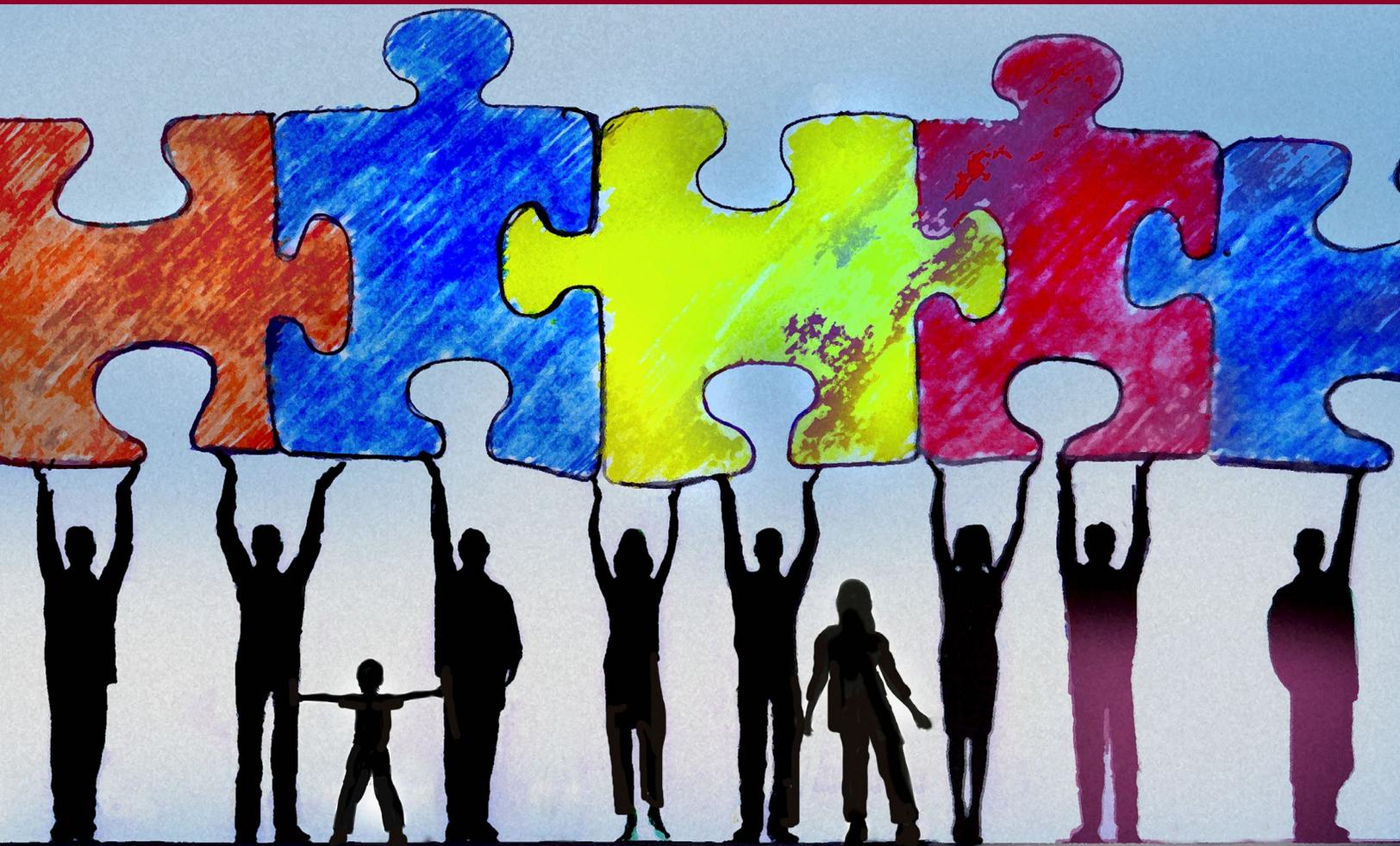# Keepers of Our Digital Future:
An Assessment of the National Digital Stewardship Residencies, 2013–2016

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Foreword by Abby Smith Rumsey

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Cover illustration: © Gary Waters via Ikon Images

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Acknowledgments

Foreword

Computers have long been instrumental in the management of library and archival collections. While initially used for "automation," by the mid-1990s computers were transforming the nature of the collections themselves: They were born digital. Librarians and archivists now confront the enormous scale of born-digital materials, their vulnerability to format obsolescence, and endless cycles of technological change driven largely by well-financed technology companies competing to keep current by continuing to "innovate."

Paradoxically, cultural heritage institutions have certain advantages in a relentlessly competitive environment. They have always adhered to principles of openness while at the same time protecting the privacy of their users. Thus they enjoy a measure of trust unmatched by commercial entities in an era of increased surveillance and security breaches. In contrast to the guiding ethos of a hyper-competitive private sector, these cultural values will grow more important, not less.

The public trusts libraries and archives to keep knowledge accessible and stable over time. To merit that trust, these institutions must retool their technical infrastructure, recruit staff with new skills, and above all, re-invent library and archival paradigms and practices. The need to rethink the work of stewardship—selecting materials to acquire, describing the collections, providing access to them, and ensuring their long-term preservation—for the digital age is clear, and it is urgent.

The National Digital Stewardship Residency (NDSR) model responds to this need by matching early-career professionals with forward-looking institutions to model and test concepts of digital knowledge management and develop corresponding practices. This report describes the achievements of the early NDSR cohorts, articulates the challenges they encountered that remain to be addressed, and makes recommendations for new programs going forward.

Young professionals in digital stewardship need both classroom education and operational experience to succeed and flourish. It is the latter that NDSR provides and that participants universally cite as most valued. The essential elements of professional competency—content expertise, operational knowledge of organizational culture, and understanding the community of data creators and users—are key to effective digital stewardship. Participants can benefit from working within a specific data community, be it discipline-based such as biology or art, or media-centric, such as audiovisual archives. As advocates for digital practices, they are destined to be seen by many as models. The elements of the program that emphasize communication and writing, public speaking, and collaboration

are integral to their professional training. It is no surprise that residents benefited from peer interactions and cited their desire for more. Convening cohorts at regular intervals has numerous advantages, such as solidifying knowledge, motivating fellows, reinforcing progress, and forging professional connections likely to last decades.

As important as peer relationships are, the report finds that sustained and engaged guidance from senior professionals in host institutions is just as critical to success. Participants repeatedly underscored their need for leadership and support from established figures in the field. NDSR is successful in part because it is structured as a residency, not a fellowship. Fellowships aim to prepare individuals for a profession, and NDSR makes significant investments in the individuals in the program. But the long-term success of digital stewardship depends not only on nurturing talented and dedicated individuals. Equally important are the long-lived institutions that are able to attract the most promising professionals, nurture them, and recruit them for leadership positions.

To succeed, we will need the participation of institutions willing to commit personnel and capital resources to responsible stewardship. After all, digital access depends on digital preservation. For libraries and archives, digital stewardship entails building an infrastructure that keeps pace with technological innovation and is sustained by reliable funding. Such a commitment is possible only with the support of leadership at the highest level of the organization. The benefits of such investments redound to the whole library and its users because managing the digital content lifecycle includes ensuring that data with long-term value are born archival. Stewardship begins at the moment of creation, when preservation-friendly formats are chosen by the creators and projected use cases are taken into consideration.

Like individual residents, NDSR organizations may serve as models to other libraries and archives looking for ways to meet their own preservation needs. Many cultural heritage organizations that collect ephemeral or rarified digital content, or those that serve local constituents such as public libraries, historical societies, and state libraries, cannot afford to pioneer digital practices. They can, however, learn about and adapt strategies that have proven successful in other institutions. This is true as well of those libraries and archives that serve niche users, "small data" disciplines, and specialized datatypes, such as GIS.

NDSR has shown that it is a compelling model that merits expansion into new organizations and new data communities. However, the report identifies challenges that must be addressed as the program grows. Among them is the disparity of training and knowledge among incoming participants—all with graduate training, some with experience with digital practices, and others arriving with at best only theoretical knowledge. While this may be inevitable, given the goals of the program, it begs a question: Should there be a core curriculum that everyone must master by the time they leave the residency? If so, what would it be? If it is broad enough to encompass all cohorts of a given year, then should there also be an expected level of expertise particular to a data type (e.g., text or GIS); or a discipline (e.g., performing arts or social science); or type of institution (e.g., state archives or history museum)? Perhaps, at this early stage of NDSR and of digital

stewardship itself, there should be a clear set of questions participants seek to answer; or models to be tested and refined. Without clear expectations of those entering and graduating from the program, it will be hard to scale up these residencies successfully.

Other areas that beg further thought are described in the report. They range from the need for a dedicated and independent administrator and more secure financial support to concerted attention to the public face of the program through a website, social media, and in-person presentations by individuals and their home institutions.

Some practices and their underlying rationale will take a long time to settle. As the number of NDSR residents increases, more questions about the theory and practice of digital stewardship will arise. A sure sign of advancing knowledge is when a research project moves beyond filling in gaps of knowledge in a well-defined area. It is when some answers are found that generate new questions and open the door for new interpretations. As NDSR grows and matures, its ability to pose new and ever thornier questions about digital stewardship in practice may turn out to be a benchmark of the program's success.

Today, librarians and archivists whose practices once embraced the wisdom of fixing knowledge permanently onto enduring formats in canonical forms—the photograph, the printed page—to ensure long-term access must be flexible, self-documenting, and transparent in their practices. While permanent solutions are elusive, incremental growth and ready response to the changes in the communities they serve are vital. With critical attention to this report's findings, the National Digital Stewardship Residency can be an effective model for training such professionals.

—Abby Smith Rumsey

1. Introduction

Over the past two decades, a significant increase in born-digital material and concern over the loss of digital and analog content have driven the demand for information professionals with a host of new technical skills. As early as 1996, Donald Waters and John Garrett identified threats to digital information and made recommendations to preserve it in their report, *Preserving Digital Information, Report of the Task Force on Archiving of Digital Information* (Waters and Garrett 1996). More than a decade later, the Digital Preservation Outreach & Education (DPOE) initiative at the Library of Congress (LC) conducted a study that found that staff at nearly 900 libraries, archives, historical societies, and corporations across the country believed that digital content in their care should remain accessible for ten years or more and that there were limited professional development opportunities in digital preservation (DPOE 2010). Most of these institutions, however, did not have staff with the expertise to provide such access. A follow-up survey conducted by LC in 2014 demonstrated that concerns over the preservation and access of digital content and adequate staffing persisted (DPOE 2014). The National Digital Stewardship Residency (NDSR) was created to address this need for effective management of digital materials by increasing the number of professionals prepared to undertake that vital work.

The first NDSR program was launched in 2011 as a collaboration between the Institute for Museum and Library Services (IMLS) and the Library of Congress Office of Strategic Initiatives. This pilot program placed ten recent graduates of master's programs in information science and related fields at cultural heritage organizations in the Washington, D.C., area to pursue projects related to the collection, selection, management, preservation, and accessibility of digital material. Since then, several institutions and organizations have propagated and extended the NDSR concept through additional, separate IMLS-funded initiatives. These have included a second D.C.-based program run by the Library of Congress, a Boston-based program led by Harvard Library and MIT Libraries, and a New York-based program led by the Metropolitan New York Library Council. By summer of 2016, 35 residents, 49 supervisors, and 32 host organizations had participated in these four programs.[1] IMLS

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[1] The number of supervisors exceeds the total number of residents because some residents had two supervisors at their host institution. In addition, Harvard Library, MIT Libraries, and the National Library of Medicine each hosted two residents.

has also funded three more NDSR programs led, respectively, by the Philadelphia Museum of Art and the Art Libraries Society of North America, the American Archive of Public Broadcasting, and the Ernst Mayr Library of the Museum of Comparative Zoology, Harvard University, in cooperation with partners in the Biodiversity Heritage Library.

In September 2015, IMLS awarded a grant to the Council on Library and Information Resources (CLIR) to investigate the early impacts of the NDSR programs, to inform subsequent development of similar programs by others with a vested interest in building professional capacity to preserve digital information. The CLIR assessment was a formative evaluation that gathered qualitative feedback from interviews and surveys to capture the diversity of experiences of the first NDSR participants. The findings of this study derive from a sampling of the growing number of residents and host institutions connected with NDSR programs, most of whom participated in the program in 2015–2016. The insights these participants have shared shape the recommendations in this report. These recommendations are intended to help future administrators, residents, and supervisors chart their own paths forward as they work together to curate and sustain vital documents, data, media, and cultural heritage for the benefit of future generations.

2. The Study

This report summarizes the findings of a broad and comparative assessment of the NDSR programs. The study sought to identify key program strengths that have influenced participant satisfaction and perceptions of success.[2] The findings should inform funders, current and future hosts and applicants, current and future coordinators of new NDSR initiatives, and national and international professional organizations interested in developing professional capacity for digital stewardship.

The study considered four NDSR programs that were completed by summer 2016: the initial NDSR pilot program designed by the Library of Congress (2013–2014); the second D.C.-based program, also led by the Library of Congress (NDSR-DC, 2015–2016); the Boston-based program led by Harvard Library and MIT Libraries (NDSR Boston, 2014–2016); and the New York City-based program led by the Metropolitan New York Library Council, or METRO (NDSR-NY, 2014–2016). All of the residents and supervisors who participated in NDSR programs in Boston, New York, and Washington, D.C., as well as most of the individuals involved in administering these programs, were invited to provide feedback for the study (see Appendix 1 for study design and methodology). The research team also met or

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[2] As will become clear in this report, perceptions of success have varied. For residents, developing skills in digital preservation that can help them secure permanent employment is paramount. For host institution supervisors and colleagues, the completion of a resident's project and the long-term effects of project outcomes on institutional practice are key indicators of success.

corresponded with staff associated with two programs launched in 2016: one led by the American Archive of Public Broadcasting (AAPB NDSR) and one led by the Philadelphia Museum of Art and the Art Libraries Society of North America (NDSR Art). These programs were only just under way during CLIR's assessment, so were not a significant part of the study.

The following questions guided the study:

1. What benefits do the NDSR residency programs offer for recent graduates of master's programs in library and information science and related fields, for institutions who host residents, and for the development of a nationally coordinated approach to digital stewardship in institutions of cultural memory?

2. What have been the most significant differences in how these programs have been designed, and how have these differences affected residents, supervisors, and host institutions?

3. What factors are common to successful and productive residencies, and what roles do administrators, supervisors, and residents play in contributing to that success and productivity?

4. What opportunities might there be for building on the NDSR programs to create a national network of professionals and professional development resources related to digital stewardship?

Notes on Terminology

We have used the terms *program* and *initiative* interchangeably to refer to the various iterations of NDSR. There is as yet no overarching governance structure or unified program supporting the residencies at a national level.

We use *program staff* as a catch-all phrase referring to individuals who have proposed, administered, and managed the different NDSR programs. The positions of these individuals and the divisions of responsibility among them have varied, but titles of program staff have included project manager, project director, curriculum coordinator, and principal investigator.

The terms *mentor* and *supervisor* have been used interchangeably within the NDSR programs. For this assessment, the research team has typically used the term *supervisor* to describe the primary individual(s) assigned to provide oversight and support for residency projects. When referring to host institution staff who have been expected to assume a broader range of responsibilities on behalf of NDSR residents, including career guidance and professional development support, the team has used *mentor* and *mentorship*. However, the individual(s) assigned to provide project oversight and professional development support have typically been one and the same.

3. History of the National Digital Stewardship Residencies

To address the need for increased professional development in the field of digital preservation, IMLS entered into collaboration with the Library of Congress in 2011 to develop the National Digital Stewardship Residency pilot program. This partnership helped build capacity for digital preservation within the Library while also advancing the mission of IMLS's Laura Bush 21st Century Librarian Program (LB21). The LB21 program is intended to develop a more diverse workforce of librarians by supporting professional development, graduate education, and continuing education to help libraries and archives.

NDSR's mission is to "build a dedicated community of professionals who will advance our nation's capabilities in managing, preserving and making accessible the digital record of human achievement" (Library of Congress, n.d.). The term *digital stewardship* is defined as the "act of selecting, maintaining, collecting and archiving digital assets in addition to their preservation" (IMLS and Library of Congress 2011, 1). Central to the aim of developing this community, the NDSR provides an opportunity for recent graduates of library and information science (LIS) and related programs who are interested in the field of digital preservation to gain hands-on experience that will help them link their theoretical knowledge to practice in a professional context. As the NDSR-NY orientation manual states, NDSR "was created to bridge the gap between existing, well developed classroom education and the need for more direct professional experience in the field" (NDSR-NY 2015a, 1). Although the residents are tasked with completing short-term projects and paid through IMLS funding, host organizations are expected to regard residents as regular employees who are simultaneously gaining direct, practical experience in digital preservation and early experience as full-time professionals. Program staff are responsible for supporting the ongoing training and professional development of the residents throughout the residency, over and above what residents learn at host sites.

The Library of Congress launched the first NDSR program in 2013.[3] George Coulbourne, executive program officer in LC's Office of Strategic Initiatives; Kevin Cherry, senior program officer; and Joyce Ray, associate deputy director of library services at IMLS originally crafted the interagency agreement that outlined the pilot program for training new professionals to manage and preserve digital information. After the project was funded in 2011, a curriculum committee comprising members of the digital preservation community was created to further flesh out the program. Committee members convened in Washington in April 2012 to clarify key elements of the residencies, including the types of institutions that might support an NDSR resident, how residents would be selected, and how the program might be grown and sustained over time (Library of Congress

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[3] Originally called the National Digital Curation Residency, the program underwent a name change prior to the start of the first residency. The term *stewardship* replaced the term *curation* (IMLS and Library of Congress 2011).

NDSR timeline

2013–2014

$ IMLS-Library of Congress Cooperative Agreement, 2011

NDSR Pilot

Association of Research Libraries

Dumbarton Oaks Research Library

Folger Shakespeare Library

Library of Congress

Maryland Institute for Technology in the Humanities

National Library of Medicine

National Security Archive

Public Broadcasting Service

Smithsonian Archives

World Bank Group Archives

2014–2015

$ IMLS-Laura Bush 21c Librarian Program, 2013

NDSR Boston

Harvard Library

MIT Libraries

Northeastern University

Tufts University

WGBH

NDSR-NY

American Museum of Natural History

Carnegie Hall Archives

The Museum of Modern Art

The New York Art Resources Consortium

NYU Libraries

2015–2016

$ IMLS-Laura Bush 21c Librarian Program, 2013

NDSR Boston

Harvard Library

MIT Libraries

JFK Presidential Library

Joseph P. Healey Library

State Library of MA

NDSR-NY

Brooklyn Academy of Music

CUNY TV

NY Public Radio

Rhizome

Wildlife Conservation Society

$ IMLS-Library of Congress Cooperative Agreement, 2014

NDSR-DC

American Institute of Architects

Martin Luther King Jr. Memorial Library

Government Publishing Office

National Library of Medicine

U.S. Senate Historical Office

2016–2017

$ IMLS-Library of Congress Cooperative Agreement, 2014

NDSR-DC

Association of Research Libraries

Food and Drug Administration

Georgetown University Libraries

The Sheridan Library, Johns Hopkins Univ.

World Bank Group Archives

$ IMLS-Laura Bush 21c Librarian Program, 2015

AAPB NDSR

CUNY TV

Howard University TV

KBOO Public Radio

LA Public Broadcasting

MN Public Radio

WI Public TV

WYSO

2017

$ IMLS-Laura Bush 21c Librarian Program, 2016

NDSR Foundations

Field Museum/Chicago Botanic Garden

Ernst Mayr Library, MCZ

MO Botanical Garden

LA County Natural History Museum

Biodiversity Heritage Library with Secretariat/Smithsonian Libraries

NDSR Art

TBD

2017–2018

NDSR Art

TBD

Fig. 1. The NDSR Timeline, 2013–2018

2012). The committee included Jefferson Bailey, Andrea Goethals, Ross Harvey, Ingrid Hsieh-Yee, Lisa Johnston, Ronald L. Larsen, Jacob Nadal, Naomi L. Nelson, and Katherine Skinner. (See Appendix 6.)

The pilot residency launched in 2013, placing ten recent graduates of master's programs at cultural heritage institutions in the Washington, D.C. area.[4] The first cohort began the program with an intensive two-week workshop that addressed topics such as content selection, levels of digital preservation, and current systems and tools. From there, residents went to their host organizations to begin work on individual projects for nine months. During the pilot program, the Library of Congress secured additional funding from IMLS to support two more Washington-based cohorts of the NDSR program between 2015 and 2017.

