January 7, 2014

Dr. Donald J. Waters  
Dr. Helen Cullyer  
The Andrew W. Mellon Foundation  
140 East 62nd Street  
New York, NY  10065

Dear Dr. Waters & Dr. Cullyer,

We respectfully submit a prospectus to the Andrew W. Mellon Foundation requesting $439,935.00 to support research of the online faculty workflow, focused on the streamlining of finding and archiving scholarly materials via Zotero software. We explain in the attached proposal the scope of the project and research objectives, the essential questions guiding our research, the projected project outcomes, and the rationale for and scope of funding requested for the project. Additionally, we enclose our proposed project’s draft budget, as well as the required proposal cover sheet.

With a faculty-centered Humanities focus, this project seems ideally suited to The Andrew W. Mellon Foundation. We look forward to building upon our prior research on the scholarly workflow, funded by the Mellon Foundation in 2012. This research explored the information management habits and needs of Penn State faculty members, and identified areas of necessity with regard to personal archiving and discovery of new research materials. Through the enhancement of Zotero citation management software, we hope to build a ready imperative for researchers to participate in locally based personal archiving of scholarly works. These enhancements will also further refine Zotero-based discovery for users. This proposed project represents a significant step forward in unifying the scholarly research workflow and simplifying personal information management for faculty researchers.

We are thankful for your consideration of this proposal, and we eagerly anticipate your feedback.

Very sincerely yours,

Ellysa Stern Cahoy  
Education & Behavioral Sciences Librarian  
Penn State University Libraries  
Assistant Director  
Pennsylvania Center for the Book

Dr. Sean Takats  
Associate Professor of History  
George Mason University  
Director of Research  
Roy Rosenzweig Center for History and New Media

Ellysa Stern Cahoy  
Education & Behavioral Sciences Librarian  
Penn State University Libraries  
Assistant Director  
Pennsylvania Center for the Book  
The Pennsylvania State University  
502-C Paterno Library  
University Park, PA  16802-1803  
(814) 865-9696  
Fax: (814) 863-5774  
E-mail: ellysa@psu.edu

An Equal Opportunity University
# PROPOSAL COVER SHEET

<table>
<thead>
<tr>
<th>Date of Submission</th>
<th>January 7, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>(This date must match the date of the cover letter)</td>
<td></td>
</tr>
<tr>
<td>Legal Name of Grantee</td>
<td>Pennsylvania State University</td>
</tr>
</tbody>
</table>

**Proposed Project:**

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Discovery and Archiving with Zotero and Library Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request Amount</td>
<td>$439,935.00</td>
</tr>
<tr>
<td>Proposed Grant Term (in months)</td>
<td>24 months</td>
</tr>
<tr>
<td>Proposed Start Date</td>
<td>April 1, 2014</td>
</tr>
<tr>
<td>Proposed End Date</td>
<td>March 31, 2016</td>
</tr>
<tr>
<td>Internal Reference Number</td>
<td></td>
</tr>
</tbody>
</table>

**Principal Investigator(s) and Title(s):**

| Name(s) | Ellysa Stern Cahoy  
Education Librarian and Assistant Director, The Pennsylvania Center for the Book | Sean Takats  
Director of Research at the Roy Rosenzweig Center for History and New Media and Associate Professor of History |
|---------|------------------------------------------------------------------|-----------------------------------------------------------------|
| Address(es) | 502-C Paterno Library  
University Park, PA 16802 | Roy Rosenzweig Center for History and New Media  
Department of History and Art History  
George Mason University  
4400 University Drive  
MSN 1E7  
Fairfax, Virginia 22030 |
| Signature(s) | [Ellysa Stern Cahoy Signature]  
[Sean Takats Signature] |

Financial Administrator for Grant:

<table>
<thead>
<tr>
<th>Name</th>
<th>John W. Hanold, Senior Associate Director, Office of Sponsored Programs,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>110 Technology Center, University Park, PA</td>
</tr>
<tr>
<td>Signature</td>
<td>[John W. Hanold Signature]</td>
</tr>
</tbody>
</table>
Faculty Management of Intellectual Workflow: 
Discovery and Archiving with Zotero and Library Resources

A Proposal to the Andrew W. Mellon Foundation from
The Pennsylvania State University Libraries and
George Mason University

January 2014

Proposal Summary

The Andrew W. Mellon Foundation generously funded the previous (2012-2013) phase of our project, and our research into faculty’s scholarly workflow has been fruitful. Our research team surveyed 196 Penn State faculty and graduate students on their research and information management practices, and conducted in-depth, ethnographic interviews with twenty-three Penn State faculty members.

Throughout our initial study, two areas of challenge for faculty researchers consistently emerged: difficulty with discovery (finding and storing articles and other research materials) and archiving (curating and saving personally authored materials, such as research articles) for the future. In the next phase of this project, we propose to address discovery and archiving by collaborating with the Zotero project, led by Sean Takats, Director of Research at the Roy Rosenzweig Center for History and New Media and Associate Professor of History at George Mason University.

This project focuses solely on Zotero software. In our previous study, we found that 33% of surveyed faculty in Penn State’s College of the Liberal Arts used citation management software in general. Among those faculty who did use citation software, Zotero was overwhelmingly the most popular choice (Zotero usage 67%; Endnote usage 27%; Mendeley usage 3%) for responding Liberal Arts faculty. Our research confirmed other studies’ (Collins et. al, 2011) findings that humanities scholars are more likely to use a specific tool if there is institutional support and peer usage (both of which are present for Zotero at Penn State). Other tools (ReadCube, Mendeley) were considered for this project. As our research team aimed to focus on humanities scholars in the second phase of this project, centering on Zotero presented several opportunities. The popularity of Zotero among our respondents shows the traction of this software among humanities scholars, yet the low rate of adoption overall in the College of the Liberal Arts provides an educational opportunity to use the next phase of this project to encourage greater usage among a wider swath of humanities faculty members. The aim to look closely at the impact of software of humanities scholars’ needs made the decision simple. Our Zotero colleagues’ enthusiasm to partner on this project cemented this decision.

Zotero is a self-sustaining project, but limited funds are available internally to pursue new lines of development. With the support of the Andrew W. Mellon Foundation, Penn State and Zotero will work closely to embed localized discovery and personal archiving into the Zotero software, with the goal of extending Zotero’s functionality to capture and optimize further aspects of the user’s scholarly workflow. The new Zotero optimizations respond to faculty needs identified in the original study. This next phase of research will in turn assess the impact of the Zotero optimizations on the overall scholarly workflow.
Our proposed work centers on the following areas of enhancement and exploration:

1) Discovery. Humanities faculty in our study used the Penn State Libraries website and its databases as an entry point to research more frequently than any other tool (e.g., Google, Google Scholar). This finding reinforces the reemerging primacy of local discovery tools for humanities faculty, echoed in more nationwide studies, such as the recent ITHAKA S&R Faculty Survey. (Marcum, Schonfeld, Housewright, & Wulfson, 2013) According to the ITHAKA study, “For known item searches, almost twice as many humanists as scientists start at the library website, while twice as many scientists as humanists start at a specific scholarly database or search engine.” (p. 20) Further, our research indicated a breakdown for humanities faculty between the stages of discovery and organization/storage, due to continued legacy (more directed towards print-based) organizational practices. Discovery must be connected to the other stages of the scholarly workflow. Other citation managers are pursuing discovery optimizations within the interface, as well. ReadCube and Mendeley are both affiliated with journal publishers (Macmillan and Elsevier, respectively) and not surprisingly, are increasingly building their interfaces around discovery of journal articles (including those published by their parent organizations). Through the Penn State / Zotero partnership, we will also explore how discovery can be more readily embedded into the user's workflow. Specifically, we will test new enhancements to the Zotero interface, including native feed support to enable easy management and import of relevant scholarly publications from within Zotero. Researchers will be able to keep track of new scholarship by subscribing to journal and other publisher feeds within Zotero. Adding relevant items to Zotero will require users only to drag items from these current publication feeds directly into their personal or collaborative research libraries.

2) Scholarly Archiving. Our faculty members expressed difficulty with archiving and organizing important information. In interviews, most of our faculty felt that their most important scholarly output was their research articles. Many of the faculty indicated discomfort with the knowledge that publishers may hold the only lasting record of their scholarly work, and hoped that their home institution would also preserve a record of their work. We noted in our previous proposal the pervasive, continued disconnect between the institutional repository (IR) and the user. Indeed, while Penn State University recently launched an IR (scholarsphere.psu.edu) in Fall 2012, faculty in our study were relatively unaware of the service and why (and how) they should use it. None of the current tools available widely (including Mendeley and ReadCube) integrate personal archiving via an IR. Mendeley features a ‘My Publications’ folder similar to the one that we propose in this project, where the user asserts authorship over specific materials, and stores the identified items in a dedicated folder.

We propose a Zotero / Penn State partnership to enhance and further explore local customizations that can connect users with their IR and allow them to claim authorship for and deposit works automatically. We will add functionality to the Zotero client software to allow users to assert authorship over their own scholarship and to indicate whether they hold the copyright to such materials. We will also develop a pluggable backend for Zotero that will allow any IR to draw such content from the Zotero ecosystem. This pathway between Zotero libraries and IRs will not circumvent existing copyright policies but merely facilitate the deposit of appropriate materials. Our first implementation will involve linking Penn State’s IR, ScholarSphere, a Fedora repository built on a Hydra-based platform. The results of this collaboration will provide open-source code for others in the Hydra community and an open API
for adopters of other repository software (e.g., DSpace, Islandora, EPrints) to link institutional and subject repositories to Zotero. Because this code will be freely available as open source, we anticipate that other reference management software providers will also adopt it. Additionally, the potential adoption of SUFIA (the ScholarSphere codebase) by several large research universities may provide additional opportunities for locally based adoption of the Zotero enhancements.

