

## **Visualizing the Future Symposia: A National Forum on Data Visualization in Libraries**

### **Abstract**

This two-year project, hosted by University of Michigan in collaboration with co-organizers from University of Southern California and Duke University, will support the gathering of a group of 12 participants (or fellows) and three organizers for an extended discussion of the state of data visualization support and usage in libraries. The project will go beyond discussion, however, by translating the discussion into full-developed instructional modules on visualization, covering a variety of topics and meeting the needs of a variety of institutions and audiences. These instructional modules will be built and tested over the course of a year by the organizers and fellows, and presentation travel funded by the grant will ensure that the modules receive feedback from a variety of audiences. The organizers will ensure the success of the project by hosting regular, full-project meetings to make steady progress and build open lines of communication; by partnering with advisory board members and local, regional, and national groups to review the outputs of the project; by evaluating the project regularly, both in terms of the quality of the outputs and also the experience of the participants; and by sharing all outputs openly to make sure the project has an impact on as broad of an audience as possible.

Data visualization is a rapidly expanding field whose skills, techniques and insights are increasingly intertwined in disciplines across and beyond academia. Data visualizations can be found in major news outlets, family newsletters, highly sophisticated data analysis interfaces, and everywhere in between. While many libraries are already recognizing the importance of supporting data visualization, resources for this new work are typically limited, making it difficult to provide support beyond basic tool-based instruction. An individual library staff member trying to expand her job responsibilities to include data visualization support will likely have to re-skill while maintaining other obligations, and the field of data visualization moves quickly enough to make it difficult to dive deeply into any topic. This project addresses this growing need in libraries by using the first few months of the award period to support project fellows in a deep dive into a specific, visualization-related research topic, the results of which will inform both discussions around visualization and the development of instructional materials.

The first in-person meeting will occur approximately six months into the project, and the result of the three-day meeting will be a summary of the discussion around the challenges of supporting and developing instruction on visualization, as well as plan for the types of instructional modules that will be developed over the coming year. The fellows and organizers will build instructional modules individually or in small groups, and the project will fund travel to at least one conference or meeting to allow for sharing and testing of the modules. A final in-person meeting, the *Visualizing the Future* symposium, will bring all project participants together at a public event to present results and findings, propose final changes to the instructional materials, and begin the final documentation and dissemination phases. All instructional modules will be disseminated publicly, and where possible the project will also create and disseminate video recordings of the modules that can be distributed to learners as-is.

The project is structured to focus national resources on this growing and increasingly important need. Project participants will build deep expertise in a particular area of visualization research and broad expertise in the field of visualization in general, as well as in developing instructional materials. The audience of the instructional modules will gain knowledge that allows them to be critical consumers and producers of visualization in a complex data environment. Finally, the library community and other collecting institutions will gain institutional knowledge about the issues that arise when teaching about data visualization, planting the seeds for a continuation of the discussion over time and the development of a true community of practice around data visualization in libraries.

## **Visualizing the Future Symposia: A National Forum on Data Visualization in Libraries Narrative**

A partnership between University of Michigan, Duke University, and University of Southern California, this National Forum Grant proposal will develop a literacy-based instructional and research agenda for library and information professionals with the aim to create a community of praxis focused on data visualization. Building upon previous IMLS grants<sup>1</sup>, the CritLib movement, Data Carpentry, and the growing need for a holistic data training model this grant will help fund the creation of a diverse community that will advance library-based data visualization instruction beyond hands-on, technology-based tutorials toward a nuanced, critical understanding of visualization as a research product and form of expression.

### **Statement of Broad Need**

Data visualization is a rapidly expanding field whose skills, techniques and insights are increasingly intertwined in disciplines across and beyond academia. The practice of data visualization has become “absolutely critical to our ability to process complex data and to build better intuitions as to what is happening around us.”<sup>2</sup> As libraries increasingly provide, collect and use data, developing a variety of methods for supporting this work are becoming absolutely critical; data visualization support offers an accessible, nuanced and meaningful way for libraries and their communities to engage with data and information. Libraries are being called upon to provide support, to teach and to utilize data visualization.<sup>3</sup> Given the interdisciplinary nature of data visualization, libraries are uniquely situated to support building skills and communities of practice in this area. Moreover, data visualization services provide a powerful complement and entry point to the expanding field of data services and support in libraries. Data visualization also offers new opportunities for libraries and other collecting institutions to operate as a platform, understanding and exposing their collections and processes as data. Thus, a growing number of libraries provide instruction, consultation, technology, and spaces to support data visualization as part of a broader expansion in library data services.<sup>4</sup>