Building on the concept for the pilot, in 2013 Harvard Library and the Metropolitan New York Library Council (METRO) proposed new NDSR programs to the IMLS LB21 program. These programs were similar to the pilot, but purposefully different in some respects. NDSR Boston was designed to be administered by an academic institution, Harvard Library. Both the Boston and New York initiatives were funded by IMLS in 2013 and followed similar schedules, recruiting host institutions during the 2013–2014 academic year, and launching two cohorts of five residents per year in 2014–2015 and 2015–2016. The Boston and New York initiatives were created to test the NDSR model in geographic regions beyond the capital, as a step toward cultivating a nationwide community of trained, experienced, and networked digital stewardship professionals. (See section 4 of this report for more about these three regional programs.)

The NDSR community continues to evolve and expand, and three more IMLS-funded programs, listed below, are under way in 2016. They will further address the aim of creating a national community of professionals who can address digital preservation challenges, since each program will distribute cohorts at host institutions across the country:

- **AAPB NDSR:** In 2015, IMLS awarded the American Archive of Public Broadcasting (AAPB) a grant to support the preservation of at-risk audiovisual materials. Seven residents have now been assigned to public television or radio stations across the country. The program aims to give residents experience in the effective stewardship of vulnerable audiovisual content.
- **NDSR Art:** In 2016, the Philadelphia Museum of Art and the Art Libraries Society of North America received a grant from IMLS for an NDSR program focused on art information professionals. This program will support two cohorts of four one-year residents, dispersing them to art and cultural heritage libraries across the country.
- **NDSR Foundations to Actions:** In 2016, IMLS awarded a grant to the Biodiversity Heritage Library (BHL), based at the Ernst Mayr Library of the Museum of Comparative Zoology at Harvard University, for an NDSR program. Beginning in January 2017, five

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[4] Many NDSR residents have graduated from library and information science programs, but others have earned graduate degrees in history, archiving and preservation, or other related subjects.

residents will work at institutions across the country, focusing on a collaborative project to improve preservation strategies and tools related to the BHL, which is the world's largest open access digital library for biodiversity literature.

4. The NDSR Model and Early Programs

Section 4.1, The NDSR Model, provides an overview of the components shared across NDSR programs. Feedback from participants in CLIR's assessment is incorporated throughout, indicating what elements of the model have been successful in contributing to the mission of building a dedicated community of digital preservation professionals. Section 4.2 describes how each of the independent regional programs—those based in Boston and New York, and the two initiatives led by the Library of Congress in Washington, D.C.—were run and managed. Both sections highlight major program similarities and differences, emphasizing how the latter have affected the experiences of residents and supervisors.

To date, each NDSR program has been funded by IMLS either through an interagency agreement, in the case of the pilot program and NDSR-DC, or by a grant awarded through the Laura Bush 21st Century Librarian Program, in the case of NDSR Boston, NDSR-NY, AAPB NDSR, NDSR Art, and NDSR Foundations. The proposals for each of these funded programs are available through IMLS's awarded grants database.

Karl-Rainer Blumenthal NDSR–NY 2014–15
Web Archivist, Internet Archive

Karl-Rainer Blumenthal was a resident at the New York Art Resources Consortium (NYARC) in 2014–2015. Prior to NDSR, Karl worked in academic and design libraries and archives. He earned his B.A. in History of Art from Haverford College and his M.S.L.I.S. from Drexel University. Since completing his residency, Karl has helped the Internet Archive's vast network of partners in libraries, archives, and other organizations around the world collect and preserve born-digital resources as a web archivist for the Archive-It service.

How did the residency experience shape your vision and goals for your career?
"My residency deepened my commitment to digital stewardship as a pursuit to be shared and advanced by the broadest possible collaboration among stakeholders. It was tremendously helpful and ultimately quite inspiring to share my residency challenges and outputs with a community of multi-institutional stakeholders, cohort members, and our respectively growing networks of professionals. I couldn't be any more satisfied to now work with such a vast and diversely missioned community of digital preservation professionals and enthusiasts as a representative of a nonprofit service provider. It remains my goal, as it was at the outset, to engage the community widely and effectively; the residency provided me a uniquely constructive venue in which to begin this career-long charge."

4.1. The NDSR Model

The NDSR programs were designed to establish a set of norms and practices that could be followed by similar initiatives nationwide. The 2011 interagency agreement between the Library of Congress and IMLS anticipated that NDSR would become a "highly visible and prestigious national model, one that will be openly and widely shared—including through tools such as a manual, handbook, online toolbox, wiki, etc.—and thus able to be replicated in other programs and institutions" (IMLS and Library of Congress 2011, 1). An extension of the agreement between the Library and IMLS, signed in 2014, further specified that the "ultimate product under this agreement" is a Digital Stewardship Field Model that is to include best practices, sample curricula, and documentation such as a program manual (IMLS and Library of Congress 2014, 2).

Both the Boston and New York programs were proposed to IMLS before the first Washington, D.C. residencies had begun. The NDSR Boston initiative aimed to "test the NDSR DC pilot in the Boston, Massachusetts area and transform the documents created by the NDSR-DC pilot into model documents useful for replicating residency programs across the country" (Harvard Library 2013, 3). Boston program staff compiled these documents into the NDSR Program Starter Package (NDSR Boston 2016a). NDSR-NY staff anticipated working with NDSR Boston and NDSR-DC to test and refine a "national model for training, standardizing a digital stewardship curriculum, and providing a replicable framework that can be widely adopted to train digital stewardship professionals" (Metropolitan New York Library Council 2012, 2).

The regional programs were designed to take advantage of opportunities to communicate and share with one another. For example, the same host and resident application forms have been used across programs, with a few modifications. These documents are not officially standardized, but they have been informally exchanged and replicated. The Library of Congress created host and resident manuals for the NDSR pilot program; these documents have been shared across programs and represent models to be refined and tailored by others (Library of Congress 2013a; 2013b). However, there has not yet been an effort to create a standardized digital stewardship training curriculum or training documentation for use across programs.

There are also, unsurprisingly, competing visions for what the NDSR can and should be, based on different program-specific needs. To stimulate a national, community-wide conversation about the NDSR model and its iterations, a symposium is planned for late spring 2017 that will focus on evaluating and discussing the first four years of NDSR programs. The symposium was proposed by former NDSR residents Rebecca Fraimow and Margo Padilla on behalf of the Metropolitan New York Library Council and funded by IMLS in 2016. It will provide an opportunity to bring stakeholders together and is meant, among other goals, to develop standardized guidelines for future NDSR programs. In addition to planning the symposium,

the 2014–2015 New York cohort recently authored a paper titled *What Makes a Digital Steward*, which proposes a competency profile for the field as a whole (Blumenthal et al. 2016).

Although there is no comprehensive standardization of the NDSR model, all programs to date have shared some basic characteristics, including application processes for candidates and (usually) hosts, an immersion workshop, on-site residencies at institutions engaged in digital preservation, projects proposed by hosts and undertaken by residents, a cohort model, enrichment sessions, mentorship, professional development expectations, and a capstone event or final symposium.

4.1.1. Application Processes

The original application documents for the NDSR program were created by LC's pilot program leadership. Although the application process for residents has remained similar across programs, NDSR initiatives have advertised to potential residents and hosts in divergent ways, and evaluation processes have differed across programs (see section 4.2, below). The following paragraphs introduce the most common similarities.

To be eligible, individuals interested in becoming an NDSR resident must have earned a master's or higher degree in a field related to digital preservation within two years of the start date of the residency. In some cases, currently enrolled doctoral students are also encouraged to apply. All candidates must submit an application form; examples are available online:

- NDSR Boston's resident application can be found on its program website and is archived on CLIR's website, under the NDSR Program Starter Package documents' zip file
- NDSR-DC's resident application for the 2016–2017 cohort
- NDSR-NY's resident application form for the 2015–2016 cohort
- AAPB NDSR's 2016–2017 resident application form

All NDSR initiatives have required residents to submit standard job application components such as a résumé or *curriculum vitae* and two or three letters of recommendation. Some programs have requested graduate school transcripts. In addition, each of the first four NDSR programs required applicants to submit a two-to-three-minute video or online project. In its 2013 application form, LC advised applicants that the video was an opportunity to demonstrate their "personality, work, academic experiences, and communication skills." Other resident applications have included some variation of the following instructions:

> The piece does not need to be technically perfect or professionally edited, but it should show your ability to communicate through spoken language, visual images, or other means. It can use original or stock footage, still images, text, screencasts, animations or any other moving image medium that communicates your message. Online projects can utilize a variety of platforms and

approaches in answering the same question. The key point is to convince a viewer/user of your interest in digital preservation and why you would make a good advocate for, and practitioner of, digital stewardship as part of the NDSR program (Library of Congress 2013c).

Each initiative has posed a different question for applicants to address in the video or online project. LC asked NDSR-DC applicants, "What makes you the best candidate for the program and specifically for your top project choice?" METRO asked NDSR-NY candidates, "Why are you interested in digital stewardship?" Harvard and MIT Libraries asked NDSR Boston applicants, "Why are you passionate about digital preservation?" The NDSR Boston program was more explicitly focused on digital preservation, as opposed to digital stewardship more broadly conceived (see section 4.2). Similarly, the AAPB NDSR program, which is focused on the digital preservation of audiovisual content in public media, asked potential residents, "Why are you interested in audiovisual digital preservation and/or preservation of public media?"

Residents had mixed opinions about the video requirement, some noting that it was an uncomfortable experience and that they were uncertain how it contributed to their application. One resident stated that the video requirement "almost stopped me entirely" from applying. The first cohort of NDSR-NY residents reflected positively on the application process and video requirement, which they discussed in their group blog post, "So you've decided to apply to NDSR." They recommended that future applicants treat the video as an "audiovisual cover letter."

Supervisors typically reported that they found the videos useful in evaluating potential candidates because they provided a clearer perspective of candidates' personalities and strengths. As one supervisor put it, "when you're not going to get an in-person interview it's really helpful." Some did wonder, however, if the requirement might favor certain personality types or discourage more introverted individuals from applying to the program.

Most potential host organizations have been required to submit application forms for review by program staff and advisors. These forms have been based on the same template, with some refinements, as seen in the following examples:

- NDSR Boston's host application can be found on its program website and as archived on CLIR's website, under the NDSR Program Starter Package documents' zip file
- NDSR-DC's host application for the 2015–2016 cohort
- NDSR-NY's host application for the 2015–2016 cohort
- AAPB NDSR's host application for the 2016–2017 cohort

Potential host institutions are typically required to provide the names of a primary and secondary mentor (or supervisor), a letter of commitment from upper-level management, a statement of interest describing why the host institution is a good site for an NDSR

resident, and a project proposal describing work that will be completed by the resident. In addition to the guidance provided within the host application, all NDSR programs have supplied potential hosts with descriptions of host responsibilities:

- NDSR Boston's "Host Attributes" document can be found on its program website, in the NDSR Program Starter Package.
- NDSR-DC has a Host Institution Commitment Checklist.
- NDSR-NY provided details on the eligibility and requirements of host institutions in its NDSR-NY Host Institution Requirements document.
- AAPB NDSR provided its criteria for hosting a resident in the AAPB NDSR Host Institution Requirements document, and more information on how to submit an application in its AAPB NDSR Host Application Instructions document.

Most supervisors and staff at host organizations who participated in this study reported that the application process to host a resident was straightforward and unproblematic.

4.1.2. Immersion Workshop

Although the curricula have varied, an intensive workshop or training period has taken place at the beginning of each residency term. The immersion workshop provides an orientation to the overall residency, an introduction to host organizations, and instruction in digital stewardship. The Library of Congress pilot program included a two-week immersion seminar with a curriculum based on LC's Digital Preservation Outreach and Education (DPOE) training modules. A post-seminar assessment led by Howard Besser (see Appendix 2) identified several ways the immersion workshop could be improved. The first residents suggested shortening the seminar to one week, extending the curriculum beyond the DPOE training modules, and incorporating less lecture-based teaching and more interactive and hands-on experiences. In response, LC revised the two-week schedule to one week for subsequent cohorts and appointed guest presenters who could introduce interactive activities and tools. The revised curriculum also allowed time for host organization supervisors to present overviews of all the residency projects.

NDSR Boston also built an immersion workshop curriculum that drew on the DPOE modules for its first cohort; the schedule is included in its NDSR Program Starter Package. The Boston program leadership broadened the workshop's focus "to go beyond digital preservation to cover the larger scope of digital stewardship" (Harvard Library 2013, 4). For its second immersion workshop, the Boston team used a more interactive approach that included, for example, visits to each host organization. NDSR-NY immersion workshops have been designed to cover not only digital preservation, but also strategies for professional development. For the second cohort (2015–2016), NDSR-NY residents completed work prior to the workshop that included readings on digital stewardship and online tutorials on project and time management. A recap of AAPB NDSR's

more recent immersion week, with links to presentation slides, can be found online.

The 2013–2016 residents whom CLIR surveyed and interviewed generally stressed that they wanted hands-on, interactive training with digital preservation tools and systems at the immersion workshop, along with examples of current preservation practices. One survey respondent from the pilot NDSR cohort remembered that the immersion workshop "was advertised as being an intensive tool-based, hands-on learning experience, but it was actually just a lecture-style overview of concepts covered in graduate school." Although subsequent immersion workshops in D.C.—as well as in Boston and New York—were designed to address this critique, at least half of the residents from all cohorts felt that the immersion period did not offer training or content that went beyond what they had already learned in graduate school. "It felt rudimentary," according to one respondent. "I would have thought that the curriculum would have been more advanced and nuanced because we were expected to have knowledge of the field."

Some residents who did not benefit from digital stewardship training in graduate school, however, felt that reviewing basic concepts was necessary: "Because I was really starting from zero, the best component for me was the introduction to the standards," noted one. Another survey respondent from one of the earliest cohorts articulated the importance of learning the foundations of digital preservation:

> A solid understanding of digital preservation and a scalable model of [digital preservation] practices for smaller organizations has been vital to my career…. The tools and technology I was able to use at my host organization … aren't things I have access to in my post-residency career currently, but understanding them and understanding the underlying importance of digital preservation has made me an effective advocate for prioritizing [digital preservation] at my [institution].

Most residents across cohorts and years wanted less lecture-style instruction and more interaction with speakers, instructors, and each other. They typically reported that the immersion workshop was a successful way to get acquainted with their cohort, but they desired even more opportunities to network with instructors, supervisors from the host organizations, and digital preservation experts.

Supervisors who attended the immersion workshops generally had positive feedback, noting that they were particularly successful for cultivating a sense of community and interpersonal relationships conducive to collaboration. One supervisor said, "Attending the immersion week was interesting and helpful. I felt it was useful to know what the other residents were doing." Some supervisors, however, agreed with residents that the program curriculum was too rudimentary. For example, one noted that it was a misconception that residents need a grounding in basic digital preservation concepts: "They're all coming out of grad school with basics in place," said one

supervisor, referring to residents, "but what they need is to get to the hands-on part of it. It [the workshop] really didn't seem that useful to anyone."

From the perspective of NDSR program staff, especially those who were instrumental in formulating the workshop curriculum, the workshops are an important means of providing residents with an overview of the digital preservation landscape. Program staff described the importance of ensuring that all residents had a basic understanding of the core concepts of digital stewardship. They see the immersion workshops as the appropriate time to teach or review foundations, and to confirm that all residents understand basic concepts.

At the same time, the continual evolution of the curriculum, tailored to the different needs of program hosts and to residents' different backgrounds, seems vital to making the experience effective. Future program leaders should have ample opportunities to experiment with pre-readings, demos, peer-to-peer instruction, and collaborative problem-solving activities as they prepare new cohorts for their host environments.

4.1.3. On-site Residencies

Residencies are centered on project-based work at host organizations. LC program leaders have referred to the residencies as "a collaborative field experience" meant to provide participants with rigorous hands-on training and the opportunity to bridge the theory and practice of digital stewardship (Library of Congress 2013c). Each residency is focused on a project defined by hosts prior to resident selection.

The length of the residencies has varied within and across NDSR initiatives. The initial, LC-managed pilot residency was nine months, but LC extended residencies to 12 months for the second and third D.C.-based cohorts. The Boston and New York programs each created two cohorts with nine-month residencies. The AAPB residencies are ten months. NDSR Art will support two cohorts with 12-month residencies, and NDSR Foundations to Actions will create one cohort of 12-month residents.

Beyond work on projects, the AAPB, Boston, and New York programs specified that residents devote 20 percent of their work time to professional development or cohort activities. Although these activities have varied by program, this time was generally spent on participating in training beyond the immersion workshop, networking, and other program-related events. This time could also include participation in enrichment sessions (see section 4.1.6), blogging, attending or presenting at conferences, and organizing a workshop or event for fellow residents or other digital stewardship professionals. Residents reported attending networking events, developing their online professional portfolios, participating in computer programming and coding workshops, and organizing tours of regional organizations beyond NDSR host sites. The pilot program did not formally require residents to devote 20 percent of their residency to

NDSR activities and professional development. It did, however, require residents to create a professional development plan with their supervisors at the beginning of the residency term, which specified professional development goals and activities such as relevant conferences and training opportunities. For the second D.C. cohort, program staff advised residents that they should devote up to one day a week to professional development and NDSR activities.

4.1.4. Projects

Potential host organizations propose digital stewardship projects when they apply to the institution administering the NDSR initiative. As stated above, a host application form has been shared across initiatives, with minor refinements. The form states that project proposals should:

> clearly identify the scope of work that the resident will complete throughout the experience. It should include the nature of the project, the context for the project (the project's role in the bigger picture of the institution and for outside the institution), a proposed timeline for completion (with relevant milestones), and a description of the project deliverable at the end of the program" (Library of Congress 2015a).

Following the pilot program, LC produced a video describing the role of the NDSR host organizations, featuring some of the first NDSR residents' projects.

Since the inaugural year, all NDSR program leaders have given potential hosts examples of project proposals as well as individualized guidance. NDSR Boston created a project template, which is included in its NDSR Program Starter Package, while the documentation for the first AAPB NDSR residents lists the necessary characteristics of a project plan:

- Be well-defined and contain explicit descriptions of the organizational need, proposed deliverables, and desired skills;
- Include an explicit description of how the project and its outcomes will be incorporated into organizational operations;
- Be practical, hands-on, and collaborative in nature.

The administering organizations of the different NDSR initiatives are responsible for setting project guidelines. NDSR-DC and NDSR-NY required potential projects to address digital stewardship, defined as "the practice of acquiring, selecting, managing, preserving, and providing access to digital information." NDSR Boston and AAPB NDSR have required projects to be more focused in scope. NDSR Boston designed its program to be geared explicitly toward digital preservation, mandating that projects "focus either on the preservation aspect of the digital lifecycle or some specific process that spans the entire cycle including preservation" (NDSR Boston 2016b). The AAPB initiative is specifically tailored to the needs of public media organizations. Projects must "focus on one or several aspects of audiovisual digital preservation and stewardship, such as

digitization, digital file management, or long-term digital preservation planning" (AAPB n.d.)

The differences in program guidelines and the broad range of participating host organizations have fostered a wide variety of resident projects. As part of their 2016 study, "What Makes A Digital Steward: A Competency Profile Based On The National Digital Stewardship Residencies," the NDSR-NY residents from 2014 to 2015 compiled all NDSR projects completed from 2013 to 2016. The 2016–2017 AAPB NDSR projects can also be accessed online. Most projects have included some form of assessment of digital preservation tools, infrastructure, policies, and workflows in place at host organizations.

Residents' work in this category has included interviewing stakeholders, examining procedures, documenting best practices, generating gap analyses, and drafting recommendations. For example, Mary Kidd completed an assessment of the "born-digital" assets at New York Public Radio. Her project involved interviewing staff members and external stakeholders about their production workflows, then making recommendations for long-term digital asset management in a final report. In other projects, the purpose of the resident's assessment was to conduct an internal audit to certify the institution as a Trusted Digital Repository.[5] This formed the basis for the residencies of Jessica Tieman at the Government Publishing Office and Julie Seifert at the Harvard Library. While most of the residencies concluded at the recommendations phase, a small portion included a testing phase, when residents implemented the practices they had suggested. At the University of Massachusetts, for example, Jeffrey Erickson refined and augmented the university's existing digital preservation workflow before testing out the new procedures with a variety of file formats. In the case of Rebecca Fraimow's project at WGBH Boston, the implementation phase occurred early on. Within the first few weeks of her residency, she had moved from workflow design to implementation.

Residents from the first Boston, New York, and Washington cohorts (2013–2015) had mixed reactions about project success and overall satisfaction. Some residents suggested that projects in the first round of residencies suffered from poor design and that they had expected their supervisors to provide more guidance and have more expertise in digital preservation. Residents from the second Boston, New York, and Washington cohorts (2015–2016), on the other hand, were largely very positive about their projects. During interviews and site visits, residents expressed a great deal of satisfaction with learning how to manage a project from beginning to end and with the results of their work. One resident felt her project had a "huge potential to make a big impact" on her host organization, which did not employ anyone full-time with a digital preservation background. Another resident believed her project work would jumpstart her career: "I think my project will end up being very useful as a starting

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[5] For more information on the certification of trusted digital repositories, see the Trustworthy Repositories Audit & Certification: Criteria and Checklist (OCLC and Center for Research Libraries 2007).