3) Evaluation. The first phase of our project yielded valuable data on the challenges and opportunities currently present in unifying faculty’s scholarly workflow. This next proposed phase utilizes and builds upon this data to further unify the workflow via discovery and archiving, providing the opportunity to evaluate the significance of Zotero enhancements on these two critical areas of need.

During the first year of the project, we will consult with our Zotero users from the first phase (recruiting additional users in the College of the Liberal Arts, as well) to test and provide feedback on the development of new features in Zotero. Additionally, we plan to fortify and add to our existing data analysis by conducting usability testing, along with an ethnographic study of faculty workflow in year two of the project. This dual-stage process of evaluation will ensure that our software development process is informed by current user needs, and will build upon the data already collected in the first phase of the project, providing a richer portrait of Liberal Arts faculty workflow needs with regard to the Zotero interface and features.

Project Background

*Information on the first phase of this study:* The 2012-13 study was comprised of two research phases, each of which focused on a specific set of research questions and goals. The first phase included a web-based survey that consisted of twenty-five questions which, in addition to demographic information, included queries about data searching, storing, citing, sharing, and archiving practices, as well as about scholars’ experiences in using digital research tools and resources. A total of 196 faculty completed the survey; 59% were female, and 41% were male. A majority of respondents were tenured faculty, with fixed-term (non-tenure track) faculty, and tenure-track faculty following. The humanities tended to have older respondents (over 40 years of age), while the sciences and social sciences faculty skewed lower in age.

The second phase of the study included a set of face-to-face ethnographic interviews. A total of twenty-three scholars volunteered to participate in the interviews, and they were equally divided along the lines of disciplinary profiles, academic ranks, and gender: 13 were faculty in the humanities and social sciences (HSS) and 10 in the sciences; 11 were tenure-track and 12 tenured faculty; 13 were female and 10 men. The interviews were semi-structured and, on average, lasted an hour. The interviewees were audio-recorded and then transcribed by a professional transcriptionist. The interview transcripts were first coded into broader categories (nodes) by two independent coders. We then proceeded with focused coding, where the categories into which the data were originally coded had additionally been refined for relevant patterns, themes, and topics.

The results of our initial study showed that digital technologies have different roles and levels of integration at various phases of scholarly workflow. For instance, digital tools are actively used
for finding, storing, and archiving research materials. This finding is true across disciplines, although certain disciplinary differences can be traced. For instance, while the majority of respondents across disciplines (92%) actively store research materials important to them, humanities scholars reported the highest percentage of lost and inaccessible research files; predominantly (27%) had inaccessible files that resulted from failing to migrate research materials from obsolete to contemporary digital formats. Similarly, while searching for information electronically is a standard, daily practice of our respondents regardless of their disciplinary background and/or level of technical proficiency, HSS scholars commonly prioritize the Penn State library catalog as their search and access points, while scholars in the sciences prioritize Google Scholar.

The results of our study further show that, in the phases of data collecting and analysis, the use of digital technologies significantly differs across disciplines. Our respondents in the sciences commonly noted that their work would be impossible without digital technologies, and scholars in the social sciences indicated digital tools and methods becoming ‘a new normal’ in their data gathering and analysis practice. Contrary to this, respondents in the humanities, with a few exceptions, implied the lack of digital technology use in those phases of their research process. Parallel with this, however, they indicated awareness of digital tools and methods that could facilitate their analytical practice, suggesting the lack of available training and time as key impediments to developing technology literacies needed for mastering those tools.

Disciplinary differences have also been observed in the activities of data sharing and communication, particularly in the use of social media. With regard to data sharing, two thirds (63%) of scholars in the sciences indicated that they actively share their research data, while a nearly identical percentage of the humanities scholars (69%) indicated the opposite. Yet we found that, in addition to disciplinary differences, academic standing also influences the data sharing practices of our respondents, with tenure-track faculty being more protective of their data than tenured scholars. We further observed widespread use of digital technologies in scholarly communication across disciplines, with a noticeable difference being frequent social media use among the humanities scholars, a practice that was nearly non-existent among respondents in the sciences.

Annotating and reflecting emerged as research phases where the use of digital technologies is most idiosyncratic, that is, based on scholars’ personal preferences rather than the level of technical skills or availability of digital tools. With regard to citation, the use of citation management programs was somewhat higher in the sciences than in the HSS (55% vs. 30%), but the overall level of digital technology use in this research activity was lower than in other phases of the research workflow. Conceptually, our results illustrate various ways in which integration of digital tools in one phase of the research processes influences other segments of the workflow. For example, scholars’ full reorientation on electronic search and access produces an abundance of collected materials, requiring adjustments in researchers’ storing, organizing, and archiving practices. As some of our respondents observed, integration of digital tools into their search activities resulted in a complete breakdown of their systems for organizing information, which had been developed for managing print-based materials. Therefore, while implementation of digital tools into one phase of the workflow might be rewarding, it might also become a challenge in other phases of the workflow. This finding is particularly relevant in the perspective of tool development, implying that digital research tools should be designed to support a
continuous research workflow instead of separate and disconnected activities.

Our findings also suggest that in a digital scholar’s research practices, technical rather than traditional methodological expertise shapes interconnectedness among phases of the workflow. In our study, a greater level of workflow interconnectedness was observed among scholars in the sciences, who tend to be more technologically savvy than scholars in the humanities and social sciences. This finding, as well as our previously mentioned study results, indicates a significant scope of disciplinary differences with regard to the use of digital technologies in scholarly work, as well as a demonstrated level of need among humanities scholars for technical support and professional development.

Prior Related Studies: Several projects predate the self-archiving features suggested in this proposal: Stanford’s SALT project (Self-Archiving Legacy Toolkit) and JISC’s DURA Project (Jisc, 2011; Stanford University Libraries and Academic Information Resources (SULAIR), 2009). No longer under active development, SALT was created to produce a web-based service that would allow faculty to readily archive and annotate their scholarly works and other materials. SALT partners with Zotero to pull the faculty member’s personal Zotero library into an archival management interface. This project sought to expand the notion of a citation manager from a research tool into a connector for self-archiving activities. Elements of SALT live on in current Stanford digital archival projects. The essential goals of SALT, however, to enable the end-user to self-archive with their local institution on their own behalf, however, have not been realized by another known project.

The JISC DURA project began in 2010 and ended in 2011, with the goal of connecting Mendeley to DSpace IRs, to enable self-archiving of works. The project was never formally implemented within Mendeley, and no code was released. JISC DURA was succeeded by DepositMO and now DepositMOre (Jisc, 2010, 2012). DepositMOre (http://blog.soton.ac.uk/depositmo/) attempts to move beyond the purview of citation management software, with the goal of connecting IRs with everyday software applications, such as Microsoft Word. The goal of both projects is to make self-archiving a more continuous activity that is readily and easily available to individual users.

The myKive project, based at the University of Illinois, Urbana-Champaign, takes a broader view of personal archiving, and is software designed to harvest a user’s social media postings, email records, desktop computer files, enabling visualization and mining across all file types (Hawkins, Prom, & Chan, 2013). While still in a very nascent form, this project takes the most expansive view yet on the scope of personal scholarly archiving. The developer, Christopher Prom, notes that in the future, myKive may also expand to include users’ citation management libraries, including references from Zotero (Hawkins et al., 2013, p. 243). The myKive project is currently in a more nascent phase, and is entirely focused on the possibilities archiving of personal social data, at this point. They have been approached as a possible partner for future phases of this project, beyond the scope of this current proposal, and they have indicated interest in future collaborative work. We will continue to communicate with Chris Prom, lead developer on the myKive project, as our work moves forward.

Although SALT, JISC DURA, and its successors have so far failed to produce sustainable and production-grade integration of institutional repository usage into researchers’ workflow, the
intense effort behind these projects suggests the ongoing need to bridge existing research practices with institutional archiving and imperatives. We believe that by tying IRs to Zotero, which already benefits from high adoption rates and includes structured metadata and file attachments, this project will simultaneously encourage self-archiving at both the individual and institutional level.

Background on Zotero: Since its initial launch in 2006, Zotero has evolved from a relatively simple plugin for the Firefox web browser to a sophisticated ecosystem of interrelated desktop, mobile, and cloud tools and services. Today Zotero users access their research libraries on Windows, Mac, and Linux personal computers, using iOS and Android mobile devices, and via all modern web browsers. Over 1.2 million scholars have elected to synchronize their research libraries with Zotero’s sophisticated cloud services, where the project currently hosts over 200 million bibliographic items along with notes, tags, and metadata. These researchers collaborate in over 150,000 online Zotero research groups, over half of which are open to the public. The massive (and growing) scale of this basic infrastructure (e.g. servers, storage, bandwidth) and maintenance development costs -- currently approximately $300,000 per year -- are defrayed by the sale of storage subscriptions for individual and institutional users. Rapid development of new functionality (and the cultivation of new audiences), however, is not currently possible without external funding. Because Zotero is already on sound financial footing, the present proposal’s relatively small investment in the project will translate into significant results.

Literature Review

The literature on faculty needs relevant to archiving and discovery informs the design of this proposed study. Two areas of research are relevant to our proposed project: facilitating user discovery and archiving and studies of humanities faculty needs relevant to the research workflow.

