Community-Enhanced Repository for Engaged Scholarship: A Case Study on Supporting Digital Humanities Research

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Abstract

Building digital curation and sustainability into digital humanities project development is challenging, and engaging digital humanities researchers fully as partners in curation practices with the library is even more so. How can we represent the longevity and sustainability of digital humanities research projects as a shared responsibility between faculty and student researchers and library staff? Northeastern University Libraries Digital Scholarship Group has designed a series of tools and workflows to ease the burden of sustainable development, support community engagement with digital materials, and enable the library and its partners to work together to build sustainable digital projects.

Keywords
digital projects, workflows, sustainability, digital humanities, library partnerships

Introduction

The importance of digital curation as a very early element of sustainable digital humanities research has been well established. However, building digital curation and sustainability into digital humanities project development—in a systematic, structural way that includes robust policies and practices—is challenging, and engaging digital humanities researchers fully as partners in curation practices with the library is even more so. How can we represent the longevity and sustainability of digital humanities research projects as a shared responsibility that begins with fundamental project design decisions and data creation strategies rather than purely an obligation of the library? And how can we create a culture of partnership among faculty and student researchers and library staff in which the challenges of digital curation are understood as shared research challenges rather than functional details of purely “technical” implementation?

In an effort to address these questions, Northeastern University Libraries Digital Scholarship Group (DSG) has designed a series of tools and workflows meant to enable the library and its partners to work together to build sustainable digital projects. The Community Enhanced Repository for Engaged Scholarship (CERES)
is an interlocking set of systems and tools designed to ease the burden of sustainable development, foster stronger partnerships between library technical staff and research partners, and support community engagement with digital materials. CERES serves as the foundation for a set of flexible, scalable tools for creating and publishing digital humanities research projects, organized through a WordPress theme and associated plug-ins.

The design of this system is predicated on a set of basic principles that animate the project development process. The first of these principles is that the library has the resources to build and support systems (whose support costs scale up with the number of types of projects supported), not individual projects (whose support costs scale up much more quickly with the number of individual projects). Our focus is thus on developing tools that offer a steadily diversifying set of publication, editing, and dissemination features needed by digital humanities (DH) projects at Northeastern and are built in such a way that the DSG can support them in the long term. The second principle is that DH research objects stored in the repository should be simultaneously curatable and usable, and the curation and dissemination of these materials should be planned from the outset. Researchers wishing to develop DH research projects in CERES must first build or plan a strong collection of data that meets our standards of long-term sustainability and open access principles and that anticipates the kinds of future usage the researcher intends the data to support. The third principle is that the expansion of the tool set—identifying and prioritizing new features, exploring their potential scholarly value, experimenting, and testing—should be a shared research undertaking in which scholars and library staff are full partners with diverse expertise to share. We expect scholars to understand that these tools and data standards are tied to scholarly outcomes at a deep level and to take them seriously as part of the research endeavor.

Background

The Northeastern University Libraries’ Digital Scholarship Group is an applied research group committed to helping faculty, staff, and student researchers through all stages of building a digital project. The DSG was founded in January 2014 as a response to a particular need at Northeastern to support the university’s growing digital scholarship communities in the humanities and beyond. The DSG supports and educates researchers at all levels on new techniques of representation, analysis, and dissemination, including text analysis and encoding, GIS, data visualization, data management, repository services, copyright guidance, and semantic web services.

Formally, the staffing of the DSG is framed around a set of roles that are familiar in digital centers as documented in Zorich (2008). The group includes some developer positions (two programmers plus effort from the neighboring Library Technology Services group); some “analyst” positions including a GIS specialist, a data visualization specialist, a semantic web and ontologies specialist, and a text encoding specialist; and some management/strategic oversight positions including a director, an
assistant director, and the manager of the Digital Repository Service. It also includes several research assistant positions that contribute to project management, training, documentation, and content development. Funding for these positions during DSG’s startup phase has been a mix of hard and soft funding: some of these positions are funded by the library’s operating budget, and some are funded on a pilot basis through short-term institutional funding, with the expectation that firmer funding will be established over time. Additional funding for some positions comes from specific projects or from external grants.