Table 1. NDSR 2015–16 Project Deliverables Summary

Host Organization	Resident	Mentor	Project Deliverables
NDSR Boston			
Harvard Library	Julie Seifert	Andrea Goethals	• Helped complete self-assessment of Harvard Library's long-term preservation repository • Authored final report based on self-assessment • Created Excel spreadsheet with details at the individual metric-level
JFK Presidential Library & Museum	Alice Prael	Erica Boudreau	• Completed gap analysis • Authored report of initial findings based on review of existing systems and procedures for digital preservation • Authored digital asset management (DAM) report • Authored digital preservation storage report • Drafted new digital preservation policy
MIT Libraries	Alexandra Curran	Nancy McGovern	• Created reference document with relevant digital preservation standards • Created list of recommendations and suggested additions to workflow documentation • Created summaries and profiles of possible preservation storage options
University of Massachusetts at Boston, Healey Library	Jeffrey Erickson	Joanne Riley and Andrew Elder	• Completed gap analysis • Created new digital preservation workflows • Trained archive staff in new digital preservation workflows and software • Authored preliminary report on the digital stewardship landscape and needs • Analyzed DAM systems • Implemented Archivematica
State Library of Massachusetts	Stefanie Ramsay	Alix Quan	• Performed comprehensive assessment of Massachusetts state government's digital publications • Created a collection policy statement for capturing and preserving state publications • Produced final report for the State Library • Created an outreach plan
NDSR-DC			
U.S. Senate Historical Office	John Caldwell	Alison White	• Surveyed 26 different digital preservation tools and produced guides for some, such as Droid • Authored paper recommending best practices for preserving digital assets for Members' offices • Authored report recommending improvement to workflows for digital acquisitions, accessioning, and ingest procedures for Senate committee records
American Institute of Architects	Valerie Collins	Nancy Hadley	• Interviewed departments to inventory born-digital assets and build repository structure • Co-led selection, testing, and implementation of Preservica • Developed thorough documentation for in-house use of the repository system
National Library of Medicine	Nicole Contaxis	Ben Peterson	• Created inventory of NLM's software development corpus • Completed preservation pilot project on "How to Grateful Med" software • Authored final report summarizing lessons of preservation project
D.C. Public Library	Jaime Mears	Lauren Algee	• Established DC Public Library Memory Lab • Developed resources and documentation for library and public use pertaining to digital preservation, personal digital archiving, and physical preservation • Trained 50 librarians and staff in best practices in digital preservation • Developed a number of partnerships with segments of public and other organizations, such as the National Museum of African American Culture
Government Publishing Office	Jessica Tieman	Lisa LaPlant	• Conducted surveys and interviews with 12 OAIS-compliant repositories and created document summarizing feedback, best practices, and lessons learned • Prepared gap analysis • Performed an internal audit of FDsys against the TDR checklist • Authored final audit report
NDSR-NY			
Brooklyn Academy of Music	Carmel Curtis	Evelyn Shunaman	• Completed assessment of born-digital materials created and retained • Created inventory of born-digital materials held at BAM • Created new records retention schedule • Authored final report with recommendations for best practices and workflows for ingesting materials into a digital preservation environment and moving toward becoming an OAIS-compliant repository
CUNY TV	Dinah Handel	Dave Rice	• Migrated micro-service scripts into GitHub • Developed work plan for migration of AV material from LTO-5 to LTO-7 • Proposed and implemented changes to microservices code, created documentation of microservices and internal archiving and preservation practices and policies
New York Public Radio	Mary Kidd	John Passmore and Andy Lanset	• Completed assessment of the born-digital collections • Authored best practices report with recommendations for the implementation of new digital preservation workflows • Presented report's findings to NYPR's Broadcast Engineering Department
Rhizome	Morgan McKeehan	Dragan Espenschied	• Developed metadata system and descriptions for all 850 works in ArtBase collection • Contributed to testing WebRecorder tool • Refined and contributed to Wikibase system migration
Wildlife Conservation Society	Genevieve Havemeyer-King	Leilani Dawson and Kim Fisher	• Completed staff interviews and assessment of digital assets • Selected, configured, and implemented an OAIS-compliant pilot system for digital archives management and preservation • Revised and refined WCS Archives' policies and procedures for transfer and ingest of digital content • Authored final report and presentatations on new archival workflow with recommendations for best practices and next steps for WCS

point in my career, the fact that I have worked on and produced this physical thing. Essentially, I have had full responsibility over this project and I believe this will end up being a competitive plus for me as I move forward."

In interviews for this assessment, most residents from the 2015–2016 cohorts were able to report precise deliverables and accomplishments related to their projects, presented in Table 1.

The vast majority of supervisors from all cohorts were satisfied with residents' work. In general, they noted that projects progressed in a satisfactory manner, even when adjustments to the original project proposals had to be made. Several supervisors explained that having a resident focused on a specific digital stewardship project allowed their organization to complete work that would not otherwise get done. One supervisor articulated that benefit as "such a gift that there's all this research and time that we can allocate to specific preservation-focused work."

4.1.5. The Cohort

Key to the residency concept is establishing a cohort of individuals who move together through an immersive, hands-on work experience. The cohort provides residents further professional and personal support beyond that offered by supervisors and program staff. Ideally, cohort members also collaborate across and beyond projects in a way that creates a greater impact on their host institutions, their careers, and the larger community of digital preservation professionals. In the case of the New York- and D.C.-based programs, the cohort was generally understood to include just the residents. In the case of NDSR Boston, the cohort was defined to include supervisors as well.

Collaborative cohort work has included attending and presenting at conferences, coauthoring papers, and organizing events. Washington and New York cohorts have also organized public symposia and events as part of their residencies. For example, the pilot cohort organized "Emerging Trends in Digital Stewardship," held in April 2014; the 2015–2016 Washington cohort organized "Digital Frenemies: Closing the Gap in Born-Digital and Made-Digital Curation," held in May 2016; and the 2015–2016 New York cohort organized "{Let's Get Digital}!" held in April 2016.

Residents consistently identified the cohort as a beneficial aspect of the NDSR program. Peggy Griesinger, an NDSR-NY resident from the 2014–2015 cohort, noted, "Taking advantage of the cohort model of NDSR is incredibly important. By that I mean utilizing this built-in support network of residents going through a very similar experience to you." Residents from the second Boston, New York, and Washington cohorts (2015–2016) echoed similar sentiments in interviews, noting that their cohorts encouraged them to pursue important professional opportunities such as joint conference presentations, while also offering social and moral support. "For me," said one resident, "the experience of being in a cohort has been so overwhelmingly positive. We peer review each other's blog posts

Heidi Dowding NDSR Pilot, 2013–14
Digital Preservation Librarian at Indiana University

Heidi Dowding holds an M.L.I.S. from Wayne State University and a B.A. in art history from Michigan State University. After graduating from Wayne State, she was the reference and digital services librarian at Nazarbayev University in Kazakhstan. As a member of the inaugural cohort of NDSR residents, she helped identify an institutional solution for long-term digital asset management at the Dumbarton Oaks Research Library and Collection. In her current position, she is responsible for developing the digital stewardship capacities of the Indiana University Libraries.

How did the residency experience shape your vision and goals for your career?

"My experience with the National Digital Stewardship Residency program not only opened a lot of doors for my career but also made me realize how much I could ultimately achieve. I think that interacting with the top professionals in digital preservation at such an early stage made me a lot more aware of what it took to attain that level of success. The program also introduced me to a lot of the concepts that I've been able to explore deeper in my current position, so it really laid the foundation of knowledge that I need to get there."

and it's just really great to have a group of people to bounce ideas off of." Said another resident, "We share resources and help one another. And honestly it's just nice to have a group of people to blow off steam with—we relate to each other. They will play into my future career, I think. Digital preservation is a niche community, so having these contacts [will help me with] networking."

The AAPB program, launched in the summer of 2016, is the first NDSR program to experiment with a geographically distributed cohort. The programs based at the Philadelphia Museum of Art and the Biodiversity Heritage Library are also placing residents across the United States. All three of these programs include an immersive training period at the beginning of the residencies, allowing the cohorts to meet in person to establish cohesiveness and camaraderie. Over the remainder of their residencies the cohorts will interact virtually, except when attending the occasional conference.

4.1.6. Enrichment Sessions
In addition to the immersion workshop, all NDSR programs have included enrichment sessions that offer further training and professional development opportunities over the course of the residencies. The frequency, number, format, and content of these sessions have varied across programs, but they have typically included instruction from guest speakers. The coordination of these sessions has also varied, with residents or program staff taking the lead.

Enrichment session topics have included data visualization, personal digital archiving, web archiving, and introductions to specific tools such as BitCurator. For example, Peggy Griesinger from the 2014–2015 New York cohort organized a session about metadata hosted at the Museum of Modern Art; Jaime Mears from the 2015–2016 Washington cohort organized Digital Curation and the Public:

Strategies for Education and Advocacy at her host site, the Martin Luther King Jr. Memorial Library; and Valerie Collins from the 2015–2016 Washington cohort organized a session on web archiving at her host organization, the American Institute of Architects.

Overall, residents' feedback about the enrichment sessions echoed that of the immersion workshops: most sought more opportunities for hands-on exposure to digital preservation tools and systems. One resident suggested that instead of focusing on recruiting guest speakers from beyond the immediate NDSR community, enrichment sessions could be an opportunity to explore the work of fellow residents. "It would be nice," she wrote, "to be able to literally try out the tools that other residents in the cohort are using in their day-to-day work. Also, it would be nice to hear about or experience the unique work culture at each of the various host institutions."

Supervisors who attended enrichment sessions had positive feedback about their effectiveness. Although several mentioned that it was difficult to schedule the time to attend these events, many noted that they found them to be a useful opportunity to connect with other supervisors. One supervisor from the Washington, D.C., area stated that it was "good to see how other organizations in D.C. are in a similar situation with digital preservation."

4.1.7. Mentorship

In addition to proposing projects and hosting a residency, host organizations are expected to identify primary and secondary mentors who can support residents with their projects and professional development. In most cases, primary mentors are the same individuals as the residency project supervisors. Mentors are the residents' main point of contact at the host organization. They are generally expected to oversee residents' project work and advise on career and professional development. Expectations and directives for mentoring vary by initiative. The Library of Congress provides host organizations with a manual that suggests mentors provide guidance by clarifying expectations for performance, by offering "career guidance and counsel," and by offering feedback and constructive criticism that support the resident's intellectual development. The manual also states that residents should be integrated into host organizations "as regular employees" and be offered all the tools and support needed to complete their projects (Library of Congress 2015b, 12).

The only expectation expressly documented for the Boston and New York programs is that host organizations are required to "provide an engaging supervisor/mentor" (see, for example, the NDSR-NY Host Attributes Institution Requirements document, NDSR-NY 2015b). Recognizing that supervisors play a crucial role in supporting residents who do not have a local cohort, AAPB NDSR staff asked host organization supervisors, who are referred to as local mentors, to sign a commitment of responsibilities as part of the host application form. This document explicitly asks AAPB supervisors to "offer career advice, résumé feedback, and professional support to the resident throughout the residency." Beyond these conditions, the

mentoring component of the NDSR programs has not been clearly structured. Supervisors and residents interviewed for this assessment said that expectations about mentoring and actual mentoring styles varied significantly within programs and among individuals.

From the residents' perspective, the relationship with a primary mentor/supervisor can be critical to the success of a residency. Most residents surveyed and interviewed reported a positive working relationship with their supervisors, but noted variation in the level of active mentoring related to career and professional guidance. One resident noted, "My mentors were incredibly thoughtful and helpful and I consider them good friends, but I'm not sure how helpful they were in terms of mentoring me about career advice." Some residents reported that assigned mentors facilitated a great deal of networking in the local professional community and offered vital support as residents entered the job market. A few, however, noted a lack of guidance, support, and engagement. At least one resident observed, for example, that her supervisor did not like to use the term *mentor* because it implied a special relationship that was not present. In another instance, a supervisor was not on site for most of the residency, which diminished the capacity to provide the resident with day-to-day guidance.

Most supervisors who participated in this assessment reported positive experiences with residents, but levels of commitment and expectations about their roles as mentors varied considerably. "I've really enjoyed the professional development part of [the residency]," said one supervisor. "It's really the mentors who have responsibility for that, and that was something we did specifically work on here. We set explicit goals for the project and for professional development and encouraged [the resident] to ask about other things she wanted to learn about and do." Other supervisors reported being less involved in providing this kind of active mentorship, instead focusing on supporting the resident's project. When primary and secondary mentors shared the responsibilities of daily resident support, they had the opportunity to establish distinct relationships with the resident. One mentor might help the resident forge connections within the host institution, while the other might help her with networking in the wider professional community. Or one might offer project management advice, while the other provides information on digital preservation tools and technologies.

4.1.8. Professional Development
Improving the professional acumen of residents is another core goal of the residency programs. Residents gain valuable experience through immersion in the host organization, but the NDSR programs have also established expectations and offered many opportunities for other kinds of learning such as the enrichment sessions and the policy that residents dedicate 20 percent of their time to building their skills and professional networks. In addition, all residents have been expected to attend digital preservation conferences, to participate in regional professional activities related to and beyond NDSR,

and to communicate about their work via social media, primarily blogging.

Programs have handled professional development expectations and requirements differently. The D.C. program, for example, mandated that residents present as a group at one or two professional conferences. The New York program strongly encouraged but did not require residents to present at conferences. Residents across all programs have received stipends toward conference travel (see Table 2 for stipend amounts).

Related to their professional development, all residents have been strongly encouraged to maintain a personal social media presence. The Washington-based program has required residents to contribute at least one post to LC's digital preservation blog, *The Signal*. Both Boston cohorts managed their own joint blogs, *SIPs, DIPs, and bytes: NDSR Boston's Digital Preservation Test Kitchen* and *NDSR Boston*, while the two New York cohorts blogged on the NDSR-NY website. Residents from both the Boston and New York programs also contributed posts to *The Signal*. Many residents also maintained their own websites, where they posted about their NDSR work. The majority were also active on Twitter, using the hashtag #ndsr. Residents from all the programs included in this study expressed enthusiasm for building a social media presence and presenting at and attending conferences. Dinah Handel from the 2015–2016 New York cohort, for example, noted "there's an emphasis in the residency placed on presenting your work and sharing your work with other people in the community, and I think that that's been really valuable and important." Overall, residents believed that the NDSR experience was extremely successful in contributing to their professionalization. Participants in all cohorts consistently reported ample professional development opportunities throughout the residency, and that these opportunities constituted a major program benefit.

4.1.9. Capstone Events and Symposia

Each NDSR residency cohort has concluded with a culminating activity such as a capstone event or final symposium. The pilot program in Washington ended with a five-day capstone event that included professional development activities and resident presentations. In addition to a capstone event that functioned as a graduation, the residents from both the pilot and the 2015–2016 Washington cohorts organized major symposia at the National Library of Medicine. The first symposium, titled "Emerging Trends in Digital Stewardship," was held on April 8, 2014, and filled the venue to full capacity with 175 participants. The second Washington cohort organized "Digital Frenemies: Closing the Gap in Born-Digital and Made-Digital Curation," held on May 5, 2016, with comparable attendance. Both events featured resident presentations about their projects as well as guest speakers from the field of digital preservation. Similarly, the 2015–2016 New York cohort organized "{Let's Get Digital} NDSR-NY Preservation Week Symposium," held at the Brooklyn Historical Society on April 28, 2016. The full-day schedule included

presentations by the residents and invited speakers, and hands-on workshops. Both the Washington and New York symposia were large, formal events. Rather than taking a similar course, the Boston program staff organized smaller capstone events to conclude their residency cohorts. These events were designed as poster sessions where residents shared and discussed results of their project work with peers, supervisors, and friends of the NDSR Boston community.

Residents who organized major symposia reported that it was a particularly rewarding experience. One resident from the pilot program called the symposium "one of the most beneficial professional development opportunities of the residency."

Table 2. *NDSR Programs, 2013–2016*

Program	IMLS Log Number	Funding	Shared Costs	Award Recipient	Award Year	Residency Term(s)	Number of Residents	Residency Length	Stipend Per Resident	Professional Development Funds Per Resident	Benefits Provided
NDSR LC Pilot		$440,000		Library of Congress	2011	2013-14	One cohort of 10	9 months	$23,508	Varied	No
NDSR Boston	RE-06-13-0055-13	$498,385	$210,364	Harvard Library, in partnership with MIT Libraries	2013	2014-15, 2015-16	Two cohorts of 5	9 months	$27,300	$1,000	No
NDSR-NY	RE-06-13-0057-13	$498,135	$187,634	METRO	2013	2014-15, 2015-16	Two cohorts of 5	9 months	$36,036	$1,500 in 2014-15; $1,000 in 2015-16	Yes (separate grant brokered by METRO)
NDSR-DC		$500,000		Library of Congress	2014	2015-16, 2016-17	Two cohorts of 5	12 months	$40,000	$1,000	No
AAPB NDSR	RE-06-15-0039-15	$450,126	$163,351	WGBH	2015	2015-16	One cohort of 8	10 months	$29,977	$589	Yes (residents will be eligible for the same benefits as a regular full-time contract employee, as per the benefit plans of the host institution)
NDSR Foundations into Action	RE-40-16-0082-16	$370,756	$129,739	Biodiversity Heritage Library partners, led by the Ernst Mayr Library of the Museum of Comparative Zoology, Harvard University	2016	2017	One cohort of 5	12 months	$50,000	$2,000	Yes
NDSR Art	RE-40-16-0105-16	$421,750	$123,422	Philadelphia Museum of Art, in partnership with the Art Libraries Society of North America (ARLIS/NA)	2016	2016-17, 2017-18	Two cohorts of 4	12 months	$40,000	TBD	TBD

4.2. The Three Regional Programs, 2013–2016

Each NDSR program has been funded by IMLS through an inter-agency agreement, in the case of NDSR-DC, or a grant awarded through the Laura Bush 21st Century Librarian (LB21) Program, in the case of NDSR Boston, NDSR-NY, AAPB NDSR, NDSR Art, and NDSR Foundations. Once IMLS funded each NDSR proposal, the administration of those funds and the operation of the programs become the responsibility of the grant's principal investigators and project staff such as program managers hired with grant funds. Because each proposal has been crafted to leverage the capacity and to fulfill the aims of the organizing institutions, there is considerable variability in the way programs have been run and managed. The following paragraphs compare the oversight and administration of the Boston, New York, and Washington residencies. In addition, Table 2 outlines some basic differences among these regionally focused programs.

Participants in CLIR's assessment were enthusiastic about the residency and general design of the NDSR program. However, consistent themes about administrative policies and practices emerged from the interview and survey data. Many participants echoed the spirit of a comment made by one former resident:

> Overall, I think the concept of the residency is strong, particularly for this field where completing a practicum of sorts builds skills and networks that will help shape the rest of your career. The cohort I had was absolutely excellent, and I see friendships and professional relationships from this experience as long-lasting. That said, there are still improvements to be made in the administration and structure of the program for it to be truly successful.

Participants felt strongly that the key to successful management of an NDSR program was dedicated staff capable of devoting enough time to coordinating residency logistics. Residents were generally satisfied with the initial application process, and supervisors strongly agreed that the program attracted an excellent pool of candidates. However, opinions diverged about the clarity and consistency of contact with program staff during other points in the residency term. To give context to these different experiences, it is important to understand the differences in the ways the first three NDSR initiatives have been organized and led.

4.2.1. NDSR-DC

The original pilot and subsequent Washington cohorts were funded through an interagency agreement between LC and IMLS, which was signed in 2011 and amended in 2012, 2013, and 2014. This agreement stipulates that LC is responsible for all administrative and operational support necessary to plan and implement the program. The Washington program was originally administered through LC's Office of Strategic Initiatives, but it currently falls under the auspices of the National and International Outreach Division, under the

direction of George Coulbourne. Coulbourne has worked with several different LC staff members on managing all aspects of NDSR-DC since the program's inception and through a period of major reorganization and staff turnover. Their work has included promoting the program; selecting residents and hosts; determining and administering resident stipends; setting program-related expectations, deliverables, and schedules; and handling all program-related communication. As one of the establishing institutions of NDSR, LC created the original manuals for residents and hosts, which have been refined and shared across programs.

