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## Electronic Records Archives

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**Electronic Records Archives**

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**Master of Science**

**Historic Preservation**

**School of Architecture, Art and Historic Preservation**

**Roger Williams University**

**Spring 2015**

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Electronic Records Archives

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## TABLE OF CONTENTS

TITLE PAGE:	i
SIGNATURES:	ii
TABLE OF CONTENTS:	iii
ABSTRACT:	v
LIST OF FIGURES:	vi
 PREFACE:	 1
 CHAPTER 1: ELECTRONIC RECORDS, BEST PRACTICES	
1.0 Introduction:	3
1.1 Electronic Records Infancy:	3
1.1.1 Digital Preservation Challenges:	4
1.2 Defining Digital Entities:	5
1.2.1 Quantities of Material:	5
1.3 Preservation Software:	6
1.4 Intervene at Critical Points:	6
1.4.1 Consulting:	7
1.5 Preservation Strategies:	8
1.6 Digitization Projects:	8
1.7 Early Electronic Records Development (1960s onward):	9
1.8 Electronic Commerce:	17
1.9 Allied Systems Functionality:	18
1.10 Diversity of Technologies:	19
1.10.1 Upgrades, Updates, and Conversions:	22
1.10.2 Programming and Coding:	22
1.10.3 Coding Languages:	23
1.11 Outreach and Advertising:	25
 CHAPTER 2: PROBLEM ISSUES OF THE PAST AND PRESENT	
2.0 Introduction:	28
2.1 Migration Tracking:	28
2.2 Scalability:	28
2.3 Context-aware Digital Entities:	29
2.4 Modes of Communication:	30
2.5 Preservation Longevity:	31
2.6 File Formats:	32
2.7 Organizational Capabilities:	33
2.7.1 Cyber Security:	36
2.8 Legal Issues:	36
2.9 Professionalization of the Electronic Archivist:	37
2.10 Legacy Systems, Technology Obsolescence:	38
2.11 Digital Dark Age:	39

CHAPTER 3: SURVEY RESULTS	
3.0 Introduction and Methodology-	42
3.1 Survey Dispersal-	43
3.2 Results Analysis-	43
3.2.1 Survey Question 1-	44
3.2.2 Survey Question 2-	45
3.2.3 Survey Question 3-	46
3.2.4 Survey Question 4-	47
3.2.5 Survey Question 5-	48
3.2.6 Survey Question 6-	49
3.2.7 Survey Question 7-	50
3.2.8 Survey Question 8-	51
3.2.9 Survey Question 9-	52
3.2.10 Survey Question 10-	53
3.2.11 Survey Question 11-	55
3.2.12 Survey Question 12-	56
3.2.13 Survey Question 13-	58
3.2.14 Survey Question 14-	58
3.2.15 Survey Question 15-	59
3.2.16 Survey Question 16-	60
3.3 Survey Conclusions-	61
CHAPTER 4: CONCLUSIONS AND SUGGESTIONS	
4.0 Introduction	62
4.1 Development of Records Management Policies:	62
4.2 Knowledge Economy:	62
4.3 New and Experimental Research Projects in Digital Preservation:	63
4.4 Rethink Research Process Framework:	64
4.5 Addressing Obstacles:	65
4.6 Preservation Standards:	66
4.7 Practical Results:	68
4.8 Adjust Collection Efforts:	68
4.9 Cost and Efficiency, Time and Money:	69
4.10 Survey Conclusion:	70
BIBLIOGRAPHY:	72
APPENDIX A: SURVEY TEMPLET:	80
APPENDIX B: GLOSSARY OF ACRONYMS AND TERMS:	85
APPENDIX C: ROGER WILLIAMS UNIVERSITY HUMAN SUBJECTS REVIEW BOARD APPROVAL:	88
APPENDIX D: INFORMED CONSENT FORM:	89

**ABSTRACT**

What are the best practices of electronic records archives the archival field, how can problems be resolved or how to avoid them; and where do we go from here with electronic records archives? First I review practices, policies, and management of electronic records developments. Next I discuss problematic issues archives and research facilities face relating to electronic records. I then discuss and analyze survey results. To conclude, I discuss ideas, and challenges, and offer suggestions for electronic records archives.

**LIST OF FIGURES**

Figure 1	44	Figure 16	51
Figure 2	44	Figure 17	52
Figure 3	45	Figure 18	52
Figure 4	45	Figure 19	53
Figure 5	46	Figure 20	54
Figure 6	46	Figure 21	55
Figure 7	47	Figure 22	55
Figure 8	47	Figure 23	56
Figure 9	48	Figure 24	57
Figure 10	48	Figure 25	58
Figure 11	49	Figure 26	58
Figure 12	49	Figure 27	59
Figure 13	50	Figure 28	60
Figure 14	50	Figure 29	60
Figure 15	51		

## **PREFACE**

In the summer of 2007, at the United States Marine Corps Archives at Quantico, Virginia, I became aware I wanted to be an Archivist. I realized that preservation and organization of documents and materials was how history was truly recorded. How do we know something happened in the past? Well, go look at the documentation. Writing about history was fun, but the preservation of history was thrilling. Spending the next several years working in the Archival Field, I naturally gravitated towards digitization projects and electronic records management. I felt that using those preservation methods would allow for optimal access and the best means of preservation.