As few graduate programs in library science offer training in data visualization, many later career librarians are finding it necessary to develop data visualization skills on the job. One of the great challenges for researchers and librarians is developing the necessary skill set and expertise in data visualization to engage critically in the practice. Patrons are increasingly approaching both public and academic libraries with these growing needs, but training for librarians to develop these new skills is limited and largely tool based, often at the expense of deeper engagements with research methods, ethical design, and critical consumption and production of visualizations.<sup>5</sup>

Furthermore, the current excitement around data visualization has pushed conversations and funding towards data and technology-intensive environments (e.g. visualization screens, high performance computing and generally expensive labs). While this work is important and must be part of any discussion of visualization, there is a risk that it occludes opportunities to develop support for visualization that is accessible to a broad

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<sup>1</sup> Data Science in Libraries, Institute of Museum and Library Services grant number RE-43-16-0149-16.

<sup>2</sup> Fox, P., & Hendler, J. (2011). Changing the equation on scientific data visualization. *Science*, 331(6018), 705-708.

<sup>3</sup> Jefferson, C. (2016). Integrating Data and Spatial Literacy into Library Instruction. *Data Visualization: A Guide to Visual Storytelling for Libraries*, 173.

<sup>4</sup> In 2017, Zoss conducted a survey of 36 library professionals doing visualization work, representing 30 institutions across the United States and Canada. About half of the participants had only officially begun visualization work within the past two years. Most report offering consultations, teaching workshops, and doing visualization project work as part of their positions.

<sup>5</sup> Recent tool-based offerings include data visualization workshops taught by Zoss at the NCSU Data Science and Visualization Institute for Librarians and the 2016 ALA pre-conference workshop Joque, Rutkowski and Zoss provided on data visualization.

range of users and institutions. It is of the utmost importance that a collective conceptualization of visualization support in libraries be diverse and encourage critical engagements with tools, methods and data sources.

While there is a history of thinking about ethics and the socio-political implications of data visualization and data writ large, this work has not been fully integrated into the support of data visualization in libraries.<sup>6</sup> Some groups have pioneered a critical visualization research agenda - e.g., The MIT Living Lab, D-Lab at Berkeley, Data and Society, Studio for Creative Inquiry - and communities of practice like the data journalism community have also made commitments to ethical data visualization practices, but again these critical approaches have not effectively been integrated into library visualization support and instruction. We believe that public and academic libraries, as community anchors and hubs for interdisciplinary work, personal development, and life-long learning can benefit from incorporating these efforts into pedagogical frameworks that will help librarians to reskill for this new field while maintaining a commitment to critical, literacy-based instruction. The opportunity exists to create a vibrant data visualization ecosystem that would complement current trends and successes in information and data literacy.<sup>7</sup>

We are at a unique moment where a well described, researched and articulated vision of the future of data visualization support and use in libraries could help shape the national landscape for years to come. Collectively deciding on what this future should look like and how to best achieve it will guarantee that each institution does not have to chart its own course. Furthermore, articulating a nationally-coordinated approach to data visualization will make sure that this growing field in libraries integrates with and supports larger efforts around data librarianship.

A national discussion is crucial to help libraries develop a coherent framework to guide and articulate complex, literacy-based data visualization support and instruction in order to further develop support for digital and data driven work in libraries and their communities. We aim both to provide a national forum to bring together individuals to shape the future of data visualization in libraries and to produce instructional materials to aid in realizing this future. A new framework for data visualization support and instruction would build on the success of more general extant frameworks for data literacy. Libraries have a responsibility to challenge users and facilitate a pedagogy that pushes the boundaries of data visualization practices in order to guarantee a future in which data visualization support becomes a meaningful, accessible and open practice supported by a diversity of libraries.

## **Project Design**

This National Forum Grant will both open a nation-wide conversation on data visualization in libraries and also generate open-access instructional modules on data visualization to offer an immediate, tangible impact on academic and public libraries. The grant will specifically support recruitment of a cohort of librarians as fellows (or project participants), virtual meetings, in-person meetings, project management support, conference travel, and open-access documentation and instructional materials. The project addresses a broad and substantial need in both public and academic libraries for a more nuanced approach to utilizing and providing services around

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<sup>6</sup> For example: Tufte, Edward R. *Beautiful evidence*. Vol. 1. Cheshire, CT: Graphics Press, 2006.

Robison, Wade L. "Ethical Presentations of Data: Tufte and the Morton-Thiokol Engineers." In *Philosophy and Engineering*, pp. 151-162. Springer, Cham, 2017.

More generally: Noble, Safiya Umoja. *Algorithms of Oppression: How search engines reinforce racism*. NYU Press, 2018.