All of these positions, regardless of title, are considered by the DSG as applied research positions that entail active pursuit of new expertise, keeping abreast of developments in a range of fields, contributing to strategic planning, and sharing work with relevant professional communities. Within the DSG group, all members also participate in mutual mentoring and education, collaborative writing (of documentation, training materials, planning and reporting documents, and grant proposals), and working with students. These activities are designed to ensure that all members of the group develop working knowledge of each other’s areas of expertise and a strong understanding of how these areas interrelate. As a result, the group is acculturated to take seriously the significance of design and development decisions that affect CERES as a research ecology: data representation standards, modeling of objects in the digital repository, and tools for data visualization. In not treating decisions as purely or merely “technical,” we seek to make them more porous to participation by faculty and student collaborators.

Students play a particularly important role in DSG’s work. In the context of Northeastern University’s emphasis on experiential education, the boundary between “work” and “education” is already fruitfully blurred. Undergraduate students work as part of project teams alongside faculty, graduate students, and library staff and contribute to metadata creation, digitization, keywording and description, and exhibit creation. Undergraduates can also undertake internships and individual research projects. For graduate students whose work involves digital humanities (including those who are completing the Digital Humanities Certificate), working on DSG projects is an important form of professional development and practical experience that offers not only technical skills but also exposure to project management, grant writing, data modeling, data curation, and other essential competencies. All of these work areas emphasize the continuities among data curation, project sustainability, and research excellence.

**Literature review**

More and more libraries have become the structural centers for DH work. As scholars rely more on the libraries for digital project support, the issue of scalability and portability of projects becomes apparent. In their experience at NYU Libraries providing technology systems for faculty use, Vinopal and McCormick (2013) found that they felt “challenged to respond effectively to what [they] have come to call ‘the faculty Web site problem’ -- an ever-growing number of requests for Web-based
spaces and tools to collaborate on scholarly research and share the results" (28), a challenge that they suggest could be solved through "service and tool standardization" (31). The Digital Humanities Observatory (DHO), when threatened by the lack of funding available to maintain the project, found that they were able to better support projects by "creating systems that are exemplary and sustainable" and "rather than locking projects into a technology infrastructure dependent on the DHO's sustainability, [they] created infrastructure that is easily sustainable on its own, using commodity hosting and development resources" (Gourley and Viterbo 2010, 480). Since DHO had focused on systems development, the shift of focus to interoperability (instead of building individual projects and websites from the ground up) enabled the projects they support to have a better chance at survival even without DHO. On the other hand, while the Victorian Women Writers Project (VWWP) at Indiana University has enjoyed a rise in activity since 2007, it floundered during severe staffing changes years before. According to Courtney and Courtney, "the VWWP needed a[n] environment of support, participation, use, and interest in order to create a sustainable setting as it started on its new path" (2015, 267). The catalyst to create this scalable and sustainable environment came in the form of dedicated project directors from within the library, ensuring that digital projects hosted or supported by libraries would be guaranteed support, in both their staffing and software, and not custom intervention for each project.

Digital publishing via web interfaces, Muñoz argues, should include data curation as an integral part of the workflow. Muñoz states that:

"Curation of these data sets takes time, effort, and money. Libraries getting involved to help digital humanists do this kind of work would be offering something of value. This would be ‘publishing’ not only in the sense of registering and ‘making public’ a product of scholarly work, but also in the sense of ensuring quality and disseminating outputs to interested communities." (2013, 16)

Proper curation is publishing, and digital publishing becomes more usable (and reusable) when the underlying data are properly curated and preserved. Green and Courtney echo this idea in their analysis of how digital humanities scholars utilize library collections, noting that there are two primary needs: “having sustained access and effective discovery mechanisms for digital collections, and the ability to mix and reuse digital materials” (2015, 698). They also note that "these needs map to the areas of digital curation and interoperability, which are two critical issues facing the development of digital collections to meet the research needs of today’s humanities scholars." Both articles make clear that curation partnered with careful systems development allows projects to be more discoverable, reusable, and ultimately sustainable over time.