Before the pilot cohort began, LC established a curriculum development panel to set educational goals for the residency and advise on the curriculum. This group included prominent members of the digital preservation community from both academia and the private sector such as Jacob Nadal, executive director of the Research Collections and Preservation Consortium at Princeton University, and Katherine Skinner, executive director of the Educopia Institute (see Appendix 6 for a full list of advisory board members). This panel met once before the pilot to discuss the immersion workshop, host organizations' role in supporting the curriculum, how to measure resident success, and program scalability and sustainability. For the second D.C. cohort, an advisory board that included former NDSR supervisors, LIS educators, and digital stewardship professionals was assembled to help select residents. In 2014, Howard Besser, professor of cinema studies and associate director of New York University's Moving Image Archiving & Preservation Program, was commissioned to assess the Washington program and has since played a key role in developing the content and curriculum for the second and third Washington residencies (see Appendix 2 for more about Besser's 2014 assessment).

The Library has advertised widely for potential host organizations on listservs including the Digital Curation Google group, the DPOE listserv, the National Digital Stewardship Alliance listserv, and the Society of American Archivists forums. The Library has also held recruitment meetings where staff explain the program to interested host applicants. After the pilot year, program staff began visiting potential host organizations before making final selections in conjunction with their advisory board.

Calls for residents are also widely distributed, and applicants submit materials through the USAJOBS website. Both program staff members and prospective supervisors at the selected host organizations evaluate resident applications. During the pilot year, all resident applications were forwarded only to the applicants' top-choice hosts for review, but as the program grew, some supervisors expressed a preference for assessing all potential applicants (Besser 2014). As a result, LC had candidates for the 2015–2016 residencies rank their top three choices of projects and host organizations. Host organizations were initially only forwarded the applications of candidates who ranked their project as their first choice, but could see more applications if they requested to do so. Some supervisors

from this most recent cohort indicated that they felt this process still placed too much responsibility on candidates; they would have liked to see the applications of all applicants who had listed their project and organization within their top three choices.

4.2.2. NDSR Boston

NDSR Boston was funded by an IMLS grant to Harvard Library in 2013. Harvard Library administered the initiative in partnership with MIT Libraries. The program was coordinated by a three-member project team: Andrea Goethals, manager of digital preservation and repository services at Harvard Library, served as PI and program director; Nancy McGovern, head of digital preservation at MIT Libraries, contributed to the development of the program and served as curriculum coordinator; and Harvard Library staff assistant Kristen Confalone was project manager. Goethals was responsible for providing overall direction for the program, as well as determining key program dates, and supervising Confalone's work. McGovern was responsible for improving and extending the curriculum for NDSR Boston. Confalone managed scheduling, the project website, and developing and updating project documentation. The program team also served as instructors and facilitators for NDSR Boston training sessions. The Boston program established a project advisory board to review project designs and documents. The board's five members were chosen for their expertise in digital stewardship and their knowledge of Boston-area institutions (see Appendix 6 for a list of advisory board members).

In addition to testing the NDSR model in a city outside of Washington, D.C., a major goal of the NDSR Boston initiative, as stated in its proposal to IMLS, was to "transform the documents created by the NDSR DC pilot into model documents useful for replicating residency programs across the country. In addition, the curriculum used by the NDSR DC pilot will be transformed into digital stewardship training materials that can be used to retrain existing staff within our institutions" (Harvard Library 2013, 3). The outcome of this specific objective was the NDSR Program Starter Package.

NDSR Boston leaders solicited host applications through calls posted to groups such as the Digital Curation Google group and the New England National Digital Stewardship Alliance Northeast. They also targeted organizations that might be a good fit for the initiative. For their first year, in conjunction with NDSR-NY they hosted an informational webinar for host applicants. Program staff followed up with potential hosts after the webinar and received three complete applications in the first year of the program, which were reviewed by program staff and Boston's advisory board. In the second program year, calls were supplemented by reaching out directly to potential hosts, resulting in seven applications. NDSR Boston created a Host Candidate Evaluation Rubric, available as part of its NDSR Program Starter Package (NDSR Boston 2014a). Some of the criteria suggested for evaluating potential host organizations include:

- having a clearly defined project with concise measurable outcomes
- having an assigned mentor with the willingness, time, and resources available to support the resident
- being engaged in the digital preservation community and having responsibility for the long-term stewardship of digital objects or being in a position to influence other institutions with this responsibility

NDSR Boston solicited resident applications in coordination with NDSR-NY. Both programs used the same call, which was posted on a variety of listservs, mailing lists, and groups including the Digital Curation Google group, the Society of American Archivists listserv, and several LIS school lists. NDSR Boston program staff and host organizations used their Candidate Evaluation Rubric, which is available in the NDSR Program Starter Package, to evaluate residents based on their video or online projects, letters of recommendation, cover letters, academic strength, and potential residency success. NDSR Boston program staff worked with host organizations to find residents who would be a good fit for individual projects.

4.2.3. NDSR-NY

NDSR-NY was created through a grant to The Metropolitan New York Library Council (METRO) in 2013. The initiative was administered by METRO in partnership with the Brooklyn Historical Society. Jefferson Bailey was the original principal investigator and project director for the initiative, with former NDSR-DC resident Margo Padilla acting as program manager in 2013. Padilla took over Bailey's role as project director when he left METRO for another position in 2014. The director was responsible for overall project management including planning and scheduling, curriculum development, hiring and managing a project coordinator, coordinating the selection and management of residents, and working with host institutions. NDSR-NY also established a three-member advisory board responsible for refining and developing program guidelines and the curriculum, and selecting host organizations (see Appendix 6 for a list of advisory board members).

NDSR-NY provided both residents and supervisors with an orientation manual at the beginning of the residency that included information such as a timeline of activities, residency logistics, contact information, pay schedule, and residency and project expectations.

NDSR-NY advertised widely for potential hosts. Host applicants to the program received guidance on their project proposal from program staff upon request. Once host applications were submitted, the program staff worked with their advisors to select the organizations. The final five host sites were selected at a day-long meeting with program staff and the advisory board.

NDSR-NY also advertised widely for resident candidates, coordinating outreach with NDSR Boston. Resident applications included information about host organizations and projects, and applicants

were asked to rank their top three preferred projects. Program leaders worked closely with advisors, host organizations, and supervisors to match candidates with suitable projects. NDSR-NY program staff collaborated with host organizations to work out the best way for them to receive resident applications. Some hosts wanted to see only the applications that the program staff deemed good fits for their project, while other hosts wanted to see applications from candidates that ranked them as top choices.

5. Findings

This section identifies major successes and challenges of the NDSR programs, based on feedback from assessment participants, and the most significant issues that repeatedly surfaced, highlighting the individual experiences of residents and supervisors. It continues with a discussion of the impact of the NDSR program on host organizations and how participants in CLIR's assessment envision the NDSR program expanding nationally.

5.1. Overview of Major Findings

Successes

- Even assessment participants who offered critiques and suggested program refinements felt that all NDSR programs were highly successful.
- Supervisors reported that residencies had an overwhelmingly positive impact on host organizations.

Julia Kim NDSR-NY 2014–15
Digital Assets Specialist, American Folklife Center at the Library of Congress

Julia Kim was a resident at NYU Libraries, where her project focused on born-digital workflows, from accession to access. Prior to NDSR, she graduated from NYU's Moving Image Archiving and Preservation Program in 2014. Her thesis examined the applications of digital forensics for born-digital materials in cultural archives. Julia also co-founded XFR Collective, a nonprofit that helps preserve at-risk audiovisual media. She is currently the digital assets specialist at the American Folklife Center at the Library of Congress.

How did the residency experience shape your vision and goals for your career?
"NDSR gave me the institutional resources to get totally engrossed and immersed in archival theory and practice while also becoming a professional in the field. During my residency at NYU, I contributed directly to the preservation, emulation, and access of artist Jeremy Blake's mixed-media collection, a cutting-edge project with interesting technical and cultural implications. NDSR also gave me opportunities outside the archive and the lab to grow among my new colleagues in the field, where I presented and published papers on digital preservation, complex media, and art conservation. By the time I completed my nine-month intensive residency, I felt thoroughly trained, tested, and ready for the next phase in my unfolding career as a folklife specialist and digital assets manager at the American Folklife Center of the Library of Congress in Washington, D.C. Under the auspices of NDSR, I ultimately have been able to reimagine what is possible for myself, especially as I make lasting connections beyond my cohort with our community of mentors, collaborators, and peers."

- Most residents felt that the NDSR residencies have been very effective in contributing to their professional development.
- Participants in the early NDSR programs responded overwhelmingly positively to the regional cohort model.
- Most participants reported that resident projects were well designed and completed effectively and on time.

Challenges
- Participants need more guidance and communication from program administrators during their residencies.
- Residents want even more exposure to and applied practice with digital preservation tools and systems.
- Participants felt that supervisors should be better integrated into the cohort communities, and their skills and experiences should be better leveraged for the benefit of residents.
- Most study participants felt that connections across NDSR cohorts and initiatives should be formalized and strengthened.

5.2. General Feedback

Residents were typically very satisfied with their project work, their cohort experience, and their professional development. Supervisors tended to be enthusiastic about residents' progress on projects, their overall NDSR experience, and NDSR's positive impact on digital preservation at their organization.

Most residents expressed much optimism about how their involvement in NDSR would affect their careers. All residents felt that their residencies increased their expertise in the field of digital stewardship to some degree and that they had learned new skills, although the nature of these skills varied among residents. Many residents expressed increased confidence in their abilities and breadth of knowledge. "It's not just like you leave library school with what you learned and that's it," said one. "It's been really reassuring to me that I can continue to learn new things about working with digital materials." Said another resident, "I feel excited and very grateful. This program has been a positive experience for me. Although my background is in a very different area—time-based-media—this project expanded my knowledge into this new area of geospatial data and I feel exposed to a totally new and different field."

Participants provided clear suggestions about ways the programs could be improved. They almost unanimously agreed that residencies should last 12 months. Residents noted that a 12-month position would be more convenient and desirable since it would be worth the time and effort to relocate and find housing in a new city, which typically entails signing a year's lease on an apartment. Supervisors felt that a full year can help integrate the resident into the host organization more effectively and result in a greater level of engagement with residents and their projects. Said one supervisor, "the 12-month residency supports better projects. Digital preservation projects are complicated."

Residents frequently noted that having health care coverage during the residency is important. For the NDSR-NY program, staff obtained supplemental funding to secure health insurance for the second cohort, since resident insurance was not covered in the original IMLS grant budget. All the residents from that cohort attested that this benefit significantly improved their quality of life during the residency. One resident commented that she did not feel she could "navigate living in New York City–which is so expensive–and also pay for health insurance." Another said that having health coverage "made an enormous impact on my quality of life ... I can't overstate how important this was, to be able to have health coverage, and to have that recognized as an important aspect of funding for the residency." Residents in Boston and Washington, who had to pay for health care out of their own stipends, described this cost as an "obstacle" and "added stress." At least two residents pointed out that a lack of health care could be a serious deterrent for someone with a disability or preexisting health condition wishing to apply to the program. "I think that if you have a pre-existing condition," said one resident, "this essentially excludes you from being able to enroll in the NDSR program." Providing health insurance would, therefore, ensure greater inclusivity and diversity in NDSR.

Supervisors from all Boston, New York, and Washington cohorts were extremely positive about the impact of NDSR on their organizations. The successes they cited were in raising awareness about digital stewardship within the host organization, improving digital preservation practices and workflows, and, in some cases, gaining the attention of higher-level administrators to advocate for funding for more expansive preservation policies and programs. "Our project was very broadly defined and it had an enormous impact on raising the awareness of the need for digital stewardship…," said one supervisor. "The residency was very valuable for the institution as whole." According to another, "This project will be really useful for building awareness within all of the various departments of our organization, for building awareness around the need for a digital preservation strategy. We hope this will become apparent to upper level management so that funds can be applied toward this work."

One supervisor observed that "the largest amount of progress we've had in our archival workflows happened within the course of this project. It's valuable for the community that there are these specialist residents that are focused so intensely on digital preservation matters when a lot of the archivists are drowning in the more tedious daily work and [are] not necessarily able to focus on the vision or progress that the resident projects are more dedicated to."

Many supervisors noted that the NDSR projects provided them with key insight into what their organizations needed to do in order to improve their stewardship of digital materials. "Mainly we have begun understanding what we are currently not doing," said one supervisor. "[The resident] asks a lot of good, hard questions–in areas that include policy and procedure, for instance. We have become distinctly more aware of how much more we could do in the realm of digital preservation."

Some projects had the capacity to have an impact not only on the host organization but also on the larger community. Referring to her resident, Lauren Algee of the Martin Luther King Jr. Memorial Library in Washington reports, "Jaime [Mears] has learned how to navigate this type of organization—she has worked across five to six different departments at the D.C. Public Library. She has had practice working with various stakeholders: the public, the agency, the city at large—from individuals to entire communities."

5.3. Administration of Programs

Participants in CLIR's assessment felt that the key to the successful administration of an NDSR program is dedicated staff who can devote enough time to coordinate and communicate effectively. Participants emphasized that clear, timely, and consistent communication was crucial to effective administration. They also expected program staff to advocate on behalf of residents, and they desired increased transparency in program administration.

Echoing these comments, Margo Padilla, an NDSR resident from the 2013–2014 Washington cohort who later became program manager for the NDSR-NY initiative, also noted that, in her experience,

> Running NDSR is one full-time job. That can be broken up in different ways (hiring one full-time person, or part-time staff mixed with a percentage of time from full-time staff), but I think getting 50 percent of a full-time position commitment should be standard for stability. That has been the time commitment of my position and it's been completely necessary, especially when we were between hiring part-time program coordinators.

Challenges tended to arise when program staff were stretched thin, unable to devote enough time to coordinating the residencies, or when there was frequent staff turnover. Residents and supervisors from both the Boston and Washington initiatives, where program staff were often juggling NDSR work with other professional duties, reported that communication from coordinators during the residency term needed to be improved in several respects. First, participants desired clear and consistent communication over the course of the residency about the program timeline, including the schedule for events such as enrichment sessions or workshops. Second, residents and supervisors recommended clear guidance on the expectations of the residency, the cohort, mentorship, project work, and other requirements. Residents from the Boston and Washington cohorts received documents such as the NDSR resident manual (Library of Congress 2015c) and NDSR Boston's "Expectations and Opportunities" (NDSR Boston 2014b). But they wanted more clarity on the expectations for the use of residents' 20 percent professional development time, for the organization of enrichment sessions, for the final capstone event, and for the provision of project feedback to residents.

One survey respondent noted that "communication was frequently a problem within [our] program—expectations were often

unclear." Some residents indicated that when they sought further support or clarification, the communication that came back to them was occasionally disrespectful and unprofessional. Members of one early cohort reported that interactions with program staff had negatively affected their experience, noting difficulties such as unclear expectations, lack of regular engagement, deadlines set on short notice, late responses to requests for support, and public disparagement of residents who left residencies early to assume permanent positions. By contrast, having a former resident in the role of dedicated program manager effectively minimized these difficulties for NDSR-NY. The program manager's experience as a former resident helped her anticipate the needs of participants and hosts.

Residents and supervisors felt that it was the program staff's responsibility to advocate for residents. Participants noted the following examples of advocacy: providing guidance if residents encountered challenges with supervisors, publicly supporting the residents, facilitating networking opportunities, and looking out for residents' interests and needs. One supervisor was especially concerned that several early residents had to take part-time jobs to supplement their NDSR stipends, suggesting this was a situation where program leaders could have done more to ensure that stipends adequately covered the cost of living for their locations. Some supervisors expressed disappointment that program staff seemed to have little interest in residency projects after those projects got under way, instead shifting focus to recruitment for future hosts and residents or unrelated responsibilities. Residents in some cohorts expressed frustration with not receiving paychecks on time in multiple instances, because of administrative mishaps.

Supervisors and residents from across the 2015–2016 cohorts pointed to the NDSR-NY program staff's work as an example of successful advocacy for residents, especially program manager Margo Padilla's efforts to secure additional funds to provide residents with health care. One interviewee summarized the importance of having a good advocate for residents:

> Oversight by program managers … makes sure that the residents are getting everything they can out of the residency program. It's important for them to feel that they have someone to go to if they feel they are having a problem with their project or with their mentor. I find that that makes them feel more supported while they work on this intense timeline on a pretty serious project.

Several study participants felt that having individuals or organizations serve in a dual role as program administrators and hosts risked compromising fair and effective advocacy for residents. In the pilot year of the program, LC was both the administrative home for the program and the host institution for one resident. Similarly, leading partners Harvard Library and MIT Libraries managed the NDSR Boston program as well as hosting two residents each, with program leaders serving as supervisors. Principal among participants' concerns was the potential for conflicts to arise in which residents would

not have a disinterested advisor to consult. A supervisor's loyalty to a resident could also potentially interfere with his or her ability to treat all residents equally and fairly, and a resident's loyalty to a supervisor could force him or her into the uncomfortable position of having to explain or defend the choices of program administrators to fellow residents. Other participants in the study expressed concerns about the possibility of a conflict of interest arising in the host application process when program staff represent institutions that are also among the host applicants, or when program leaders also serve as resident supervisors.

Although the NDSR initiatives are designed to expand residents' opportunities and connections to the larger digital stewardship community, some residents wanted even more support in this capacity. One 2015–2016 resident noted that program staff tend to be well-connected individuals in the digital preservation community and that they have "the power to introduce the resident to other people in the organization, or suggest people they know. They could encourage that networking." In this regard, residents and supervisors alike expected program staff, especially program directors, to be publicly supportive of residents' work. For example, there was an expectation that program leaders be present at resident talks and poster presentations whenever possible. Events such as end-of-residency symposia provide ideal opportunities for well-connected program staff to support residents publicly by inviting and introducing residents to members of the wider digital preservation community. Several supervisors from across cohorts also felt that program staff could have facilitated more connections among host organizations.

Most NDSR community members want more transparency in program administration. Participants expressed a desire for easy access to information about how program funds are allocated, how the selection processes for residents and hosts are managed, and about general program procedures. One resident remarked, "The NDSR program as a whole is not very transparent," communicating a widely held misperception that a single set of national standards and practices govern the various programs. This misperception has led to some confusion about the lack of consistent practices across programs. On a listserv that residents had created for themselves, several mentioned, for example, that they found out that different programs' stipends varied. Many residents noted that this informal group was an important way for them to gain information about NDSR, about previous residents' experiences, and about cohorts in other cities. However, most wanted a more formal venue for sharing information across programs. Supervisors were interested in having a better understanding of how decisions, especially decisions about host selection, had been made. Most expressed satisfaction with resident selection, but supervisors often had little knowledge of how or why their institutions were selected to become hosts.

5.4. Projects and Professional Development

The most substantial components of the NDSR programs for residents are the project-based work at host organizations and the built-in opportunities for professional development. Residents from the first Boston, New York, and Washington cohorts (2013–2015) who responded to CLIR's survey had varying opinions about their project work. Several residents found that some of the projects for the first residency rounds were poorly designed. However, supervisors generally felt their organizations benefited from residents' contributions regardless of the quality of the project plan. Several residents from the first-year cohorts in each program expressed a desire for more advice and support from their supervisors, and others indicated that their supervisors lacked the necessary expertise to assist them with project work. Said one resident, "I loved my mentors and they were super helpful in navigating the landscape of my institution, professionally developing me, helping me network, provid[ing] opportunities to advance my career, etc. That being said—they had NO idea how to do the project they wanted me to do, so I had to learn everything on my own."

Significantly, residents from the second Boston, New York, and Washington cohorts (2015–2016) who participated in the CLIR assessment were almost unanimously positive about their projects, suggesting that NDSR program leaders had been passing on to later resident hosts the lessons learned through the experiences of earlier cohorts. During phone interviews in early 2016, all the 2015–2016 residents reported that their projects were on track, even when some adjustments to original project proposals had been needed. At the end of their residencies, this group expressed a great deal of satisfaction with the results of their work and with learning how to manage a project from beginning to end. One resident predicted that the "the fact that I can now say that I managed this project on my own" would be a significant boost to her career. Several residents from the 2015–2016 cohorts also noted that the opportunity to work on specific projects played a significant role in their interest in NDSR. Nicole Contaxis from the second D.C. cohort, for example, stated that she applied to NDSR-DC "because of the NLM-Developed Software project. I decided that I would enroll in the residency if I was accepted to this project."

Supervisors from the first Boston, New York, and Washington cohorts (2013–2015) who were surveyed by CLIR were very positive about the impact of the NDSR projects on their organizations. Wrote one, "The project was a huge success for us … Our resident quickly became an important part of the Archives team and mentoring actually went both ways—we learned a lot from our resident about digital preservation and best practices!"

Supervisors from the second Boston, D.C., and New York cohorts (2015–2016) who took part in CLIR's assessment reported that residents' projects progressed and were completed in a timely manner, even when some adjustments were made to the original proposals. During site visits, supervisors expressed satisfaction with how

project work increased awareness about the need for good digital preservation practices and policies within their organizations.