Chris Alen Sula's 2012 "The Ethics of Visualization" presentation at Columbia's Digital Library Seminar Series is exemplary in this regard ([https://library.columbia.edu/bts/ldp/digital\\_seminars/2012/2012-12-12.html](https://library.columbia.edu/bts/ldp/digital_seminars/2012/2012-12-12.html)), but still this type of teaching about data visualization rarely is integrated into library work.

<sup>7</sup> See Association of College and Research Libraries Board. (2016). *Framework for Information Literacy for Higher Education*. Access at <http://www.ala.org/acrl/standards/ilframework> on June 08, 2017. Carlson, Jacob, Michael Fosmire, C. C. Miller, and Megan Sapp Nelson. "Determining data information literacy needs: A study of students and research faculty." *portal: Libraries and the Academy* 11, no. 2 (2011): 629-657.

data visualization, and the activities planned are specifically designed to both establish a community of practice around this topic and also produce outputs that will offer a best first step in providing critical literacy-based instruction on data visualization. Success criteria for this project include: positive feedback from fellows on the inclusiveness and effectiveness of virtual and face-to-face meetings, positive feedback from physical or virtual attendees at public presentations and symposia, positive reviews from advisory board members on outputs, and usage metrics for website and course materials (long-term evaluation). Additional measures of success will be developed in concert with the fellows, along with feedback from the advisory board, as we collectively explore critical issues around data visualization.

The proposed project includes a series of overlapping activities that will support participants in their efforts to dig deeply into one or more areas of data visualization theory and practice and translate their understanding into modular instructional materials appropriate for a wide range of institutions and audiences. The main components of this project are listed below and will be discussed in detail in this section:

- Recruitment of 12 fellows to participate in the national forum on visualization, under the guidance of an advisory board
- Individual research projects undertaken by fellows on a visualization research topic of their choosing
- Monthly virtual meetings to connect fellows to each other and to regional visualization communities and to build skills in curriculum development
- A kick-off meeting in summer 2019 to explore commonalities and complications that arose throughout the research period and produce a set of specific visualization topics to develop into course modules
- A year of course module development, delivery, and refinement, undertaken by fellows and organizers, including travel to relevant conferences and meetings of professional organizations to present and share this work
- A final symposium in summer 2020 to review the results of instruction efforts, share strategies that worked well, and harmonize materials as needed
- A close-out period for completion and dissemination of course materials and other reports from the grant activities
- Regular evaluation throughout the grant period to ensure attainment of goals determined by project team, advisory board, and IMLS agency-level priorities
- Progressive development of stand-alone, open access, web-based outputs to share the process and results of the national forum with the broader public and academic library communities

In the first phase of the project, a cohort of twelve fellows will be recruited and oriented to the goals of the project. Formal and informal advertising for the project will begin in mid-to-late fall of 2018. When the award period begins on December 1, 2018, the organizers will begin accepting applications. Applications, consisting of a 250-word proposal for a research and instruction project and a letter of commitment from the applicant's institution, will ensure that the applicant has already considered how visualization can complement his/her current work and also that the institution is prepared for the applicant to devote a significant amount of work time to the project.

In collaboration with our advisory board we will identify and recruit a short list of prospective fellows to supplement the open call. The short list of fellows will be intentionally chosen in order to make sure we have representation from different types of institutions, experiences, and backgrounds. We will also identify listservs and other venues that specifically address marginalized and underrepresented groups in libraries. Selection of fellows will include individuals with high and low levels of experience with data visualization, as well as individuals occupying varying positions in libraries, to improve the range of experiences represented in the group and to counterbalance the effect of convergence that may have happened with individuals who have been working in this area for several years. Across both the short list and open call, applications will be reviewed

with an eye to the feasibility of the proposed project, the relevance to critical visualization instruction, and the diversity of topical interests.

Applications will be accepted for two full months (December 2018 and January 2019), taking advantage of a traditionally slower time in public service positions but also offering applicants flexibility to work on applications around vacation time. Applications will be reviewed by project organizers and volunteers from the project advisory board to construct a cohort of twelve individuals representing diversity of gender, ethnicity, experience in the field, disciplinary background, institution type, and geographic location. Fellows will be notified at the end of February 2019, at which point the orientation and research period of the project will begin.

To encourage a learner-centered approach to helping visualization novices develop real-world expertise in a particular topical area, each participant will be asked to spend four months working on a specific challenge or problem within their practice of visualization that is unique to their institution and user community. Sample topics include: representations of data, both visual and non-visual; how visualization design engages with empathy and readability; how visualization design differs based on data source; the process of inference/induction from data; ethics of data visualization; or accessibility of data visualization. These research projects will be designed largely by the fellows, with the support and advice of the larger group, based on their individual and institutional needs and interests. We envision these projects addressing questions related to both library support for visualization and the larger field of visualization. Prior to the summer kick-off meeting, participants will summarize their preliminary research in a short position statement, which will be distributed on the project website.

