



# LAURA BUSH 21<sup>st</sup> CENTURY LIBRARIAN PROGRAM

Sample Application RE-259001-OLS-25  
Project Category: Early Career Research

University of Michigan (School of Information)

Amount awarded by IMLS:      \$667,509

The University of Michigan School of Information will implement a three-year Early Career Development research project. Dr. Rebecca D. Frank will examine how stakeholders in the CoreTrustSeal (CTS) digital repository certification process understand and construct the concept of risk. The study investigates how participants' understanding of risk influences preservation actions and their perception of certification value. Research activities include semi-structured interviews with CTS stakeholders, comparative case studies of two certified repositories, and an evaluation of the CTS system using Becker's Assessment Framework. Expected deliverables include scholarly publications, guidelines for under-resourced institutions seeking certification, and educational modules for LIS students and practitioners. The project will benefit stakeholders in the CTS system, digital preservation practitioners more broadly, smaller institutions seeking certification, and LIS students, while contributing to the theoretical foundation of repository certification and risk assessment in digital preservation.

Attached are the following components excerpted from the original application.

- Narrative
- Schedule of completion

When preparing an application for the next deadline, be sure to follow the instructions in the most recent Notice of Funding Opportunity for the grant program to which you are applying.

## 1. Project Justification

### 1.1. Introduction

“The Social Construction of Risk in Trustworthy Digital Repository Certification (SCOR-TDR)” is a three-year \$667,509 Laura Bush 21st Century Librarian Program Early Career Development research project led by Dr. Rebecca D. Frank at the University of Michigan School of Information (UMSI), which addresses **LB21 Goal 2, Objective 2.2** (i.e., support the research of untenured, tenure-track library and information science faculty), and **LB21 Goal 2, Objective 2.1** (i.e., develop or enhance professional development and training programs to enable the library and archival workforce to meet the needs of their communities).

This research centers on examining how stakeholders in digital preservation construct their understanding of risk, with the CoreTrustSeal (CTS) certification process serving as the specific context for investigation. The mandate for federally funded data to be made accessible (Nelson, 2022) adds urgency to questions of trustworthiness in digital repositories. This proposal critically examines CTS as a risk assessment framework for evaluating such repositories. In this project, through activities including 1) interviews with CTS stakeholders; 2) a comparative case study of two geographically and thematically distinct CTS certified repositories; and 3) a formal evaluation of the CTS system, the PI and her students will investigate the following **research questions**:

- (1) How do stakeholders (i.e., standard developers, auditors, and repository staff members) in the CTS repository certification process understand risk in the context of digital preservation? Which factors, if any, from the Model for the Social Construction of Risk in Digital Preservation influence their understanding of risk?;
- (2) How do participants’ understandings of risk influence behaviors regarding preservation actions and repository certification?; and
- (3) How do stakeholders in the CTS certification system understand the value of certification?

### 1.2. Repository Certification Acronyms (in alphabetical order)

Below you will find a brief list of acronyms that appear throughout this proposal.

*Table 1: Overview of Acronyms*

| Acronym   | Description                                                                                                                                                                                                                                                                                                        |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TDR       | Trustworthy Digital Repository is a term used to describe a repository that has undergone an audit and achieved certification; it is a general term that does not refer to any specific certification.                                                                                                             |
| ISO 16363 | Process for the audit and certification of trustworthy digital repositories based on the Open Archival Information System (OAIS) Model. ISO 16363 is the number of the standard that governs the process.                                                                                                          |
| TRAC      | Trustworthy Digital Repositories: Audit and Certification is a repository certification process that was administered by the Center for Research Libraries in the early- to mid-2010s. This process was separate from ISO 16363 certification, but in practice the terms have sometimes been used interchangeably. |
| CTS       | CoreTrustSeal is a certification system in which repositories are evaluated for sustainability and trustworthiness.                                                                                                                                                                                                |

### 1.3. Statement of Broad Need

**Need:** A common theme across existing research is the assumption that repositories that achieve CTS certification are indeed trustworthy for long-term preservation and that the system works largely as intended. In contrast, this project investigates how stakeholders construct their understanding of a foundational concept in repository certification: risk. Examining repository certification in terms of risk allows us to critically assess the assumptions that underpin the certification process. Because risk is a term that has different meanings across disciplines, it is crucial to understand the varied perspectives of stakeholders to ensure an effective certification process. There is a need for research that examines the foundations of repository certification rather than its effects, and this project fills that gap.