Studies of Faculty Search and Archiving Needs:

The initial phase of this project identified distinct areas of challenge for humanities faculty with regard to connecting the phases of finding materials and archiving to the rest of the scholarly workflow. Collins et al (2011) indicate two different factors that determine how faculty behave with regard to information seeking and retrieval. ‘Supply-side influences’ are new technologies and emerging tools that impact how faculty find and access information, while ‘demand-side characteristics’ are the features and behaviors of the faculty themselves that impact how they find and use information. In the qualitative interviews conducted during our study, some humanities faculty reported their ‘demand-side characteristics’ being overwhelmed by the volume of materials produced by ‘supply-side influences.’ Indeed, scholars’ full orientation on electronic search and access produces an abundance of collected materials, requiring adjustments in researchers’ storing, organizing, and archiving practices. As some of the respondents observed, integration of digital tools into their search activities resulted in a complete breakdown of their systems for organizing information, developed for analog or print-based materials. Therefore, while implementation of digital tools into one phase of the workflow might be rewarding, it might also become a challenge in other phases of the workflow.

The ITHAKA S&R Faculty Survey 2012 provides much food for thought on current and future needs of faculty researchers with regard to information management and discovery (Marcum et al., 2013). In the humanities, faculty reported a higher preference for using local resources (i.e.,
the library web site, the library catalog) for known-item searches, or for beginning a new research query. This 2012 finding is a marked change from other years of the survey, where preference for more networked research tools, such as Google Scholar, were reported among faculty across disciplines. This preference for local resources was confirmed as well in our study. The survey also reports a marked preference by humanities faculty (over 60%) for socially-based recommendations of new and relevant research articles or other information, either via following the works of key scholars in their field, or receiving recommendations from fellow colleagues in similar areas of research focus. Humanities faculty report a lower incidence than sciences or social sciences faculty of setting alerts for specific topic-relevant keywords or following research-related blogs or websites; however, humanities faculty also displayed the highest level of openness among faculty (over 80%) to receive training or support in using technology to increase and enhance their research productivity. This positive reception towards training and support was also confirmed in our study.

Seaman (2011) studies humanities faculty needs with regard to information storage and IRs. While a small sample, the faculty in the study indicates a willingness to store research materials (including scholarly works) in an IR, as long as technical support was provided. Faculty also indicated a need for conversion services for materials in outdated file formats, as well as digitization for non-electronic materials, such as photos or archival documents. “What Researchers Want” reviewed the recent literature on faculty needs with regard to data management and archiving. (Feijen, 2011) While the literature consulted in the study had a broad, multi-disciplinary focus, results were shared with relevance to humanities faculty needs. The paper stresses that any new tools or services must be developed with the disciplinary workflow in mind, there must be ease of use, and support for any new tools must be locally based, hands-on, and readily available when needed by faculty. Foster, Gibbons, and Bell’s research (2005) on faculty work practices in relation to IR needs remains a seminal work in this area of study. While the study is now over seven years old, it was one of the first imperatives to broaden out the role of an IR from simply storage to becoming a service that provided a more expansive menu of options for faculty needs (researcher home pages, research tools).

The ITHAKA report, “Supporting the Changing Research Practices of Historians” (Rutner & Schonfeld, 2012) highlights the significance of discovery for history researchers. While faculty studied felt comfortable finding and accessing secondary sources, they indicated difficulty accessing finding aids and digitized copies of archival materials. This corresponds with Collins’ (2011) notion of supply-side influences colliding with demand-side characteristics, and again brings forward the need to address bridging of scholars’ legacy practices to the use of new technology tools.

Facilitating Discovery and Archiving:

Discovery or research articles can happen inside and outside of the traditional web browser. In his article, “Reconfiguring the Library Systems Environment” (2008), Lorcan Dempsey reinforced the significance of two user trends: First, discovery happens elsewhere (for scholars, typically within a subscription journal database, even when search is initiated at the library web site); and second, research activities must occur “in the flow” of users, i.e., where the user’s attention and scholarly habits take them naturally. Research activities (including the act of discovery) must be readily interconnected within one workflow. Dempsey identifies three
different workflows that exist in the consumer environment, and that must be integrated effectively in order to facilitate seamless discovery and sharing: personal workflow, institutional workflow, and network level workflow. All of these processes must be synchronized in order for optimal individual-based knowledge management to occur. (Dempsey, 2008) Dempsey (2012a) notes, “The use and mobilization of bibliographic data and services outside the library catalog is an increasingly important part of library activity. This is especially important as "discovery increasingly happens elsewhere" – in other environments than in the library.” and further: “Research workflow tools like Mendeley and social reading sites like Goodreads are important in another way: they allow their users to develop personal libraries connected to network level reservoirs of data and social services.” (Dempsey, 2012a) Connecting the user’s discovery to research tools like Mendeley and Zotero creates “social value in library services.” (Dempsey, 2012b) Grant (2013, p. 202) similarly advocates for seamless discovery and socially based information management, calling the next generation of integrated library services a “knowledge creation platform.” While Grant does not specifically point to any existing tools (including bibliographic management software), the emphasis is on embedding discovery within the context of the rest of the workflow, and providing a more comprehensive research solution for library users.

The literature on discovery and archiving within citation management software is scant at present. A recent development in this area is a new project led by ReadCube and the University of Utah Libraries. ReadCube, a new entrant into the research management software field, has partnered with the University of Utah to embed Nature Publishing Group journal article discovery and access within ReadCube. The results of this user-centered project are discussed within their recent article. (England & Anderson, 2013) While usage of the service was small (out of 1,320 invited participants, 102 registered for access, and 41 articles were purchased) the project itself represents a new step towards integrating e-resource acquisition within an environment other than the library web site. Through the ReadCube partnership, University of Utah users were able to download articles for individual use within ReadCube. This ‘pay per use’ model allowed the University to pay only for what students and faculty actively used, rather than simply blanket purchasing vast swathes of journal subscriptions in advance of anticipated use. It remains to be seen if this model will be more cost-effective (as well as more responsive to user needs) than the traditional online journal/database subscription model. Somewhat similar (although undocumented in the literature) is Mendeley’s recent effort to bring literature searching within the Mendeley software desktop client. Users may now search for articles in the Mendeley catalog within the software (via a direct link to the Mendeley catalog) and download citations to their Mendeley library. In order to access the full text, users are forwarded from the software to the web-based Mendeley catalog and are authenticated through their University’s proxy server. Although each presents a different take on institutionally based search within a proprietary software package, Mendeley and ReadCube’s efforts are first steps towards full integration of discovery within a personalized information management interface.

A number of researchers have looked closely at how the functionality of an IR can be broadened to make it more pertinent to and embedded within the scholar’s overall workflow. Salo (2008) asserts that an IR must be more than simply a container; it must be a destination in itself and facilitate scholarly collaboration. Marshall (2008a) concurs, stating in addition to collaborative capabilities, the IR must synchronize with the user’s other information collections, such as desktop or cloud-based file folders. Further, Marshall identifies the challenges of personal
archiving (accumulation, distribution, curation, and long-term access) and suggests remedies, including “circumscribed, digital places” to save important content (such as an IR) (2008b). Basefsky (2009) argues for the integration of ‘social’ services within an IR. This proposed integration does not refer to the social functions typically employed by IRs (e.g., post to Facebook on my behalf when I upload a new paper), but instead calls upon Dempsey’s notion of ‘social value’, creating a research and communication tool that enables discussion and socialization around the research process.

**Research Questions**

*This study will center on the following research questions:*

*How can discovery be more intuitively embedded and optimized within Zotero to enable rapid, contextual discovery of locally held resources?* Several current citation managers (ReadCube, Sente, Papers) embed searching within the user interface so that retrieval and storage of scholarly information is seamless. While Zotero also achieves this in some manner with browser integration, we are interested in further refinement of this experience. Will integration of feeds provide easy discovery of relevant and new journal articles?

*Does the integration of discovery and archiving within use of Zotero increase faculty members’ ability to manage, share, and archive personal scholarly information collections?* During the second year of the study, we will compare past self-reported information workflow issues (including those surrounding discovery and archiving) with current Humanities faculty-based findings regarding unification of the entire research workflow, and ease of integrating discovery and archiving successfully within the Zotero workflow. Both qualitative and quantitative data will be collected in this area of study.

*Are there specific learning support needs with regard to discovery and personal archiving that must be addressed with humanities faculty?* The ITHAKA S&R 2012 Faculty Survey indicated that humanities faculty are receptive to technology training, and display overall a low incidence of using technology to optimize the research workflow. These findings were confirmed in our study, as well. Adding feed-driven discovery and self-archiving into Zotero will require training for faculty users on how to use and customize these features for their needs. Strategies investigated will include both electronic and in-person instructional initiatives.

*Do the new Zotero enhancements influence the future development trajectory of peer citation management software (Mendeley, Endnote, ReadCube, Papers, etc...)?* In general, other citation management software has followed Zotero’s lead of inserting itself into multiple stages of the ‘flow’ of user research: embedding institutional authentication and search (Mendeley, ReadCube, Papers), aggregating bibliometric data from on the user’s libraries (Mendeley), and enriching and extracting bibliographic data from PDFs for additional research suggestions (ReadCube). In each of these cases, streamlining the flow of research within the user’s library (without an outside trip to an external application to gather resources is key. We believe that feeds are an intuitive and facile way to stream new works into the user’s library. The closest approximation to this model in current practice is Mendeley’s ‘related’ feature, which analyzes selected citations in the user’s library and attempts to retrieve records from Mendeley’s internal catalog similar to those already in the user’s library. By definition, however, this feature does not provide access to new
research, as feeds provide. The integration of self-archiving is also entirely new, and (while explored several years ago by the JISC DURA Project and Stanford's SALT) may provide impetus for other citation managers to pursue similar integration with IRs and other repositories. We anticipate that this research question will be answered over the long-term, and will move beyond the scope of the current timeline of this proposed project. We will continue to watch Mendeley, ReadCube, and other leading and emerging workflow tools throughout the project timeline and beyond, to assess integration of new features optimizing discovery / archiving.