Libraries should aim to create systems for publishing that allow for projects to be sustainable, scalable, and interoperable. To build these systems and make them useful to the digital humanities projects that will use them, libraries should partner with scholars in their research and development stages. Cahoy and Antonijević (2016) worked with faculty to build a Zotero enhancement, noting that the voices
most often missing from discussion about DH and libraries, especially during software
development, are the voices of the users. By collaborating with the scholars who will be users
of the systems libraries develop for DH project support, libraries can integrate their concerns
for preservation and data curation while also satisfying the scholar’s digital publishing needs.

**Methods and workflows**

**Systems**

As noted, one of the primary goals of the DSG is to integrate two sets of needs that on the
surface are in conflict: providing project teams and research groups with excellent long-term
curation of digital project materials while also enabling them to develop space to publish their
projects on the web. Many of our researchers use popular web publishing tools such as
WordPress or Omeka to store and display their materials because these tools are simple to use
and easy to customize, not because they are ideal for long-term file storage. Others use
Northeastern University Libraries’ Digital Repository Service (DRS; [https://repository.library.northeastern.edu/](https://repository.library.northeastern.edu/)) to store materials, which is ideal for long-term
storage but cannot be customized in support of individual project needs. Our solution to this
problem was to create an alternative tool that would satisfy the preservation and presentation
needs of a project by joining DRS storage with customizable web publishing tools.

We outlined four goals in support of this solution:

- Create a sustainable and shareable digital project environment for scholars.
- Build tools that could support many types of digital research materials.
- Start a program that would scale by encouraging project teams to become stewards of
  their own content and empowering them to customize and develop on their own.
- Increase preservation of Northeastern research by securing digital materials in the DRS
  and web-based projects on library servers.

We met early in the design phase with representatives from a few DSG partners to discuss
what they, as digital scholars, needed from a repository-integrated digital publishing service;
this early meeting was the first of many opportunities to engage with active scholars and
researchers to learn about their digital scholarship needs. We identified a few common needs
from the group, including faceted searching, visualizations, file sharing, downloading, and
image galleries, which we used to inform our decisions about the initial CERES specification
and project workflows. Drupal, Omeka, and WordPress were considered as base platforms.
However, none of the consulted partners or inaugural projects expressed a preference; thus,
we selected one: WordPress. WordPress is a well-known and broadly used open source
blogging platform that natively supports many common web publishing features and can be
customized using many different themes and plug-ins. CERES was developed
by DSG staff by modifying the Quest WordPress theme and integrating it with a custom plug-in to connect with data sources.

The DRS, which is a homegrown Fedora / Hydra repository (http://fedoracommons.org/, https://projecthydra.org/), is the primary data source for CERES content. Northeastern University Libraries and the DSG are committed to ensuring that project team research materials are securely stored and managed during the course of a research project, as well as after the project is completed. To that end, we work with project teams to review their materials and, if necessary, make recommendations to ensure that those materials are prepared for long-term preservation by offering assistance in transferring files to curatable, open source formats; describing materials using widely used metadata standards; and performing copyright and other rights evaluations. This effort also helps to prepare the materials for long-term use and reuse and for storage in the DRS, which we encourage all project teams to do, regardless of their participation in the CERES project. Storing materials in the DRS offers several advantages, including:

- Ensured long-term care of the digital objects.
- Distributed responsibility for management of the digital objects.
- Decreased risk of catastrophic data loss caused by staff turnover, hard drive malfunction, or server failure.
- Increased access to digital project experts in the library.
- Centralization of data management processes, making them more efficient and reliable.