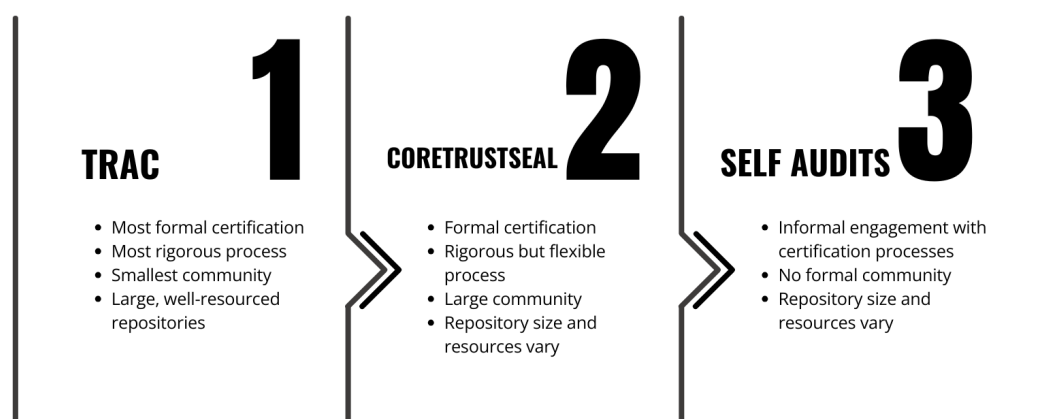
**Impact:** This project will (1) contribute to the theoretical foundation of repository certification by providing insights into the social aspects of the process; (2) equip practitioners with a deeper understanding of risk in digital preservation and curation, enabling them to engage more effectively in certification processes; (3) make repository certification more accessible to smaller organizations by providing practical guidance and scalable approaches tailored to their unique challenges and resources; and (4) contribute to LIS education by fostering mentorship opportunities for student researchers and supporting the development of educational programming for LIS practitioners.

#### **1.4. Context: Research Agenda**

The project proposed here is the second in a series of three planned studies (see Figure 1 below) focusing on risk in digital preservation, moving from formal to informal certification systems and well-resourced to under-resourced repositories. The first was an examination of risk in the context of the TRAC certification process (e.g., Frank, 2018, 2020, 2022b, 2024). This study investigated the most formal and stringent TDR certification process, administered to a small number of well-resourced North American repositories. This study also produced a theoretical framework for the social construction of risk in digital preservation (see Figure 2 below) as well as a typology of risk sources identified by stakeholders (e.g., Frank, 2020, 2022b). The TRAC project found that while stakeholders agreed on the risks facing digital repositories, they disagreed about whether achieving TRAC certification did indeed verify that a repository was trustworthy for long-term digital preservation (Frank, 2022b). Staff members of certified repositories were skeptical, while standard developers and auditors were confident in the process. For example, the requirement that repositories have a succession plan was viewed as an effective way to manage financial and organizational risk by standard developers and auditors, but repository staff members argued that succession plans would be ineffective and unenforceable.

**An examination of the CTS certification system is the next phase of this long-term research agenda.** This proposal, which represents the second phase of this multi-year research agenda, moves to the CTS repository certification system. CTS is a less formal certification system, with a smaller number of more flexible requirements than TRAC, a less costly application process for repositories, and a less formal process for selecting members of the audit team. The CTS community represents greater breadth in terms of repository type, institution type, language, focus, geographic range, and communities served.

The third phase of this research will examine the experiences of repositories that engage in self-audits. This, the least formal approach to TDR certification, will investigate the experiences of repositories that are either unable to participate in formal certification systems, or that choose to demonstrate trustworthiness through efforts outside of, or adjacent to, those systems.



*Figure 1: Research Trajectory*

The three phases of this research agenda complement and build upon one another to produce a robust understanding of the factors which influence how digital repository stakeholders construct their understanding of risk in the context of long-term digital preservation. By moving from formal to informal certifications, and well-resourced to under-resourced repositories, over time this research will provide a comprehensive view of the spectrum of digital preservation practices across different types of institutions and the varied perceptions of risk associated with each. This approach aims to identify the commonalities and differences in risk assessment and management across different certification systems and

resource levels. The ultimate goal is to develop clear and adaptable guidelines that can be used by many types of institutions to help them protect their digital collections against current and future risks. By doing so, the project seeks to contribute significantly to the field of digital preservation, offering insights that may help shape future standards and practices that ensure the longevity and integrity of digital information. This research agenda will also investigate whose voices shape digital preservation practices, by exploring the groups who establish and enforce standards (ISO 16363, TRAC), those who participate in the systems that uphold those standards (CTS), and institutions that operate outside those formal structures (self audits).