While working at the National Archives, Reference Services, in Washington D.C., every day I would see Civil War Service and Pension Records being pulled from the stacks, viewed, and returned. Thousands, perhaps tens of thousands of these documents were being damaged just through usage. The National Archives was having these documents digitized through a partnership with Ancestry.com and Fold3.com. As the documents were digitized and made available online, the documents were then closed to the public, except through special requests. Largely because the demand on these records is extremely high, the digitization project is a great means to preserve the documents and increase their accessibility. This concept got me thinking about its application to other records and collections. The volume of records at the National Archives, just at Archives I in Washington D.C., is a massive amount of records to contemplate. Discounting the time and manpower needed to digitize documents, I realized the real difficulty in this endeavor would be on the technological aspects. Where and how would we store the digitized materials? Who would be responsible for monitoring and maintaining these new



electronic records? Would these electronic records then be in the domain of an Information Technology Specialist and no longer in need of an Archivist?

From these questions about digitization then came the avalanche of questions about born-digital records. Considering a generalized procedure for processing born-digital records into an archive's collections, I saw there were daunting issues in every step. I began to wonder how some of the steps could be accomplished at all, let alone maintained as a practical archival collection. The enormous bulk of data needed to be retained for this concept for the federal government was mind blowing. My experience in the U.S. Marine Corps Reserve had taught me that terabytes of storage were needed as standard for small unit operations. Scaling up to accommodate an entire federal agency would require an entire magnitude more of storage capability. Exabytes (1 million terabytes), Zettabytes (1 billion terabytes), and Yottabytes (1 trillion terabytes) would be needed just to house the mass of data. Was this level of data management feasible? How would this expanse of cyber archive be accessible? Most archival and research facilities may never need to contemplate on this scale. However, the basic procedural steps apply and the premise remains the same for all sizes of facilities in need of archival systems. The future of every archive and research facility will include electronic records.

With these questions and ideas in mind, I will discuss the concepts, challenges, and possibilities of electronic archives. The discovery and sharing of best practices of electronic records management is my goal in this writing. Archives across the United States have been using electronic records, in one form or another, for decades. Communicating the successes and warning of the failures is the best means for the Archival Field to advance.

## **CHAPTER 1: ELECTRONIC RECORDS, BEST PRACTICES**

### **1.0 Introduction**

After more than thirty years of analysis, experimentation, and development, a menu of best practices for electronic records for archival facilities to choose from should be available. But it is not. Communication within the Archival Field and cooperative efforts with technology corporations have made advances towards codifying options of best practices for electronic records archives. However, a future where archives across the world can easily and seamlessly share practices, policies, inventories, metadata, and digital holdings is hardly just around the corner. Serious work lays ahead for archivists and all types of records managers.

The best practices developed thus far provide a jumping off point. Using these to our advantage, electronic records archives (or any research facility) needs to develop plans for initiating an electronic records archive. The future operations of any research facility will involve electronic records. Even if their collections remain in hardcopy format, communications and administrative files will inevitably require electronic archiving. Like it or not, there is no going back. The successful creation and transition to electronic records archives is in the hands of motivated and innovative archivists.

### **1.1 Electronic Records Infancy**

In 1991 Margaret Hedstrom wrote, "Electronic records are in their infancy, and society has only begun to witness their transformative effects on documentation and communications."<sup>1</sup>

This was true then, and seems to still be true today, as far as the archival field is concerned.

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<sup>1</sup> Hedstrom, Margaret. "Understanding Electronic Incunabula: A Framework for Research on Electronic Records." *American Archivist* 54 (Summer 1991): 334-54, p. 335.

Twenty-four years later, the use and employment of electronic records has made poor progress in the overall condition of archival facility operations.

“Two decades of research has done much to raise awareness of the digital preservation challenge and encouraged some organizations to adopt policies and procedures to improve the longevity of their digital resources.”<sup>2</sup> We can do better and we must do better to preserve our digital history. Research, but more commonly trial-and-error, has accorded improvements in archival operations. Practices including enhanced metadata creation and increased use of common standards have helped to establish field-wide recognition that intervention needs to come early in the life of digital entities, if not before their creation.<sup>3</sup>

### **1.1.1 Digital Preservation Challenges**

Preservation in the electronic realm has created challenges for which archivists have been struggling to find solutions. There are few areas in which electronic records solutions are applicable to the entire field of archival science. New technologies and custom requirements of each facility have caused constant fluctuation. As suitable preservation technologies, practices, and methods are found, they should be shared as part of the public interest.<sup>4</sup> “Instead of riding the electronic wave, the archives and records management professional communities for the past two decades have been experiencing traumatic adjustment, reinvention, redefinition, and alignment with new and shifting institutional objectives.”<sup>5</sup>

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<sup>2</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 319-320.

<sup>3</sup> Ibid.

<sup>4</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 323.

<sup>5</sup> Dearstyne, Bruce W. "Riding the Lightning: Strategies for Electronic Records and Archives." In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p.139.