The DRS API is the connective tissue between the DRS and the CERES WordPress sites. The DRS API is a JSON feed that passes essential information about each of the approximately 68,000 publicly available files in the DRS, including all displayable descriptive metadata, thumbnails, and download options. To reduce noise and increase site speed, API queries for CERES sites are scoped to a particular DRS collection or custom set of DRS materials, which limits search and browse activity for the site to just the content relevant to the project’s goals. In addition to the DRS, CERES also incorporates materials from the Digital Public Library of America (DPLA), allowing users to blend content from both systems into the site. In the future, additional repositories will also be linked to CERES in a similar manner, further broadening the range of materials that can be built into CERES projects. And, in a reciprocal manner, the DRS API will support similar usage of its contents at other institutions.

**Exhibit tools**

Project teams use the CERES plug-in exhibit builder to create exhibits, pages, or blog posts that interweave DRS or DPLA materials with text to communicate the project team's work to site visitors. The exhibit builder uses a custom API query to request specific DRS or DPLA items based on keywords and search limits set by the exhibit designer. The results are returned and large thumbnails representing the files are displayed in the object selection interface so the exhibit designer can
select which files to include in the exhibit. Each exhibit is customized using WordPress shortcodes, which are abridged strings of code representing exhibit settings. Exhibit designers do not build the shortcodes themselves; rather, the CERES plug-in presents the designer with menu settings that build the shortcode based on object and setting selections (Figure 1).

The first major CERES release included three exhibit-building tools (single item exhibit, tile gallery, and slider gallery) and a media playlist:

- The **single item** exhibit is a simple method for inserting a single file thumbnail into a WordPress page, similar to a traditional website page layout for text with images.
- The **tile gallery** exhibit embeds a block of file thumbnails for multiple files onto a WordPress page.
- The **slider gallery** exhibit displays file thumbnails in a rotating slideshow (Figure 2).
- The **media playlist** exhibit displays a series of audio or video files for streaming in a sequence prescribed by the exhibit designer.

In addition to small improvements and bug fixes, the development for CERES’ second major release focused on three new features: a map exhibit, a timeline exhibit, and a powerful image viewer:

- The **map** exhibit embeds a map onto a WordPress page, on which all or some project materials with geographic metadata can be plotted (Figure 3).
Figure 2. Picturing the World slider gallery displaying Dutch maps.

- Similar to the map exhibit, the **timeline** exhibit embeds a chronological timeline into a WordPress page, on which all or some project materials with temporal metadata can be plotted.

**Workflow**

Accompanying this tool infrastructure is a set of practices, policies, and roles that are equally essential in establishing a culture of partnership and shared responsibility. All DSG projects, including those that utilize the CERES tools, are required to submit a project proposal, participate in an intake interview, write a data management plan, and participate in an annual check-in meeting. All four activities are formally tracked and documented to produce a project history and ensure continuity.

New project teams working with the DSG, including those wishing to use CERES, are asked to fill out a project proposal and set up an intake interview. Both the project proposal and the intake interview serve to teach us more about the project work, including the history of the project, the size and members of the project staff, and project goals. The intake interview is an opportunity to discuss the scope of the DSG’s involvement in the project and set expectations (particularly around labor and development timelines), to sketch an agreed-upon timeline for the work (taking into account any grant or other deadlines), and to clarify responsibilities for the DSG.
and the project team. Project teams requesting a CERES site must also have a clear project lead and a plan for designing the site, either with their own or hired labor.

We also have new projects write a data management plan by asking the team to answer a series of questions about their data and digital materials. The act of building a data management plan serves three purposes. First, it prompts project teams to think deeply about their project materials in ways they may not have otherwise considered. Second, it better prepares projects to apply for funding from agencies that require a data management plan as part of the grant application. Third, this exercise gives us an opportunity to learn about how they are managing their research materials so we can make informed recommendations to improve their data management practices. As creating a full data management plan can be daunting for project teams, in addition to our full data management questionnaire, we also provide an abridged version.

Finally, all DSG project teams are invited to meet with us for an annual check-in each spring. In addition to updating basic information about a project, like new deadlines or staff changes, these meetings allow us to discuss any new or revised project goals and help inform our own internal decisions about infrastructure or other development efforts.