Proposed Research Activities

*We propose a twenty-four month project focused conducted in two phases.*

**Phase One: Development and implementation of Zotero / Penn State optimizations.**
Ms. Stern Cahoy and Dr. Takats will work collaboratively, along with Zotero / Penn State developers, to implement the following Zotero optimizations:

**Integration of ScholarSphere / Zotero.** *We envision the integration of Penn State's IR with Zotero occurring at several user-focused levels:*

**Feed Discovery**

Although Zotero remains primarily a tool for archiving and sharing personal research materials, it has also developed functionality related to research discovery, including the automated retrieval of canonical metadata and integrated lookup functionality using library resolver services. With this project we propose to add a new layer of discovery, where researchers can monitor and import recent publications in their areas of interest within the Zotero application.

Zotero's design has always been guided by the understanding that the researcher has the best sense of where and how to locate materials. Rather than create a new search interface within the software, for example, Zotero instead piggybacks on browser usage by the researcher. This same philosophy informs our plan to embed feed-reading functionality into the Zotero client. By subscribing to ubiquitous feeds associated with formally published journals as well as gray literature like blogs, researchers will be able to receive notifications from the important sources in their fields as they appear. While the previous study did not discuss the use of RSS feeds for discovery, the need for better linking the discovery and storage / citing phases of the workflow indicate a need to more closely embed the acquisition of new articles within software used for related practices (annotation, citing, etc...)

This approach differs markedly from other efforts to embed discovery into research management software. First, it does not require that new publications already exist in some form within the Zotero ecosystem, since it harnesses the Zotero client to external feeds. Second, it does not second-guess the researcher by relying on computational analysis of reader preferences, which are inherently problematic for large, heterogeneous research collections. Instead it exploits the researcher's own expertise in identifying the key publishing outlets in one's own areas of interest and then drawing from those automatically on an ongoing basis.

In light of the much-lamented demise of Google Reader, feed reading might initially appear to be in decline, but RSS and Atom feeds remain an essential aspect of scholarly infrastructure that
opens the door to enabling aggregation and monitoring of new publications in real time. By integrating local feed functionality directly into Zotero, we will enable researchers to collect and track journal tables of contents, new blog posts, and other formal and gray literature related to their research areas.

New publications will appear in dedicated, read-only collections within the Zotero application. Users will receive visual feedback indicating that new publications are available, and they will need only to drag and drop these items into their personal or group library to collect the full object metadata and any associated files like PDFs and web snapshots. If necessary, these collected items can then be passed to Zotero's existing institutional resolver service.

**Institutional Repository (IR) Integration**

IRs will be able to accession content directly from participating researchers' Zotero libraries via the implementation of two new features: a “My Publications” Zotero collection and a software tool that links IRs to Zotero.

*Please note: the full workflow for the process outlined below is diagrammed in figure 1.*

The new “My Publications” collection will be accessible to all new and existing Zotero users, though users will also be able to hide the collection if they’re not using it. By dragging an item to the “My Publications” collection, users will assert authorship, and the Zotero software will display a warning message reminding them that they should only add self-authored materials. Zotero users who synchronize their libraries with the Zotero servers at zotero.org will be able to share their self-archived content with the public via Zotero's web site. All "My Publications" content will include a "Report Abuse" button to allow readers to report the inappropriate sharing of material, for reasons of attribution, copyright, or spam. If the Zotero administrators receive reports of inappropriate sharing via other channels, such as a Digital Millenium Copyright Act (DMCA) takedown notice we will investigate and respond accordingly. Self-archived content will also be accessible via Zotero's application programming interface (API), enabling our new archiving tool to deliver self-authored content to Penn State’s ScholarSphere and other IRs.

The two main components of this tool will be new server-side service and a new “push” API. The server-side PHP-based service will enable institutional users like university faculty to authorize their own IRs to pull self-authored content automatically from their personal Zotero libraries. The new push API functionality will send users' Zotero library updates directly to the authorized service without the need for each repository to check repeatedly for changes across thousands of libraries. The API will be designed and developed in the open where the broader community can get involved and offer feedback, which will be critical to building adoption outside of Penn State, with the goal of encouraging implementation in other repositories such as DSpace, Islandora, and EPrints.

The Penn State team will identify and work with institutions both within and outside the Hydra community to ensure both the open API and the open-source code are usable by a broader audience, in order to maximize the impact of this work.

**Phase Two: Evaluation (looking closely at our users as well as the process for development used by the partners.)**
The following research activities will contribute to the PI and researchers’ understanding of current faculty scholarly practices, as well as the current state of faculty’s online scholarly workflow:

The Zotero team will maintain the new functionality developed in Phase One and support the adoption and implementation of the IR archiving service by other institutions beyond Penn State. Phase Two will complement the research conducted in 2012-2013, drawing on much of the same qualitative methodology, but solely focused on College of the Liberal Arts faculty. This singular focus will inform the further development of library support and Zotero services for this core population. Our analysis will provide further data on the scholarly habits and needs of humanities faculty, and with Zotero as a model, will illuminate a future path for continued integration of the humanities research workflow.

This research will include the following activities:

Ethnographic interviews with faculty on their research, storage, and archiving practices. Zotero users in Penn State’s College of the Liberal Arts will be identified (drawing from previous participants in our first phase of research, as well as other sources including Penn State’s Humanities in a Digital Age Interest Group (http://sites.psu.edu/humanitiesda/)). We will interview these users in their office environment, focusing on description of the overall scholarly workflow (including technologies used to manage the workflow), with specific emphasis and detail on use of Zotero for citation management, discovery, and archiving. We have included the Interview Protocol (Appendix I) from the initial phase of this project, which should give additional details on the scope of these interviews. Additional questions will be added for this current proposed phase, including more specific queries on usage of Zotero within the workflow.

Usability Testing of the Improved Zotero Interface. Our subject librarians (Eric Novotny, Dawn Childress, and John Meier) will lead usability testing focused on the improved Zotero interface. The usability testing goals will center on efficiency and emotional response relative to the Zotero interface. Subjects will utilize the ‘think-aloud’ protocol during testing to articulate their train of thought while navigating the interface. Popularized by usability researcher Jakob Nielsen, the think-aloud protocol asks research subjects to verbally articulate their thought process as they use an interface, including any perceived difficulties or interface challenges. Findings from the usability testing will be considered and analyzed in tandem with ethnographic interview findings, and will be shared with Zotero for additional interface refinements.

Analysis and publication of collected research to inform the continued development of Zotero, as well as unification of the scholarly workflow for Humanities users. These interviews will be transcribed and analyzed to enhance the continued development of the Zotero interface and features, as well as to complement and build upon the existing research from the initial phase of this project. The research findings resulting from this study will provide the basis for multiple publications and presentations on a national and International level, from a disciplinary and general perspective.

Core Project Personnel

Ellysa Stern Cahoy (Penn State)

Description of Responsibilities: Within this study, Ms. Stern Cahoy will guide the project (in
close collaboration with Dr. Takats). She will work closely with the research anthropologist, and will participate in the data collection in the College of the Liberal Arts. Ms. Stern Cahoy will also administer all research requirements, including Penn State human subjects approval. Ms. Stern Cahoy will lead the data analysis and publication of research results with the research anthropologist, and the Project Team.

Brief Bio: Ms. Stern Cahoy is liaison to Departments in the College of Education, and is an Assistant Director of the Pennsylvania Center for the Book. Ms. Stern Cahoy has conducted and published research on personal archiving, library instruction, information literacy, and evidence-based librarianship. In 2013, Ms. Stern Cahoy was awarded the Miriam Dudley Instruction Librarian Award by the American Library Association (ALA) Association of College & Research Libraries (ACRL) Instruction Section. Ms. Stern Cahoy recently published "Faculty Members as Archivists: Personal Archiving Practices in the Academic Environment," in D. Hawkins, Ed., Personal Archiving: Preserving Our Digital Heritage (2013).

Sean Takats (George Mason)
Description of responsibilities: Dr. Takats will oversee the technical aspects of this project, including the development of all core software in phase one. In phase two, he will also direct the Zotero team’s provision of technical support to outside developers in order to create plugins for their institutional repository software as needed.

Brief bio: Sean Takats is Associate Professor of History at George Mason University and Director of Research at the Roy Rosenzweig Center for History and New Media. His research focuses on early modern France, the Enlightenment, and the digital humanities. At the Roy Rosenzweig Center for History and New Media, Takats directs Zotero, the popular research software platform, and PressForward, an ongoing experiment in open-access scholarship, along with a range of other projects on text mining and the history of science. He is author of The Expert Cook in Enlightenment France (Johns Hopkins University Press, 2011), and his current research extends this interest in occupational expertise to the colonial world, where he explores the practices of collecting and synthesizing a wide range of exotic medical knowledge.

Smiljana Antonijević (Research Anthropologist) (Penn State)
Description of responsibilities: In collaboration with Ms. Stern Cahoy and Dr. Takats, Dr. Antonijević will lead the project research on the online scholarly workflow of disciplinary faculty. Dr. Antonijević will organize and oversee qualitative and quantitative data collection throughout 2015 / 2016 during this project, and will work closely with Ms. Stern Cahoy, Dr. Takats, and the Project Team on the project design and methodology. Dr. Antonijević will contribute initial data analysis and will significantly participate in further analysis and formal dissemination of results with Ms. Stern Cahoy, Dr. Takats, and the other Project Team members. Please note: Dr. Antonijević served as Research Anthropologist on the first phase of this project, and we are hopeful that she will be able to join us once again in the same capacity in 2015 / 2016. If Dr. Antonijević is unable to join us, we will advertise for a researcher with a similar focus / background in anthropology and the digital humanities. (Please see Appendix II for the proposed position description).
Brief Bio: Smiljana Antonijević is an Assistant Professor of Culture and Technology at Roskilde University in Copenhagen, Denmark, and an Affiliated Researcher at eHumanities Group of the Royal Netherlands Academy of Arts and Sciences. Her most recent projects include “Digital Scholarly Workflow” (Penn State University), “Alfalab: eHumanities Tools and Resources” (Royal Netherlands Academy of Arts and Sciences), and “Humanities Information Practices” (University of Oxford). Her publication record includes one edited collection and a number of peer-reviewed journal articles and book chapters exploring various aspects of digital scholarship and digital culture (selected publications: Palgrave Macmillan, 2013; MIT Press, 2012; Palgrave Macmillan, 2012; Journal of the American Society for Information Science and Technology, 2011; Cultural Heritage Online, 2009); Information, Communication & Society, 2008; American Behavioral Scientist, 2008; The Sage Handbook of Rhetorical Studies, 2008; University of Minnesota Press).