## 1.2 Defining Digital Entities

Defining the terms used to describe electronic records is and will continue to be debated. The Society of American Archivists differentiates between ‘electronic records’ and ‘digital archives’: “Electronic records are those, whether digital or analog, that require electronic devices in order to be created and used; and ‘digital archives’ are permanent digital records that require a computer to create and use them.”<sup>6</sup> Just as using the term ‘archives’ can be taken to mean both archival materials and the repositories that house them, ‘digital archives’ may refer to an archival institution which manages electronic records or a collection of digital entity materials.

At this point in time, defining usage of terms and phrasing is relative to several factors: experience, language, culture, education, facility, and others. Conventions and industry standards are needed to get archivists on the same page linguistically because terms such as electronic, digital, record, file are used to describe the same thing or many different things.

### 1.2.1 Quantities of Material

The magnitude of electronic materials is far beyond what was once thought possible. Terabytes, petabytes, exabytes, zettabytes, yottabytes and beyond have or will become the measures of volume for archives. A yottabyte is equal to 1 trillion terabytes. “The sheer quantities of material that need to be preserved and the pervasiveness of the need (whether for economic, audit, or compliance reasons) for methods and technologies to enable its preservation makes preservation a high-priority area for research.”<sup>7</sup> Backlogs of textual documents and materials were once considered a heavy burden for archivists to process and preserve before integrity and organization could be lost. Application of this concept to electronic records is no

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<sup>6</sup> Society of American Archivists. "What Is the Difference/relationship between "digital Archives" and "electronic Records"?" What Is the Difference/relationship between "digital Archives" and "electronic Records"? Accessed March 01, 2015. <http://www2.archivists.org/prof-education/das/FAQs/2>.

<sup>7</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 318.

less an issue. Complicated and massive as this bulk of records might be, planning must begin to handle the ingress, storage, and management of this avalanche of information. Very few facilities are having to contemplate a management capability and capacity on those levels of scale but trends in creation and usage of electronic records indicate no sign of slowing.

### **1.3 Preservation Software**

In the role of ‘tool maker,’ the Archivist must step up to the challenge of creating methods of digital preservation. “Most research on digital preservation has attempted to map traditional preservation practices for physical materials onto digital content. Digital preservation strategies necessitate a complete redesign and re-engineering of digital preservation processes.”<sup>8</sup> Grafting traditional practices onto new technology may not produce sufficient methods for preservation. This is most evident in provenance and collection organization methodologies.

### **1.4 Intervene at Critical Points**

“Can archivists intervene at critical points in the development and introduction of new technologies?”<sup>9</sup> Archivists have been considering this question for many moons now. The incredible rate of technological development over the past decades has made many attempts to coordinate effective practices and policies obsolete even before they could be adopted by many facilities. Software has had better success, but only with continual updates and modifications. “As digital entities reside in an environment susceptible to constant technological change, digital preservation is not a one off event, but must be continuous and dynamic.”<sup>10</sup> The intervention of

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<sup>8</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 321.

<sup>9</sup> Hedstrom, Margaret. "Understanding Electronic Incunabula: A Framework for Research on Electronic Records." *American Archivist* 54 (Summer 1991): 334-54, p. 347.

<sup>10</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 318.

archivists into the design and deployment processes within information technology have made progress. "Archivists have something to offer to designers of information systems."<sup>11</sup>

#### **1.4.1 Consulting**

Consulting and participating is best instituted in the creation of policies and practices that govern the use of information technology. Early intervention, when new technologies are introduced into organizations, will allow a greater influence on the conceptual usage, which directs all products created by the usage. "By concentrating on emerging technologies, archivists have the potential to build records management and archival requirements into software, applications, policies, and procedures, rather than trying to satisfy them retrospectively."<sup>12</sup> Archivists need to raise concerns about access, retention, preservation, and retrieval procedures long before adjustment, reprogramming, and conversion issues are considered as too cumbersome, too expensive, or irrelevant to sustain practical retention of digital archival material.<sup>13</sup>

"The advent of electronic records and archives might well have been a renaissance for the archives and records management fields. Digital information technology arose to support astounding transformations in information handling and records creation."<sup>14</sup> There should be a multi-disciplinary character to archival units/sections (e.g. archival science, computer science, information studies, psychological organizational behavior and human computer interaction) to best tap all available resources and apply them in conducting operations. Only through communication and cooperation can we build on cooperative results. This is applicable to the

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<sup>11</sup> Hedstrom, Margaret. "Understanding Electronic Incunabula: A Framework for Research on Electronic Records." *American Archivist* 54 (Summer 1991): 334-54, p. 347.

<sup>12</sup> Ibid, p. 337.

<sup>13</sup> Ibid.

<sup>14</sup> Dearstyne, Bruce W. "Riding the Lightning: Strategies for Electronic Records and Archives." In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 139.

archival field at-large, not only localized in one facility's staff structure. If coordinated carefully, controlled and managed effectively, progressive methods and strategies will begin to account for themselves with the success of projects and growth of staff expertise.