### **1.5. Risk in Digital Preservation**

Digital preservation consists of those actions that ensure the viability and authenticity of digital objects over time (e.g., Berman, 2008; Hitchcock et al., 2007). Risk is a foundational element of digital preservation (e.g., Barons et al., 2021; Conway, 1996; Schaefer et al., 2021). The long-term preservation of digital information is an ongoing exercise in risk management. In order to ensure the longevity of digital content, repositories preserving digital assets need to develop a sustainable organizational structure and financial stability as well as create robust processes to ensure the viability and accessibility of file formats and the long-term storage and management of data. Digital repositories must have the ability to manage risk in all of these areas (Anderson, 2005; Garrett & Waters, 1996; Hey et al., 2009).

The relationship between risk and digital preservation has been well documented. Some definitions characterize digital preservation as a type of risk assessment (Conway, 1996; Vermaaten et al., 2012) or risk management (Barateiro et al., 2010), and others describe digital preservation as consisting of actions or practices that include risk assessment and/or risk management (Barateiro et al., 2010; Ross & McHugh, 2006a, 2006b; Strodl et al., 2007). Scholarship in digital preservation has tended to examine and discuss risk in a deterministic way that treats it as both knowable and calculable. Recent initiatives have taken steps to develop systems that will help repositories quantify their risk exposure (e.g., Barons et al., 2021), to identify and/or classify types of threats and vulnerabilities (e.g., Saffady, 2020; Schaefer et al., 2021; Vermaaten et al., 2012), and develop typologies of risk (e.g., Barateiro et al., 2010; Benoit et al., 2023; Clifton, 2005; Dappert, 2009; Mayernik et al., 2020).

Although it is useful to carry out this descriptive work, it is also important to understand how people in digital preservation perceive and construct their understanding of risk (e.g., Burgess, 2015; Nelkin, 1989) because digital preservation outcomes depend on the actions of people in response to risk information – not just on the identification of risk (e.g., Dearborn & Meister, 2017; Luhmann, 2005). The proposed research will extend research about risk in digital preservation from questions about how to identify and classify threats to one that asks how people receive and interpret risk information. Digital preservation outcomes depend not just on identifying threats, but on how people behave in response to risk information.

#### **1.5.1. Theoretical Framework: A Model for the Social Construction of Risk in Digital Preservation**



*Figure 2: Model for the Construction of Risk in Digital Preservation*

This study will apply the Model for the Social Construction of Risk in Digital Preservation (Frank, 2020) to the CTS audit and certification process (see Figure 2 above). This model was developed during phase 1 of the research agenda depicted in Figure 1 above, and argues that digital preservation is a social process in which risks are interpreted by individuals, whose behaviors and actions are shaped by those interpretations. Applying this framework to an examination of stakeholders in the CTS process will provide an understanding of the social factors that contribute to their attitudes, and facilitate an examination of the CTS audit process that is human-centered rather than organizationally-, economically- and/or materials-centered.

The model depicted in Figure 2 above includes primary and secondary factors that contribute to the social construction of risk, meaning factors that have been shown to have substantial influence on how stakeholders in digital preservation construct their understanding of risk, and factors whose influence has been present but less substantial. The proposed research will apply this model to CTS in order to investigate whether and to what extent these factors influence the ways in which CTS stakeholders construct their understanding of risk. These are:

- *Communication*: Perceptions of risk change depending on how information is communicated, such as the source, method, and means. These factors can amplify or attenuate perceptions of risk (e.g., Kasperson & Kasperson, 1996).
- *Complexity*: High levels of complexity can make it difficult to identify hazards, and their probabilities and consequences. Complexity in systems can also lead to increased risk due to unexpected interactions between component parts (e.g., Perrow, 1999; Wilkinson, 2001).
- *Expertise*: Both expertise and lack of expertise can influence perceptions of risk. Experts may have specific knowledge but can be limited in their perspective, while non-experts may have a broader understanding of social contexts (e.g., Wynne, 1992).
- *Organizations*: Organizations both produce and manage risk, and perceptions of risk and are impacted by the roles of individuals within them. Risk management activities occur within an organizational context, and are affected by the organization and the individuals participating in them (e.g., Vaughan, 1996).
- *Political Culture*: National context influences how risks are defined. Perceptions of risk are shaped by the political culture within which individuals exist, and by their place or role within that culture (e.g., Jasanoff, 1986).
- *Trust*: Perceptions of risk can vary depending on the trust among individuals and groups with different knowledge and expertise in an organization (e.g., Wildavsky & Dake, 1990).
- *Uncertainty*: Risk and its components (hazard, probability, consequences) are hard to identify and understand in uncertain situations, and uncertainty affects how people perceive risk (e.g., Tversky & Kahneman, 1974; van Est et al., 2012).
- *Vulnerability*: Risk exposure, or vulnerability, influences perceptions of risk. Those who can manage their exposure to risks may view them differently than those who cannot (e.g., Murphy, 2006).