**Figure 3.** Map exhibit plotting drawings from Henry David Thoreau’s journal.
These four project activities facilitate a shared understanding of project details and needs, which helps to ensure smooth implementation of all the CERES workflow stages, from content review to site launch. It does not guarantee that the project will run smoothly or linearly (workflow stages are often revisited or revised with new project information, materials, or staff), but it does prevent some of the more common project pitfalls, like surprise deadlines.

CERES projects

More than twenty CERES sites have been built since the project launched in 2015. Faculty, staff, and faculty-sponsored students may request a new CERES site at any time throughout the year, although project teams requesting additional feature or tool development must submit a proposal during the two-month Call for Proposals (CFP) period. The CFP process is an opportunity for us to promote the service widely to the Northeastern community, including all disciplines and research levels, and to learn about what tools are needed to properly exhibit research at Northeastern. Described here are three exemplary projects that we think represent the successes and challenges of implementing our shareable and sustainable approach to curating digital projects.

The Early Black Boston Digital Almanac

In 2016, a professor in the department of English designed the curriculum for an undergraduate experiential education course around creating an almanac detailing the lives of African Americans in the city of Boston from the seventeenth century to today. In her proposal, the professor suggested a collaboration with the DSG to use CERES as a framework to create and publish an almanac of digital exhibits describing early African American life in Boston and New England. This framework would allow students to demonstrate their research using a mix of traditional essays and web writing as they explored the experiences of African American lives throughout Boston’s history.

This proposal was eagerly accepted because we were interested in collaborating with faculty to introduce CERES in the classroom and because it gave us the opportunity to develop an integration with a new data source. Although the DRS contains more than 68,000 public items to be used in exhibits, including thousands of files documenting the desegregation of Boston Public Schools, we were concerned that students would not have enough relevant content to create exhibits around the Boston African American experience in the seventeenth through nineteenth centuries. We resolved this concern by adding the DPLA as a second data source, which broadened the available exhibit material set from 68,000 digital objects to more than 15 million. This feature has greatly expanded the set of foundational material in CERES and has garnered interest from DPLA staff.

DSG staff were involved in many elements of the course, and we were given the opportunity to insert lessons on exhibit design into the syllabus, as well as specific
training on CERES itself. DSG staff were present for many sessions to introduce students to best practices for website and exhibit design and to provide guidance on building exhibits using CERES, selecting appropriate materials and resources, and writing for the web. We also held hands-on sessions designed to give students the opportunity to ask questions about using CERES to build their exhibits.

We used this course collaboration to learn how CERES could be used as a framework for digital humanities projects in a pedagogical setting. One of the long-lasting outcomes of this collaboration was a rough sketch of a reproducible plan for using CERES in the classroom. We have built on this preliminary curriculum to develop a set of resources for using CERES as a pedagogical tool, including a suggested course schedule and activities, lecture topics, sample assignment prompts, and helpful resources for students and faculty. Additionally, an unexpected outcome is that the Almanac will now be used in at least one Public History course, giving graduate students the option to continue researching the African American experience in Boston and building exhibits to share that research. Indeed, one particularly valuable outcome of this pilot was a demonstration of how classroom projects of this type could build on one another and accumulate value over time, strengthening the students’ investment in their contribution. We now plan to issue a regular call for proposals for curricular uses of CERES, modeled on this pilot.