### **1.5 Preservation Strategies**

Digitization projects and the advantages they offer preservation have been instrumental in developing preservation strategies. By digitizing archived materials, original documents can be kept secure and protected from damage or wear. Additional advantages of this preservation technique is the ability to share the digital copy electronically to multitudes more researchers than could ever view and use the original document. Identification of new problems that result from constantly evolving technology hinder many archives from fully embracing digitization programs. The reengineering of preservation strategies directs the field towards methods in which archival processes and services might be better structured and utilized to significantly reduce the costs of long-term data management and preservation. Process transformations are only the beginning of new preservation strategies. The cycle of influence from preservation systems and technology to preservation strategy, and back to systems and technology, is a discussion in the never ending evolution of tools and methods that are needed to support archival advancement.<sup>15</sup>

### **1.6 Digitization Projects**

As a preservation technique, digitization of collections can physically preserve the original version of the material while allowing the text, image, and information of the collection to be used by more patrons accessing the digital copy. Items in delicate condition, but highly used could be preserved much longer with the reduced handling.

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<sup>15</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 320.

Some archivists may be averse to conducting digitization projects. “Technological innovation may be seen as threats to job security or to the ‘time honored’ and well understood ways of doing things.”<sup>16</sup> Although I believe this attitude to be held by a small minority of staff in the archival field, these perspectives are held by some nonetheless. “Such concerns are often well founded as the streamlining of workplace patterns frequently involves the automation of functions earlier carried out all or in part by humans.”<sup>17</sup>

### **1.7 Early Electronic Records Development (1960s onward)**

Since the 1960s governments and companies have used computers extensively for recording and manipulating information. However, during that time, archivists have made little progress toward developing specialized programs for electronic records. Integrating electronic records from core business functions and operations into archives has been dealt with incrementally and as technology allowed. Archivists have not sufficiently established and accepted standards, practices, or approaches to manage and preserve electronic records.<sup>18</sup>

“In the 1960s and 1970s, when most electronic records were in the form of machine-readable data files that contained numeric data, electronic records could be treated as a distinct form of material.”<sup>19</sup> Early computer technology was customized and relatively simplistic, allowing machine-readable files to be archived in the same manner. However, “as computer technology provides the capability to store almost any type of information in digitized form – words, pictures, sounds, graphics, and images – the distinction between electronic records and

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<sup>16</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 8.

<sup>17</sup> Ibid.

<sup>18</sup> Hedstrom, Margaret. "Understanding Electronic Incunabula: A Framework for Research on Electronic Records." *American Archivist* 54 (Summer 1991): 334-54, p. 336.

<sup>19</sup> Ibid, p. 345.



other forms of material becomes less meaningful, while differences among forms of electronic records become significant.”<sup>20</sup>

Even the term ‘electronic record’ has changed very little. “Electronic records is really a catchall term used to cover the products of government information technology, just as machine-readable records was a catchall term used to cover the more limited products of an earlier generation of information technology.”<sup>21</sup> The term is more generalized today than ever to encompass records created by information technology.

The information technology of the 1960s was largely restricted to expensive centralized, mainframe computers and networks which were highly structured, data-centric systems. Most of these applications were transaction oriented and mostly in the financial sector; this includes accounting systems, payroll systems, and communications. “There was a certain likeness between the statuses of management information systems in the 1960s and electronic records systems in the 1990s – they were very much topics of discussion and debate at professional conferences, but there was little way of well-implemented, operational, systems.”<sup>22</sup>

Technologies, practices, and methods have inched along to enable limited preservation of early digital entities, even in primitive, yet essential, forms. If we accept that the protection and conservation of cultural memory is a societal good, we must do better than the recent past. We will only be able to adapt if sustainable preservation systems and technologies become available. Effective and affordable digital preservation strategies and systems will underpin the move from

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<sup>20</sup> Hedstrom, Margaret. "Understanding Electronic Incunabula: A Framework for Research on Electronic Records." *American Archivist* 54 (Summer 1991): 334-54, p. 345.

<sup>21</sup> Turnbaugh, Roy C. "What Is an Electronic Record?" In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 32.

<sup>22</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 10.

an industrial to a knowledge-based economy. Sustainable digital archives depend upon the availability of quality and reliable preservation tools and services.<sup>23</sup>

During the early development of electronic records, government offices felt that machine readable data tapes were not considered records. Beginning in the 1960s, Meyer Fishbein, Director of the Military Archives Division at the National Archives and Records Service [NARS, the predecessor to the National Archives and Records Administration], promoted the retention of the tapes and similar machine readable mediums as retainable records. His advocating the collection and retention of this type record was from a broad legal perspective that viewed a 'record' as any item connected to representing the cultural memory of an agency. Fishbein was also keen to identify the problematic issue of technology and computer experts as being unable or rarely helpful in collection and preservation of such records. "This was the key decision that determined the course that subsequent professional engagement with electronic records would take. Since then, data that has been stored digitally and is readable only by computers has been treated as public record, and not only by the federal government and the National Archives, but also by the governments of the states."<sup>24</sup> Fishbein's precedent guides the professional and legal recognition of the values assigned to electronic records.