During the same four-month period, fellows will be required to participate in monthly virtual meetings to begin building a community of practice and to share updates on the progress of their research. These virtual meetings will be rotated between the project organizers, who will also invite members of local library and visualization interest groups to attend and make presentations or offer feedback. Finally, the virtual meetings will offer opportunities for fellows and organizers to share resources and best practices on relevant topics for the project, from visualization-specific research to techniques for designing effective instructional materials.

Following the orientation and independent research period, the kick-off meeting will be held in July of 2019 over the course of three days at the home institution of one of the project organizers. The goals of the meeting will be to have 15-minute reports from all of the fellows on their research projects and to collectively draft a set of provisional challenges, goals, open questions, and instructional modules. To ensure a welcome environment to all participants, a student assistant will be trained and employed as a meeting facilitator to maintain adherence to discussion ground rules and encourage equal participation in discussions. To increase the impact of the project and to promote transparency, funds for the meeting will also cover full documentation of proceedings, including video and audio recordings, transcriptions, and collaborative note-taking.

During the first two days of the meeting, we will use an unconference structure that will emphasize a shared approach to agenda setting with the aim of building a community that will critically develop a set of practices, guidelines, and recommendations around data visualization services. On the third day (a half day), we will have a final discussion to organize work around several modular courses that can be developed by individuals or small groups of fellows, plan out a preliminary position paper to summarize the discussions of the symposium, and strategize about possible travel to test out preliminary course modules over the coming year. After the meeting, feedback will be gathered from fellows on the success of the monthly virtual meetings and the kick-off meeting. The feedback survey will include questions outlined by the IMLS agency-level goal assessment guidelines, in order to measure progression toward completion of these goals over time. Organizers will share results with the advisory board and adjust plans and structures as needed to respond to feedback. Organizers will also compile and publicly share a white paper to summarize the discussions from the kick-off meeting.

For the next year, participants will extend their individual research projects into the development of related instructional modules, as discussed in the kick-off meeting. Preliminary workshops and presentations will be developed and tested in increasingly broad settings, from the fellows' local institutions to regional<sup>8</sup> and national<sup>9</sup> meetings. Not only does this begin the dissemination process within the first year of the project, but it also provides fellows several opportunities to obtain feedback from the larger profession and build a community of practice around the topic. The project will fund travel to one conference for each fellow and organizer, though that travel could be reserved for after the second in-person meeting in June of 2020. A feedback survey will be prepared that all fellows can distribute to workshop attendees to evaluate instructional materials. Fellows will be encouraged to supplement the general survey to tailor the evaluation to the specific learning outcomes of their workshops. Throughout the year of workshop development, monthly virtual meetings will continue to ensure that fellows are learning from each other and from visualization groups throughout the country. Hosting duties for these meetings will rotate among the fellows to forge connections to new regional visualization communities.

This work will culminate in a *Visualizing the Future* Symposium, at which we will pull together all of the participants' work and articulate a shared pedagogical approach and philosophy to data visualization services. This symposium, which will take place June 2020, will be open to the public and live streamed, and the results of the year of effort will be summarized and presented by fellows and organizers. Business meetings during the symposium will organize groups to complete the reporting and dissemination process in the final months of the award period. Meeting facilitation will again be provided by a graduate student assistant, and the symposium activities will be documented through recordings and live note-taking. In the six months after the symposium, the organizers will distribute a feedback survey to participants and prepare a final white paper summarizing the work of the grant, and fellows will complete work on instructional materials. Any remaining travel funds will go toward conference workshops and presentations to share final products with the broader library community. Monthly meetings will continue, ensuring that all project outputs are completed by the end of the award period. A final assessment of project goals will be conducted in the final month, when results of all assessments will be compiled and organizers will prepare the IMLS Final Performance Report.

The final outputs will include an open access website, to share ongoing progress and ensure broad dissemination of results; a collaboratively built and tested curriculum (both teaching materials and video recordings of the full modules) ready for use, to lower the barrier for new organizations to offer visualization instruction; position papers of individual research results, to share the complex work of the participants more directly with the research community; and two reports summarizing the development process, lessons learned for supporting visualization, and areas for future research, to provide the growing community of practice with institutional memory and next steps. Outputs will be evaluated through audience feedback at monthly meetings and public presentations, review by the advisory board, and peer-reviewed publication (where appropriate).

