Digital Collections for Multiple Audiences: Transcription, Translation, and Storytelling

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Through our CLIR Digitizing Hidden Collections grant, Science and Survival: Digitizing the Papers of Georg and Max Bredig (awarded 2020), the Science History Institute is bringing an important archive to multiple digital audiences. The Bredig Papers are an intimate family collection that covers Georg Bredig's scientific training under the founders of physical chemistry, followed swiftly by his forced retirement and the demise of his career and very way of life under the Third Reich. Today, local communities across the US are curious about their heritage and the challenges faced by their immigrant parents, grandparents, and great-grandparents. Scientific networks were often used to negotiate escape routes for those fleeing Nazi-occupied Europe, making the Bredig collection of interest to both scholarly and public audiences.

Yet while processing and digitizing collections is often sufficient for scholarly audiences, our Google Analytics and end-user interviews taught us that public audiences need more. Additional resources must be invested in transcribing archaic handwriting, translating foreign languages into English, and interpreting the large body of historical content into a digestible narrative story. This paper explores how we gathered data about our target audiences and what strategic decisions we made upon analyzing them. We will discuss hiring a professional translator, building a custom UI for viewing transcriptions and translations, as well as creating online magazine articles, public programming, and collaborations with both local and European community groups. We seek to answer the question "we digitized it—what's next?" by showing that such projects shouldn't end with digitization.

Introduction

The CLIR DHC grant for Science and Survival: Digitizing the Papers of Georg and Max Bredig has allowed the Science History Institute to make publicly accessible thousands of previously unknown photographs, letters, telegrams, and documents from an intimate and important family archive. Unlike many other archival collections of German-Jewish scientists that were seized and destroyed by the Nazis, Georg Bredig's papers miraculously survived and have now been digitized, transcribed, and translated. This project pays testament to the many Holocaust stories that may never be known and helps give voices to silent memories that trauma and loss may prevent from ever being told. In addition to providing item-level discoverability for roughly 3,000 items of correspondence, photographs, and works of art, the CLIR grant also allowed the Institute to transcribe and translate into English approximately 1,000 manuscript items in the collection.

However, while providing free online access was an important first step, it would not have accomplished the goal of true accessibility. Additional work was needed to interpret and contextualize the archive. The Bredig Papers collection contains correspondence in multiple European languages, often handwritten in rapid scrawls and outdated German scripts that make the content unreadable even to native German speakers today. As such, the Institute knew that digitization itself would not be enough to engage the wide range of audiences who could benefit from these powerful stories.

In this paper, two members of the Science History Institute's CLIR DHC project team discuss how they used digital surrogates in creative ways to engage a much wider public audience with this important archival collection. Since this was the Institute's first large-scale digitization project with a significant transcription and translation component, the Digital Collections librarian conducted user testing to improve the public interface through an iterative design process. Next, the project team collaborated with the Institute's Museum and Facilities departments to install an exhibition on the building's street level windows to raise public awareness of the collection. Associated public events, online magazine articles, and a forthcoming video have packaged and interpreted the archive to ensure educators, students, and community groups have access to these resources.

The Papers of Georg and Max Bredig

Georg Bredig (1868–1944) was a pioneering scientist in the field of physical chemistry who held important academic positions in Europe until his career was ended by the Nazis in 1933. Fearing that his archives would be destroyed, he shipped his books and papers from Germany to the United States in 1938 where they were received by his son, Max (1902–1977). "Under no circumstances do I want it to be wasted/lost, given away or tossed! It should give witness over my life's work," he explained to his son in an accompanying letter.

Max Bredig held onto the collection after his father's death in 1944 and would later add his own wartime papers and correspondence to the steamer chest that housed the collection in the Bredig family's basement. Max's son and Georg's grandson, George Bredig, then inherited the collection after the death of his parents. Noticing extensive correspondence with many Nobel laureates in chemistry and physics, he sought a suitable archive to house the collection. George Bredig sold the collection to a Pennsylvania-based autograph dealer in 2018, who reached out to the Science History Institute as a potential home for this collection.

The Institute purchased the Papers of Georg and Max Bredig in 2019, recognizing that that it was the perfect addition to the robust collections in the Institute's Othmer Library of Chemical History. The Science History Institute is a free library and museum in center city Philadelphia whose mission is to expand knowledge and challenge perspectives in the history of chemistry, engineering, and the life sciences. The Othmer Library holds thousands of rare books and manuscripts dating back to the fifteenth century; over 50,000 historical photographs; more than 1,200 oral histories with STEM practitioners; and over 7,000 linear feet of significant archival papers. Known for its award-winning magazine and podcast, *Distillations*, the Institute was the perfect place not just to preserve and provide access to the Papers of Georg and Max Bredig, but also to tell engaging stories from them.