Beyond the benefit of the projects themselves, residents believed that the NDSR programs contributed to their professional development. Members of all cohorts reported ample professional development opportunities and that these opportunities constituted a major benefit of NDSR. More than 80 percent of surveyed residents from the first Boston, New York, and Washington cohorts reported that they gained experience in project management, self-direction, and public speaking, while more than 60 percent of this group reported gaining experience in bridging units and departments within their host organizations and in professional writing. Members of the pilot cohort noted, however, that professional development occurred primarily at the host organizations and that they mainly initiated opportunities for themselves.

Residents from the second Boston, New York, and Washington cohorts reported an even greater range of and increase in their professional development, including improvements in project management, time management, networking, research skills, professional writing, public speaking, working across and connecting units and departments, and interviewing.

Many residents also reported that NDSR boosted their overall professional confidence. Said Mary Kidd, from the 2015–2016 NDSR-NY cohort, "I used NDSR as a way to reinvent myself professionally. I can't speak highly enough about how that's just kind of revolutionized me, my career, [and] how I perceive myself within this industry."

On the whole, NDSR has had a significant impact on the careers of most of its early participants. Twenty-six of the thirty-five residents who have completed the programs are now employed in the digital preservation field, including Kidd, who now handles a variety of digital preservation-related duties as the special collections operations and systems coordinator at the New York Public Library. Other examples of NDSR alumni who now work in the field include Lauren Work, the first digital preservation librarian at the University of Virginia Library; Maureen McCormick Harlow, digital librarian at the Public Broadcasting Service; and Morgan McKeehan, a digital preservation analyst at Yale University Library.[6] Most former residents who participated in CLIR's assessment indicated that their NDSR residencies were directly applicable to their current careers. Eighty-eight percent agreed or strongly agreed that their residency experience made them a more attractive candidate for prospective or current employers, while 84 percent reported that they use the skills and experiences gained through NDSR in their current positions. Several often use the digital preservation skills acquired during their residencies in their current jobs. Common among the transferrable skills residents mentioned is a familiarity with specific digital preservation systems, digital asset management, and web archiving. Three

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[6] A full list of residents' positions as of fall 2016 is available here.

residents confirmed that they obtained their current position as a direct result of their participation in NDSR.

Our assessment team also asked supervisors to reflect on what they felt residents gained in terms of professional development. Generally, supervisors said that experience in a professional environment—regardless of the size and nature of the organization—was beneficial to residents' growth. Supervisors noted improvements in residents' abilities to work across departments and with multiple stakeholders and to communicate effectively both within and across organizational boundaries.

5.5. Curriculum and Skills Development

Residents from all cohorts believed that their NDSR programs provided an opportunity to expand their skill sets and expertise in digital stewardship. However, the degree to which they felt formal program education and training was successful varied, as did the types of skills and competencies they reported developing. The applied skills and expertise they gained were highly dependent on the nature of their project work. Residents often expressed a desire for even more exposure to digital preservation tools and systems.

Ninety-four percent of the residents surveyed from the first Boston, New York, and Washington cohorts indicated that they gained experience in strategic development such as contributing to institutional policies, auditing, or determining best practices. Sixty-five percent reported gaining technical expertise in a specific area such as preserving specific file formats and implementing standards or information security protocols. Less than half responded that they gained applied experience in content-specific preservation such as web archiving or audiovisual material, or practice with an existing preservation system such as Archivematica or Preservica. Only two respondents gained experience in implementing a preservation system. Finally, 82 percent of residents from the first-year cohorts expressed a desire for more hands-on exposure to tools and systems used in digital stewardship.

Residents from the second Boston, New York, Washington cohorts (2015–2016) reported greater development in their digital preservation skills and expertise than their predecessors did. Depending on the project work, these residents reported acquiring applied experience in the following areas:

- preservation storage
- implementation of the OAIS functional model
- digital repository standards
- asset management and migration
- coding and working with the command line
- content-specific preservation including web archiving and working with audiovisual material and geospatial data
- practice with existing preservation systems such as DuraCloud
- implementing a preservation system including Archivematica or Preservica

- institutional strategies such as contributing to policy, auditing, needs assessments, inventories, and determining best practices

Several residents mentioned that getting familiar with the digital preservation tools and systems used by the host institution was too limiting. Many also wanted a chance to learn—at the immersion workshops or enrichment sessions—how software and systems were being implemented at cultural heritage institutions in their region. One resident stated "NDSR should provide residents with more exposure to various types of digital preservation projects (at various locations) and take a close look at the related tools and systems that they are utilizing." One resident noted that her host institution had limited resources and that "it would be terrific to get to learn about how to use such tools as Archivematica and/or BitCurator." Others wanted to learn more about different systems such as CONTENTdm, Fedora, and D-Space.

Residents from all cohorts felt that their immersion workshops could have incorporated more applied skills training and more exposure to different tools and systems. One resident from a first-year cohort wrote, "[T]here should be a lot more hands-on work. It would have been great to have had computers with BitCurator running on them, for example, with writeblockers, and to have real hardware to plug in and explore. Similarly, having an actual repository and using that to assess in terms of something like TRAC would have also been really helpful to understand[ing] how these theoretical concepts are addressed in a practical way." Echoed another respondent, "Hands-on time configuring, testing, and learning tools and workflows for digital preservation is essential." This sentiment was overwhelmingly shared as way to improve the immersion workshops and the overall NDSR experience.

Residents and supervisors were generally very satisfied with how the program encouraged professional development. Residents

Jaime Mears   NDSR-DC 2015–16
National Digital Initiatives division, Library of Congress

Jaime Mears currently works in the National Digital Initiatives division of the Library of Congress, where she leads the planning and event coordination for Collections as Data and the Archives Unleashed datathon. She completed her M.L.I.S. at the University of Maryland in 2015 and holds a B.A. in English Literature from the University of Virginia. Her NDSR project was hosted by the D.C. Public Library and focused on personal digital preservation, access, and education. During her residency, she created a digital lab, tools, and instructions to help the general public preserve their own files and unique artifacts.

How did the residency experience shape your vision and goals for your career?
"Building the Memory Lab helped me understand that I do my best and most satisfying work when I can be a part of an idea's genesis and bring it into reality—when I can synthesize different stakeholders' needs and find a happy medium. You don't often get a chance to take on that kind of responsibility as a young professional, and my residency gave me that chance. My goal is to continue on a career path in libraries that takes me to these kinds of projects—and so far it's been successful!"

also suggested extending the curriculum to include more instruction in public speaking, grant writing, programming languages, and project management. Grant writing, in particular, surfaced as a priority in interviews with 2015–2016 residents. "I think residents definitely need grant writing exposure," noted one. "There is so much pressure put on archivists to justify their work. You need the resources to get projects off the ground." According to another, "This is something we all think is a common need for this community where funding is often minimal or lacking."

Several residents also felt that more could be done during the immersion workshops to leverage the interactions among residents, supervisors, and experts from different organizations. One resident suggested that the immersion week experience could "capitalize on the expertise" of the supervisors, and that residents should hear more about supervisors' work and experiences beyond the NDSR project.

Our assessment team also asked supervisors to reflect on what they felt residents learned about digital stewardship from the immersion workshop and enrichment sessions. Supervisors described many ways in which their residents gained technical expertise, most often in working with diverse digital media, gaining experience with digital preservation needs assessments, refining and/or creating digital preservation workflows and documentation, and surveying digital preservation tools and software.

5.6. Cohort and Mentorship Experience

Besides guidance from NDSR program staff, the chief ways that residents are supported are through their cohort and mentorship relationships. Both proved to be crucial to how residents perceived the value of their experience.

Residents consistently identified the cohort experience as a particularly beneficial aspect of the NDSR model. Ninety-five percent of the residents from the first Boston, New York, and Washington cohorts rated their cohort experience as "excellent" on our survey. One respondent noted that their cohort remains "very close-knit" and they "rely on each other for professional as well as personal support." Observed another respondent, "My cohort was the most valuable part of the experience, hands down." Residents from the second Boston, New York, and Washington cohorts (2015–2016) echoed similar sentiments. "It has been a really positive experience," said one. "I like and value the other four cohort members personally and professionally."

Residents mentioned many concrete ways that the cohort functioned as a supportive group, including reviewing each other's work such as blog posts or papers, practicing for upcoming talks, building relationships with future colleagues in the field, and collaborating on projects such as grant proposals or conference panels. Genevieve Havemeyer-King, from the 2015–2016 NDSR-NY cohort, further described the benefit of the cohort model beyond her immediate

experience. "Being an archivist can be a very isolated job, and I think that the cohort model helps foster this idea of changing the culture of archives from being a single person alone in a dark room to being a more community-based field."

Residents reported very few negative aspects to the cohort model. However, a few noted that tensions arose when program staff did not clarify for residents the program's expectations for how and how often to interact with one another. When some residents perceived that they devoted more time and attention to cohort collaborations than their peers did, tensions could arise. Generally, however, residents understood that they were expected to interact regularly and collaborate with their fellow cohort members, and most were keen to cultivate close peer relationships. Many residents mentioned wanting more opportunities to collaborate across cohorts current and past, in other cities. Said one resident, "While cross-cohort communication was very much promoted, it was self-directed (if it happened at all). We could definitely use more support from coordinators to encourage cross-cohort communication and collaboration. Maybe they could plan some sort of cross-cohort meeting?"

Residents also perceive mentorship from supervisors as vital to project work and career trajectories. Most residents across programs reported good working relationships with assigned supervisors, but the amount and quality of mentorships varied. Residents from the first Boston, New York, and Washington cohorts surveyed by CLIR rated the quality of their interactions with their host supervisors as a 4 or 5 on a scale of 1–5 (1 being poor, 3 being neutral, and 5 being excellent). Over 70 percent rated career advice from supervisors as "adequate" or "valuable and insightful." However, several added comments that expressed a wider range of experiences. One respondent described their supervisor as "fabulous," crediting their weekly meetings as an opportunity to discuss problems, questions, and concerns. "She mentored me in all aspects of my project and career." Other residents had more limited support from supervisors:

> I am very grateful for and continue to be supported by my cohort. On the other end of the spectrum is my mentor, who I rarely spoke to about my project, and who I felt viewed me as any other intern. Feedback from him was rare, as was his availability…. [I feel like] I lost an opportunity to have a lasting professional relationship, which I was looking forward to in this residency.

Residents from the second Boston, New York, and Washington cohorts (2015–2016) reported a similar range in their supervisors' commitment to mentorship. One resident observed, "There's a huge disparity across the cohort about what mentorship means." This resident, as well as several others, noted that it would be useful to have specific requirements for mentorship. Other program assessments—completed by Howard Besser and Michelle Gallinger—have recommended giving supervisors more detailed guidelines about the mentor role, or assigning individuals other than project supervisors to be residents' mentors (see Appendix 2). This would more clearly

separate the responsibility of project oversight from the responsibility of career guidance. This suggestion merits serious consideration.

Most supervisors reported positive experiences with mentoring their residents and were satisfied with the progression of NDSR projects. Most, for example, reported that their resident's expertise aligned with expectations and the needs of the project. Supervisors from the first Boston, New York, and Washington cohorts who were surveyed felt that their residents needed only a reasonable, rather than an excessive, amount of feedback on their projects. Most rated the quality of their interactions with their residents as a 4 or 5 on a 1–5 scale. Supervisors from the second Boston, New York, and Washington cohorts who participated in the CLIR assessment were overwhelmingly positive about their residents' project work.

At the same time, supervisors expressed a significant range in their own willingness to guide their resident beyond the project and provide more intensive career support. NDSR participants and program staff have typically referred to all supervisors at host organizations as mentors. Many supervisors took that role literally, providing professional advice and guidance beyond the project level. One supervisor, for example, actively encouraged her resident to apply to a job that "really suited her" despite the fact that it meant the resident would leave the residency early if hired. In this case, the resident was hired and the supervisor enthusiastically helped rearrange the project timeline to ensure that the resident could accept the job. Several supervisors expressed a desire to keep the resident on as a full-time employee, and in one instance the resident was hired for an additional year at her host organization as a "preservation expert."

At the same time, other supervisors found it challenging to balance the duties of their regular job with their role supervising an NDSR resident. In those cases, most expressed a desire to have offered more support to their resident if time had allowed. In one exceptional case, a supervisor felt strongly that it should not be a requirement to provide career advice and to support residents, and that this kind of relationship might only develop in some cases. Although that same supervisor did not express dissatisfaction with the resident's performance, they were only willing to provide a reference or letter of recommendation for the resident under certain circumstances.

Supervisors from across cohorts had mixed opinions about their involvement in the NDSR community beyond their resident and project. Remarked one, "Most of our participation with the NDSR program on the broader level is done through a relationship with the resident … I don't necessarily feel like as a host we're an active part of the NDSR community except for in relation to the resident." This was enough involvement for some supervisors, as noted by one D.C. supervisor: "It feels like the individual institutions are left to our own devices, but I actually like that."

However, about half of the supervisors consulted expressed a desire to be part of a stronger "mentor cohort" that would provide more interactions and involvement with other supervisors. Some of

the supervisors from each of the 2015–2016 Boston, New York, and D.C. cohorts wanted even more interaction with each other and the local NDSR community. A supervisor from Boston acknowledged that the program staff aspired to cultivate a cohort experience among hosts, but that there was "no other interaction" beyond a few initial meetings. This supervisor went on to add, "I thought that there might be more. But there haven't been any cohesive group discussions." Similarly, a supervisor from NDSR-NY described interactions with other supervisors as taking place "just at the open house and the annual conference and that's been it. Otherwise we haven't interacted with the other mentors."

Many also expressed an interest in seeing increased coordination across cohorts in different cities and years. Supervisors interested in increasing their ties to the broader NDSR community—at both a regional and national level—felt that NDSR program staff and administrators should facilitate this network. Suggestions for how this could be done included informal gatherings, online interactions through a central website, face-to-face meetings every three months, a shared document repository, and a supervisors' listserv or online discussion forum. A few noted that face-to-face informal social activities such as lunches or mixers with other supervisors, staff, and residents would be ideal.

5.7. Perspectives on a National Model

Participants in CLIR's assessment shared the opinion that national-level coordination of NDSR needs further development. On the whole, residents, supervisors, and program staff all expressed an interest in strengthening connections across NDSR cohorts and initiatives, and in seeing the NDSR model reproduced nationwide. The three newest initiatives—AAPB NDSR, NDSR Art, and NDSR Foundations into Actions—will place residents in host organizations located across the country, marking a departure from the regional programs that were the subject of CLIR's study. Although these efforts will expand NDSR nationally, many participants in the study suggested that these developments also increase the need for coordinated and effective communication across programs.

As indicated in section 4, many aspects of the NDSR structure, such as the cohort model and application documents, are currently shared across initiatives. However, this sharing and replication is an informal process. There are no prescribed standards, best practices, or overarching administration. NDSR community members have mixed opinions on whether more aspects of the programs such as the immersion week and enrichment sessions should be standardized. The NDSR Boston coordinators, for example, stressed to CLIR's team that it was important for programs to expose residents to the same core digital preservation concepts. By contrast, LC's George Coulbourne did not feel that curricula needed to be standardized, but instead recommended that an NDSR brand be established, which could include a logo, a community social media platform, and a consistent means of marketing NDSR to new residents and hosts.

Jeffrey Erickson   NDSR Boston 2015–16
Freelance Digital Archivist

Jeffrey Erickson graduated from the School of Library and Information Science at Simmons College with a focus on archives and cultural heritage informatics. Building on a professional career in IT, he became an archivist specifically to work on digital stewardship issues. His residency was hosted at the University Archives and Special Collections at the University of Massachusetts Boston, where he managed a digital preservation planning and implementation project using hosted versions of Archivematica, CONTENTdm, and DuraCloud.

How did the residency experience shape your vision and goals for your career?
"As a former IT professional, I knew that I wanted to combine my technology skills and M.L.I.S. training to address digital stewardship issues. The National Digital Stewardship Residency program provided an opportunity to work toward this goal. The experience reinforced that I had selected the right career path and gave me confidence that I had the qualifications and ability to do this work. The response I have received from speaking at conferences about my NDSR project and digital preservation confirms my belief that the NDSR program is highly regarded and well respected within the professional community. I am proud to be affiliated with the program and with my NDSR colleagues."

Most of the study participants including residents, supervisors, program staff, and advisory board members articulated the need for some form of overarching coordination of NDSR. Some felt IMLS should serve as the national coordinating body, a role that would fall outside the scope of the agency's mission as a funder. Others suggested that a standing advisory board managed by a single institution or professional organization could coordinate the national program. Participants in our assessment suggested that a coordinating body might be involved in activities such as:

- setting central goals and expectations for the residency
- determining curricular standards
- developing and maintaining model documentation
- fostering collaboration across cohorts and programs
- creating and promoting an NDSR brand
- building and supporting a centralized application and review system
- maintaining records of residency participants and projects
- assessing the implementation and outcomes of NDSR programs

There was also general consensus that more regular and efficient communication across all NDSR programs would be beneficial. Many participants noted that a centralized website with public information about all current and past programs, as well as private online discussion groups for program stakeholders, would help strengthen the existing community and make information more accessible to potential hosts and residents. Former NDSR Boston resident Rebecca Fraimow has begun to develop an NDSR website that may address this need. George Coulbourne also suggested that an annual meeting of all cohorts would encourage collaboration between current and former residents and help maintain the community. Currently, most

of the conversations about the development of the NDSR model and a national community are occurring informally and among a limited group of people.

A cohesive, encompassing vision for the NDSR programs is still emerging. What, if anything, all residents should achieve through NDSR is still an open question. In interviews with CLIR's team, program administrators reflected on some of the broader questions about NDSR that remain to be addressed such as: What should be true about everyone who goes through NDSR? Is NDSR a recruitment tool for the community or a job-finding tool for residents? An NDSR symposium planned for spring 2017 will help jumpstart a more inclusive conversation and perhaps help to answer some of these questions.

6. Recommendations

The following recommendations, drawn from assessment participants' feedback, are designed to inform the development of future initiatives. A set of general recommendations for NDSR programs is followed by recommendations for effectively coordinating programs, building curricula, cultivating skills in line with program goals, creating strong cohorts, and fostering successful mentorship. Section 6.5 provides recommendations for establishing more formalized national coordination for the NDSR programs. If implemented, this last set of recommendations would require new forms of funding and management.

6.1. General Recommendations

- **Residencies should last 12 months.** Year-long programs allow easier transitions for residents, many of whom must move to a new city and lease a new apartment; 12-month terms also encourage deeper engagement with project work and host institution colleagues.
- **Resident pay should reflect the cost of living in different locations.** Remuneration for residents should be set at a level that allows them to live in the residency city without having to seek outside employment.
- **Programs should provide residents with health care.** This benefit could significantly improve residents' quality of life. The organizations that have and are likely to administer and host residencies are generally equal opportunity employers that do not discriminate against individuals with disabilities. Absent program-provided health care, applicants with preexisting conditions or disabilities might be deterred from applying to NDSR. Providing health insurance would, therefore, ensure greater inclusivity and diversity in NDSR. The cost of health care could be included in grant budgets; it could be covered by a supplementary grant (that program administrators would need to secure), or it could be provided by host organizations.

- **Programs should provide professional development funds for residents at levels that match expectations about conference and meeting attendance.** NDSR initiatives have encouraged residents to attend and/or present at multiple conferences during the course of their residency. Stipends of $1,000 have typically been allocated to residents (see Table 2). This stipend covers the registration fee of one conference with a digital preservation focus, such as iPRES, and associated travel. When residents are expected to attend and present at multiple conferences, the program must increase stipends to match these expectations. To date, residents' pay has typically not been high enough to supplement additional travel, lodging, and registration fees. The cost of conference attendance could be factored into the grants administered through IMLS, it could be covered by an external grant, or it could be subsidized by mandatory host organization contributions.
- **Program administrators should continue to collect, assess, and share data about residents' competencies.** Understanding what residents are learning and how they are growing professionally over the course of the residency benefits funders, instructors, program staff, and residents themselves. Requiring an evaluation or survey of each resident upon entry and exit from NDSR would provide useful data and give a clear sense of program strengths and weaknesses, offering program managers insight into ways to improve the residency experience. Some initiatives have already collected this type of information through pre- and post-residency questionnaires. The results are of general interest to the NDSR community, including former residents, and should be shared broadly. This practice should be extended across initiatives.