With its combination of research and agenda setting for visualization in libraries, *Visualizing the Future* will directly support the goals of IMLS and the National Digital Platform. Both participants and the larger community of libraries will develop the "capacity to create, develop, and use the open source software applications...to provide digital content and services to all users." Moreover, continuous regional and national partnerships for community building, feedback, and dissemination will help build and sustain a visualization community of library professionals.

Along with the IMLS agency-level assessment goals, the project team will evaluate the success of the project by surveying fellows, meeting attendees, and workshop participants for their opinions on the inclusiveness, utility, and usability of project outputs. The success of this project depends on buy-in from the fellows and advisory

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<sup>8</sup> e.g., Maptime, Code for America, Midwest Data Librarian Symposium, Triangle Research Library Network, etc.

<sup>9</sup> e.g., ALA, ACRL, RDAP, DLF, IASSIST, etc.

board members to put in the time necessary for success; on scaffolding of activities to build products slowly and deliberately; on models and structures to promote a culture of support and inclusion; on strategic partnerships to ensure the quality, utility, and impact of outputs; and on the greater library community to thoroughly engage with and vet the work. Without these components, there are risks that the project will fail to meet its ambitious objectives. The excitement of the project organizers and our advisory board members, as well as the community needs uncovered in a recent survey of library professionals, suggest that the time is ripe for this initiative. With regular evaluation and communication with our fellows and advisory board, we are confident that we can address issues as they arise.

### ***Project Team***

The project will be organized by veteran visualization instructors for academic libraries and advised by a diverse advisory board. Zoss, Joque, and Rutkowski are all data visualization consultants within academic libraries with 25 years of collective experience developing instruction around data visualization and related topics.

**Justin Joque** (Visualization Librarian, University of Michigan) has a PhD in Media Studies and Communication from the European Graduate School and a Master's of Science of Information from the University of Michigan.

**Angela Zoss** (Data Visualization Consultant, Duke University) has a PhD in Information Science from Indiana University and has pioneered the visualization instruction for the NCSU Data Science and Visualization Institute for Librarians.

**Andy Rutkowski** (Visualization Librarian, University of Southern California) holds multiple MAs from NYU and was the inaugural Interdisciplinary GIS Library Fellow at the University of Southern California.

All three are active members in national and regional library communities and will leverage previous experience in community building and event planning to structure a meaningful and productive national forum.

### **Diversity Plan**

The American Library Association lists “Diversity” as one of its core values of librarianship and recommends that it should be fostered by “providing a full spectrum of resources and services to the communities we serve.”

<sup>10</sup> Our proposal and the resulting work that we envision will directly support this core value by critically engaging with current practices in data visualization services and making them more meaningful, accessible, and open. The diversity plan we aim to implement will be intentional in its design, with concrete, actionable items and a framework that will enable accessibility and accountability. Our vision begins with the belief that the success of the proposal will only be possible with a diverse group of librarians, a sustainable plan for creating an inclusive working environment, and a commitment to addressing social justice issues as part of this process.<sup>11,12,13</sup>

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<sup>10</sup> See the American Library Association's Core Values for Librarianship, <http://www.ala.org/advocacy/intfreedom/corevalues>.

<sup>11</sup> MIT Libraries has helped to provide leadership and thinking on how organizations, projects, and groups engage and implement diversity, inclusion, equity, and social justice within their organizations and the profession more broadly. See MIT Libraries Vision, Mission, and Values, <https://libraries.mit.edu/about/organization/>; MIT Libraries National Leadership Grant from the Institute of Museum and Library Services to host a workshop on accessibility, diversity, and inclusion in library systems.; and, Works in Progress webinar: Diversity, Inclusion, and Social Justice Work in the MIT Libraries' Collections Directorate, <https://www.oclc.org/research/events/2017/09-19.html>.

<sup>12</sup> The most recent National Diversity in Libraries Conference provided an opportunity for open and critical dialogue on diversity and featured programming tracks on “Programming, Outreach, and Advocacy” and “Personnel, Management, and Organization.” National Diversity in Libraries Conference 2016, <http://ndlc.info/>.

<sup>13</sup> The *Inclusion, Diversity, and Equity: Members of the Association of Research Libraries* is a powerful and helpful report to

Our goal is to have a group of participants that cuts across age, race, sex, gender identity, ethnicity, ability, experience in libraries, disciplinary background, job responsibilities, institutional characteristics, socio-economic background, and other aspects. Moreover, we hope to seek out participants who will be able to embody the ethic of care that Bethany Nowviskie has recently written about in order to foster a cohort of librarians that will be motivated to continue and share this work well beyond the forum<sup>14</sup>. In order to achieve this goal we have reached out and formed an advisory board that was chosen in order to provide us with a depth and breadth of knowledge not only in the subject area of data visualization but also in their commitment and leadership on diversity practices. One of the most important roles that our advisory board will fulfill is helping to craft our call for participation and helping us identify and select a group of fellows. The board will also advise and shape the meeting agendas, activities, and outcomes.