From the Fishbein precedent, NARS moved steadily to create a machine readable records program. In 1966, the Archivist of the United States, Robert H. Bahmer, appointed a committee to draw up plans and procedures for accessioning and managing a magnetic tape archives, and in 1968 then Archivist of the United States, James B. Rhodes, appointed a special assistant to propose plans for a machine readable archives to encompass the expanding field of electronic

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<sup>23</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 317-318.

<sup>24</sup> Turnbaugh, Roy C. "What Is an Electronic Record?" In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 25.

records.<sup>25</sup> That same year, NARS established a data archives staff, which evolved into the Machine-Readable Archives Branch in 1974. This group prepared general schedules for data files and eventually published a catalog describing these files.”<sup>26</sup> In short, this was the beginning of today’s Electronic Records Archives Program [ERA] at the National Archives.

The creation of the Machine-Readable Archives Branch, the proto-ERA program, was incredibly insightful and groundbreaking to the archival field, although not realized at the time. Looking back, NARS’s leap into this the new realm of electronic records preservation was extremely risky, given the expense and complexity of the task. The limited manpower and resources available were humble compared to the immensity of the endeavor. “NARS Staff assigned to Machine-Readable Records [Branch] reached a peak of fifteen professionals in 1980, before it was reduced to seven in 1982. As of 1985, some 2,500 tapes had been accessioned by NARS, out of an estimated 10-12 million tapes in agency custody.”<sup>27</sup> The mountainous backlog of material today, not just of the antiquated magnetic tapes but of all types and formats of electronic records used in the past thirty years, is inestimable due to the complexity and variety of files types, program languages, customized equipment, and a host of technological issues.

The process of providing access to electronic records, once in NARS/NARA custody throughout the 1970s-90s, effectively prevented practical use by all but researchers with the skill and resources to run copies of tapes on equipment of their own. Even the short-term preservation of the magnetic tapes necessitated an investment of significant resources, which still did not provide a long-term solution to preservation. “In short, motivated by an understandable desire to

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<sup>25</sup> Turnbaugh, Roy C. "What Is an Electronic Record?" In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 25.

<sup>26</sup> Ibid.

<sup>27</sup> Ibid, p. 26.

save materials of potentially high research value, the National Archives embarked on a course that could only offer hope of isolated and temporary successes.”<sup>28</sup>

A fundamental flaw to the concept of the machine readable archives was to base the program on magnetic tape technology and rely on the premise that only machine readable systems would ever create, read, and use the information stored on the tapes. How wrong NARS and the pioneering archivists were about the direction information technology would take decades to be realized and even longer to be corrected. There should be no blame attached to the failure of the assumptions about the mainframe/flat-file model that NARS used. This pioneering and experimental program was an enormous step for archival science. As only NARS/NARA had the time, means, skill, and authority to proceed with this form of preservation technology, the personnel involved would have had no references with which to guide their work. Simply by making the attempt to create and manage such an endeavor would engage other records professionals in a world which would shortly undergo revolutionary change.<sup>29</sup>

In the 1990s the National Archives developed a succession of programs called NAIL [NARA Archival Information Locator] and ARC [Archival Research Catalog]. NAIL was the first catalog implemented in the late 1990s, with ARC replacing NAIL in 2002. These systems were meant to replace several programs which dealt with descriptions of records. Over the decades, there had been various styles developed in creation of descriptions. David Kepley, at one time a member/leader of NARA’s Electronic Records Archive [ERA] program development team, described these files as layers of descriptive metadata which were useful but difficult to

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<sup>28</sup> Turnbaugh, Roy C. "What Is an Electronic Record?" In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 26.

<sup>29</sup> Ibid.

track and record storage placement.<sup>30</sup> ARC helped in maintaining and centralizing metadata and collection descriptions but was not originally designed to do anything more.

The surge of government records, generated during the late twentieth century, resulted in tremendous storage space needs. This meant that the storage facility at Suitland, Maryland, among other regional records centers, would become permanent long-term storage site. The dispersal of records storage throughout NARA's facilities provided the justification for creating a consolidated networked database system to not only contain searchable metadata and descriptions, but to also provide tracking/location information of the material. The MLR [Master Location Register] was meant to provide a solution to the problem. The MLR provided searchable access to location information; however, the limited software and operating platforms of the 1990s and early 2000s could not allow the MLR system to function as well as many had hoped.

It was at this time that archivists at NARA developed the idea that preservation status/conduction and lifecycle management schedules should also be included with collection description, metadata, storage location, and usage information. Archivists wanted a system that could tell them about the physical holdings themselves. These ideas and efforts led to the creation of HMS [Holdings Management System]. HMS is the current system which NARA uses to maintain its collections. "Lots of bumps and grinds, none of the software worked perfectly out of the box," said Dr. Kepley in describing the initiation of HMS.<sup>31</sup> Working through the glitches, the program has developed into a crucial tool in daily life at NARA today. It has become the consolidated database of all of NARA holdings. Every NARA facility is networked into the HMS program; millions of cubic feet of material is identified and tracked through this system.

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<sup>30</sup> Kepley, David. "Oral History Interview with David Kepley." Interview by author. June 20, 2014.