Patricia Hswe (Penn State)
Description of Responsibilities: Dr. Hswe will participate in both phases of the project, working collaboratively with Zotero / Penn State developers during the first year, and participating in project research during the second year. Dr. Hswe’s focus on ScholarSphere development and user services will make her an integral partner in this project, as she will ensure user-focused development and alignment of the project with the strategic goals and projected development and service trajectory for ScholarSphere.

Brief Bio: Patricia Hswe is Digital Content Strategist and Head, ScholarSphere Repository Services, and co-leads the department of Publishing and Curation Services. She works to make digital content and data discoverable, accessible, and usable over time, for as long as these materials are useful — toward the related goals of repurposing them and adding value to them. She also collaborates with colleagues in the Libraries to support researchers in their pursuits of innovative digital scholarship. Dr. Hswe has published on data curation and community of practice, as well as on data management services in libraries. Her current research interest focuses on science data publishing practices and services, both library-based and publisher-based. She holds a PhD in Slavic Languages and Literatures from Yale and an MS in Library and Information Science from the University of Illinois at Urbana-Champaign.

Michael Giarlo (Penn State)
Description of Responsibilities: Mr. Giarlo will serve as a developer, as a technical architect, and as a liaison with the Project Hydra community. He will align the technical approach of the Zotero integration with the current ScholarSphere architecture and work with the Hydra community, and the broader repository community, to find other developers to test the open API and code that is implemented to allow Zotero access to ScholarSphere.

Brief Bio: Mike Giarlo is Digital Library Architect at the Pennsylvania State University. His primary roles are designing a technical architecture for durable access to the institution’s digital assets, providing vision and strategy for the development of the architecture, and fostering community around digital repositories locally and abroad. He has been working in library
technology since 1999, holding systems administration and software development positions primarily in support of digital libraries and repositories at the Library of Congress, Princeton University, the University of Washington, and Rutgers University. He earned both a bachelor's degree in linguistics and an MLIS at Rutgers.

Daniel Coughlin (Penn State)
Description of Responsibilities: Mr. Coughlin will serve as a developer and manager of technical resources (developers, hardware, software) for the development of additional ScholarSphere functionality. He will participate in discussions with outside developers from Zotero for implementation strategy and progress updates. Mr. Coughlin will work with internal units at Penn State to help align the authentication and authorization with the existing IT infrastructure at Penn State.
Brief Bio: Daniel Coughlin is the Director of Applications & Repository Services within ITS at Penn State and served as the technical development lead for the development of ScholarSphere. In his position he manages the development team for Hydra based repository solutions, and has also presented nationally on ScholarSphere and development methodologies.

Eric Novotny (Penn State)
Description of Responsibilities: Mr. Novotny will work collaboratively with Ms. Stern Cahoy and the Project Team on project design and methodology. As library liaison to the History department, Mr. Novotny, will actively recruit History faculty to the project. After data is collected, he will work with the Project Team to analyze and disseminate data on Humanities faculty's online scholarly workflow with a special emphasis on findings relevant to historians.

Brief Bio: Mr. Eric Novotny is Humanities Librarian for History and Acting Head of the George and Sherry Middlemas Arts and Humanities Library at Pennsylvania State University. Primary responsibilities as Humanities Librarian include developing collections in history and facilitating access to historical materials in all formats. Mr. Novotny received his MLS from the University of Illinois Urbana Champaign. He has conducted and published research on library assessment and usability, while also researching the historical role of public libraries in society during the early twentieth century.

Dawn Childress (Penn State)
Description of Responsibilities: Ms. Childress will work collaboratively with Ms. Stern Cahoy and the Project Team on project design and methodology. As liaison to literature and philosophy departments, will actively recruit faculty to the project and work with the Project Team to analyze and disseminate data, with an emphasis on findings related to humanities researchers. She will participate in discussions on Zotero/ScholarSphere integration to help ensure user-focused development and implementation.

Brief Bio: Dawn Childress is the Kalin Librarian for Technological Innovation in the Humanities and Humanities Librarian for French and Francophone studies, German and Slavic languages and literatures, Comparative literature, and Philosophy. Her primary responsibilities involve
supporting the research needs of scholars, from building and creating access to collections in all formats to providing consulting and technical support for digital scholarship. She has conducted and published research on building community, capacity, and infrastructure for digital scholarship and scholarly communication initiatives within libraries and manages several R&D projects related to digital publishing and digital humanities.

John Meier (Penn State)
Description of Responsibilities: As a science librarian, Mr. Meier, will work with the project team to conduct research and analyze results, looking specifically at how the Zotero enhancements can benefit faculty in the Sciences. He will participate in discussions on Zotero/ScholarSphere integration to help ensure user-focused development and implementation.

Brief Bio: John Meier is a Science Librarian in the Physical and Mathematical Sciences Library at Penn State University. Primary responsibilities as Science Librarian include developing collections in mathematics and statistics, developing library instruction materials, and acting as the Patent and Trademark Resource Center Librarian for the University Libraries. Mr. Meier received his MLIS from the University of Pittsburgh and his MS in Electrical and Computer Engineering from Carnegie Mellon University. He has conducted and published research on science and engineering information sources, while also examining the current and future roles of science and technology librarians.

Ben Goldman (Penn State)
Description of Responsibilities: Mr. Goldman will work collaboratively with the other members of the project team to assess the integration of ScholarSphere within Zotero for archiving activities. As a Libraries faculty member centered on archival practices, he will also assess the possibility for future integration of ArchiveSphere with ScholarSphere, allowing for self-deposit of archival works by Penn State faculty members.

Brief Bio: Ben Goldman is the Digital Archivist in the Penn State University Libraries Special Collections Library. In this leadership role, Mr. Goldman oversees all digital workflows and processing of born-digital archival materials. Mr. Goldman is implementing ArchiveSphere at Penn State, and maintains a professional interest in enabling user-centered archiving practices. Prior to his hiring at Penn State in 2012, Mr. Goldman was the Digital Programs Archivist in the American Heritage Center at the University of Wyoming. Mr. Goldman holds an MSLIS from Syracuse University.

Project Timeline

April 1, 2014 - March 2015: Development and testing of all new Zotero and ScholarSphere enhancements. Dr. Takats and Ms. Stern Cahoy coordinate Zotero and Penn State developers on this phase of the project.

April 2014 - July 2014: Prototyping and initial implementation of push API and pluggable standalone PHP-based web service to enable institutional repositories to ingest content from Zotero servers (Zotero contract developer). Prototyping and initial implementation of client UI
for feed reading and "My Publications" collection (Zotero contract developer).

**August 2014 - December 2014:** Live, production implementation of push API, allowing Zotero servers to send updates to third-party services rather than require those services to poll for updates (Zotero contract developer). Initial implementation of "My Publications" self-archiving in zotero.org’s web interface (Zotero web programmer). Developer branch rollout of client UI enhancements and functional feed reading (Zotero contract developer). Ms. Stern Cahoy and Penn State colleagues will begin the process of hiring the research anthropologist, with that position’s work slated to begin in April 2015.

**January 2015 - April 2015:** Public beta followed by general release of feed-reading functionality and "My Publications" in both Zotero client and the zotero.org website (Zotero contract developer and Zotero web programmer). ScholarSphere plugin completed and full integration of Zotero client, server API, and ScholarSphere tested, with public use slated for May 2015. Conduct user testing of all new enhancements to inform development. Dr. Takats and Ms. Stern Cahoy will work in collaboration with Zotero and Penn State developers on the technical aspects of this phase. Humanities Librarians (Novotny and Childress) will join the project to conduct think-aloud interface testing of users.

**April 2015 – March 31, 2016:** Ongoing support and refinement of web-based "My Publications," API support, and technical support for third parties seeking to integrate their own IRs with Zotero (Zotero web programmer).

**April 2015 – July 2015:** Research Preparations. PIs and Project Team develop and refine survey instruments for use in study and navigate Penn State Human Participants Research (IRB) approval for the project, in partnership with the research anthropologist. This group will also map out the research plan for the fall 2015 semester, and finalize all recruitment materials for faculty subjects.

**August – September 2015:** Recruitment. The PIs and Project Team finalize the protocol for studying identified faculty subjects, in partnership with the research anthropologist. Humanities faculty will be recruited for the study.

**September - December 2015:** Data Collection. The PIs and Project Team work in consultation with the subject librarians on data collection from identified faculty subjects. All participating faculty in the study will complete an initial survey, and will also meet with the appropriate subject librarian and the anthropologist to schedule and conduct ethnographic research activities. Research activities occurring during this time period include: Ethnographic interviews with faculty on their research, storage, and archiving practice. The anthropologist oversees all data collection and storage, in consultation with the PIs and Project Team.