**A Proud Past: Boston-Bouvé College, 1913-1981**

Northeastern University Archives and Special Collections has a decade-long history of designing and building online exhibits to showcase its digital collections. As more and more archival collections were digitized and stored in the DRS, Archives staff expressed a need to unify exhibit building workflows, upgrade legacy exhibits, and simplify maintenance for all online exhibits. During the CERES pilot phase, Archives submitted a CFP proposal to test CERES as a tool for streamlining their exhibit-building process, which lead to the development of *A Proud Past: Boston-Bouvé College, 1913-1981* ([http://aproudpast.library.northeastern.edu](http://aproudpast.library.northeastern.edu)). The exhibit, which uses digitized archival photos and documents to illustrate the history of the school from its founding in 1913 to its merger with Northeastern University and its eventual rebranding to become the Boston-Bouvé College of Health Sciences, was successfully reconstructed using CERES and quickly inspired Archives staff to replace several of the legacy exhibits with new CERES sites. Since the 2015 pilot, Archives has created ten sites, which is a significant portion of the total number of CERES sites hosted by the DSG. The quick adoption of CERES by Archives firmly tested the scalability of CERES technology and workflow with satisfying results, as infrastructure, staffing, and maintenance were not adversely affected by the increase in use. This proved the original conceit of CERES, that exhibit design control can be placed in the hands of the subject expert (Archives) while the infrastructure can be firmly controlled by the technical experts (DSG), creating a mutually beneficial partnership of shared responsibility.
Additionally, the CERES Bouvé pilot has spawned a productive, collaborative, and long-standing partnership between the DSG and Archives, prompting us to coordinate related research activity to explore shared goals and funding opportunities for more ambitious DH projects involving transcription, annotation, and identification of archival materials. The Archives currently stores 17,000 digitized documents in the DRS, which, as a corpus, could be used to research and analyze various topics, particularly underrepresented Boston communities. These possibilities have inspired Archives and DSG to collaborate on grant proposals to support TEI text encoding of target archival collections, including the Boston Desegregation project. Archives digital photograph collections also provide opportunities for augmenting collections by crowdsourcing descriptions for images with less description, including people names, geographic locations, event titles, or dates. These research activities could significantly increase the accessibility and discoverability of the archival collections, increase their use in the DH space, and advance DSG development priorities for supporting related CERES features.

The Catskills Institute

The Catskills Institute (http://catskillsinstitute.northeastern.edu/) is an organization that was founded to promote research and education on the significance of the Catskill Mountains for Jewish-American life run by Phil Brown, a University Distinguished Professor of Sociology and Health Sciences and director of the Social Science Environmental Health Research Institute at Northeastern University. On behalf of the institute, Brown has collected thousands of images, postcards, programs, and other artifacts representing Jewish-American life in the Catskills Mountains. The institute worked with Brown University’s Center for Digital Scholarship to describe and digitize more than 1,300 of the items in the institute’s collection, as well as create a website to widely share the institute’s work. When Brown and The Catskills Institute became affiliated with Northeastern in 2012, the DSG offered to house the digitized materials in the DRS and modernize the research website. The commitment needed to support the institute’s work using the CERES infrastructure was significant and, as with many projects, setting expectations and allocating labor were major challenges. The DSG and the Catskills Institute formed a relationship before the CERES infrastructure was developed; therefore it was difficult to accurately estimate the time it would take to fully realize the modernized Catskills Institute website.

In order to fully transfer the institute material to Northeastern, the DSG and Library Technology Services needed to transfer the digitized files from the Brown Digital Repository (along with the associated MODS XML metadata), augment the transferred MODS records to conform to the library’s standards for digital object cataloging, and develop new DRS features to support the display of sequenced postcard, brochure, and monograph page images and to batch ingest the sequenced images and their associated MODS XML metadata into the DRS. The two new DRS developments were specific to this project’s needs, but they were prioritized and completed because we knew that other projects could benefit from both new
features. The page sequencing feature developed for this project has been used by at least two other projects to display sequenced images, and the batch ingest tool has been used to load nearly 1,000 more files into the DRS (a number we expect to grow).

Another challenge was the shared labor responsibilities for this project, as neither Brown nor the DSG had additional staff to dedicate to designing and building the new Catskills Institute CERES site. The DSG relied on interns from Simmons College and a Northeastern work-study student to revise the cataloging, design the site, and build site pages and exhibits. We continue to struggle to find time and labor to commit to completing the remaining features and pages, but we will seek assistance where we can until the site is complete. Brown is also eager to digitize more material, and the library is currently designing digitization workflows in support of this and other large-scale digitization projects at Northeastern.