<sup>31</sup> Ibid.

“ERA [Electronic Records Archives], probably the greatest, biggest software project the National Archives has ever undertaken by orders of magnitude.”<sup>32</sup> Kepley credits Dr. Kenneth Thibodeau of the National Archives, for formulating the concept of establishing the modern Electronic Records Archive and getting the concept recognized by the Archivist of the United States [AOTUS] and the senior records managers as a critical program for the future of NARA. Thibodeau convinced staff and AOTUS to recognize the need to manage electronic records, generate preservation methodologies, and get to work on solving the problem of what to do with the electronic records the government was creating.

In creating the ERA, the systems analysis and resulting introduction/alteration of electronic records policies changed the way NARA conducted many of its traditional archival operations, including many procedural steps for processing hardcopy materials. Automation of records lifecycle functions is now applied to all federal records. Because ERA has grown to encompass management of all records, hardcopy and electronic form, the program name has become a misnomer of its function and importance, a ‘branding’ problem that continues to exist. ERA was a conditional success because archivists worked with computer programmers and systems engineers<sup>33</sup>, Office of Business Management, and records managers throughout all government offices and agencies to create an electronic records management program. The success of ERA is conditional due to further complications and developments. There are some people who believe that ERA was a tremendous failure.

Over the past several years, the convergence of ARC, HMS, and ERA have spawned OPA [Online Public Access]. The OPA portal is available at [www.archives.gov](http://www.archives.gov) and is free and accessible to all users. OPA is the search engine platform which utilizes data from ERA, HMS,

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<sup>32</sup> Kepley, David. "Oral History Interview with David Kepley." Interview by author. June 20, 2014.

<sup>33</sup> [Lockheed Martin was the initial contractor responsible for designing the ERA software].

and ARC to provide researchers with up-to-date available content, descriptions, location, material type, and several other attributes of government collections. Access to electronic records is still limited, but as OPA has already evolved, born-digital collections and digitized materials (especially photographic materials) have become increasingly available. In the vast scope of the archival collections of the United States government, the National Archives has had a difficult and arduous journey to a functional system to host electronic materials.

It is disappointing that Archivists, Records Managers, and Information Management Technicians of the 1950s, 60s, and 70s could not have also conceived of practices and policies of electronic records lifecycle management. "Thinking during the emergence of digital systems in the 1950s and 1960s created a [mindset], especially in the IT community, which continues today in many quarters that all records resulting from all electronic systems are the ones maintained in paper form, not the ones in digital form."<sup>34</sup> Progress has been made in maintaining the integrity of electronic records throughout a records digital lifecycle. Still, retaining printed versions of electronic records is common practice throughout society today. The limitations of retention, organization, and even transference of digital materials into hardcopy form are limiting and wasteful. Lifecycle planning and management issues, "are too often seen as technical matters for handling by technical staff in the IT department and not as projects that support strategic aims and not as projects that manage valuable organizational assets in the form of information."<sup>35</sup> Guidance and planning for electronic records lifecycle has been largely held in the hands of technology professionals. The special technical expertise that has been required to manage, let alone comprehend, electronic records throughout the past necessitated IT specialists to create and

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<sup>34</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 11.

<sup>35</sup> Ibid.

supervise lifecycle management. This arrangement has always been, “a slippery slope, which has resulted in improper identification of stakeholders and the inadequate involvement of business and records management interests in system design.”<sup>36</sup>

## **1.8 Electronic Commerce**

Electronic Commerce [e-commerce], “depends upon access to records, sometimes, as in the case of pharmaceuticals and aerospace manufacturers, for decades, for purposes of auditing and compliance with laws and regulations.”<sup>37</sup> Commerce and business administration has long provided an impetus for archiving electronic records. Although in this context ‘archiving’ means retention of documentation mostly for legal and tax purposes, the business goals of preservation and integrity of electronic records coincides with goals of the archival field. As the need for larger storage space, more complex data and metadata, and ease of information accessibility becomes necessary for routine business transactions, commercial entities offer opportunities of lessons learned and for mutually beneficial development endeavors. “If they are to serve the needs of their current and future users’ digital libraries [and archives] must develop digital repositories that will enable them to ingest, make accessionable, conserve, and preserve digital entities.”<sup>38</sup>

“The role of recordkeeping in the enterprise – where the enterprise is a government, university, company, etc. – is a valuable and often understated business role.”<sup>39</sup> Archivists and records managers should always capitalize on this role and engineer themselves into the systems

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<sup>36</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 11.

<sup>37</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 318.

<sup>38</sup> Ibid.