**December 2015 – March 31, 2016:** Data Collection and Analysis. Data collection with all faculty subjects is concluded, and analysis and dissemination of findings begins. The PIs and Project Team anticipate presenting initial findings during this period on the Web and at local (Penn State) and national presentation venues. If accepted, initial findings will be presented at the Personal Digital Archiving conference (spring, 2016). With initial project outcomes met, the PIs and Project Team begin planning for the next phase of the project. Focused analysis of collected research will occur during this time period, as the PIs and Project Team begins the
process of manifesting project findings through the creation of new resources and services for scholars.

Expected Outcomes and Benefits of the Project

*By March 31, 2016, we anticipate that this project will achieve the following research outcomes:*

- Zotero client software that includes feed-reading functionality.
- A server-based software interface that links Zotero user libraries to institutional repositories.
- Public repository of open-source software developed for this project
- User-based assessment of the enhanced Zotero interface
- Analysis and publication of collected ethnographic research to inform efforts towards further unifying the scholarly workflow, with particular attention towards the phases of discovery and archiving

Intellectual Property Issues

All research conducted at Penn State University is governed by the University’s policies on Technology Transfer and Intellectual Property (see [http://guru.psu.edu/policies/RA12.html](http://guru.psu.edu/policies/RA12.html)). Ms. Stern Cahoy will apply for Human Subjects Review approval from the Penn State Office of Research Protections prior to the commencement of the proposed research.

Penn State’s work on ScholarSphere will be added to its open GitHub repository ([https://github.com/psu-stewardship/scholarsphere](https://github.com/psu-stewardship/scholarsphere)) and released under an open-source Apache 2 license and promoted to the rest of the Hydra community (currently encompassing 19 partner institutions, with more on the way). Consistent with the current practice on the Zotero Project, all Zotero code produced under this grant will be issued under the Affero GPL (General Public License).

The Zotero software will display a warning message reminding users that they should only add self-authored materials to their "My Publications" collections. All "My Publications" content hosted on Zotero's website will include a "Report Abuse" button to allow readers to report the inappropriate sharing of material, for reasons of attribution, copyright, or spam. If the Zotero administrators receive reports of inappropriate sharing via other channels, such as a DMCA takedown notice they will investigate and respond accordingly.

All content uploaded to Zotero.org is subject to Zotero's privacy policies and terms of use ([http://digitalscholar.org/z_terms/](http://digitalscholar.org/z_terms/) and [http://digitalscholar.org/z_terms/](http://digitalscholar.org/z_terms/)), prepared with legal support paid by the Corporation for Digital Scholarship (CDS). A private corporation in the Commonwealth of Virginia, CDS is legally independent of George Mason University, handling the payment processing and administrative support associated with Zotero's free and paid storage subscription plans. CDS contracts with George Mason University, which provides the services to develop and operate the Zotero software and website. As the developer and operator of the Zotero software and website, George Mason University will be responsible for signing the intellectual property agreement which governs this grant.

CDS is currently reworking the Zotero terms of use to include specific instructions for DMCA takedown requests and to include a registered DMCA agent as follows:
All content posted on zotero.org must comply with U.S. copyright law. Pursuant to the Digital Millennium Copyright Act (17 U.S.C. §512, as amended) ("DMCA"), if you believe in good faith that copyrighted work has been copied, adapted, reproduced, or exhibited on the Site in a manner that constitutes copyright infringement, you may submit written notification of the claimed infringing activity to our Designated Agent, Maria E. Recalde, at: Sheehan Phinney Bass + Green, PA, 255 State Street, 5th Floor, Boston MA 02109. To be effective, the notification of claimed infringement must include the following information:

A. A physical or electronic signature of a person authorized to act on behalf of the owner of the exclusive right that is allegedly infringed;

B. Identification of the copyrighted work claimed to have been infringed, or, if multiple copyrighted works at a single online site are covered by a single notification, a representative list of such works at that site;

C. Identification of the material that is claimed to be infringing or to be the subject of infringing activity and that is to be removed or access to which is to be disabled, and information sufficient to permit CDS to locate the material;

D. Information reasonably sufficient to permit CDS to contact the complaining party, such as an address, telephone number and, if available, an electronic mail address at which the complaining party may be contacted;

E. A statement that the complaining party has a good faith belief that use of the material in the manner complained of is not authorized by the copyright owner, its agent, or the law; and

F. A statement that the information in the notification is accurate, and under penalty of perjury, that the complaining party is authorized to act on behalf of the owner of the exclusive right that is allegedly infringed.

Please consult your legal adviser before submitting written notification, as the above-stated requirements may have changed. For further information about the DMCA, please visit the website of the U.S. Copyright Office at:

http://www.copyright.gov/onlinesp/

In appropriate circumstances, CDS, at its sole discretion, may suspend or terminate any user’s access to the Site and/or the Services and/or take other action against users where infringing activity is apparent, regardless of whether the material or activity is ultimately determined to be infringing.

By including explicit copyright policies we follow industry-standard practices for identifying and removing infringing content. Those new terms of service, detailing copyright responsibilities and takedown procedures, will be in effect before the start of this project. Additionally, items deposited in ScholarSphere via Zotero will be subject to the ScholarSphere Terms of Use (Appendix III) as well as the ScholarSphere Deposit Agreement (Appendix IV).
Long Term Sustainability of Results

This research will provide an online architecture within Zotero to support and encourage personal archiving and information management. We anticipate working with other universities to link their IRs (and perhaps cloud-based storage services) to Zotero for increased local use. The source code developed as part of the project will be managed along with the rest of Penn State's ScholarSphere-related code by a team spanning the University Libraries, Information Technology Services, and the Hydra community. Long term, the data and findings from this project will be relevant to a wide academic audience, and this project will forge a path for additional Zotero optimizations regarding unification of the scholarly workflow, as well as future, collaborative explorations of faculty's personal archiving and information management needs by peer research universities.

Reporting

The PIs (Ms. Stern Cahoy and Dr. Takats) will document the progress of the project and current expenditures in two reports to the Foundation: first after the completion of phase 1 by July 1, 2015; and second following the conclusion of the project by July 1, 2016. The PIs will follow the Mellon Foundation reporting guidelines to prepare the interim and final reports.

Budget Narrative

Listed below is a draft budget and preliminary rationale for funding requests (totaling $439,935.00 for a twenty-four month period—April 1, 2014 – March 31, 2016). Please refer to the attached budget worksheet for specific data on salary and fringe per time period.

Please note: Penn State policy for managing unspent grant funds, calculating interest, and applying it to the grant is as follows: Penn State University establishes a unique restricted account for each sponsored project, within the University’s accounting system. Transactions are not comingled with other projects. The Federal government has approved this accounting system and all transactions are subject to audit annually. When the sponsor advances funds and requires interest earnings on remaining balances, the Controller’s Office calculates and posts interest to the restricted account. Interest earnings are only used to further the objectives of the project, or as directed by the sponsor. For cost-reimbursement agreements, any remaining cash balances are returned to the sponsor after the project’s scope of work has been completed.

Salaries and Wages

The principal investigator is budgeted at the percentage of time shown using his/her actual salary in the calculation. The principal investigator's time includes both technical and project management functions. Any other individuals/positions shown are technical staff with the percentage of time shown and actual salaries used. For project time occurring after June 30 of any given year, the salaries have been adjusted at the University approved rate of 2.5% per year each July 1.

Fringe Benefits

Fringe benefits are computed using the rates of 36.5% applicable to Category I Salaries, 13.2% applicable to Category II Graduate Assistants, 7.9% applicable to Category III Salaries and Wages, and 0.2% applicable to Category IV Student Wages, for the fiscal years 14 and 15 (July
1, 2013, through June 30, 2015). Fringe benefits for postdoctoral scholars and fellows are computed using the proposed rates of 7.9% through June 30, 2014, and 25.0% thereafter. If this proposal is funded, the rates quoted above shall, at the time of funding, be subject to adjustment for any period subsequent to June 30, 2014, if superseding Government approved rates have been established. Fringe benefit rates are negotiated and approved by the Office of Naval Research, Penn State's cognizant federal agency.

**Budget and rationale for funding requests (totaling $439,935.00 for a 24 month period)**

**Funding (20%) for Ms. Stern Cahoy ($35,168 = $17,367 (12 months – Year One) + $17,801 (12 months – Year Two)**) As one of the Principal Investigators, Ms. Stern Cahoy will direct the overall development and research program and oversee the work of the wage student workers in the first and second years, as well as the Research Anthropologist in the second year of the project. Ms. Stern Cahoy will also promote the program locally and nationally, working on original research that will inform the project and promote the group's work throughout the research process.

**Funding for a 40 hr. / week anthropologist / project manager ($54,500.00, Year Two)** The Research Anthropologist will, in collaboration with Ms. Stern Cahoy, oversee and execute project ethnographic research. (Please see Appendix II for proposed position description.)

**Funding for two wage payroll student employees ($14,580.00 = two employees at $3,600.00 per employee, Year One; $3,690.00, Year Two)** These wage student positions would each be ten hours per week during a thirty-six week academic year. The students will, under the direction of Ms. Stern Cahoy, help facilitate research activities. These wage positions will not come with tuition stipends.

**Funding (10%) for three subject librarians ($35,342)** The identified subject librarians (two Humanities librarians and one Science Librarian) will work closely with Ms. Stern Cahoy and the Research Anthropologist to study faculty’s workflow. The Science Librarian will only enter the project in Year Two when the results will be compared against those in the sciences from the prior study. The Humanities Librarians will be involved in both years, as they participate in the Zotero development project, and conduct research. The subject librarians may publish and present research individually or in collaboration with the PIs, on findings in their individual discipline area.

**Fringe for all Category I salaries (all librarians and the Research Anthropologist, including Ms. Stern Cahoy) ($45,680 = $11,429, Year One; $34,198, Year Two)** Fringe was calculated at a rate of 36.5% for all Category I salaries. The cost is higher in Year Two, as that in the year in which the Research Anthropologist and the Science Librarian join the project.