#### **1.6. Trustworthy Digital Repository Certification: CoreTrustSeal**

There is an urgent need for trustworthy and reliable repositories that have demonstrated the ability to preserve and provide access to digital information (e.g., COAR et al., 2021; Downs, 2021). CTS is a community-based certification system that evaluates digital repositories in order to determine whether they are trustworthy stewards of digital information capable of long-term preservation. The certification process is one in which repository staff members are asked to engage in risk identification and assessment, providing documentary evidence that their organization understands and is prepared to respond to risks that threaten both the repository and its digital collections. Once a repository is certified, members of its staff are invited to become auditors, administering the certification for future applicants (Dillo & De Leeuw, 2018).

Previous scholarship about CTS has examined the development and maintenance of the CTS system (e.g., L'Hours et al., 2019), the influence that CTS has on repositories (e.g., Donaldson, 2020), and the experiences of individual repositories through the CTS certification process (e.g., Hutchison et al., 2021; Medina-Smith, 2021). Scholarship has also examined concepts that are foundational across TDR certification systems (e.g., Bak, 2016; Bettivia, 2016). Researchers have conducted research about CTS by examining the publicly available audit reports (e.g., Donaldson & Russell, 2023), and through single-site case studies (e.g., Lindlar & Schwab, 2019). Missing from this landscape is research which examines the entire CTS system.

Risk is foundational for repository certification (e.g., Frank, 2022b), but scholarship has tended to focus on trust and trustworthiness (e.g., Bak, 2016; Donaldson & Russell, 2023; Dryden, 2011; Faundeen, 2017). Research about TDR

certification has examined the trustworthiness of repositories that have received certification (e.g., Donaldson, 2020; Donaldson & Russell, 2023), investigated the process and/or value proposition of certification (e.g., Conzett, 2021; Lindlar & Schwab, 2019), and examined particular elements of certification such as the Designated Community (e.g., Bettivia, 2016; Moles, 2022). Other scholarship has described the process of developing and maintaining certification systems (e.g., Dobratz & Neuroth, 2008; Giaretta, 2011; L'Hours et al., 2019), and reported on the experience of becoming certified as a TDR (e.g., CLOCKSS, 2014; Free, 2011; Kirchhoff et al., 2010).

The majority of this work has operated from the baseline assumption that TDR certification delivers on its promise to evaluate the trustworthiness of digital repositories for long-term preservation. Meaning, repositories that become certified have shown that they can preserve digital information. For example, Donaldson and Russell investigated whether repositories' CTS certification scores improved over time, but asked whether repositories "improved their trustworthiness" (2023, p. 553). Scholarship that has been critical of TDR certification has argued, for example, that a designation of trustworthiness conferred by a panel of auditors does not necessarily translate into a repository that is trusted by stakeholders (e.g., Bak, 2016), that foundational concepts such as the Designated Community are poorly defined and difficult to implement (e.g., Bettivia, 2016; Moles, 2022), and that frameworks for repository assessment have not been sufficiently examined (e.g., Maemura et al., 2017). In contrast to critiques such as these, which focus on implementation and/or results of TDR certification processes, there is a need for research that critically investigates the theories and concepts that form the foundations of repository certification - such as risk.

### **1.7. Pilot Study**

This proposal also builds upon a pilot study conducted in 2020-21, which included a survey of all CTS certified repositories, and qualitative interviews with 17 CTS stakeholders. Response rates for both the survey and interviews were above 50%, and comparable response rates are expected for the study proposed here. The data from that pilot study can be combined with future data from this project to enable robust analyses of CTS stakeholders. Findings from this pilot study indicate that stakeholders in the CTS system have more consistent views of risk than stakeholders in the TRAC certification system (e.g., Frank, 2022a, 2023; Frank et al., 2024). This is notable given the breadth of CTS stakeholders compared to TRAC stakeholders.

### **1.8. Research Gap**

Current research in this field generally makes two assumptions: (1) that repositories with CTS certification are indeed trustworthy for long-term preservation, suggesting the system works as designed, and (2) that risks can be precisely identified and measured, and that people involved with digital repositories will respond to risk information in predictable ways. In contrast to these perspectives in existing studies about repository certification, this project aims to explore how different stakeholders build their understanding of risk—a fundamental concept in repository certification. There is a need for research that examines the underlying principles of repository certification rather than focusing on its effects, and this project addresses that gap.

## **2. Project Work Plan**

### **2.1. Overview of Activities**

This project will involve three main activities, which will collectively address the three research questions by building an understanding of the social construction of risk across different levels of analysis and stakeholder groups in the CTS system: (1) **in-depth semi-structured interviews** with CTS stakeholders (e.g., staff members from CTS certified repositories, CTS Board members, and CTS Assembly of Reviewers members); (2) a **comparative case study** of two geographically and thematically distinct CTS certified repositories (both have agreed to participate); and (3) an **evaluation** of the CTS system using Becker et al.'s Evaluation Method for Assessment Frameworks (Becker et al., 2018). Analysis of data from these activities will be conducted using appropriate tools (e.g., SPSS, NVivo, etc.). Reliability measures such as interrater reliability (i.e., Scott's pi) will be applied across all three research activities where appropriate (e.g., McDonald et al., 2019; Scott, 1955). In addition to Dr. Frank, doctoral and graduate research assistants will be engaged in planning and execution of all research activities described here.