Rather than adopt a rigid definition of diversity, we believe that diversity calls for “valuing difference.” In order for us to be able to put this definition into action we will strive to embody inclusivity at every phase of our project. An area that we will especially focus on is developing and implementing a model for communication and facilitation that ensures accessibility, openness, and collaboration. This will mean using different modes of communication and using a variety of tools for working together. It will also mean ensuring that all of our outcomes are meaningful and accessible to the entire library community and hopefully beyond. Another important aspect of creating an inclusive space is having clearly articulated rules of conduct for participants.<sup>15</sup> We will work with the advisory board and participants in order to craft guidelines for participants and for the broader community in order to best facilitate ethical, constructive, and meaningful dialogue and exchange. An inclusive environment means and requires many different things, but one of the most important aspects is that it is built collectively by our participants and advisory board with an ethic of care.

## **Broad Impact**

Data visualization support in libraries is at a critical juncture; it is growing rapidly with an increasing number of libraries hiring visualization librarians and assigning visualization responsibilities to a variety of librarians. At the same time as a profession we lack a broad vision and articulation of what skills, knowledge and methods are central to this type of work. A National Forum would provide an invaluable opportunity to articulate the role data visualization can play in advancing the mission of academic and public libraries and the frameworks, tools and opportunities needed to train librarians to support and engage with this work. Beyond improving data visualization services, such a framework will also offer a rich and critical lens through which to understand the complexities, challenges and insights of data services writ broadly. The resulting framework will serve both as a resource for libraries that want to develop or expand data visualization services and as a research agenda for future work. In addition, participants will further become resources to their communities and be able to provide instruction, consultations and strategy setting to develop robust data visualization services.

One challenge for data visualization services has been clearly articulating how they directly support the mission and goals of academic and public libraries. An important aspect of this conversation has been to frame data visualization as a practice and area of subject expertise that encourages an active research partnership with those seeking research support and not merely services that are provided as a means to an end. Furthermore, data visualization is an important part of library data services writ large. Data visualization offers a unique opportunity to shape and influence the provision of these services. It provides a rich and critical lens through which to understand the complexities, challenges and insights of data and the role libraries can provide in

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better understand the current demographics of academic library employees,  
<http://www.sr.ithaka.org/wp-content/uploads/2017/08/20170830-Mellon-SR-Report-Inclusion-Diversity-Equity-ARL.pdf>.

<sup>14</sup> Nowviskie, Bethany. *On capacity and care*. <http://nowviskie.org/2015/on-capacity-and-care/>.

<sup>15</sup> See the Digital Library Federation (<https://www.diglib.org/about/code-of-conduct/>) and the IMLS funded Collections as Data (<https://collectionsasdata.github.io/>).



supporting it. In particular, libraries will be able to better articulate, engage, and support their patrons in an area that is in demand and growing. Solidifying libraries support for data visualization will add further nuance and depth to the expanding work libraries are doing around collecting, using and interpreting data. Public libraries have been at the forefront of providing cutting edge services such as makerspaces to their communities. Adding support around data visualization will strengthen their public advocacy role and commitment to lifelong learning in a new and emerging field. Museums, archives and other cultural institutions can take advantage of data visualization, and the work this National Forum will produce, in countless ways in order to bring a different perspective to how patrons interact and understand their collections. Similarly, services in academic libraries have constantly been evolving to meet new user needs, and the ability to develop and support data visualization services will be a critical test of how libraries will continue to be an integral part of the larger mission of academic institutions. This National Forum Meeting will allow librarians working in this field to collectively articulate the future of this field and to participate in the ongoing discussions around the role of data in libraries.



	'19	'20										
	12	1	2	3	4	5	6	7	8	9	10	11
<b>Recruitment</b>												
<b>Application Review</b>												
<b>Orientation</b>												
<b>Individual Research Projects</b>												
<b>Monthly Virtual Meetings</b>												
<b>Kick-off Meeting</b>												
Select meeting dates												
Secure meeting venue												
Negotiate housing rate												
Announce details												
Hire, train graduate asst.												
Arrange catering, recording												
Host meeting												
Distribute post-meeting survey												
Write meeting white paper												
<b>Workshop Development</b>												
<b>Workshop Testing, Evaluation</b>												
IEEE VIS												●
DLF Forum												●
CNI	●					●						
ALA Midwinter		●										
PLA			●									
Code4Lib			●									
RDAP				●								
IASSIST						●						
ALA Annual							●					
<b>Visualizing the Future Symposium</b>												
Select meeting dates												
Secure meeting venue												
Negotiate housing rate												
Announce details												
Hire, train graduate asst.												
Arrange catering, recording												
Host meeting												
Distribute post-meeting survey												
Write meeting white paper												
<b>Dissemination</b>												
Create website with project plan												
Advertise public meetings												
Post meeting records and reports												
Create workshop videos												
Post final workshop materials												
Publish individual research findings												
<b>Final Reporting</b>												
Final project survey												
Compile feedback from surveys												
Complete Final Performance Report												