**Fringe for all Category III salaries and wages (Two wage student assistants) ($1152.00 = $569.00, Year One; $583.00, Year Two)** Fringe was calculated at a rate of 7.9% for all Category III salaries.

**George Mason University (Zotero) Costs as Subcontractor to Penn State University ($207,239.00 = $155,364.00, Year One; $51,875.00, Year Two)** These costs include personnel (two years summer research funding for Dr. Takats as a Primary Investigator; funding for a
programmer, and an administrative assistant), fringe (7.22% summer research, 40.62% classified), a contract developer (consulting services), and equipment. (Please see Appendix V for a detailed budget narrative of these costs).

**Domestic travel funding for planning and to present findings and research at relevant conferences ($34,478.00 = $8,487, Year One; $25,991, Year Two)** This funding will support the PIs / Penn State developers / Research Anthropologist / subject librarians' travel to relevant conferences during the two years of the project, including Personal Digital Archiving, Joint Conference on Digital Libraries, Society for the Social Studies of Sciences (4S) Conference, and the American Historical Association Conference. Conference attendance will provide opportunities for presentation of the project research and / or discovery of related projects / research which will inform the project's focus and findings. This budgeted amount also provides funding for two George Mason University - Zotero / Penn State meetings each year, to be held on site at either campus. Travel funding was calculated by using Penn State's internal travel booking / calculation tool (travel.psu.edu) to estimate proposed travel costs outside those listed on the respective conference / meeting web site. If a specific city was not yet listed for a conference, Chicago was used for calculations, as it is the most centrally located major city in the United States.

**International travel funding for planning and to present findings and research at relevant conferences ($7,074.00 Year One)** This funding will support the PIs / Research Anthropologist’s travel to the Digital Humanities Conference in Lausanne, Switzerland. Conference attendance will provide opportunities for presentation of the project research and / or discovery of related projects / research which will inform the project’s focus and findings. Travel funding was calculated by using Penn State’s internal travel booking / calculation tool (travel.psu.edu) to estimate proposed travel costs outside those listed on the respective conference / meeting web site.

**Technology funding: ($1,235.00)** This will supply needed technology (laptop computer) for the wage student employees’ work with Ms. Stern Cahoy. The estimated cost of the laptop has been obtained through Penn State purchasing.
References:


Feijen, M. (2011). What Researchers want: a literature study of researchers’ requirements with respect to storage and access to research data. Technology (pp. 1–32).


Figure One:

Zotero Institutional Repository Integration Workflow

1) The user drags self-authored items into a special "My Publications" collection and confirms authorship.

2) The Zotero client syncs the "My Publications" collection with the Zotero servers.

Zotero client

My Library
- Collection 2
  - Item 1
  - Item 2

Group Libraries
- Group 1
  - Collection 1
- Collection 2
- Group 2
  - Collection 3
- My Publications

Zotero data server
- Data API
- Push API

Zotero web server
- Website
- OAuth

Penn State server
- Zotero archiving tool w/ ScholarSphere plugin

ScholarSphere
- Website
- API

3) Items added to "My Publications" are made publicly available on zotero.org.

4) On ScholarSphere, users generate an authorization key for accessing the Zotero API.

5) The authorization key is registered with the archiving tool, which is instructed to subscribe to the given library.

6) The archiving tool uploads newly added items to the ScholarSphere API for display in the repository.

7) The archiving tool subscriptions for changes to "My Publications" collections in specific libraries and pulls down bibliographic data when available.
Appendix I: Interview protocol

Date and time:
Location:
Interviewer:
Interviewee:

DEMOGRAPHIC DATA

Age:
21-30
31-40
41-50
51-60
> 60

Gender:
Male
Female

Current standing at Penn State:
Tenure-track faculty
Tenured faculty
Fixed-term faculty
Instructor
Graduate student
Other (please specify)

College:
1. Liberal Arts
2. Education
3. Sciences

4. Engineering

5. University Libraries

6. Other

**Primary area(s) of research:**

**INTERVIEW QUESTIONS**

1) Which digital tools do you use in your daily work?

2) What tools do you have the most success doing research with? Why?

3) For how long have you been using digital tools in your research practice?

4) What is the role of digital tools at various stages of your research process?

5) What impact of digital tools on your work practices would you identify as most important?

6) What have you experienced as the main value-add of digital tools in your research?

7) What have you experienced as key challenges of using digital tools in your research?

8) Where do researchers in your field of study learn and teach digital research methods? □

9) How confident do you feel in your data management skills? What do you think could improve those skills?

10) What is the role of librarians and the library in facilitating your research process?

11) Who should ensure longer-term access to your work? Is this the individual’s responsibility, or is this the institution’s responsibility? □

12) Where do you want your archive to reside? Who should have access to it?

13) Do you curate information from your larger collection that is important to you? If so, where and how do you choose and save it?

14) What do you see as your most lasting scholarly output? What strategies do you use to curate and/or preserve your output?

15) In your view, what kind of influence do researchers have on the design and development of digital research tools?

16) What kind of influence do researchers have on the development of new library search tools
and library resources (collections and more)?

17) In your opinion/experience, what are special considerations to be taken into account when developing digital research tools?

18) What, if anything, would improve your experience in using digital tools?

FIELDWORK NOTES

FIELDWORK COMMENTS
Appendix II: Research Anthropologist Position Description

The research anthropologist will, in collaboration with the project team, lead a one-year research project, currently under consideration for funding (expected notification date is March 2014). This project will provide hands-on experience facilitating an in-depth study of faculty research practices, as well as an exploration of the intellectual online workflow for disciplinary faculty in the humanities at Penn State University. The anthropologist will work collaboratively as part of a project team based at Penn State and George Mason University, which includes subject librarians, scholarly communications librarians, archivists, disciplinary faculty, and technology developers. Work will include designing and conducting interviews with faculty about their research process, use of citation management software (Zotero), discovery practices, data storage and archiving practices; design of documentation methods; coding of qualitative data; supervision of graduate assistants affiliated with the project; other research activities to be determined as part of the study. If funded, the appointment would begin April 1, 2015 and conclude March 31, 2016.

Required Qualifications:

- Doctoral degree in Anthropology or related field
- Experience conducting ethnographic research
- Excellent project management skills
- Ability to work collaboratively with a variety of audiences on a project
- Excellent oral, written, and interpersonal communication skills.

The Libraries are now engaged in a range of activities to support the emerging needs of scholars by developing and extending a suite of digital publishing and curation services. The Libraries have partnered with Penn State Information Technology Services (ITS) to scope and define needs for these services to support the development of necessary infrastructure, which also extend to other forms of digital data, including electronic business records. Our profession has largely focused its attention on curation and archiving of the end-results of research: theses, dissertations, publications, research data. This research-focused position offers a unique opportunity to help shape futures library services by shedding light on the day-to-day practices of researchers in managing their own digital content when research is in progress.
Appendix III: Terms of Use for ScholarSphere

1. General: The Site is maintained by the The Pennsylvania State University Libraries and The Pennsylvania State University Information Technology Services (ITS), in support of our mission to disseminate information and research to scholars, educators and the public. As used in these Terms of Use, the terms "we," "us," and "our" refer to the Libraries, ITS, and The Pennsylvania State University ("Penn State"). Use of ScholarSphere (the Site and its contents) is subject to the following terms and conditions and all applicable laws. By using the Site or any of its content, you accept and agree to be bound by these Terms of Use and all applicable laws. If any of these Terms of Use are unacceptable to you, do not use the Site.

2. Changes to Terms of Use Are Binding: We may change these Terms of Use from time-to-time without advance notice. Your use of the Site or any of its content after any changes have been made will constitute your agreement on a prospective basis to the modified Terms of Use and all of the changes. Accordingly, you should read these Terms of Use from time-to-time for any changes.

3. Copyright and Use of ScholarSphere Content: The Site includes text, images, graphics, information, articles, multi-media objects, scholarly projects and other works protected by copyright, trademark and other laws ("Content"). Some of the Content on this site may include materials from older published works that have passed into the "public domain" under U.S. copyright law. Where such information is known, it is included specifically in the metadata associated with each item of Content. However, the Site itself and most of the materials held as Content on the Site are protected by copyright and other laws. These materials have been deposited to enable teaching, research, and other non-profit educational activities. Unless otherwise specified in the metadata attached to an item of Content, you may use the Site and the Content only for non-commercial, research, educational, or related academic purposes. Further, you have the responsibility to make your own assessment of the copyright or other legal concerns that might affect your use of ScholarSphere content and to assume personal responsibility for your uses of Content.

4. Special Permissions: ScholarSphere does not have the authority to grant or deny special permissions to use images or other Content found on the site beyond those uses that are specifically described in these Terms of Use or as noted specifically on individual items of Content. ScholarSphere staff are not able to undertake copyright investigations on behalf of Site users.
5. **ScholarSphere Access Levels:** Where possible, ScholarSphere makes its Content available to the general public. However, some of the Content on this Site has been made available only to Penn State community users or other user subgroups by the depositor. Such Content cannot be used, downloaded, or distributed outside the Penn State community (or subgroup identified) without the specific permission of the depositor.