*Table 2: Overview of Activities*

| Activity   | Description                                                                                         | Timeframe | Research Question |
|------------|-----------------------------------------------------------------------------------------------------|-----------|-------------------|
| Interviews | In-depth semi-structured interviews with CTS stakeholders                                           | Years 1-2 | RQ 1, 2, 3        |
| Case Study | A comparative case study of two geographically and thematically distinct CTS certified repositories | Years 1-2 | RQ 1, 2, 3        |
| Evaluation | An evaluation of the CTS system using Becker et al.'s Evaluation Method for Assessment Frameworks   | Years 2-3 | RQ 3              |

## 2.2. Personnel and Management

### 2.2.1. Key Personnel

**Principal Investigator:** Dr. Rebecca D. Frank, is an Assistant Professor at the [University of Michigan School of Information \(UMSI\)](#). She is also affiliated with the [Inter-University Consortium for Political and Social Research \(ICPSR\)](#), and the [Einstein Center Digital Future](#), an Einstein Foundation funded research center that supports digitalization research which is located in Berlin, German. Prior to joining the faculty at UMSI, she had appointments at the School of Information Sciences at the University of Tennessee-Knoxville and the the Berlin School of Information Science at Humboldt-Universität zu Berlin. Her research examines the social construction of risk in trustworthy digital repository audit and certification. She also conducts research in the areas of open data, digital preservation, digital curation, and data reuse, focusing on social and ethical barriers that limit or prevent the preservation, sharing, and reuse of digital information. She has a PhD from the University of Michigan School of Information, an MSI from the University of Michigan School of Information with a specialization in Preservation of Information, and a BA in Organizational Studies from the University of Michigan. Her work has been supported by the Deutsche Stiftung Friedensforschung (German Foundation for Peace Research), the Einstein Centre Digital Future, the InfraLab Berlin, the National Science Foundation (United States), and the Australian Academy of Science.

**Graduate Student Research Assistant (GSRA):** A GSRA will be recruited in Year 1; this role will be filled by a doctoral student and their work on this project will contribute to their doctoral training. The GSRA will be involved in all data collection and analysis activities, contributing to publications and other research outputs, and assisting in project coordination.

**Hourly graduate research assistants:** Graduate research assistants will be recruited in the summer of years 1 and 2 of the project to participate in analysis of interview and case study data. These students will contribute to research publications and will have the opportunity for co-authorship. They will join the research team in the summer, when their contributions will be most effective and when the team will be best positioned to provide mentoring. It is anticipated that this work will contribute to their professional development and competency in digital curation.

**Advisors.** Two experts have agreed to serve as advisors for the project. The advisory board will have a virtual meeting with the PI once per year, with additional consultations as needed.

- **Dr. Suzie Allard** (University of Tennessee) is Chancellor's Professor & Board of Visitors' Professor at The University of Tennessee in the School of Information Sciences. She is also Associate Dean for Research for the College of Communication and Information (CCI) and Director of the CCI Research & Innovation Center. Dr. Allard is also the PI for the World Data Systems International Program Office (WDS-IPO). Allard is or has been PI or Co-PI on grants funded by the National Science Foundation, the Institute of Museum and Libraries Services, the Department of Energy Office of Science, the Alfred P. Sloan Foundation, IEEE and others. She is also a member of the Board of Directors for the Networked Digital Library of Theses and Dissertations.
- **Dr. Elizabeth Yakel** (University of Michigan) is the C. Olivia Frost Collegiate Professor of Information at the University of Michigan School of Information. Her research interests include digital archives and curation, specifically data reuse; teaching with primary sources; and the development of standardized metrics to enhance repository processes and the user experience. Yakel is or has been PI or Co-PI on grants funded by the National Science Foundation, the Institute of Museum and Libraries Services, and the Mellon Foundation.

Both have expertise in digital preservation, digital curation, and digital repositories, as well as extensive experience successfully managing grant-funded research in these areas. Each also brings unique knowledge to their advisory role, from Dr. Allard's experience with WDS, to Dr. Yakel's experience with research about data reuse and trust in digital repositories.

*An additional note:* the project has allocated funds for four advisory board members. An expert in repository certification who was attached to the project had to withdraw shortly before submission as a result of recent events in the research funding landscape. A suitable replacement will be found before the start of the project, with the goal of identifying someone with expertise in repository certification. The fourth space will also be filled at the start of the project.