# DIGITAL PRODUCT FORM

## Introduction

The Institute of Museum and Library Services (IMLS) is committed to expanding public access to federally funded digital products (i.e., digital content, resources, assets, software, and datasets). The products you create with IMLS funding require careful stewardship to protect and enhance their value, and they should be freely and readily available for use and re-use by libraries, archives, museums, and the public. However, applying these principles to the development and management of digital products can be challenging. Because technology is dynamic and because we do not want to inhibit innovation, we do not want to prescribe set standards and practices that could become quickly outdated. Instead, we ask that you answer questions that address specific aspects of creating and managing digital products. Like all components of your IMLS application, your answers will be used by IMLS staff and by expert peer reviewers to evaluate your application, and they will be important in determining whether your project will be funded.

## Instructions

- Please check here if you have reviewed Parts I, II, III, and IV below and you have determined that your proposal does NOT involve the creation of digital products (i.e., digital content, resources, assets, software, or datasets). You must still submit this Digital Product Form with your proposal even if you check this box, because this Digital Product Form is a Required Document.

If you ARE creating digital products, you must provide answers to the questions in Part I. In addition, you must also complete at least one of the subsequent sections. If you intend to create or collect digital content, resources, or assets, complete Part II. If you intend to develop software, complete Part III. If you intend to create a dataset, complete Part IV.

## Part I: Intellectual Property Rights and Permissions

**A.1** What will be the intellectual property status of the digital products (content, resources, assets, software, or datasets) you intend to create? Who will hold the copyright(s)? How will you explain property rights and permissions to potential users (for example, by assigning a non-restrictive license such as BSD, GNU, MIT, or Creative Commons to the product)? Explain and justify your licensing selections.

All content, resources, and assets produced by the project and intended for distribution to the community will carry the Creative Commons BY-SA 4.0 license. This license specifically encourages use, reuse, and remixing of content in and outside of the community. Our aim with any and all content that is created is that it is easily and readily shared and used by library community. This license will encourage and ensure that our content be used freely and without any undue limitations.

**A.2** What ownership rights will your organization assert over the new digital products and what conditions will you impose on access and use? Explain and justify any terms of access and conditions of use and detail how you will notify potential users about relevant terms or conditions.

No conditions will be imposed on access or use of the primary products of the project beyond those specified by the licenses CC-BY-SA 4.0 and GPL v3.0.

**A.3** If you will create any products that may involve privacy concerns, require obtaining permissions or rights, or raise any cultural sensitivities, describe the issues and how you plan to address them.

N/A

## Part II: Projects Creating or Collecting Digital Content, Resources, or Assets

### A. Creating or Collecting New Digital Content, Resources, or Assets

**A.1** Describe the digital content, resources, or assets you will create or collect, the quantities of each type, and format you will use.

This project will produce a range of learning, programming, and outreach objects including but not limited to workshop materials, lesson plans, discussions, hands-on exercises, assessment forms, a white paper, presentations, and published articles. There is no minimum or maximum amount of content that the project will produce.

**A.2** List the equipment, software, and supplies that you will use to create the content, resources, or assets, or the name of the service provider that will perform the work. The project team will use standard hardware and software available to them through their institutions. All software will either be open-source or provided through licenses already available.

**A.3** List all the digital file formats (e.g., XML, TIFF, MPEG) you plan to use, along with the relevant information about the appropriate quality standards (e.g., resolution, sampling rate, or pixel dimensions).

File formats may include PDFs, CSVs, EXCEL, JPG, TIFF, and MPEG depending on content.

## **B. Workflow and Asset Maintenance/Preservation**

**B.1** Describe your quality control plan (i.e., how you will monitor and evaluate your workflow and products).

The project team will utilize Google Drive (Docs and Sheets) for communication and documentation. Slack, Google Hangouts, email, and/or phone will be used for facilitating and monitoring day-to-day communications, questions, and activities. With the help of the advisory group and input from the first meeting we will collectively decide on using a set of tools that will emphasize accountability and ease of use.