<sup>39</sup> Slavin, Timothy A. "Implementing Requirements for Recordkeeping: Moving from Theory to Practice." In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 49.



development and processing for recordkeeping of the business or enterprise. The nature of information retention of business and commerce can combine the fundamental knowledge and skills of archivists and records managers to form mutually beneficial applications for those unique systems. "Issues such as data retention and data selection can be shaped by the lessons learned in retention scheduling and archival appraisal."<sup>40</sup>

### **1.9 Allied Systems Functionality**

Today's complex electronic documents and records, which include combinations of text, graphics, and spreadsheets, are already in universal use.<sup>41</sup> Integration of technology and archives can work both ways. Just as the application of archival methodology can better documentation of commercial interests, systems integration and functionality can support archival systems. "The impact of technology has at once made this issue both easier and more complex to solve. As information is increasingly created and maintained in electronic format, there is less pressure to clear filing cabinets from expensive office space. Yet the very fragility of electronic records and the need to access the information even as software changes complicates the issue."<sup>42</sup>

The alliance of functionality and archives is always rough at best and impossible at the worst. Institutions and corporations with diversified activities or components, such as universities, have been slow to centralize this important merge policy. Complicated and varied as a university's separate college, schools, programs, and operations are, the university archive continues to struggle as a campus-wide electronic preservation repository for the institution. As Christopher Prom writes of Roland Baumann's experience at Oberlin College is probably typical

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<sup>40</sup> Slavin, Timothy A. "Implementing Requirements for Recordkeeping: Moving from Theory to Practice." In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 49.

<sup>41</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 8.

<sup>42</sup> Prom, Christopher J., and Ellen D. Swain. *College and University Archives: Readings in Theory and Practice*. Society of American Archivists, 2008, p. 14.

of many university archivists, “I still must use the art of persuasion in acquiring/transferring institutional records. We still do not have approved guidelines for the administration of electronic records.”<sup>43</sup> This is a failure of institution-wide integration of retention policies and procedures. Absolutely, ingest of such various electronic records is complex. However, there are solutions, either through technology or archival policies, to correct and improve these preservation efforts.

### **1.10 Diversity of Technologies**

Details of technological diversity and evolution is beyond the scope of this work, yet the repercussions of the constant change effects the foundation of all electronic archives. There is even consideration that ‘electronic’ might not be accurate in describing certain technology systems and the data products produced. Computers today may be of pneumatic, optic-electronic, opto-optical, and possibly even biochemical design and function.<sup>44</sup> How records generated through these means will be preserved is currently beyond common knowledge and considerations. This is surely a concept to be discussed as the technology becomes of use in applications which require the management and preservation of their information.

Today’s advanced technology is tomorrow’s common use technology. Archives must learn to adapt to and understand these tools of tomorrow. “Records managers are required to do what needs to be done to properly preserve and otherwise manage record[s] whether they like the

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<sup>43</sup> Prom, Christopher J., and Ellen D. Swain. *College and University Archives: Readings in Theory and Practice*. Society of American Archivists, 2008, p. 14.

<sup>44</sup> Turnbaugh, Roy C. "What Is an Electronic Record?" In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 33.

new technologies that produce them or not.”<sup>45</sup> Working with electronic records, whether singularly or especially simultaneously of the past, present, and future is no easy task.

Programs and projects are underway to provide access and storage suitable for archival purposes. There are many conceptual ideas of how archives may function with electronic records, but there are few of these concepts that have been placed into practical operation. In the area of digital preservation, certain projects have promoted research and awareness of digital preservation apparatuses. These include CEDARS [Coupling Energetics and Dynamics of Atmospheric Regions] (Archival Madrigal Database), CAMiLEON [Creative Archiving at Michigan and Leeds: Emulating the Old on the New], ERPANET [Electronic Resource Preservation and Access Network], InterPARES [the International Research on Permanent Authentic Records in Electronic Systems], and PADI [Preserving Access to Digital Information].<sup>46</sup>

PADI was a subject gateway that attempted to gather the most useful sources of advice and research relating to how digital information could be managed and preserved. No longer updated, the online gateway forum closed in 2011. A good idea and great initiative but something must have been lacking [perhaps too narrow or limited topic of discussion] to sustain the forum.

The CEDAR Archival Madrigal database is where all data from all other Madrigal equipment sites is automatically imported for archiving. This system is capable of managing and serving archival and real-time data, in a variety of formats, from a worldwide network of

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<sup>45</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 8.

<sup>46</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 318.

facilities.<sup>47</sup> Since the system is for archiving and sharing atmospheric and scientific information from Madrigal atmospheric testing equipment, it is not an archives specific platform for archives. However, it does serve the purpose of demonstrating what an archives information system could potentially achieve.

“The CAMiLEON Project is developing and evaluating a range of technical strategies for the long term preservation of digital materials.”<sup>48</sup> They have proposed ‘emulation’ as a solution to legacy systems obsolescence. Through ‘emulation’ an archivist could enable obsolete systems, files, and programs to operate on future systems, thus making it practicable to retrieve, display, and use digital documents within the original software.

“The ERPANET project aims to establish an expandable and self-sustaining European Initiative, which will serve as a virtual clearinghouse and knowledge-base in the area of preservation of cultural heritage and scientific digital objects.”<sup>49</sup> Creation of forums for exchanging ideas and discussing developments in electronic records archives is where more participation and support should be paid. ERPANET includes more than just librarians, archivists, and preservationists. The project cooperates and coordinates efforts with governments, entertainment companies, commerce and financial institutions, and technology industries as well. Transfer of expertise and experience across these sectors can only aid in improvement of electronic records archives.