### **2.3. Timeline of Activities**

Please refer to the Schedule of Completion for an overview of the timeline.

#### **2.3.1. Year 1: Interviews & Case Study**

- Administrative Tasks: Secure IRB approval, recruit doctoral student for Graduate Student Research Assistant (GSRA) position, recruit hourly Research Assistant (RA), meet with the Advisory Board.
- Interviews: Develop and pilot test interview protocol, begin data collection (interviews), process interview data, begin analysis (qualitative coding).
- Case Studies: Develop and pilot data collection instruments.

Year one will focus on establishing project infrastructure and beginning primary data collection. Administrative groundwork will include securing Institutional Review Board approval for our research protocols involving human subjects, recruiting a doctoral student to serve as Graduate Student Research Assistant, recruiting an hourly Research Assistant in the summer, and convening our Advisory Board for their first meeting. The interview phase will commence with the development of a semi-structured interview protocol informed by current literature on risk perception in digital preservation contexts, and drawing on the interview protocol from the pilot study (see Appendix B). After pilot testing and refinement, we will begin formal data collection with key CTS stakeholders. As interviews progress, we will implement transcription workflows and establish a systematic approach to qualitative coding to identify emergent themes in how stakeholders conceptualize and operationalize risk. Concurrently, we will develop case study methodology tailored to repository settings, creating observation protocols and document analysis frameworks that will enable robust data collection at our selected sites. These instruments will be designed to capture both explicit and implicit manifestations of risk assessment practices within certified repositories.

#### **2.3.2. Year 2: Interviews, Case Study & CTS Evaluation.**

- Administrative Tasks: Recruit hourly RA, meet with the Advisory Board, begin development of educational materials.
- Interviews: continue data collection until data saturation is reached, continue analysis of interview data.
- Case Studies: Collect data (2 site visits), process case study data and begin analysis.
- Evaluation: Collect and organize data for evaluation, conduct preliminary analysis, iterate on collection and preliminary analysis as needed.

The second year will see a deepening of our data collection and analysis efforts across all methodological strands. Administrative activities will include recruiting additional research assistance to support the intensified analytical work and reconvening the Advisory Board. Interview data collection will continue until theoretical saturation is achieved. Analysis will advance from initial open coding to more sophisticated axial coding, identifying conceptual relationships and theoretical constructs that explain variations in risk perception among different stakeholder groups. The case study component will enter its field research phase, with site visits conducted at two geographically and thematically distinct CTS-certified repositories. These visits will yield rich data on organizational cultures, certification implementation strategies, and practical risk mitigation approaches. We will synthesize field notes, institutional documentation, and contextual information to facilitate cross-case comparison and integration with interview findings. Evaluation of the CTS framework itself will begin with systematic collection and organization of certification documentation, historical materials, and implementation guides. Preliminary qualitative analysis will examine how risk is conceptualized within the framework, with iterative refinement of our analytical approach based on emerging insights from other data streams. Development of educational materials will begin.

### **2.3.3. Year 3: Case Study & CTS Evaluation.**

- Administrative Tasks: Meet with the Advisory Board, distribute educational materials, final IMLS report.
- Interviews & Case Studies: Continue data analysis as needed.
- Evaluation: Conduct evaluation.

The final project year will focus on completing analysis and synthesizing findings across methodological approaches. We will convene the Advisory Board for a culminating consultation on theoretical implications and practical recommendations before preparing our comprehensive final report for IMLS. The evaluation will be conducted using data collected in earlier phases of the research. Educational materials will be delivered via appropriate channels, and made available Open Access (OA) via a suitable digital repository. To maximize the impact and accessibility of our work, all publications, datasets, and other research outputs resulting from this project will be made available through OA channels, including peer-reviewed journals that support OA publishing models and digital repositories, ensuring that our findings reach the broadest possible audience of practitioners, researchers, and other stakeholders in the digital preservation community.

### **2.4. Research Activities**

Approval from the Institutional Review Board (IRB) at the PI's home institution will be secured before any participant recruitment or data collection activities begin. The interviews and case study activities described below are independent and may have some overlap in the project timeline. The evaluation, however, will rely on data collected during the interview and/or case study activities and will therefore take place in sequence following the first two activities.

#### **2.4.1. Interviews (RQs 1, 2, & 3)**

The PI and her team will conduct in-depth semi-structured interviews with approximately 20-25 CTS stakeholders from three groups: staff members from CTS certified repositories, current and/or past members of the Assembly of Reviewers, and current and/or past members of the CTS Board. Previous research has shown that repository staff involved in TDR certification tend to fall into three functional areas: digital preservation, repository administration, and IT (Frank, 2022b; Frank & Yakel, 2013). Care will be taken to ensure sufficient representation of interviewees across those three areas.