**B.2** Describe your plan for preserving and maintaining digital assets during and after the award period of performance. Your plan may address storage systems, shared repositories, technical documentation, migration planning, and commitment of organizational funding for these purposes. Please note: You may charge the federal award before closeout for the costs of publication or sharing of research results if the costs are not incurred during the period of performance of the federal award (see 2 C.F.R. § 200.461).

Most outputs will be stored and shared using a Github repository or similar infrastructure. Some larger outputs may be stored at our local repositories.

## **C. Metadata**

**C.1** Describe how you will produce any and all technical, descriptive, administrative, or preservation metadata. Specify which standards you will use for the metadata structure (e.g., MARC, Dublin Core, Encoded Archival Description, PBCore, PREMIS) and metadata content (e.g., thesauri).

N/A

**C.2** Explain your strategy for preserving and maintaining metadata created or collected during and after the award period of performance.

N/A

**C.3** Explain what metadata sharing and/or other strategies you will use to facilitate widespread discovery and use of the digital content, resources, or assets created during your project (e.g., an API [Application Programming Interface], contributions to a digital platform, or other ways you might enable batch queries and retrieval of metadata).

N/A

## **D. Access and Use**

**D.1** Describe how you will make the digital content, resources, or assets available to the public. Include details such as the delivery strategy (e.g., openly available online, available to specified audiences) and underlying hardware/software platforms and infrastructure (e.g., specific digital repository software or leased services, accessibility via standard web browsers, requirements for special software tools in order to use the content).

All content, resources, and assets will be made available online. Github and other open source platforms will be utilized for developing the underlying platform and infrastructure.

**D.2** Provide the name(s) and URL(s) (Uniform Resource Locator) for any examples of previous digital content, resources, or assets your organization has created.

N/A

## **Part III. Projects Developing Software**

### **A. General Information**

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**A.1** Describe the software you intend to create, including a summary of the major functions it will perform and the intended primary audience(s) it will serve.

N/A

**A.2** List other existing software that wholly or partially performs the same functions, and explain how the software you intend to create is different, and justify why those differences are significant and necessary.

N/A

## **B. Technical Information**

**B.1** List the programming languages, platforms, software, or other applications you will use to create your software and explain why you chose them.

N/A

**B.2** Describe how the software you intend to create will extend or interoperate with relevant existing software.

N/A

**B.3** Describe any underlying additional software or system dependencies necessary to run the software you intend to create.

N/A

**B.4** Describe the processes you will use for development, documentation, and for maintaining and updating documentation for users of the software.

N/A

**B.5** Provide the name(s) and URL(s) for examples of any previous software your organization has created.

N/A

## **C. Access and Use**

**C.1** We expect applicants seeking federal funds for software to develop and release these products under open-source licenses to maximize access and promote reuse. What ownership rights will your organization assert over the software you intend to create, and what conditions will you impose on its access and use? Identify and explain the license under which you will release source code for the software you develop (e.g., BSD, GNU, or MIT software licenses). Explain and justify any prohibitive terms or conditions of use or access and detail how you will notify potential users about relevant terms and conditions.

N/A

**C.2** Describe how you will make the software and source code available to the public and/or its intended users.

N/A

**C.3** Identify where you will deposit the source code for the software you intend to develop:

Name of publicly accessible source code repository:

URL:

N/A

## Part IV: Projects Creating Datasets

**A.1** Identify the type of data you plan to collect or generate, and the purpose or intended use to which you expect it to be put. Describe the method(s) you will use and the approximate dates or intervals at which you will collect or generate it.

N/A

**A.2** Does the proposed data collection or research activity require approval by any internal review panel or institutional review board (IRB)? If so, has the proposed research activity been approved? If not, what is your plan for securing approval?

N/A

**A.3** Will you collect any personally identifiable information (PII), confidential information (e.g., trade secrets), or proprietary information? If so, detail the specific steps you will take to protect such information while you prepare the data files for public release (e.g., data anonymization, data suppression PII, or synthetic data).

N/A

**A.4** If you will collect additional documentation, such as consent agreements, along with the data, describe plans for preserving the documentation and ensuring that its relationship to the collected data is maintained.

N/A

**A.5** What methods will you use to collect or generate the data? Provide details about any technical requirements or dependencies that would be necessary for understanding, retrieving, displaying, or processing the dataset(s).

N/A

**A.6** What documentation (e.g., data documentation, codebooks) will you capture or create along with the dataset(s)? Where will the documentation be stored and in what format(s)? How will you permanently associate and manage the documentation with the dataset(s) it describes?

N/A

**A.7** What is your plan for archiving, managing, and disseminating data after the completion of the award-funded project?

N/A

**A.8** Identify where you will deposit the dataset(s):

Name of repository:

URL:

N/A

**A.9** When and how frequently will you review this data management plan? How will the implementation be monitored?

N/A