6. **Use of ScholarSphere Site and Content:** Unless otherwise specified in the metadata attached to an item, Content that has been made accessible to the general public may be used for non-commercial, research, educational, or related academic purposes only. Such uses include personal study, distribution to students, research and scholarship (including computational research uses such as data and text-mining, citation-extraction, or cross-referencing) as long as you do not sell the Content or sell advertising on any page on which the Content is displayed. If you make an item of Content available to others, you shall do so in accordance with the terms of the rights granted pursuant to the particular item of Content, or at a minimum, you will retain with the Content its title, the name of the author(s), a reference to these Terms of Use, any copyright notice included on the original, and any metadata associated with the original. You may not use a facsimile of the published version of an article that may be posted in ScholarSphere under these open access terms, unless the publisher so permits. You will not make any translation, adaptation or other derivative work of an item of Content except as authorized under U.S. law. You may not sublicense or otherwise transfer your rights in an item of Content, unless specifically authorized by the copyright license granted to the item of Content and will only make Content available to others for use by them under these Terms of Use. Links on the Site to third-party web sites are provided solely as a convenience to you. We do not approve or endorse the content of linked third-party sites, and you agree that we will have no responsibility or liability in connection with your use of any linked third-party sites. Nothing in these Terms of Use or on the Site will be construed as granting you any right or license to use any trademarks, service marks or logos displayed on the Site. You agree not to use or register any name, logo or insignia of The Pennsylvania State University or any of its subdivisions for any purpose except with our prior written approval and in accordance with any restrictions required by us.

7. **Fair Use and Other Lawful Uses:** Nothing in these Terms of Use is intended to restrict or limit you from making uses of Content that, in the absence of rights granted hereunder, would not infringe or violate anyone's copyright, trademark or other rights. To the extent permitted by law, adaptation of ScholarSphere Content to enable use and access by persons with disabilities is encouraged.
8. **Reserved Rights; Obtaining Permissions:** All rights in the Site and the Content that are not expressly granted are reserved. You agree to use the Site and the Content only in ways that comply with copyright and all other applicable laws, as well as with these Terms of Use, and that do not infringe or violate anyone's rights. If you wish to make any use of the Content that requires authorization under copyright, trademark or other rights, you agree to obtain all necessary permissions. You are responsible for determining whether permission is needed to make any use of the Content that you wish to make.

9. **Disclaimer of Warranties:** THE SITE AND THE CONTENT ARE PROVIDED "AS IS." TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, WE DISCLAIM ALL WARRANTIES OF ANY KIND (EXPRESS, IMPLIED OR OTHERWISE) REGARDING THE SITE OR THE CONTENT, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OWNERSHIP, AND NON-INFRINGEMENT. WE MAKE NO WARRANTY ABOUT THE ACCURACY, RELIABILITY, COMPLETENESS, TIMELINESS, SUFFICIENCY OR QUALITY OF THE SITE OR THE CONTENT, NOR THAT ANY PARTICULAR CONTENT WILL CONTINUE TO BE MADE AVAILABLE. WE DO NOT APPROVE OR ENDORSE ANY POSTED MATERIAL OR CONTENT PROVIDED BY OTHERS, INCLUDING PENN STATE AUTHORS. WE DO NOT WARRANT THAT THE SITE WILL OPERATE WITHOUT ERROR OR INTERRUPTION, OR THAT THE SITE OR ITS SERVER ARE FREE OF COMPUTER VIRUSES OR OTHER HARMFUL MATERIALS.

10. **Limitations of Liability and Remedies:** WE MAKE THE SITE AND THE CONTENT AVAILABLE FREE OF CHARGE. YOUR USE OF THE SITE AND THE CONTENT IS AT YOUR OWN SOLE RISK. IN NO EVENT SHALL WE BE LIABLE TO YOU, IN CONTRACT, TORT OR OTHERWISE, FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE, EXEMPLARY OR OTHER DAMAGES OF ANY KIND ARISING OUT OF OR RELATING TO THE SITE OR THE CONTENT, OR YOUR USE OF THE SITE OR THE CONTENT, OR ANY THIRD PARTY RIGHTS IN THE CONTENT, EVEN IF THE SITE OR CONTENT IS DEFECTIVE OR WE ARE NEGLIGENT OR OTHERWISE AT FAULT, AND REGARDLESS WHETHER WE ARE ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THE FOREGOING LIMITATIONS SHALL APPLY TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW.

11. **Indemnity:** You agree to indemnify and hold harmless The Pennsylvania State University and its trustees, officers, fellows, students, employees and agents, from and against all claims,
actions, suits, damages, liabilities and costs (including, without limitation, reasonable legal fees) arising from or relating to your use of the Site or any of the Content or your failure to comply with any provision of these Terms of Use.

12. Communications:

   - A. Copyright Complaints: We respect the intellectual property rights of others. If you believe your copyright has been violated on the Site, please notify us through Penn State's designated agent under the Digital Millennium Copyright Act (see 17 U.S.C. Â§512(c)(3).

   - B. Other Site Issues: Please direct all other communications to contact form.

13. Applicable Law and Jurisdiction; Access from Outside the Commonwealth of Pennsylvania: The Site is controlled and operated from our facilities in and around University Park, PA. These Terms of Use, and any claim or dispute that arises from or relates to your use of the Site or the Content, will be governed by the laws of Pennsylvania, without regard to its conflicts of laws principles. You agree that all such claims and disputes will be heard and resolved exclusively in the courts of Centre County, Pennsylvania. You consent to the personal jurisdiction of such courts over you for this purpose, and waive and agree not to assert any objection to such proceedings in such courts (including any defense or objection of lack of proper jurisdiction or venue or inconvenience of forum). If you choose to access our website from locations other than Pennsylvania, you will be responsible for compliance with all local laws of those other locations.

14. Termination: The permissions granted to you will terminate automatically upon any breach by you of these Terms of Use. If we take down or otherwise cease to make a work available as an item of Content, the permission granted to you hereunder to use that Content thereafter will terminate at that time. ScholarSphere is maintained as a scholarly and educational resource by Penn State which may be modified or terminated by the University in its sole discretion.
Appendix IV: ScholarSphere Deposit Agreement

To properly administer this repository and preserve the contents of ScholarSphere for future use, The Pennsylvania State University (Penn State) requires certain permissions from you, the author(s), or copyright owner. By accepting this license, you do not give up the copyright to your work. You do not give up the right to submit the work to publishers or other repositories. You grant to Penn State the non-exclusive right to store your work. You agree that Penn State may translate the submission to any medium or format and keep more than one copy for the purposes of security, back up and long-term preservation of the scholarly record. Penn State will not make any alteration, other than as allowed by this license, to your submission.

When you submit your file(s) you will have the option of selecting its degree of Visibility on the Web, which will control who can access your materials. Certain license terms apply to each visibility level:

Visibility Level: **OPEN ACCESS**

By choosing the Open Access option you are allowing anyone in the world to view your submission. You may choose to apply one of several Creative Commons licenses to your submission, which are explained on the submission form and in the FAQ. These licenses allow you to set your own terms of use for anyone accessing the submission. You authorize Penn State to distribute your content under the terms of that Creative Commons license and to allow users of ScholarSphere to do the same if your license choice permits that. If you do not choose a license, you grant to Penn State the non-exclusive right to distribute your submission (including the metadata and abstract) worldwide, in any format or medium for non-commercial, research, educational, or related academic purposes only. You also authorize Penn State to allow users of the repository to distribute your submission (including the metadata and abstract) worldwide, in any format or medium for non-commercial, research, educational, or related academic purposes only. Penn State will clearly identify your name(s) as the author(s) or owner(s) of the submission, and will not make any alteration, other than as allowed by this license, to your submission.

Visibility Level: **PENN STATE**

If you select the Penn State access option, you have decided to restrict access only to users of Penn State's network. Your deposit will not be accessible to colleagues or students at other universities or to members of the public. If you want your work to be accessible to the broader scholarly community, you should consider the regular Open Access option instead. If you choose, you may also further limit access to specific individuals or groups of individuals at Penn State.

By clicking through this license, you grant to Penn State the non-exclusive right to reproduce and/or distribute your submission (including the metadata and abstract) to students, faculty, staff, and walk-in users of the Penn State libraries, in any format or medium for non-commercial, research, educational, or related academic purposes only. If you have limited access to specific individuals or groups, Penn State will distribute your submission ONLY to those users. You also authorize Penn State to allow Penn State community users of the repository to distribute your submission (including the metadata and abstract) in any format or medium for Penn State
internal non-commercial, research, educational, or related academic purposes only. Penn State will clearly identify your name(s) as the author(s) or owner(s) of the submission, and will not make any alteration, other than as allowed by this license, to your submission.

Visibility Level: **PRIVATE**

If you have selected the PRIVATE access option in the ScholarSphere deposit process, you have decided to allow Penn State a more limited set of rights than those afforded under the Open Access license option. Your deposit will not be accessible to anyone other than yourself. If you want your work to be accessible to the broader scholarly community, you should consider the regular Open Access or Penn State settings instead.

The following terms apply to ALL submissions:

You agree that Penn State bears no responsibility for the contents of your submission. You represent that the submission is your original work, and/or that you have the right to grant the rights contained in this license. You also represent that your submission does not, to the best of your knowledge, infringe upon anyone's copyright. You also represent and warrant that the submission contains no libelous or other unlawful matter and makes no improper invasion of the privacy of any other person.

If the submission contains material for which you do not hold copyright and that exceeds fair use, you represent that you have obtained the unrestricted permission of the copyright owner to grant Penn State the rights required by this license, and that such third-party owned material is clearly identified and acknowledged within the text or content of the submission.

**IF THE SUBMISSION IS BASED UPON WORK THAT HAS BEEN SPONSORED OR SUPPORTED BY AN AGENCY OR ORGANIZATION OTHER THAN PENN STATE SUCH AS, BUT NOT LIMITED TO, THE NATIONAL INSTITUTES OF HEALTH, THE NATIONAL SCIENCE FOUNDATION, OR A PRIVATE FUNDER, YOU REPRESENT THAT YOU HAVE FULFILLED ANY RIGHT OF REVIEW, CONFIDENTIALITY, OR OTHER OBLIGATIONS REQUIRED BY THAT CONTRACT OR AGREEMENT.**