Upon receiving the Bredig Papers, the Institute's chief curator of manuscripts and archives rehoused and processed the collection, creating an online finding aid (Science History Institute Archives, 2020). The collection can be described in two halves. Materials dated before 1933 detail Georg Bredig's scientific training under the leaders of the European school of chemistry, Svante Arrhenius, Wilhelm Ostwald, and Jacobus van't Hoff, and his own rise to international prominence in the emergent field of physical chemistry. The collection not only contains correspondence with these three men, all awarded the Nobel Prize in chemistry, but many letters from renowned scientists such as Ernst Cohen, Niels Bohr, Ernst Rutherford, Fritz Haber, Max Planck, and Walther Nernst.

The post-1933 material tells the very different story of the demise of Bredig's career and his life under the Third Reich. These documents reveal, in highly intimate and often harrowing detail, the Bredig family's struggle to survive the horrors of Nazi-occupied Europe; to secure humanitarian aid, visas, and offers of employment for themselves and their colleagues; and to seek and ultimately find refuge in the United States. Significant items include more than 450 documents related to the Aryanization of family assets; Georg and his son-in-law Viktor Homburger's arrest during Kristallnacht; telegrams sent from Georg's daughter and son-in-law from an internment camp in Gurs, France; and letters from chemist friend Alfred Schnell and his wife, Eva, written from their hiding place on a Dutch farm and delivered to America via the Red Cross. The letters reveal that personal and professional connections readily transformed into a survival network in this time of need. By digitizing the archival collection of father and son German-Jewish scientists we have made freely available new primary sources that reveal the impact of the Holocaust on mid-twentieth century scientific thought, networks, and enterprise.

FIGURE 1: Driver's license belonging to Max Albert Bredig (1902–1977), issued in Berlin on January 20, 1937. Photo courtesy of the Science History Institute.

Transcription and Translation in the Digital Collections

In order to fully transcribe and provide English translations for all German correspondence in the Bredig collection, the Institute needed a subject expert with specialist language and paleography training. Thanks to funding from the CLIR DHC grant, the Institute hired, for a two-year period, a project curator with a PhD in German Studies whose dissertation focused on the works of German-Jewish authors. Human transcription and translation were preferable in this case to reduce machine error, provide accurate interpretation of nuanced social topics, and build an understanding of the collection that could support the development of related public programming.

Upon hiring this project curator, several unexpected questions arose that challenged the internal library team to develop an in-house transcription and translation style guide to maintain consistency throughout the project. The project curator's workflow was to read the letters and create

plain text files of the transcriptions and translations for ingest into the Institute's digital repository. It soon became clear that style guidelines needed to be developed in conversation with the library's technical team to address a range of issues, including how to handle HTML style formatting, page breaks, and special characters. Since the application did not previously support the inclusion or display of transcription and translation data, customizing both the backend and frontend of the repository became necessary.

The Science History Institute's Digital Collections is a custom Rails application developed and maintained in house by a team of two software developers. The application provides public access to a variety of the Institute's collections, including archival documents, library books, born-digital materials, oral histories, and museum artifact collections. Having a custom local application with a dedicated staff of developers allows the Institute to create features and custom designs that address specific business needs and use cases. This flexibility afforded the opportunity to pursue the addition of transcription and translation data in the application.

The team's plan was to develop the existing application interface and build new features to accomplish three main objectives: first, to store transcription and translation data in the digital repository; second, to optimize navigation of the site to make the data easily locatable for users as well as enable efficient staff workflows; and third, to provide full text searching of both German transcription and English translation text. The Institute's technical team sought to address these goals in an iterative fashion, using multiple rounds of user testing and research between development cycles to ensure that users could intuitively operate the new features.

FIGURE 2: Digital Collections updated record interface with Transcription and Translation tabs. English Translation is displayed.
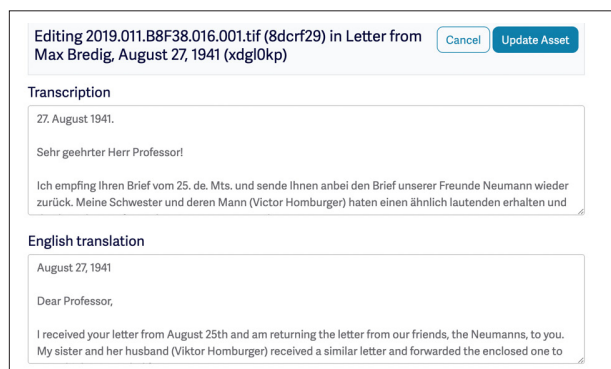

FIGURE 3: Digital Collections staff interface Transcription and Translation input fields.