Interviewees will be recruited through a combination of purposive, convenience, and snowball sampling techniques. Potential interviewees will be identified via publicly available information provided by CTS via the certification website and historic documentation about the certification system. In addition, interviewees will be asked to recommend others. The previously described pilot study included interviews with a small group of CTS stakeholders, including members from each of the three stakeholder groups (i.e., repository staff members, Assembly of Reviewers, CTS Board). Pilot study participants were identified through a combination of publicly available information (e.g., via the CTS website) and survey respondents. The pilot study interviews had a 53.12% response rate and similar results are expected here. It is important to note that interviewees will not be drawn from staff members of the case study sites, nor will they be drawn from the list of people interviewed in the pilot study, in order to prevent overlap across data collection activities. Interviewees will also be recruited from a range of organizations, with no more than two people from any single repository.

Interview questions will ask participants to reflect on their understanding of risk in the context of digital preservation, their experiences with CTS audit and certification processes, involvement in the CTS system and/or experience as a reviewer or auditor (if applicable), and the value of repository certification. Interviews allow researchers to gain in-depth information about individual perceptions, beliefs, feelings, and experiences (Hennink et al., 2019). Semi-structured interviewing is considered best in situations where the researcher will only be able to conduct one interview with each participant, which will be the case for this study. This type of interview allows the researcher discretion to follow leads as they arise in the course of the interview, while providing a general guide that will ensure that the data generated are reliable and comparable (Bernard, 2013). The interview protocol developed through the pilot study can be found in Appendix B.

#### **2.4.2. Case Study (RQs 1, 2, & 3)**

Beginning in the first year of this project, the PI and her team will conduct a comparative case study. This will be a qualitative rather than ethnographic case study. Through site visits, semi-structured interviews, and content analysis of repository documentation, the PI and her team will closely examine two CTS certified repositories. Case study methods are well-suited for research that seeks to investigate phenomena in a real world context, particularly when those

phenomena cannot be easily separated from their context (Yin, 2018). This study will employ an embedded multiple-case study design, meaning that there will be two case study sites and the unit of analysis will be the staff members of those repositories (Yin, 2018). CTS certification is a phenomenon that intersects with all aspects of a digital repository, including social and technical elements, physical and digital infrastructure, and policy and processes. Through semi-structured interviews with staff members, a site visit to understand facilities and physical spaces, and content analysis of key documents, the research team will gain an understanding of the ways that repository staff members construct their understanding of risk and the social and organizational factors that contribute to those understandings.

In contrast with the interviews described in the previous section, the case study interviews will focus on an in-depth discussion of the repository's CTS audit process and results, and will provide an opportunity for the research team to ask follow-up questions about repository documentation, policies, and processes. The site visit will allow the research team to compare the repositories' audit documentation against the real-world implementation of the processes and policies described therein, and to ask more detailed questions about processes and facilities relevant to digital preservation and CTS certification.

Sites for the case study have been secured and their agreement to participate has been verbally confirmed with the relevant IMLS Program Officer for this proposal. One is a data repository affiliated with a National Laboratory and the other is a repository affiliated with a large university system. The sites are in geographically distinct locations in North America. Repository leadership at each site have approved site visits, have agreed to provide access to staff, and to share documentation relating to their CTS certification.

### **2.4.3. Evaluation (RQ 3)**

In the second and third year of the project the PI and her team will apply Becker et al.'s Evaluation Method for Assessment Frameworks to the CTS certification system (Becker et al., 2018, 2020). CTS is an appropriate target for this method, because the certification system has an appropriate mode, scope, and focus for this method, and is sufficiently compact and well documented to be feasible. Documentation and data needed for this evaluation will be collected in year 2, and the evaluation itself will be conducted in year 3 of this project. Data that will contribute to this evaluation include: CTS documentation (e.g., CTS requirements and guidance documentation), publicly available information about the CTS system produced by stakeholders, and documentation about the results of CTS audits. By evaluating CTS as a repository assessment framework, this project will provide insights about the design of the CTS assessment framework (i.e., the CTS requirements checklist), guidance for researchers examining CTS, and practical insights for repositories that use the CTS requirements and/or who wish to pursue CTS certification.

This is a relatively new method. To date, there is no published literature that has employed the Evaluation Method for Assessment Frameworks outside of the initial publication and report describing the method (Becker et al., 2018, 2020). As such, the application of this method will be both exploratory and iterative. In addition to generating insights about the CTS certification process, this research activity will also examine the applicability of this evaluation method to repository certification processes.

