scholarship Grassroots Networks (COSGN) NSF 19-501

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- 5. Whitney Wissinger: Center for Open Science; travel and meeting coordination
- 6. Dr. Bryan Cook; CASPER; steering committee
- 7. Dr. Arij Al Chawaf; Structural Genomics Consortium; steering committee
- 8. Sophia Crüwell: METRIC Berlin; steering committee (student representative)
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- 36. Dr. Kathleen Fitzpatrick; Humanities Commons; collaborator
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- 48. Dr. Steve Haroz; Transparent Statistics in Human–Computer Interaction; collaborator
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- 51. Dr. Ginny Hendricks; Metadata 2020; collaborator
- 52. Stephan Heunis; Open Science Community Eindhoven; collaborator
- 53. Dr. Jan Höffler; ReplicationWiki; collaborator
- 54. Dr. Brian Hole; Ubiquity Partner Network; collaborator
- 55. Dr. Chuan-Peng Hu; Chinese Open Science Network; collaborator
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- 57. Dr. Petr Knoth; CORE; collaborator
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- 60. Dr. Yoshihiko Kunisato; Japanese Community for Open and Reproducible Science (JCORS); collaborator
- 61. Dr. Etienne LeBel; Curate Science; collaborator
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- 63. Dr. Corina Logan; Bullied Into Bad Science; collaborator
- 64. Dr. Dermot Lynot; Lancaster University (PrOSPr) ; collaborator
- 65. Dr. Ben Marwick; Open Science in Archaeology; collaborator
- 66. Dr. Thomas Mboa; Africa Open Science and Hardware (AfricaOSH); collaborator
- 67. Dr. Thomas Mboa; APSOHA; collaborator
- 68. Dr. Jaykumar Menon; Open Source Pharma Foundation ; collaborator
- 69. Dr. Ted Miguel; Berkeley Initiative for Transparency in the Social Sciences (BITSS); collaborator
- 70. Dr. John Mills; Society for Transparency, Openness, and Replication in Kinesiology (STORK); collaborator
- 71. Dr. Amanda Montoya; EdArXiv; collaborator
- 72. Dr. Khaled Moustafa; ArabiXiv; collaborator
- 73. Dr. Khaled Moustafa; FrenXiv; collaborator
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- 83. Dr. Tom Pollard; PhysioNet; collaborator
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- 91. Dr. Eloy Rodrigues; FOSTER; collaborator
- 92. Dr. Julia Rohrer; Open Science Initiative Leipzig; collaborator
- 93. Dr. Tony Ross-Hellauer; Graz Open Science Initiative; collaborator
- 94. Daan Rutten; Open Science Community Tilburg; collaborator
- 95. Dr. Daniela Saderi; PREreview; collaborator
- 96. Dr. Alexandra Sarafoglou; Open Science Community Amsterdam; collaborator
- 97. Dr. Kaisa Sauro; Läpinäkyvää tiedettä; collaborator
- 98. Dr. Guido Scherp; Leibniz Research Alliance Open Science; collaborator
- 99. Dr. Antonia Schettino; Open Science Community Rotterdam; collaborator
- 100. Dr. Birgit Schmidt; Göttingen Open Science Meetup, University of Göttingen; collaborator
- 101. Dr. Jürgen Schneider; Tübingen Open Science Initiative; collaborator
- 102. Dr. Felix Schönbrodt; LMU Open Science Center; collaborator
- 103. Dr. Felix Schönbrodt; Network of Open Science Initiatives (NOSI); collaborator
- 104. Dr. Paul Schultze-Motel; Helmholtz Open Science Coordination Office; collaborator
- 105. Dr. Justin Sègbédji Ahinon; AfricaRXiv; collaborator
- 106. Dr. Stylianos Serghiou; Reproducible Science @ Stanford; collaborator
- 107. Dr. Miguel Silan; Meta-Methods Philippines; collaborator
- 108. Dr. Miroslav Sirota; CREATOR (CREAting Transparent and Open Research) -- Open Science Working Group at Essex University; collaborator
- 109. Cooper Smout; Free Our Knowledge; collaborator
- 110. Dr. Alessandra Souza; Swiss Open Psychological Science Initiative (SOPSI); collaborator
- 111. Dr. Adam Sparks; Open Plant Pathology; collaborator
- 112. Dr. Peter Suber; Harvard Open Access Project (HOAP); collaborator
- 113. Dr. Toma Susi; Young Academy of Europe (YAE); collaborator
- 114. Dr. Ben Thomas; Edinburgh Open Science Initiative; collaborator
- 115. Emmy Tsang; eLife Innovation; Emily Tsang
- 116. Dr. Alexa Tullett; Society for the Improvement of Psychological Science (SIPS); collaborator
- 117. Dr. Daniel Umpierre; Strengthening the Evidence in Exercise Sciences (The SEES Initiative); collaborator
- 118. Dr. Steve van tuyl; Academic Data Science Alliance; collaborator
- 119. Dr. Anna van't Veer; Open Science Community Groningen; collaborator
- 120. Dr. Anna van't Veer; Open Science Community Leiden (OSCL); collaborator
- 121. Dr. Astrid Verheusen; LIBER; collaborator
- 122. Dr. Rebecca Willén; Institute for Globally Distributed Open Research and Education (IGDORE); collaborator
- 123. Dr. Lilly Winfree; Open Knowledge Foundation; collaborator
- 124. Dr. Niklas Zimmer; Digital Library Services, University of Cape Town Libraries; collaborator
- 125. Eririni Zormpa; Open Science Community Nijmegen; collaborator

Data Management Plan AccelNet: Community of Open Scholarship Grassroots Networks (COSGN) NSF 19-501

Consistent with the mission of the Center for Open Science (COS), all data, metadata, materials, curricula, and code produced as part of the **AccelNet: Community of Open Scholarship Grassroots Networks** (COSGN) initiative will be made as openly available as possible throughout the project term and following the grant term.