6.2. Recommendations for the Administration of Programs

- **All programs should budget for and hire dedicated staff who can commit sufficient time to managing the residency.** At least one program manager should be hired for the duration of a residency program, and program leaders should make every reasonable effort to avoid turnover in this position. A suggested benchmark is a full-time program manager position with 50 percent of time devoted to coordinating residency activities.
- **Program staff should provide clear, timely, and consistent communication about the residency.** A program's administrative timeline, relevant deadlines, and the approximate schedule for all program-related events should be set prior to the residency and communicated to all stakeholders at the outset, with regular reminders and notifications of adjustments. Participants need advance notice of events such as enrichment sessions in order to effectively manage their schedules. Deadlines for resident program outputs such as blog posts should be communicated early on and remain consistent throughout the residency.

- **Program leaders should clearly articulate to residents and supervisors the distinct responsibilities of program staff.** Residents and supervisors need to know exactly who to communicate with about residency logistics, requirements, and challenges.
- **Program staff should act as advocates for residents, if necessary.** Advocacy includes but is not limited to providing guidance if residents encounter challenges with supervisors, publicly supporting residents, facilitating networking opportunities, and looking out for the best interests and needs of residents.
- **Administering organizations must be able to pay residents in a timely fashion.** Residents must be paid according to a schedule provided to them at the beginning of their term.
- **Unless compelling reasons suggest otherwise, entities that administer programs should be separate from entities that host residents, and program staff should not serve as residents' primary supervisors.** Residents benefit from discussing residency logistics, challenges, and requirements with individuals who are independent from their supervisors. Maintaining a separation between program staff and resident supervisors helps avoid any perceived or actual conflict of interest in the management and support of residents and hosts.
- **Program staff should maximize transparency in program management.** Information about methods for selecting residents and hosts and for making funding allocation decisions should be made accessible to residents, supervisors, and the public.
- **Program leaders should solicit potential host applicants through open calls, unless there is a compelling reason to do otherwise.** Open calls and widespread advertisement increase awareness of NDSR at the regional and national level. An open process also ensures that more potential hosts have the opportunity to apply to the program, thus facilitating stronger project proposals. In circumstances where, through a residency cohort, there is an opportunity to strengthen inter-institutional collaboration toward a common goal (such as in the current NDSR Foundations program), program managers may choose to identify host partners in advance so that these partners may contribute actively to program development.
- **Program staff should establish some means for supervisors to communicate and interact as a cohort.** Supervisors would benefit from having a shared venue in which to discuss NDSR-related work and digital preservation issues more broadly. Program staff should also consider facilitating more opportunities for supervisors to interact in order to strengthen their engagement with the NDSR community beyond their work with residents.

6.3. Recommendations for Curriculum and Skills Development

- **Immersion workshops should be interactive, incorporating hands-on activities with digital preservation tools and systems.** Residents benefit from activities such as practice sessions with tools, informal discussions with instructors, and collaborative problem solving. More opportunities for spontaneous conversation will help facilitate networking and create relationships more quickly.

- **The immersion workshops and enrichment sessions should capitalize on the expertise of supervisors, and of invited speakers or instructors.** Beyond attending immersion workshop sessions, supervisors could play a more active role in training and be provided with the opportunity to discuss digital stewardship at their organizations. Program staff should encourage informal discussions and interactions among external experts, NDSR supervisors, and residents in order to facilitate networking and interactive learning.

- **Immersion workshops and enrichment sessions should continue to address a broad range of professional development topics that are responsive to residents' interests and needs.** Former residents have suggested incorporating sessions on project management, grant writing, and public speaking.

- **Program leaders should encourage enrichment sessions as opportunities to expose residents to digital preservation issues beyond those of their host organizations.** Enrichment sessions can broaden residents' experience with digital preservation challenges over the course of the residency. Visits or field trips to each cohort's host organizations or additional sites would allow residents to gain a richer understanding of the complexity and diversity of digital preservation practices across institutions.

6.4. Cohort and Mentorship Recommendations

- **Program leaders should set clear expectations for residents' participation in cohort activities.** The cohort model has been a crucial component to NDSR's success. Providing residents with written guidelines helps avoid misunderstandings about the nature and frequency of residents' interactions with and commitment to the cohort.

- **Program leaders should provide host organizations with guidelines for mentorship and project supervision.** Articulating expectations for mentorship and project supervision will benefit residents and host institutions by clarifying and normalizing hosts' responsibilities. Hosts should provide residents with career advice and guidance over and above supervising their project work. Ideally, the individual who provides career guidance to the resident as a mentor will be a different person from the individual appointed as primary project supervisor. Appointed mentors, supervisors, and mentor-supervisors should be able to commit to the

requirements of their role, such as providing a letter of reference at the end of the residency as appropriate.

- **Supervisors should deliver clear and explicit feedback on residents' projects and performance.** Supervisors should give residents regular verbal feedback about projects and occasional, perhaps quarterly or semi-annual, written progress evaluations. These evaluations may be brief, but should be constructive and timely enough for residents to address problems.

- **Supervisors should be on site for the duration of the residency.** Beyond normal absences required for professional or personal obligations, supervisors should be present at the host organization and available for regular meetings and interactions with residents. Participants in our assessment consistently reported that weekly or biweekly meetings between residents and supervisors, as well as opportunities for informal discussions around the workplace, significantly benefited project progress and collegial relationships.

6.5. Recommendations for a Coordinated National Model

The following recommendations are offered to stakeholders in the NDSR programs—funders; administrators; future, current and former residents; potential hosts; and others invested in the development of digital stewardship capacity in the workforce—as they consider the extent to which they wish to pursue a nationally coordinated program. To implement many of these recommendations, a new funding model would be required to sustain such a program over time. To date, each NDSR initiative has been funded by limited term agreements with or grants from IMLS, supplemented by the financial commitments of administering organizations and, to a lesser extent, host institutions. Directing a large national program for a specific community of professionals for an indefinite period is not within the scope of what IMLS has historically done as a funder. Such a large responsibility would be beyond the capacity of any individual institution, even one as large as the Library of Congress. Instead, collaborating institutions or professional organizations would need to work together to articulate shared goals for NDSR and to accept responsibility for maintaining a set of recommended resources and practices for the residencies. Representative administrators of multiple initiatives could contribute to the national collaboration for as long as each maintains an active interest in building capacity to support the work of digital preservation in this country. Grant support from IMLS or other funders could help establish an initial coordinating body and a set of best practices, if partner organizations would accept responsibility for continuing coordination activities over time.

- **NDSR stakeholders should consider appointing or electing a national committee to set basic standards and best practices for NDSR constituents.** NDSR programs could benefit from the support of a national steering committee or advisory board that could help advise on best practices, articulate policies and procedures

for routine program functions, and provide template guidelines for program staff, residents, host institutions, and supervisors. Issues that such a committee could help navigate include but are not limited to creating NDSR branding, maintaining model documents such as application forms, establishing minimum eligibility requirements for hosts and residents, identifying targets for residency outcomes and methods for assessing these outcomes consistently, and articulating the programs' overarching mission and goals as the stakeholder community expands.

- **NDSR stakeholders should create or strengthen a centralized NDSR web presence.** NDSR as a community should be publicly promoted through a central website and supported through a shared online forum. In addition to providing essential information about the overall model, a website is crucial for effectively communicating the value and success of the residencies to funders, professional organizations, future hosts, and potential applicants. Maintaining this web presence could be the responsibility of one or more members of the national committee supporting the programs.

- **Once established, a coordinating body comprising NDSR stakeholders should collect model documents such as resident and host application forms and program manuals from across initiatives and house them in a central repository.** Future NDSR participants—including potential residents, host organizations, and principal investigators on grants—would benefit from being able to access documentation from previous program iterations. The NDSR website could also function as a repository.

- **A national coordinating body should aggregate and make available to the public the outcomes of residency projects.** Making these outcomes more publicly available through a national website would more effectively communicate the value and success of the NDSR programs to funders, professional organizations, future

Alice Sara Prael   NDSR Boston 2015–16
Digital Accessioning Archivist, Beinecke Rare Book & Manuscript Library, Yale

Alice Prael earned an M.L.S. from the University of Maryland, College Park, where she specialized in the curation and management of digital assets. During that time, she also interned with the National Archives and Records Administration, overseeing the digitization and description of a series of records from the John F. Kennedy Assassination Records Collection. As an NDSR resident, she continued digital preservation work at the John F. Kennedy Presidential Library. She is currently the digital accessioning archivist at Beinecke Rare Book & Manuscript Library, where she manages the centralized born-digital accessioning service for special collection material.

How did the residency experience shape your vision and goals for your career?
 "My residency at the John F. Kennedy Presidential Library allowed me to lead a digital preservation project right out of graduate school, learning how to apply the theory and best practices to find the best solution for our collections. This program presented me with the reality of archiving and preserving digital content, which can be messy but is also incredibly collaborative. The NDSR program introduced me to the community necessary for archiving in the digital world, through the Boston cohort of residents and hosts, the community of past and present National Digital Stewardship Residents, and through the many conferences I was able to attend as a resident. This experience shaped my career goals by widening my view of the field and allowing me to participate through research, experimentation, and collaboration."

hosts, and potential applicants. Members of the NDSR community have also expressed interest in being able to access more easily residents' deliverables such as blog posts, conference presentations, final reports, white papers, or other deliverables that are suitable for public distribution.

- **NDSR stakeholders should formalize a means to facilitate cross-cohort communication and interaction.** A forum provided through an official website, a community email discussion list, an annual conference, or some mixture of regular online and in-person activities open to all NDSR constituents could help to enable this interaction.

- **NDSR stakeholders should establish procedures for collecting data on resident competencies.** As recommended above, NDSR as a whole would benefit from understanding how residents grow professionally and how well they build their technical skills over the course of their residencies. A standardized evaluation or survey that each resident could complete on entry and exit from NDSR would provide this data and give a clear sense of the program's overall strengths and weaknesses. A standardized tool would ensure more consistent data about the program over time.

- **NDSR stakeholders should plan for a future summative assessment of the outcomes of all NDSR initiatives.** This type of assessment could capture cumulative data on the skills residents acquired within each program, job placement statistics, and the long-term impacts of projects on host organizations. Such a study might also help community members measure the quality of project outcomes and help generate a competency profile for NDSR residents. A summative assessment would require that the residencies' precise learning goals and desired outcomes be clearly defined. Since CLIR's assessment was performed relatively soon after the completion of the first three regional initiatives, much about NDSR's long-term impact will only become clear in the future. Tracking key metrics such as job placements and the long-term impact of residency projects on host organizations would establish a useful foundation on which NDSR stakeholders could build future assessments.

7. Conclusion

As the 2015 National Agenda for Digital Stewardship confirmed, the use and production of digital content has increased substantially over the past decade, and the need for skilled digital stewards is now urgent (National Digital Stewardship Alliance 2015). The NDSR was created in response to this need; to date, it has produced 35 specialists, most of whom are already working in the field. CLIR's study of NDSR affirms that it is an effective model for training emerging professionals in digital stewardship. The NDSR programs are already beginning to contribute to the growth of a national community of professionals equipped to effectively manage the country's vast and

rapidly growing collections of digital material.

In CLIR's survey of residents from the first Boston, New York, and Washington residencies, we asked what they thought, 20 years from now, would be the most important thing they learned in the residency. "Our tools will look entirely different in 20 years," predicted one respondent, "and the models we consider foundational for our best practices will change, but the basic concepts and their implementation will still be true at the core." In addition to emphasizing the importance of the underlying concepts of digital preservation learned through the residency, other respondents confirmed that the ability to resolve problems related to digital asset management, the confidence to lead stewardship initiatives in the workplace, and their increased professional acumen would remain with them throughout their careers. These responses fuel the overarching conclusions of the study: NDSR has been particularly successful in increasing residents' professional experience, cultivating supportive regional cohorts, enriching digital preservation at host organizations, and significantly heightening the awareness and understanding of digital stewardship concepts and practices among participants in its programs.

Fundamental to the residencies is providing emerging professionals with opportunities to gain the kind of hands-on experience that is increasingly needed on a national scale and—as the National Digital Stewardship Alliance agenda attests—by individual employers. A recent cursory review of 20 digital stewardship position vacancies across the country posted between fall 2015 and summer 2016 suggests that today's employers are seeking candidates with experiential knowledge and proven facility with digital preservation systems, software, and standards. Employers frequently expressed a desire for candidates with experience in implementing digital repository standards, setting up and maintaining content management systems (including Archivematica, Archivists' Toolkit, ArchivesSpace, D-Space, and CONTENTdm), quality control and fixity checking software, and data analysis and digital forensics tools such as BitCurator. Many sought candidates who could demonstrate their ability to develop a digital preservation workflow or policy, and to evaluate content management systems.

NDSR provides its residents with opportunities to gain exactly this kind of experiential and applied knowledge. The technical skills and awareness that participants acquired over the course of their residencies varied by project and host organization, but, overall, residents reported gaining valuable experience with digital preservation tools, systems, and standards. Residents described working on storage issues, web archiving, researching and implementing digital repository standards, preserving specific types of content, working with the existing preservation systems at their host organization, and, in some cases, implementing a new preservation system such as Archivematica or Preservica.

Early results suggest that NDSR programs have prepared participants well to work in the digital stewardship field. At the time of writing, 26 former NDSR residents are employed in roles directly

related to digital stewardship such as digital preservation librarian or digital archivist. Participants in the assessment confirmed that they believed NDSR made them more attractive candidates to prospective or current employers, and most former residents who are now established in permanent positions have reported using the skills and experiences gained through NDSR in their current work. Most NDSR alumni remarked that the experience significantly increased their ability to confidently address the challenges associated with digital stewardship.

Another key strength of the NDSR model is providing participants with the opportunity to cultivate skills and connections beyond those directly related to digital stewardship. Study participants regularly emphasized that the professional context of the residencies was particularly valuable. They consistently identified project management, public speaking, and collaboration as areas where they felt they gained proficiency. Similarly, the vast majority of participants believed that opportunities to make connections with their peers at the cohort level, as well as within the larger professional community, were extremely valuable aspects of NDSR.

The NDSR programs were similarly successful for host organizations. Supervisors overwhelmingly felt that NDSR projects had a positive impact on their institutions by raising awareness about digital stewardship and improving digital preservation practices and workflows. In some cases, participating in NDSR helped supervisors and colleagues gain the attention of higher-level administrators to advocate for funding for more expansive preservation policies and programs. Supervisors frequently said that participating in NDSR was a positive experience for their organizations and for their residents, and they expressed near unanimous support for the program to be continued and expanded to more institutions in more regions of the country.

Participants in this study overwhelmingly confirmed the value of NDSR; they also had suggestions for improvements, particularly for how programs should be administered. Notably, their suggestions were remarkably consistent and directed at ensuring that future programs—and the NDSR community as a whole—set clear guidelines, expectations, schedules, and standards in a timely and consistent fashion. Strong communication from program leaders to participants and across cohorts is vital to effective and smooth program administration. Furthermore, dedicated program staff who can advocate for residents, and respond to any logistical and professional challenges that might arise, seem essential for ensuring a positive experience for both residents and mentors.

 Although they are still relatively new, it seems clear that the NDSR programs have proved valuable for the careers and abilities of early residents. These individuals have contributed to improving the state of digital stewardship within the wide variety of cultural heritage, educational, and governmental organizations that have hosted residencies. From participants' perspectives, the NDSR programs are already successful in building a community of professionals who can

skillfully manage, preserve, and provide access to digital material. With continued replication across the country, the NDSR model has the potential to strengthen and expand our nation's capacity to address the complex challenges facing us as we come to terms not just with our collective digital future, but with a future in which we rely substantially on one another to preserve our digital past.

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About the Authors

Meridith Beck Mink is the project lead researcher for CLIR's assessment of the NDSR program. She was responsible for implementing the project, including designing the interview protocols and survey, and writing the final report. In her former position as a CLIR Postdoctoral Fellow in Data Curation for Early Modern Studies, she worked at Indiana University on *The Chysmistry of Isaac Newton* project and consulted on digital scholarship in the Herman B. Wells Library's Scholars Commons. Meridith received her Ph.D. in the history of science from the University of Wisconsin-Madison. She holds an M.A. in history and B.A. in archaeology from Simon Fraser University. In addition to doing freelance consulting work, she teaches at Knox College in Galesburg, Illinois.

Abby Smith Rumsey is a historian who has published widely on cultural heritage, preservation, and scholarship in the digital age. She served as director of the Scholarly Communication Institute at the University of Virginia; director of programs at CLIR; consultant to the Library of Congress's National Digital Information Infrastructure and Preservation Program (NDIIPP) and member of the Blue Ribbon Task Force on Sustainable Digital Preservation and Access and was the senior writer and editor for the task force's final report. Before that, she worked at the Library of Congress managing programs relating to preservation of and access to cultural heritage collections. She received a B.A., M.A., and Ph.D. in Russian history from Harvard University and has taught at Harvard and Johns Hopkins Universities. Her recent book, *When We Are No More. How Digital Memory is Shaping Our Future* (Bloomsbury Press) was published in spring 2016.

About the Research Team

Alice Bishop is senior program officer at the Council on Library and Information Resources (CLIR). She oversees the Postdoctoral Fellowship Program, which provides recent Ph.D. graduates the opportunity to work on projects forging and strengthening connections among library collections, educational technologies, and current research. She is also responsible for the CLIR Chief Information Officers group, directors of organizations that have merged their library and information technology units on the campuses of liberal arts colleges and small universities. She coauthored *The Open Data Imperative: How the Cultural Heritage Community Can Address the Federal Mandate*, published by CLIR in July 2016. She has more than 30 years of project management experience, including coordinating scholarly exchanges with China at the National Academy of Sciences and managing international and national media programs at The Freedom Forum / Newseum in Washington, D.C.

Samantha DeWitt is a former NDSR Boston resident. Her 2014–2015 project at Tufts University examined how the university might track and manage institutionally produced research data. Sam has an M.S. in Library and Information Science from Simmons College. Her interests include digital preservation, science and technology librarianship, and issues related to open science and scholarship. In addition to serving as a CLIR research associate, she also works in Access Services at Harvard's Cabot and Widener Libraries. Sam received her B.A. from the University of Connecticut and her associate's degree from Bard College at Simon's Rock.

Christa Williford is director of research and assessment at CLIR. She is responsible for designing and implementing documentation and evaluation strategies for CLIR's programs, and for helping others shape and advance new initiatives related to the work of information organizations. Prior to joining CLIR, she held a Postdoctoral Fellowship in Scholarly and Information Resources at Bryn Mawr College. She has earned an M.L.I.S. from the University of Washington and a Ph.D. in Theatre History from Indiana University.

APPENDIX 1:
Study Design and Methodology

To understand the range of experiences in the NDSR programs and gather feedback on their successes and challenges, CLIR's research team conducted surveys, interviews, and site visits with current and former residents, supervisors, and other stakeholders. (See Appendixes 3 and 4 for the questions and prompts used for the surveys, interviews, and site visits.) Each of these elements involved different groups of stakeholders at different times during the course of their involvement with the residencies. In addition, researchers reviewed documentation produced by residents and program staff. Work produced by residents included reports, presentations, blog posts, and conference posters. Work produced by program staff included grant proposals, program manuals, and websites.

2015	NDSR Assessment Timeline
October–December	• Conducted document review and preliminary discussions • Developed surveys
2016	
January	• Conducted interviews with program administrators, supervisors, and residents
February	• Continued interviews
March	• Sent surveys to NDSR residents and supervisors from 2013–2015 cohorts
April	• Conducted NDSR-NY site visit
May	• Conducted NDSR Boston and NDSR-DC site visits
June–August	• Drafted final report
September–December	• Edited and formatted the report • Published the report in December 2016

Surveys

The team crafted online surveys to collect the impressions of former residents and supervisors involved in the first Boston, New York, and Washington D.C. cohorts (2013–2015). Responses were anonymous, though respondents were asked to identify the program in which they participated. These surveys received 86 percent participation from former residents and 42 percent from former supervisors.[1] (See Appendix 3 for survey questions.)

[1] We received 13 out of a possible 15 responses from residents of the 2013–2015 cohorts. Of the two former residents who did not respond, one was a member of our study team, Samantha DeWitt, who recused herself.

Interviews and Site Visits

The team collected data from residents and supervisors involved in the second Boston, New York, and Washington D.C. cohorts (2015–2016) through Skype or phone interviews mid-residency, then conducted site visits at the end of the residency term. Interviewees were given the option of anonymity if they preferred not to be named in this report.

Since these cohorts were active during the course of the assessment, the team also conducted site visits to host organizations in Boston, New York, and Washington D.C., at residency end. These visits helped researchers better understand each resident's work context, the level and quality of interaction between residents and their local colleagues, and the relationship of residents' work to ongoing activities at host organizations.

The site visits were scheduled around final events for each of the NDSR programs, namely: NDSR-NY's symposium, "Let's Get Digital," held at the Brooklyn Historical Society on April 28, 2016; NDSR-DC's symposium, "Digital Frenemies: Closing the Gap in Born-Digital and Made-Digital Curation," held at the National Library of Medicine on May 5, 2016; and NDSR Boston's capstone event held on May 23, 2016. These events provided the team with further insight into the cohorts' collaborative work and their networking within the larger digital stewardship community.