This process began with three individual user interviews. The library director asked each user to look for translation data and observed while they navigated the Digital Collections application. After silently observing their actions during a series of prompts, she then asked each user to share their experiences with other digital repositories that include translations. The interview results informed the project team where users expected to find translation data on the collection webpages, what similar resources they had used in the past at other institutions, and whether certain features would be useful when conducting research, such as downloading the full text of each translation and transcription.

The Digital Collections librarian then investigated transcription and translation projects conducted by peer institutions. The intention of the investigation was to explore where and how other institutions had incorporated transcription or translation information on their webpages. This peer analysis revealed that other institutions either did not format their transcriptions to match the original document, or they used an advanced encoding schema, such as TEI. The peer examples also rarely included both a transcription and translation, but only one or the other. Despite the realization that our endeavor was somewhat unique, these peer examples provided ample inspiration and direction for the design of new features on the Science History Institute's Digital Collections site.

FIGURE 4: Digital Collections search results interface. Results depict a German-language text search.

FIGURE 5: Digital Collections refinement options bar with features tab expanded.

Following the first round of user interviews and the investigation of peer work, the technical team embarked on an initial stage of application development. Four significant features were built at this time. First, new data fields were built for the transcription and translation textual data. Each field supports simple html tags—such as bold and italics— and Unicode characters. The text input into these fields, both German transcriptions and English translations, is indexed and fully searchable. Second, a German language tool was installed to analyze the transc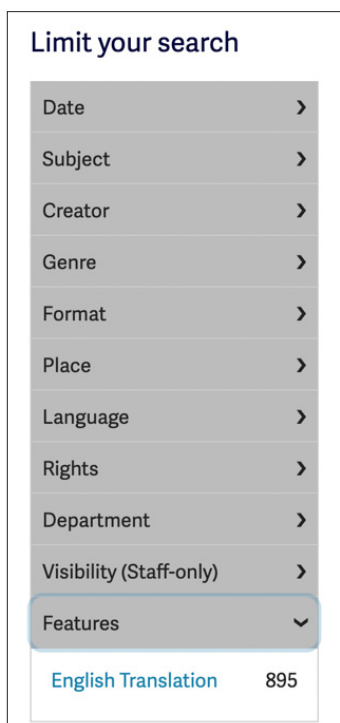ription text. The tool takes German stemming into account, splitting compound words before indexing, which in turn provides more accurate search results. Third, the public record interface was updated to include new tabs for users to toggle between the item's description, transcription, and translation. The fourth and final new feature is a facet in our "Limit Your Search" menu that allows users to refine their results by availability of an English translation.

To confirm the efficacy of the new features, an additional round of user testing was conducted by the Digital Collections librarian. In this round, subjects were recruited from three generalized personas— researchers, educators, and the public—with eight total users being interviewed. Each user was led through a series of prompts to observe how they navigated, searched, and used the site's new features. The prompts were followed by a brief interview to further explore how each user typically conducts their research, teaching, or casual searching. Though the usability testing produced varied feedback, users were universally able to locate, navigate, and appropriately utilize the new features.

Following the second round of user testing, the technical team improved the German language analyzer to ensure that the transcribed German materials would be less overwhelming in the

search results. The team also added a PDF download option for both the transcriptions and translations. Finally, an interface was drafted in which the transcription and translation will appear next to the digitized object in the repository's image viewer. This feature is not yet live as more testing is desired before it will be made public.

Storytelling to Engage Public Audiences

While the digitization, transcription, and translation of the Papers of Georg and Max Bredig improved accessibility to this important archival collection, the CLIR DHC project team recognized that the daunting quantity of items in the collection was another obstacle for a casual user. A keyword search could yield hundreds or thousands of results, and additional historical, biographical, or cultural knowledge is sometimes needed to understand the context. Therefore, as a concluding attempt to optimize the accessibility of the collection, the Institute turned to public storytelling, social media, and community events to share and interpret this poignant history of science story with both local and international audiences.