Expected Data

The types of data produced in this project include:

- **Training curricula**: All content will be openly licensed (CC0 or CC-BY) to maximize instructors' opportunities to use, revise, remix, and incorporate the training materials to best suit their audiences and to best fit their instructional needs. Trainers will have complete access to all training content and will receive regular updates on changes to curriculum through COS's Open Science Framework (OSF).
- Webinar content: All recordings of webinars will be made publicly available on the COS site and licensed under OSF Terms of Use and Privacy Policy.
- Data and metadata: Data and metadata connected to the OSF system through integrated connections to external services will be licensed based on their source terms of use. New data and metadata uploaded to OSF by users will be subject to the site Terms of Use (https://github.com/CenterForOpenScience/cos.io/blob/master/TERMS_OF_USE.md) and Privacy Policy (https://github.com/CenterForOpenScience/cos.io/blob/master/PRIVACY_POLICY.md). Content created collaboratively among COSGN members will be shared openly and licensed to maximize

created collaboratively among COSGN members will be shared openly and licensed to maximize its reuse (e.g., CC0 or CC-BY).

- **Meeting outputs:** Outputs from community meetings and Symposia will be made public, whenever possible. The meeting agendas, training materials, and Symposia session reports will be made publicly available. We will share names of attendees with their permission, or publish Symposia reports without attendee names if permission is not obtained. In addition, all Symposia events will be recorded and be made openly available for later viewing.
- Evaluation Plan outputs: Evaluation by the COSGN steering committee of the key milestones proposed that define progress and meet the objectives of this grant will be made publicly available under CC-BY license.

Data formats and dissemination

The OSF is designed to accommodate digital data in any format. It can handle diverse file sizes, though large file sizes may require specialized transfer approaches for performance reasons. A modular add-on model and public API make it possible to either store data natively in the OSF, or to connect to the data in other applications, even in secure environments. Hosting data on other connected apps in this way allows researchers with diverse needs to use OSF's capabilities for data access and management while maintaining compliance with ethical and legal mandates (e.g., GDPR). Most connected data can then be viewed directly in the browser, without being downloaded or requiring any specialized software. OSF projects can capture and present the entire research lifecycle from research questions to proposals to data to analyses to publications. Because of flexible management of private and public access, OSF can accommodate a wide range of data management plans and privacy/security restrictions. The OSF provides versioning of files so that project history of all stored data will be accessible during the project period and beyond. OSF also provides strong preservation services to assure longevity and persistence of the data and materials, and effective security measures to keep private the components of each project that must remain private but still accessible and preserved with the rest of the project materials.

Period of data retention

The OSF is committed to "data persistence" and preservation. First, the code itself is free and open-source, meaning that any other organization or individual could take and use it to reuse or stand up the modular components and/or entire product interfaces. Second, files are stored with long-term, robust preservation in mind (e.g., multiple locations, multiple services, data integrity checks, and data recovery in extremely unlikely situations). Third, others can access public OSF content via a public, documented API (<u>https://api.osf.io/v2/</u>). Fourth, COS has created a \$250,000 preservation fund to host a static version of the OSF in the event that COS ceases to function and maintain the OSF. At the conclusion of the project period, COS will ensure that all project materials and history are archived effectively in OSF for continued use and improvement.

Data storage and preservation of access

The OSF provides a high-level of security to ensure integrity of the data. OSF facilitates data sharing, and relies on users to seek approval and follow their institutional policies for deciding under what conditions it is appropriate to share data. When shared data is flagged as potentially inappropriate by the community. COS has a review process to address possible inappropriate sharing and remove content from public access, if needed. OSF uses Central Authentication Service (CAS) software to provide users secure, single sign-on (SSO) to access multiple OSF applications (Preprints, Registries, Meetings, Institutions) while providing login and password credentials only once. Because CAS supports multiple authentication protocols including OAuth2, CAS, and SAML, OSF provides institutions and other services the ability for their users to use their institutional credentials to access OSF services. OSF offers two-factor authentication for added account security. COS follows a shared responsibility model for cloud-hosted applications. COS applications and data are hosted on Google Cloud at Google data centers with strong physical and digital security measures. OSF files are stored in multi-regional buckets. We keep three types of hashes (MD5, SHA-1, SHA-256) for files. COS uses Google Cloud for active storage and Google Coldline as a backup location. File backups are hosted in Google Cloud Coldline storage, indefinitely. The OSF database is backed up via streaming replication 24 hours a day, and incremental restore points are made twice daily. Further, the OSF database is maintained in encrypted snapshots for an additional 60 days. Database backups are verified monthly. Logs are primarily stored in Google Cloud cold storage indefinitely.

Additional possible data management requirements

We do not anticipate any additional possible data management requirements at this time, but are well prepared to proactively manage any additional requirements should they occur.