APPENDIX 2:
Summary and Comparison of NDSR Assessments

Prior to and concurrent with CLIR's assessment, Howard Besser and Michelle Gallinger conducted individual assessments of the initial NDSR pilot residencies led by the Library of Congress in Washington D.C., the subsequent Washington cohorts, and the first cohorts of the Boston and New York programs. These assessments are summarized below.

Howard Besser, professor of cinema studies and associate director of New York University's Moving Image Archiving & Preservation Program, was hired in April 2014 by George Coulbourne of the Library of Congress to assess the initial NDSR pilot program. Besser's involvement with NDSR-DC has since grown in scope. He has helped implement his recommendations from the pilot assessment to improve the second and third NDSR-DC programs, and he has worked as a consultant for NDSR-DC, actively shaping the curriculum and learning outcomes for the DC-based cohorts. He is also on the advisory board for NDSR-NY and AAPB NDSR. However, he has recused himself from the selection of residents across programs because he sees that as a conflict of interest with his role as an instructor.

Michelle Gallinger is an IT executive and principal consultant at Gallinger Consulting. She develops policies, guidelines, and implementation plans for preserving digital content. She is a former facilitator for the National Digital Stewardship Alliance, and the former program coordinator for the Library of Congress's National Digital Infrastructure Information and Preservation Program. Gallinger completed assessments for the 2014–2015 NDSR Boston cohort and the 2014–2015 NDSR-NY cohort in summer 2015. Her assessments were primarily based on interviews with residents and supervisors and on a wide variety of documentation generated during the programs.

Besser and Gallinger's assessments focused on individual instantiations of NDSR and did not make comparisons across programs, although their studies were used to develop new NDSR programs such as AAPB NDSR. They evaluated the successful components of the programs for residents and their supervisors, and identified challenges in residency design, administration, and overall experience. For their second cohorts (2014–2015), program staff involved in the Boston, New York, and Washington programs implemented changes based on Besser and Gallinger's assessments .

The primary difference between their assessments and the present study is that CLIR's goal is broader in scope, comparing all NDSR programs and cohorts that were completed by summer 2016. CLIR's assessment, as stated earlier, was designed to reveal the most successful and effective features across previously established programs, in order to make recommendations for future NDSR programs.

Howard Besser's 2014 Assessment of the NDSR Pilot

Similarly, Besser's assessment focused on "learning lessons from the initial D.C. cohort that can strengthen the programs for those later cohorts" (Besser 2014, 1). Besser reported that both residents and supervisors found the program valuable and successful in terms of skills acquisition related to digital stewardship and raising awareness about data curation issues within the host organization.[1]

Below are some highlights of Besser's major findings for the NDSR pilot program:

- There was a lack of clear communication from LC, especially regarding the residency goals and expectations, deliverables, learning objectives, and logistics.
- Overall residents were proud of the projects they completed and felt they developed professionally.
- Residents reported that the cohort experience was one of the strongest parts of the program.
- Supervisors were generally pleased with the residency experience, reporting that it had value for digital stewardship at their organizations.
- Supervisors desired a more interactive cohort experience among themselves and wanted LC to help build more community around the residency.
- Supervisors liked the application process, while residents felt it was too onerous and they disliked the video component.
- Residents and supervisors thought that resident compensation was too low.

Among Besser's major recommendations:

- Clearer and more effective communication is required from LC about residency goals and benchmarks, logistics such as residents' pay, and events.
- LC should set clearer expectations about the overall residency experience and about logistics including resident travel related to professional development.
- The initial training program or boot camp should be revamped and shortened.

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[1] The original NDSR pilot was organized around the theme of digital curation, as opposed to digital stewardship.

Michelle Gallinger's 2015 Assessment of NDSR Boston

Gallinger assessed the NDSR Boston program's first cohort. She concluded that the program had a successful first year and that the Boston residents "unanimously reported that they experienced professional growth throughout the course of their residencies" and applied digital preservation experience (Gallinger 2015a, 3). Supervisors "unanimously agreed that the residency had a positive impact on the host institutions" and contributed to improved digital stewardship (Gallinger 2015a, 18). The residents, however, reported that they would have liked to have gained more technical skills.

Among Gallinger's findings:

- There was a lack of clear and timely communication from Boston program staff, especially about expectations for the residency.
- Residents desired a neutral arbitrator to help administer the program who was not involved in supervision of residents or projects.
- Residents established good working relationships with their supervisors and received adequate support from the host organizations.
- Residents felt the cohort experience was integral to the program's success.
- Residents wanted regular, structured feedback.
- Residents wanted to gain more technical skills during the residency.
- Residents thought the compensation provided was too low and they desired health care benefits.
- Supervisors reported that there was no structure in place to provide negative feedback about the resident or to enforce expectations.

Among Gallinger's recommendations:

- Provide early, clear communication to supervisors about residency events, guidance on mentorship expectations, and NDSR program requirements.
- Supervisors should be required to provide formal performance evaluations.
- Include project management training and a session on public speaking during the immersion week.
- Clearly articulate the goals of NDSR and its intended impact on host organizations and the digital preservation community.

Michelle Gallinger's 2015 Assessment of NDSR-NY

Gallinger's assessment of the NDSR-NY program examined the program's first cohort. Her findings and recommendations were markedly similar to those of her Boston assessment. She concluded that the program "was well administered with successful projects, dedicated host institutions and mentors, and residents who showed

significant professional growth" (Gallinger 2015b, 18).

Among her findings:

- METRO program staff provided clear and effective communication to residents and supervisors.
- Residents valued METRO as a neutral advocate.
- Residents wanted to gain more "and deeper" technical skills during the residency.
- Residents desired regular, structured feedback on their performance.
- Residents expressed frustration with the lack of benefits.
- Supervisors valued enrichment sessions as a form of community building.

Among Gallinger's recommendations:

- Supervisors should be required to provide formal performance evaluations.
- Host organizations should clearly lay out office standards and expectations.
- During immersion week, program staff should provide an overview of NDSR program requirements and estimated time commitments.
- Include project management training and a session on public speaking during immersion week.
- Consider offering residents benefits.

Common Themes Across Assessments

Some feedback was consistent across all assessments completed as of summer 2016. This feedback is particularly significant for future NDSR programs and for a possible NDSR model.

- Residents and supervisors wanted strong communication about residency expectations and earlier scheduling of residency events.
- Residents and supervisors typically recommended that residencies run 12 months.
- Residents learned a variety of technical skills related to digital stewardship, but these varied significantly across projects.
- Residents desired more hands-on experience and exposure to digital stewardship tools and systems.
- Residents felt the cohort experience was one of the most successful aspects of the residency.
- Residents and supervisors reported that professional and soft skills such as project management and public speaking were universally improved through the residency experience.
- NDSR residents had mixed opinions about their desire and preparedness to pursue digital stewardship careers after their residencies.
- NDSR participants tend to have mixed opinions about the global objectives and impact of the program.
- The national NDSR community is still not effectively or formally organized and connected.

APPENDIX 3:
Survey Instruments

CLIR created two online surveys to collect the impressions of residents and supervisors involved in the first Boston, New York, and Washington, D.C. cohorts (2013–2015). Responses were anonymous. However, respondents were asked to identify the program in which they participated.

Participation

Fifteen respondents to the former-resident survey identified themselves as part of the first New York and D.C. cohorts, suggesting 100 percent participation from these cohorts. Three respondents to the former-resident survey identified themselves as part of the first Boston cohort, which comprised five residents. As a member of our study team, Samantha Dewitt recused herself from the survey.

We received a total of 13 responses from supervisors for the first Boston, New York, and D.C. cohorts: six identified themselves as part of the first Boston cohort, four as part of the initial D.C. pilot program, and three as part of the first New York cohort. In total, 31 people acted as primary or secondary supervisors to the 20 residents in these cohorts, signifying fairly low participation in our survey among supervisors of the first cohorts.

3.1 Resident Survey

The Council on Library and Information Resources (CLIR) invites you to participate in a survey of former residents for our assessment of the NDSR program. The purpose of this survey is to determine what benefits the NDSR program offered you and gather information on any challenges you experienced during your residency. You are encouraged to take this survey as a way to share your experiences and suggestions with the Institute of Museum and Library Services (IMLS). This survey should take between 10 and 20 minutes to complete. The authors of the study will not include any information that could be tied to an individual person or institution in the final publication without consent. If you have any questions, contact Meridith Beck Mink, CLIR's NDSR assessment lead researcher, at meribecks@gmail.com.

Background Information

The purpose of this section is to gather information about your experience and interest in the NDSR program before you became a resident.

1. Please indicate which NDSR program you were a part of; note that the final report will not include any information that could be tied to an individual person or institution without consent.
   - ☐ DC
   - ☐ Boston
   - ☐ NY

2. Which of the following factors influenced your decision to apply to the NDSR program? Select all that apply:
   - ☐ Prestige of the program
   - ☐ Interest in working in digital preservation
   - ☐ Opportunity to get hands-on experience with digital preservation tools and concepts
   - ☐ Opportunity to increase my knowledge about digital preservation concepts
   - ☐ Compensation
   - ☐ Opportunity to work at a particular host organization
   - ☐ Opportunity to build a cohort in my desired field
   - ☐ Networking with professionals in my desired field
   - ☐ Increasing my employment prospects
   - ☐ Other (please specify)

3. Prior to the residency, rate your understanding of the risks facing digital materials on a scale of 1–5:
   - ☐ 1 (Weak)
   - ☐ 2
   - ☐ 3 (Moderate)
   - ☐ 4
   - ☐ 5 (Very Strong)

4. How would you describe your level of expertise in digital preservation prior to the residency?
   - ☐ None
   - ☐ Some theoretical knowledge from graduate school, but no applied expertise
   - ☐ Some theoretical knowledge and applied experience
   - ☐ Moderate theoretical knowledge and applied experience

5. Were you interested in a particular project or host organization when you applied to the program?
   - ☐ No
   - ☐ Yes, the one I worked on
   - ☐ Yes, but not the one I worked on
   - ☐ Yes, several

6. Were you offered more than one NDSR placement?
   ☐ Yes
   ☐ No

Immersion Week & Educational Curriculum

The purpose of this section is to gather your feedback about the NDSR curriculum.

7. How would you characterize the NDSR immersion week curriculum? Select all that apply:
   ☐ It covered concepts that were mostly familiar to me from graduate school
   ☐ It introduced me to new concepts and/or built on concepts that I learned in graduate school
   ☐ It provided the opportunity to learn about a wide variety of threats to digital materials
   ☐ It provided the opportunity to learn about a wide variety of digital preservation tools, systems, and practices
   ☐ It provided the opportunity to gain hands-on experience with digital preservation tools, systems, and practices

8. How would you improve the NDSR immersion week curriculum? Select all that apply:
   ☐ More hands-on exposure to tools and systems used in the field
   ☐ More interactive sessions or discussions with fellow residents, mentors, and instructors
   ☐ More exposure to technical material
   ☐ Less theory-based content
   ☐ Less lecturing and instruction
   ☐ Other (please specify)

9. Please expand or provide any additional comments regarding the educational aspect of the NDSR program or your experience with the immersion week:

Residency Experience—Cohort and Mentorship

The purpose of this section is to gather your feedback about your residency experience, specifically related to your cohort experience and the mentorship you received on your project.

10. How frequently did you meet—formally or informally—with your cohort?
   ☐ Once or more per week
   ☐ About every two weeks
   ☐ About once a month
   ☐ Less than once a month

11. Rate your cohort experience on a scale of 1–5:
    - ☐ 1 (Poor)
    - ☐ 2
    - ☐ 3 (Neutral)
    - ☐ 4
    - ☐ 5 (Excellent)

12. How frequently did you interact with your mentor about your project?
    - ☐ Every day
    - ☐ Several times a week
    - ☐ Several times a month
    - ☐ Once a month or less

13. Rate the amount of feedback you received on your project work from your mentor on a scale of 1–5:
    - ☐ 1 (Too Little)
    - ☐ 2
    - ☐ 3 (Just Right)
    - ☐ 4
    - ☐ 5 (Excessive)

14. How would you characterize the quality of feedback you received from your mentor on your project work?
    - ☐ Inadequate and/or unhelpful
    - ☐ Adequate
    - ☐ Valuable and/or insightful

15. How would you characterize the career advice you received from your mentor?
    - ☐ None
    - ☐ Inadequate and/or unhelpful
    - ☐ Adequate
    - ☐ Valuable and/or insightful

16. Rate the quality of interactions with your mentor on a scale of 1–5:
    - ☐ 1 (Poor)
    - ☐ 2
    - ☐ 3 (Neutral)
    - ☐ 4
    - ☐ 5 (Excellent)

Please expand or provide any additional comments on your cohort and/or mentorship experience:

Residency Experience—Professional and Digital Preservation Skills

The purpose of this section is to gather information about your professional development and the digital preservation skills you acquired during the NDSR program.

18. In which of the following areas did you gain applied experience during your project work? Select all that apply:
    - ☐ Institutional strategies such as contributing to policy, auditing, or determining best practices
    - ☐ Organizational activities, such as acquisition and appraisal or preservation planning
    - ☐ Technical expertise in a specific area, such as file formats and standards or information security
    - ☐ Content specific preservation, such as web or audio-visual archiving
    - ☐ Practice with an existing preservation system, such as Archivematica or Preservica
    - ☐ Implementation of a preservation system such as Archivematica or Preservica
    - ☐ Other (Please specify)

19. What broad professional skills and experiences did you acquire during your residency? Select all that apply:
    - ☐ Project management
    - ☐ Collaborative work experience
    - ☐ Self-direction
    - ☐ Outreach
    - ☐ Bridging units/departments
    - ☐ Social media management
    - ☐ Professional writing
    - ☐ Public speaking
    - ☐ Other (Please specify)

20. How would you characterize the amount of opportunities to discuss and promote your NDSR work within your cohort, host organization, and program?
    - ☐ Inadequate
    - ☐ Adequate
    - ☐ Ample

21. How would you characterize the amount of opportunities to discuss and promote your NDSR work within the digital preservation community more broadly?
    - ☐ Inadequate
    - ☐ Adequate
    - ☐ Ample

22. Rate the quality of your experience discussing and promoting your NDSR work during the program overall on a scale of 1–5:
☐ 1 (Poor)
☐ 2
☐ 3 (Neutral)
☐ 4
☐ 5 (Excellent)

23. Rate the professional value of promoting your work through blogging on a scale of 1–5:
☐ 1 (Not valuable)
☐ 2
☐ 3 (Neutral)
☐ 4
☐ 5 (Very valuable)

24. Rate the professional value of promoting your work through conference presentations on a scale of 1–5:
☐ 1 (Not valuable)
☐ 2
☐ 3 (Neutral)
☐ 4
☐ 5 (Very valuable)

25. Please expand or provide any additional comments about your professional development and/or digital preservation skills acquisition during the residency:

Overall NDSR Experience

The purpose of this section is to gather information about your experience in the NDSR program more broadly, beyond your project work.

26. How would you characterize the overall communication about NDSR program staff (for example: METRO, Library of Congress, Harvard Library)?
☐ Inadequate
☐ Adequate
☐ Excellent

27. Which factors had a positive impact on your NDSR experience? Select all that apply:
☐ Program structure
☐ Support from administrators
☐ Project design
☐ Clear responsibilities and/or expectations
☐ Interactions with mentor
☐ Interactions with cohort
☐ NDSR program staff
☐ Other (Please specify)

28. Which factors had a negative impact on your NDSR experience?
    Select all that apply:
    ☐ Lack of benefits, such as health care
    ☐ Level of compensation
    ☐ Lack of appropriate training in digital preservation
    ☐ Lack of program structure
    ☐ Unclear responsibilities and/or expectations
    ☐ Interactions with mentor
    ☐ Interactions with cohort
    ☐ Interactions with NDSR program staff
    ☐ Other (Please specify)

29. Who helped you resolve any challenges or obstacles related to
    your residency? Select all that apply:
    ☐ My mentor
    ☐ My immediate cohort
    ☐ NDSR program staff
    ☐ Both former and current residents
    ☐ Professionals beyond the program
    ☐ Family and friends

30. Rate the resolution of any challenges or obstacles you encoun-
    tered on a scale of 1–5:
    ☐ 1 (Poor)
    ☐ 2
    ☐ 3 (Adequate)
    ☐ 4
    ☐ 5 (Excellent)

31. How would you characterize the overall feedback given to you
    on your performance during your residency by your mentor?
    ☐ None given
    ☐ Inadequate
    ☐ Adequate
    ☐ Valuable

32. How would you characterize the overall feedback given to you
    on your performance during your residency by NDSR program
    staff?
    ☐ None given
    ☐ Inadequate
    ☐ Adequate
    ☐ Valuable

33. How long do you think the NDSR residency should last?
    ☐ Less than 9 months
    ☐ 9 months
    ☐ 12 months
    ☐ Longer than 12 months

34. Please expand or provide any additional comments about your overall experience in the NDSR program below:

Post-Residency Outcomes

The purpose of this section is to gather information about the professional outcomes of your NDSR experience.

35. After completion of your residency, which of the following factors have proved valuable or helpful to your career? Select all that apply:
    ☐ Prestige of the program
    ☐ Opportunity to get hands-on experience with digital preservation tools
    ☐ Opportunity to bridge theory and practice
    ☐ Opportunity to increase my knowledge about digital preservation concepts
    ☐ Opportunity to work at a particular host organization
    ☐ Opportunity to build a cohort in my desired field
    ☐ Networking with professionals in my desired field

36. Do you agree or disagree with the following statement: Participation in the NDSR program has made me a more attractive candidate for prospective or current employers.
    ☐ Strongly disagree
    ☐ Disagree
    ☐ Somewhat
    ☐ Agree
    ☐ Strongly agree

37. Rate the degree to which you use the skills and experiences gained through the NDSR residency in your current job on a scale of 1–5:
    ☐ 1 (Not at all)
    ☐ 2
    ☐ 3 (Moderately)
    ☐ 4
    ☐ 5 (Frequently)

38. Which professional skills and experiences acquired through your NDSR experience had the greatest impact on your post-residency career?

39. 20 years from now, what do you think will be the most important thing you learned during the residency?

3.2 Former Host Survey

The Council on Library and Information Resources (CLIR) invites you to participate in a survey of former hosts for our assessment of the NDSR program. The purpose of this survey is to determine what benefits the NDSR program offered your organization and gather information on any challenges you experienced during the program. You are encouraged to take this survey as a way to share your experiences and suggestions with the Institute of Museum and Library Services (IMLS). This survey should take between 10 and 15 minutes to complete. It will be available until March 22nd at 5:00 pm EST. The authors of the study will not include any information that could be tied to an individual person or institution in the final publication without consent. If you have any questions, contact Meridith Beck Mink, CLIR's NDSR assessment lead researcher, at meribecks@gmail.com or Christa Williford, CLIR's Director of Research and Assessment, at cwilliford@clir.org.

Background to NDSR Involvement

The purpose of this section is to gather information about your organization's reasons for participating in the NDSR program.

1. Please indicate which NDSR program you were a part of. Note that the final report will not include any information that could be tied to an individual person or institution without consent.
   - ☐ DC
   - ☐ Boston
   - ☐ NY

2. How would you describe your organization's digital stewardship strategy prior to the residency?
   - ☐ No extant strategy
   - ☐ Adequate, but needing development
   - ☐ Robust

3. Which of the following factors influenced your organization's decision to apply to the NDSR program? Select all that apply:
   - ☐ Prestige of the program
   - ☐ Opportunity to develop your organization's digital stewardship policy
   - ☐ Opportunity to develop your organization's digital stewardship best practices
   - ☐ Opportunity to have an outside perspective on your organization's digital stewardship needs
   - ☐ Opportunity for you to engage with similar organizations and professionals about digital preservation issues
   - ☐ Other (Please specify)

4. Rate your own understanding of the risks facing digital materials at your organization prior to the residency on a scale of 1–5:
   ☐   1 (Poor)
   ☐   2
   ☐   3 (Adequate)
   ☐   4
   ☐   5 (Very Strong)

5. Please expand or provide any additional comments about your organization's approach to digital stewardship prior to the residency or initial interest in the NDSR program:

Residency Experience—Project and Mentorship

The purpose of this section is to gather feedback about your residency experience, specifically related to mentoring your resident and your organization's project.