The signature interpretive project crafted from this digitization grant is an exhibition of Bredig materials curated and installed on the Institute's front windows. Also entitled Science and Survival, the outdoor exhibition features select enlarged reproductions of photographs and correspondence from the Bredig Papers. Located in the heart of Old City, Philadelphia, only a few blocks away from Independence National Historic Park, this free installation on the building's façade now can reach new or unexpected audiences, including tourists and casual pedestrians. While the archival collection is extensive, the 12 windows provided a helpful constraint for public storytelling. The project curator teamed up with the Institute's director of curatorial affairs, who collaborated with our in-house facilities team, consultant exhibit designers, and printers to create a compelling narrative. The story here focused exclusively on the family's survival correspondence, beginning with Georg Bredig's letter to the Daniel Sieff Research Institute in 1937, expressing his fear that his library might be destroyed under the Third Reich; followed by 1941 letters from his children, Max Bredig and Marianne Homburger, concerning negotiations to immigrate to the US; and eventually concluding with a 1943 family photograph in Colorado inscribed "Happy Ending." The exhibition also includes a key that identifies each source and a URL linking to the Digital Collections for those interested in exploring the content further.

To celebrate the exhibition opening, the Institute hosted an evening lecture by the project curator and displayed two cases of original archival documents from the collection. Printed reproductions of postcards from the collection were available for visitors to take home. The library director extended personal invitations to Jewish museums, community organizations, and local synagogues, and many individuals from these institutions were present in the audience of over 100 visitors on opening night. Many of those who could not attend personally responded to the library director's email to acknowledge both the importance of this collection beyond just the history of science community and also how rare it is that such a complete personal and professional archive would survive the Holocaust.

After the launch of the exterior exhibition, the project team worked with the Institute's audiovisual operations manager to create a short narrative video called *Science and Survival* (Science History Institute, 2023). The short video enabled the team to use more images than

could fit within the 12 windows and allows this haunting story to live on long after the panels are deinstalled in spring 2023. The video also gives the Institute a chance to share the exhibition with important individuals who cannot attend in person, including members of the Bredig family who reside out of state. In honor of Holocaust Remembrance Day in January 2023, the video was posted to Vimeo and circulated to the Institute's entire electronic newsletter readership. The project team will continue to monitor feedback and evaluations to ensure that it succeeded in engaging different types of learners and public audiences through these multiple storytelling platforms.

FIGURE 6: Image of Science and Survival, exhibition display. Photo courtesy of the Science History Institute.

Results and Next Steps

In addition to the qualitative user interviewers described above, the project team has been using quantitative evaluation tools across the two-year timeline of this grant: May 2021 through April 2023. Using Google Analytics to monitor website traffic, the team observed steadily increasing interaction with the digitized collection during the first year of the project. From the online launch of the Bredig collection in May 2021 through September 2022, the monthly count of users accessing the collection homepage grew from less than 20 users per month to approximately 40. Despite the upward trend, the total count of users was relatively low in comparison to other pages in the Digital Collections. It ranked as the 35th top accessed page during this period.

Notably, these same analytics show that awareness and usage of the digitized Bredig collection has increased with the production of related storytelling projects. The collection exhibition was installed in October 2022. Public events and social media promotion took place throughout October, November, and December of 2022. During these three months, the Bredig collection webpage rose to the 17th top accessed page of the Digital Collections. By continuing to use public storytelling platforms that link back to the digitized collection, the project team anticipates website analytics data will continue to reveal increasing engagement with these resources.

Conclusion

Digitized and cataloged cultural heritage materials hosted online can be viewed by any individual with an internet connection. This, however, does not mean an item's content, and consequently its cultural or intellectual value, is readily imparted or necessarily accessible to any individual who happens upon it. New digitization and cataloging projects often privilege collections that will help shape the historical record in some new way and usually prefer mass digitization of an entire collection. However, the ability to use such newly available primary sources is still difficult for many people if they are not trained in the historical context, languages, and idiosyncrasies of archival research. To design an online collection and storytelling products that truly serve the needs of multiple audiences, any digital library project team should be in conversation with

diverse user groups at multiple times throughout the project's lifecycle. Through user testing, interviews, peer research, and Google Analytics data, the Science History Institute's CLIR DHC project Science and Survival worked to combat language barriers, implement a user-friendly interface design, and interpret the complexities of the collection for local and international audiences. ●

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Michelle earned a PhD in history and English from the University of Warwick and a certificate in curation and management of digital assets from the University of Maryland. She is the author of *Lady Ranelagh: The Incomparable Life of Robert Boyle's Sister* (University of Chicago Press, 2021), part of the Institute's Synthesis book series.