### **2.5. Evaluation Plan**

For each of the three research activities, data collection and analysis instruments will be pilot tested and revised if and/or as needed. Measures of reliability will be applied to all qualitative analysis (e.g., Scott's pi, Cohen's kappa, etc.) in order to ensure consistency and address potential confirmation bias (McDonald et al., 2019; Scott, 1955). Results from each research activity will be shared with relevant communities and target groups via webinars, professional conferences, and/or dedicated meetings across the life of the project. Each of these will provide an opportunity for feedback and evaluation, as well as member checking of results.

### **2.6. Dissemination Plan**

All products resulting from this research will be made available OA. Starting in Year 1, results from this research will be shared with both scholarly and practice-focused digital preservation communities via scholarly journal articles and peer-reviewed conference proceedings (e.g., JASIST, Journal of Documentation, Archival Science, Data Science Journal, ASIS&T, and the iConference); peer-reviewed venues with a focus on digital preservation/curation practice (e.g., IDCC, iPres) presentations in venues relevant to the CTS community (e.g., RDA, CODATA); practice-focused webinars (e.g., World Data Systems); direct communication with the CTS Board; and a final report to IMLS. The PI will present research at one domestic conference and one international conference each year of the project, for a combined total of six conferences. Participation in the publication process, and attendance at relevant conferences is an important aspect of

professional development. As such, doctoral and graduate student research assistants will also have the opportunity to contribute to publications and/or presentations in relevant venues. Practical results will include concrete guidelines for smaller and/or under-resourced institutions to participate in TDR certification processes such as CTS and an educational module for LIS students and practitioners that will enable a fuller understanding of risk in digital preservation and the repository certification process. These will be developed in years 1-2 and disseminated in year 3.

### **3. Project Results & Impact**

Results from this project will be both scholarly and practical. Findings about how CTS stakeholders construct their understanding of risk will offer insights about digital preservation and repository certification that may inform the ongoing development and implementation of the CTS system. Results will also provide insights about the effectiveness and perceived value of CTS certification in the context of risk, which will bring focus to an aspect of certification that has not yet been closely examined. This research will also provide verification and adaptation of the Evaluation Method for Assessment Frameworks, a new framework that has yet to be applied in this context. Practical results will include concrete guidelines for smaller and/or under-resourced institutions to participate in TDR certification processes such as CTS and an educational module for LIS students and practitioners that will enable a fuller understanding of risk in digital preservation and the repository certification process.

Through three research activities, this research will apply and refine the Model for the Social Construction of Risk in Digital Preservation and will examine the value of certification. This work will be conducted by a team including the PI, one doctoral GSRA, and two hourly GRAs. Over the course of this project, the team will produce peer reviewed journal articles, conference papers, presentations, and/or webinars to disseminate the results of this research.

Taking a constructivist approach, Dr. Frank and her team will examine the factors that influence the ways in which CTS stakeholders construct their understanding of risk in order to explore attitudes and beliefs about long-term digital preservation and the effectiveness of CTS certification to evaluate the trustworthiness of digital repositories. The proposed work will contribute to theory and practice in digital curation and preservation, data management, and risk. The project will generate insights about trustworthy digital repositories that transcend institutional contexts, bringing a social constructivist perspective to questions of risk for long-term preservation. Findings about the ways in which CTS stakeholders construct their understanding of risk will offer insights about digital preservation and repository certification that may inform the ongoing development and implementation of the CTS system. Results will also provide insights about the effectiveness and perceived value of CTS certification in the context of risk, which will bring focus to an aspect of certification that has not yet been closely examined.

Additionally, this project has a number of educational benefits. Doctoral and graduate students will contribute to data collection and analysis, preparation of publications and other research outputs, and project coordination. These activities will contribute to their professional development and will deepen their understanding of digital curation and repository management processes. The opportunities created through this project will provide students with hands-on educational experiences that will balance theory and practice, both of which are essential for preparing LIS students for contemporary professional and academic opportunities.

In conclusion, this research addresses a fundamental question that impacts everyone who creates or uses digital information: how do we effectively identify, assess, and manage the risks threatening the long-term survival of valuable digital content? By examining how people understand and respond to risks in digital preservation, this project will yield insights that extend well beyond the CTS community to benefit a wide range of institutions working to preserve our digital heritage. The findings will help institutions make more informed risk-management decisions about protecting their digital collections, regardless of their size or resources. Educational materials developed through this work will prepare the next generation of information professionals to recognize and mitigate preservation risks more effectively. As digital materials increasingly form the foundation of our cultural, scientific, and historical record, this research serves a crucial public need by helping institutions better protect these resources against both current and emerging threats. Ultimately, this work aims to strengthen our collective ability to safeguard valuable digital information by focusing on the human dimensions of risk perception and response—benefiting not just repository managers but all who depend on reliable access to trustworthy digital information for generations to come.

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