6. Rate the clarity of the instructions provided by NDSR on host applications on a scale of 1–5:
   ☐   1 (Unclear)
   ☐   2
   ☐   3 (Adequate)
   ☐   4
   ☐   5 (Very Clear)

7. Rate the clarity of the instructions provided by NDSR on project proposals on a scale of 1–5:
   ☐   1 (Unclear)
   ☐   2
   ☐   3 (Adequate)
   ☐   4
   ☐   5 (Very Clear)

8. How would you characterize NDSR's input and guidance on your project proposal?
   ☐   The posted instructions were adequate to write our proposal
   ☐   NDSR program staff provided adequate answers to questions beyond the posted instructions
   ☐   NDSR program staff provided significant guidance and feedback on our proposal before final submission
   ☐   Other (Please specify)

9. Rate how your resident's expertise aligned with your expectations and the needs of your project on a scale of 1–5:
   ☐   1 (Poorly)
   ☐   2
   ☐   3 (Adequately)
   ☐   4
   ☐   5 (Extremely Well)

10. How would you characterize the amount of feedback your resident required on their project work to keep it advancing?
   - ☐ A minimal amount
   - ☐ A reasonable amount
   - ☐ An excessive amount

11. Rate the overall quality of interactions with your resident on a scale of 1–5:
   - ☐ 1 (Poor)
   - ☐ 2
   - ☐ 3 (Neutral)
   - ☐ 4
   - ☐ 5 (Excellent)

12. Rate your resident's overall performance on a scale of 1–5:
   - ☐ 1 (Poor)
   - ☐ 2
   - ☐ 3 (Adequate)
   - ☐ 4
   - ☐ 5 (Excellent)

13. How frequently did you meet with your resident about the project?
   - ☐ Everyday
   - ☐ Several times a week
   - ☐ Several times a month
   - ☐ Once a month or less

14. How frequently did you meet—formally or informally, in-person or virtually—with the other hosts?
   - ☐ Never
   - ☐ Once or twice over the course of the program
   - ☐ Approximately once a month
   - ☐ Every two weeks or more

15. Please expand or provide any additional comments about your project and/or mentorship experience:

Overall NDSR Experience

The purpose of this section is to gather information about your experience in the NDSR program more broadly.

16. Rate the NDSR program staff's overall communication throughout the residency on a scale 1–5:
   - ☐ 1 (Poor)
   - ☐ 2
   - ☐ 3 (Adequate)
   - ☐ 4
   - ☐ 5 (Excellent)

17. Which factors had a positive impact on your NDSR experience? Select all that apply:
    ☐ Program structure
    ☐ Support from NDSR program staff
    ☐ Clear expectations outlined by NDSR program staff
    ☐ Interactions with resident
    ☐ Interactions with other hosts
    ☐ Other (Please specify)

18. Which factors had a negative impact on your NDSR experience? Select all that apply:
    ☐ Lack of program structure
    ☐ Lack of support and/or communication from NDSR program staff
    ☐ Unclear responsibilities or expectations
    ☐ Interactions with resident Interactions with other hosts
    ☐ Other (Please specify)

19. How long do you think the NSDR residency should last?
    ☐ Less than 9 months
    ☐ 9 months
    ☐ 12 months
    ☐ 12 months or more

20. Please provide any additional comments about your overall NDSR experience:

Post-Residency Outcomes:

The purpose of this section is to gather information about the impact that the NDSR program had on your organization.

21. Rate your understanding of the risks facing digital materials at your organization after to the residency on a scale of 1–5:
    ☐ 1 (Poor)
    ☐ 2
    ☐ 3 (Adequate)
    ☐ 4
    ☐ 5 (Very Strong)

22. How would you characterize the residency's effect on your own understanding of digital stewardship?
    ☐ It made little to no impact on my understanding of digital stewardship
    ☐ It improved my understanding of digital stewardship in select areas
    ☐ It significantly expanded and enriched my understanding of digital stewardship

23. How would you characterize the residency's contribution to your organization's overall awareness of digital preservation issues?
    - ☐ Insignificant
    - ☐ Valuable in some units or areas
    - ☐ Valuable overall
    - ☐ Transformational

24. How would you characterize the residency's contribution to your organization's digital stewardship practices?
    - ☐ Insignificant
    - ☐ Valuable in some units or areas
    - ☐ Valuable overall
    - ☐ Transformational

25. How would you characterize the residency's contribution to your organization's digital stewardship policies?
    - ☐ Insignificant
    - ☐ Valuable in some units or areas
    - ☐ Valuable overall
    - ☐ Transformational

26. How would you characterize the residency's effect on higher-level administration at your organization?
    - ☐ It made little to no impact on higher-level administration
    - ☐ It clarified the importance of digital stewardship to higher-level administration
    - ☐ It significantly impacted higher-level administration's prioritization and/or funding for digital preservation
    - ☐ Other (Please specify)

27. Please expand or provide additional comments on how hosting an NDSR resident and project affected digital stewardship at your organization:

APPENDIX 4:
Interview and Site Visit Protocols

The following guides—Interview Guide for NDSR Residents, Interview Guide for NDSR Supervisors, and NDSR Site Visit Questions—provide the generic questions that guided CLIR's interviews. They were sent to participants prior to interviews and site visits. The team asked additional follow-up questions when appropriate. In particular, the questions for the site visits, which took place in April and May of 2016, were personalized based on earlier interviews.

4.1 Interview Guide for NDSR Residents

Background Information

1. How did you find out about the NDSR program?

2. Why were you initially interested in becoming a resident?

   Possible follow-up prompts:
   a. What specific skills were you hoping to gain through participation in the program?
   b. What broader professional goals did you hope to achieve through participation in the program?

The Residency

3. What are the most beneficial components of the NDSR curriculum? For example, were there specific sessions during the initial "boot camp" or immersion workshop (initial intensive training period) that covered crucial learning material?

   Possible follow-up prompt:
   a. Do you have any specific suggestions for material you'd like to see covered during the immersion workshops?

4. Are there any additional skills or material that residents need exposure to during the NDSR program—through the immersion workshop curriculum or otherwise?

5. Are there specific benefits—or drawbacks—to the cohort experience?

   Possible follow-up prompts:
   What kinds of interactions have you had with the other residents and how have those contributed to your goals? *Or* What is the quality and quantity of your interactions with the other residents, both formally and informally?

6. At a broad level, what have been the most valuable professional skills and experiences that the residency has allowed you to acquire? For example: collaboration, project management, or networking with professionals in the digital preservation field. *Or* At a broad level, what *key* professional skills and experiences has the residency allowed you to acquire?

7. What kinds of broad digital preservation issues are you being exposed to at your host organization?

   Possible follow-up prompt:
   a. Overall, how do you think your project will contribute to your host organization's digital stewardship needs?

Your NDSR Project

8. How is your NDSR project advancing and have you had to make any adjustments to your objectives and deliverables?

9. In what ways, if any, has the residency revealed unexpected issues or results related to digital stewardship thus far?

10. What kinds of challenges, if any, have you encountered while working on your project?

    Possible follow-up prompt:
    a. How have you addressed these challenges, and what role, if any, did NDSR administrators and your mentor/supervisor play in resolving those challenges?

11. What kinds of challenges, if any, have you encountered during your residency or in participating in the NDSR program as a whole?

    Possible follow-up prompt:
    a. How have you addressed these challenges, and what role, if any, did NDSR administrators and your mentor/supervisor play in resolving those challenges?

Concluding Questions

12. In what ways do you envision the residency being most useful to your career?

    Possible follow-up prompt:
    a. How do you think your cohort group might benefit you in the future?

13. How do you think the NDSR program could be improved?

    Possible follow-up prompts:
    a. How did you find the application process?
    b. How do you feel about the length of the residency?

14. Do you have any final comments regarding your NDSR experience?

4.2 Interview Guide for NDSR Supervisors

Background Information

1. How would you describe your organization's approach to digital stewardship prior to the residency?

2. What were the initial goals and expectations that prompted your organization's involvement with the NDSR program?

    Possible follow-up prompts:
    a. What were your initial expectations for how the NDSR residency would impact your organization's digital preservation practices and goals?
    b. How did your goals inform how you selected the resident?

Your NDSR Project and Resident

3. How is your NDSR project advancing and have you had to make any adjustments to your objectives and deliverables?

    Possible follow-up prompt:
    a.   In what ways to you think the residency will contribute to your organization's overall, long-term digital stewardship strategy?

4. In what specific ways has the residency already contributed to your organization's digital preservation strategy?

5. In what ways has your resident's expertise aligned with your expectations and the needs of your specific project?

Possible follow-up prompt:
a.   What are the most important skills and tools that your resident is employing in their project work?

6. In what ways, if any, has the residency revealed unexpected issues or results related to digital preservation?

Possible follow-up prompt:
a.   In what specific ways has the perspective of an outsider to your organization been insightful?

7. At a broad level, what kinds of professional skills or aptitudes has the resident acquired through their experience at your organization?

Overall NDSR Experience

8. What particular elements of the NDSR program are key to a successful experience from the supervisor/mentor standpoint?

Possible follow-up prompts:
a.   What elements of the program make your job as a mentor/supervisor easier?
b.   What elements of the program make your job as a mentor/supervisor more challenging?
c.   Are there any additional resources or areas that you need more support in?

9. What is the frequency and quality of your interactions with the other mentors/supervisors?

10. What kinds of challenges, if any, have you encountered hosting your resident?

Possible follow-up prompt:
a.   Did anyone help you resolve those challenges? If so, who and how did they help you?

11. What kinds of challenges, if any, have you encountered in participating in the NDSR program more broadly?

Possible follow-up prompt:
a.   Did anyone help you resolve those challenges? If so, who and how did they help you?

12. How do you think the NDSR program could be improved?

13. Do you have any additional comments regarding your NDSR experience?

4.3 NDSR Site Visit Protocols

Questions for Supervisors and Residents

Outcomes
- Please briefly describe the key deliverables produced by the residency.
- As a result of the residency, what specific changes were made to how digital stewardship is implemented at your organization?
  - For example, does preservation happen sooner in the life cycle of digital records? Did the residency result in improved preservation workflows, or an established set of best practices?

Questions for Supervisors

Impact on Organization
- Please briefly describe some of the major anticipated impacts of the residency.
  - What changes, if any, have been made to your organization's digital stewardship policy as a result of the residency?
  - How has the residency been received by upper-level administration at your organization?
    - Have you received additional funding or support for digital stewardship and/or the creation of a new position as a result of the residency?
- What, if any, cultural changes regarding digital stewardship occurred at your organization as a result of the residency?
  - Has the residency increased awareness of digital stewardship across your organization? If so, can you provide some concrete examples of how it has done this?
- The NDSR residents blogged about and presented on their projects extensively—how has this aspect of the residency increased the visibility of your organization?
- How confident do you feel about the long-term sustainability of the advances made under this project?

Questions for Residents

Residency Experience
- How many units or departments in your host organization did the residency require you to work with or be in touch with?
  - Professionally, how have you benefited from your relationship to co-workers at your host organization?

Career
- Now that you have completed your residency where do you see your career heading?
  - Are you applying for jobs specifically related to digital preservation?
  - Has your residency experience changed the kinds of jobs you are now prepared for and interested in pursuing?

- What aspects of the residency will you highlight in job interviews?
- How do you think your skill set has expanded?
- What kind of support from your mentor/supervisor—and NDSR community more broadly—have you received in your job search?

Community
- How do you plan to keep in touch with your immediate cohort, now that the residency is over?
  - For example, are you planning any papers at conferences or continued meetings?
- How would you like to engage with the broader NDSR community in the future?

APPENDIX 5:
Interview and Site Visit Participants

Meridith Beck Mink conducted interviews in January and February of 2016. All residents and supervisors from the 2015–2016 Boston, New York, and Washington, D.C. cohorts participated. Mink created structured interview protocols for the resident and supervisor interviews (available in Appendix 4). Some interviews were recorded with the permission of interviewees, and transcribed by research associate Samantha DeWitt.

The CLIR assessment team conducted site visits in April and May of 2016. All residents and supervisors from the 2015–2016 Boston, New York, and Washington, D.C. cohorts participated in these visits, with the exception of Dragan Espenschied of Rhizome. The protocol for site visits is available in Appendix 4.

List of Interviewees

Lauren Algee
Special Collections Digital Curation Librarian, D.C. Public Library
Supervisor, NDSR-DC 2015–2016

Howard Besser
Professor of Cinema Studies and Associate Director of New York University's Moving Image Archiving & Preservation Program (MIAP), New York University
Member, AAPB NDSR Advisory Board
Member, NDSR-NY Advisory Board
Consultant, NDSR-DC

Erica Boudreau
Archivist, John F. Kennedy Library
Supervisor, NDSR Boston 2015–2016

John Caldwell
Resident, U.S. Senate Historical Office
NDSR-DC 2015–2016

Karen Cariani
Director, WGBH Media Library and Archives at WGBH Educational Foundation
Supervisor, NDSR Boston 2014–2015

Valerie Collins
Resident, American Institute of Architects
NDSR-DC 2015–2016

Kristen Confalone
Project Manager, NDSR Boston 2014–2016

Nicole Contaxis
Resident, National Library of Medicine
NDSR-DC 2015–2016

George Coulbourne
Chief of Interns, Fellows and Residents, Library of Congress
Program Officer, NDSR-DC, 2013–Present

Alexandra Curran
Resident, Massachusetts Institute of Technology Libraries
NDSR Boston 2015–2016

Carmel Curtis
Resident, Brooklyn Academy of Music
NDSR-NY 2015–2016

Leilani Dawson
Processing Archivist, Wildlife Conservation Society
Supervisor, NDSR-NY 2015–2016

Andrew Elder
Digital Archives and Outreach Librarian, University of
Massachusetts Boston
Supervisor, NDSR Boston 2015–2016

Jeffrey Erickson
Resident, University of Massachusetts Boston
NDSR Boston 2015–2016

Dragan Espenschied
Digital Conservator, Rhizome
Supervisor, NDSR-NY 2015–2016

Kim Fisher
Spatial Analyst and Developer, Wildlife Conservation Society
Supervisor, NDSR-NY 2015–2016

Rebecca Fraimow
Archivist, WGBH
Program Coordinator, AAPB NDSR

Andrea Goethals
Manager of Digital Preservation and Repository Services,
Harvard University
Program Director and Supervisor, NDSR Boston 2014–2016

Nancy Hadley
Senior Manager of Archives and Records, American Institute of Architects
Supervisor, NDSR-DC 2015–2016

Dinah Handel
Resident, CUNY Television
NDSR-NY 2015–2016

Genevieve Havemeier-King
Resident, Wildlife Conservation Society
NDSR-NY 2015–2016

Nicholas Kerelchuk
Technology and Innovation Manager, D.C. Public Library
Supervisor, NDSR-DC 2015–2016

Mary Kidd
Resident, New York Public Library
NDSR-NY 2015–2016

Lisa LaPlant
Information Technology Specialist, U.S. Government Publishing Office
NDSR-DC 2015–2016

Nancy McGovern
Program Manager, Digital Preservation Strategy, Massachusetts Institute of Technology
Curriculum Coordinator and Supervisor, NDSR Boston 2014–2016

Morgan McKeehan
Resident, Rhizome
NDSR-NY 2015–2016

Jaime Mears
Resident, D.C. Public Library
NDSR-DC 2015–2016

Kris Nelson
Former Program Management Specialist, Library of Congress, 2010–2015
Program Coordinator, NDSR-DC

Margo Padilla
Strategic Programs Manager, METRO
Project Director, NDSR-NY 2014–2015

John Passmore
Archives Manager, New York Public Radio
Supervisor, NDSR-NY 2015–2016

Ben Petersen
Preservation and Collection Management Section Head, National
Library of Medicine
Supervisor, NDSR-DC 2015–2016

Alice Sara Prael
Resident, John F. Kennedy Presidential Library
NDSR Boston 2015–2016

Alix Quan
Assistant Director and Head of Reference, State Library of
Massachusetts
Supervisor, NDSR Boston 2015–2016

Stefanie Ramsay
Resident, State Library of Massachusetts
NDSR Boston 2015–2016

Dave Rice
Technologist Consultant and Audiovisual Archivist, CUNY TV
Supervisor, NDSR-NY 2015–2016

Joanne Riley
University Archivist, University of Massachusetts Boston
Supervisor, NDSR Boston 2015–2016

Julie Seifert
Resident, Harvard Libraries
NDSR Boston 2015–2016

Evelyn Shunaman
Processing Archivist, Brooklyn Academy of Music
Supervisor, NDSR-NY 2015–2016

Jessica Tieman
Resident, U.S. Government Publishing Office
NDSR-DC 2015–2016

David Walls
Preservation Librarian, U.S. Government Publishing Office
Supervisor, NDSR-DC 2015–2016

Alison White
Deputy Senate Archivist, U.S. Senate
Supervisor, NDSR-DC 2015–2016

List of Sites Visited

American Institute of Architects
Washington, D.C.
Resident: Valerie Collins
Supervisor: Nancy Hadley

Brooklyn Academy of Music
Brooklyn, NY
Resident: Carmel Curtis
Supervisor: Evelyn Shunaman

CUNY TV
New York, NY
Resident: Dinah Handel
Supervisor: Dave Rice

D.C. Public Library
Washington, D.C.
Resident: Jaime Mears
Supervisors: Lauren Algee, Nicholas Kerelchuk

U.S. Government Publishing Office
Washington, D.C.
Resident: Jessica Tieman
Supervisors: Lisa LaPlant, David Walls

Harvard Libraries
Cambridge, MA
Resident: Julie Seifert
Supervisor: Andrea Goethals

John F. Kennedy Library
Boston, MA
Resident: Alice Sara Prael
Supervisor: Erica Boudreau

Massachusetts Institute of Technology Libraries
Cambridge, MA
Resident: Alexandra Curran
Supervisor: Nancy McGovern

National Library of Medicine
Bethesda, MD
Resident: Nicole Contaxis
Supervisors: Ben Peterson, Rebecca Warlow

New York Public Radio
New York, NY
Resident: Mary Kidd
Supervisors: John Passmore, Andy Lancet

Rhizome
New York, NY
Resident: Morgan McKeehan
Supervisor: Dragan Espenschied

State Library of Massachusetts
Boston, MA
Resident: Stefanie Ramsay
Supervisor: Alix Quan

U.S. Senate Historical Office
Washington, D.C.
Resident: John Caldwell
Supervisor: Alison White

University of Massachusetts Boston
Boston, MA
Resident: Jeffrey Erickson
Supervisors: Joanne Riley, Andrew Elder

Wildlife Conservation Society
Bronx, NY
Resident: Genevieve Havemeyer-King
Supervisors: Leilani Dawson, Kim Fisher

APPENDIX 6:
NDSR Advisory Board Members

Library of Congress NDSR Curriculum Development Panel Members

Jefferson Bailey
Director of Web Archiving Programs
The Internet Archive

Andrea Goethals
Manager of Digital Preservation and Repository Services
Harvard University

Ross Harvey
Adjunct Professor at RMIT University
(Formerly of Simmons College)

Ingrid Hsieh-Yee
Catholic University of America
School of Library and Information Science

Lisa Johnston
Research Data Management/Curation
University of Minnesota

Ronald L. Larsen
Dean of the School of Information Sciences
University of Pittsburgh

Jacob Nadal
Executive Director
ReCAP (Research Collections and Preservation Consortium)

Naomi L. Nelson
Director, David M. Rubenstein Rare Book & Manuscript Library
Duke University

Katherine Skinner
Executive Director
Educopia Institute

Boston Advisory Board Members

Karen Cariani
Director, WGBH Media Library and Archives
WGBH Educational Foundation

Michele V. Cloonan
Dean and Professor, Graduate School of Library & Information Science
Simmons College

Michele Kimpton
Co-Founder and former CEO
DuraSpace

Elaine Martin
Director of Library Services, The Lamar Soutter Library
University of Massachusetts Medical School

Megan Sniffin-Marinoff
University Archivist
Harvard University Archives

New York Advisory Board Members

Howard Besser
Professor of Cinema Studies and Associate Director of New York University's Moving Image Archiving & Preservation Program (MIAP)
New York University

Sumitra Duncan
Web Archiving Coordinator
New York Art Resources Consortium

Kara Van Malssen
Senior Consultant
AVPreserve

AAPB Advisory Board Members

Snowden Becker
Program Manager, Moving Image Archive Studies Program
University of California, Los Angeles

Howard Besser
Professor of Cinema Studies and Associate Director of New York University's Moving Image Archiving & Preservation Program (MIAP)
New York University

George Coulbourne
Executive Program Officer, Office of Strategic Initiatives
Library of Congress

Andrea Goethals
Manager of Digital Preservation and Repository Services
Harvard University

Nancy McGovern
Head of Curation and Preservation Services
Massachusetts Institute of Technology

Stephanie Sapienza
Project Manager, Maryland Institute for Technology in the
Humanities
University of Maryland

Kara Van Malssen
Senior Consultant
AVPreserve

Leah Weisse
Digital Archive Manager, Production Archival Compliance Manager
WGBH Educational Foundation