**Analysis and outcomes**

As we hope has become clear, the three principles articulated at the start of this discussion have served as important motivating and scoping devices for the strategic design of CERES. These principles have also had a strong shaping influence on Northeastern’s research community in digital humanities and computational social sciences. By placing the digital repository at the foundation of our support for digital scholarship, the library and DSG have expressed a commitment to long-term curation of that scholarship, which empowers scholars while also setting clear parameters for our support. The emphasis on the repository as a tool for both curation and usage of digital materials has helped focus attention on innovative ways to exploit those materials: through visualization and analysis tools, new forms of publication, and community-driven data enhancement and annotation.

Positioning CERES as a community-enhanced repository, whose development is treated as a shared research undertaking that draws on the diverse expertise of scholars, library staff, and public contributors, ensures that the infrastructure described here is directly and visibly responsive to real needs and horizons of usage. Inevitably, the success of CERES as a service hinges on our awareness of research activities in the larger digital scholarship community (a duty that is built into the applied research responsibilities of DSG staff) and our ability to effectively listen to and assess the DH research needs of our local community. This is achieved through a mix of engagement activities, including regular communication with university staff and faculty; frequent DH, GIS, and Data Visualization open office hours sessions; and periodic monitoring of grant award notices, departmental newsletters, and general university announcements.

Involvement in the local community is most evident in our commitment to an annual open call for CERES development requests and feature enhancements. The CFP, which is distributed widely at Northeastern, is an opportunity for faculty, staff, and students to propose new projects or request additions for existing projects. This
CFP process has attracted proposals from many corners of the university representing diverse research activities and has prompted many of the exhibit tools in use today. Project teams submitting proposals that are not accepted are often still invited to meet with us to determine if their research needs could be served through other DSG or library services, giving us the opportunity to learn more about research activity across campus.

The key outcomes from the project so far have been both practical and cultural. In practical terms, after two full development cycles, we have begun to see concrete payoffs from the early investment in repository infrastructure. Recent development work on CERES has been able to focus on adding specific features of value to incoming project cohorts: for instance, the addition of maps and timelines, the inclusion of the high-resolution image viewer, and the ability to access materials from external repositories such as the DPLA. Furthermore, the architecture of CERES has made it easier to frame such additions as self-contained projects that can be undertaken by groups of students with guidance and supervision from DSG staff. For example, DSG has served several times as a client project for a graduate-level computer science course in which student teams undertake real-world programming projects.

We have also seen important outcomes in the creation of a strong culture of expertise in which digital methods and scholarly questions are blended. The design of the CERES interface allows project teams to focus on scholarly substance and data quality as challenges of intellectual design rather than detailed technical implementation, which broadens opportunities for substantive participation. Teams composed of faculty, graduate, and undergraduate students at all levels of technical expertise have created successful CERES exhibits, developed rigorous project metadata, and created substantial and complex repository collections. We have also been able to host substantive internships focused on data curation and enhancement. The use of a shared platform means that all skills acquired on one CERES project are transferable to other CERES projects, making it possible to develop a common set of training materials and a strong pool of highly trained student collaborators. This community of talent has been strategically important as a source of expert labor for grant-funded projects.

**Conclusion**

Looking forward, the next phase for CERES will focus on improvement and refinement. The DSG will engage with current and future CERES exhibit designers to gather feedback about the design and usability of the tools, which we will use to prioritize and develop enhancements. Additionally, we will start planning our next major set of requested features, including exhibit tools for displaying annotations, transcriptions, and translations. A nontrivial dependency for these features will be the ability to store and display the annotation, transcription, and translation data, and we are actively developing a repository system to support such activity. We will
also continue to research strategies for technical preservation of the sites themselves, including the text, dynamic resources, and site experience.

CERES increases the visibility and security of digital scholarship projects and lowers the barrier for digital object storage and website design. Using CERES ensures that many goals are achieved: project teams are able to achieve their goal of contextualizing, publishing, and distributing their work openly on the web to a broad audience; the DSG achieves its goal of connecting researchers to digital tools and services that improve their workflow and advance their research; and the library achieves its goal of securing the Northeastern community’s intellectual output by storing materials in our digital repository and securing web resources produced by researchers.

References