InterPARES works towards “developing the knowledge essential to the long-term preservation of authentic records created and/or maintained in digital form and providing the basis for standards, policies, strategies and plans of action capable of ensuring the longevity of

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<sup>47</sup> "CEDAR Madrigal Database." CEDAR Madrigal Database. Accessed January 25, 2015. <http://cedar.openmadrigal.org/>.

<sup>48</sup> "CAMiLEON Project." Digital Curation Centre. Accessed January 20, 2015. <http://www.dcc.ac.uk/>.

<sup>49</sup> "Electronic Resource Preservation and Access Network." ERPANET. Accessed January 20, 2015. <http://www.erpanet.org/>.

such material and the ability of its users to trust its authenticity.” Findings of the project are available online, they discuss products and methodology which assist in improving critical areas of ERA. What these associations have in common are the goals of innovation, progressive attitude for the preservation field, and the need to communicate.

### **1.10.1 Upgrades, Updates, and Conversions**

Technological advancement comes at a price to those wanting to partake in the benefits. The diversity and complexity of technology, especially with the essential elements of integrity and sustainability which electronic records require, involves constant attention and upkeep. Organizational contexts, types of digital entities, legislative and organizational frameworks, and purposes for which digital entities are created (from electronic records to digital art) means that a variety of approaches to preservation need to be established.<sup>50</sup> Once established, these approaches need to be maintained. Updates and upgrades to systems and software programs have become common. To prohibit any malicious damage, as an extreme example, or accidental corruption of an electronic records archive, thorough testing and examination of changes to records management systems must be carefully conducted. Time and expertise intensive as this precaution is, the loss of integrity could lead to absolute loss of irreplaceable knowledge and documentation. “As new technologies, methods, and even concepts for creating and exploiting digital information emerge, curatorial processes will require regular rethinking and revision.”<sup>51</sup>

### **1.10.2 Programming and Coding**

Archivists handling born-digital materials should begin with at least a basic understanding of how to navigate their own computer systems, network environments, and perform basic tasks within those systems (move/copy/write-protect/search for file info/delete).

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<sup>50</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 318.

<sup>51</sup> Ibid.

Whichever operating system, network configuration, software platform, or database format you work from, be proficient and knowledgeable of the use and limitations. This will require an initial time investment but also a continual investment through regular updates and changes to the configurations. Working with internet technology [IT] specialists, with luck, your research facility will have a competent staff willing to be patient and understanding to the needs of your electronic records archive.

Beyond the basics it is very helpful to learn advanced system options and even study up on coding languages (e.g. XML/XPath). The programming languages, syntax, and definitions will probably lay beyond the practical understanding of Archivists and Records Managers, but having designated staff to interpret the technologist language to the archives, and the reverse of translating the intent and purpose of preservation efforts to the technical specialists, could be beneficial for the organization as a whole. Being able to create batch conversions, using specialized ‘transformation scripts’ to manipulate encoded information between Excel, CSV, TXT, METS, XML, etcetera can save enormous amounts of manual data entry and manipulation time. More serious programming may require knowledge of open source coding, JSON, Ruby, and PHP. Advanced programming and coding might best be left to specialists but it is exactly this concept which has and will hinder development, sustainability, and experimentation in ERA.

### **1.10.3 Coding Languages**

Some programming languages can be quite powerful and easy to learn. Older languages, meaning they have been used extensively for decades, like Java or C++ will still need to be used in conjunction with accessioning old file types and formats. Giving the digital archivist significant programming capabilities will be a significant investment in time and training. However, with commitment and determination a basic coding language comprehension can both

offer timesaving techniques and ever greater preservation opportunities as digital languages age, evolve, and become obsolete. For web publication and presentations, HTML + Javascript appears to be a good place to begin. From there PHP + MySQL are possible avenues of advancement. Some of the popular archival and data storage names out there (JHOVE, FITS, DROID, Fedora, DSpace, etcetera) use Java.

While XML is no magic wand, it offers such enormous advantages that it already enjoys widespread adoption for data sharing between disparate sources, platforms, and information systems. XML holds further value because it offers great flexibility in terms of data presentation through customizable style sheets. These qualities make XML appealing as a tool for electronic commerce, electronic government services, data warehousing, and enterprise information portals.<sup>52</sup>

Needing advanced knowledge of programming languages is not required in order to be productive and conduct good work. Archivists are never going to have enough experience to adapt to all circumstances in which electronic records will need preservation and archival treatment. Being exposed to code and other areas of IT will assist any ERA preservationist through many basic troubles and avoid rookie mistakes. Few of us will consider ourselves expert enough to work in both IT and archives. Fortunately, specialist and expert assistance is generally available through a larger organization's resources. In the archival and preservation fields there are needs for staff who can straddle the fences between many specialties. This need will only increase over time. Information technology and archival science happen to be pretty far apart in their respective core competencies. As the needs of both fields blend and merge, the

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<sup>52</sup> Horton, Robert. "Obstacles and Opportunities: A Strategic Approach to Electronic Records." In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 65.

interdependencies will align and perhaps a hybrid specialty field/occupation will become common. For now, archives need people who are not afraid of rolling up their sleeves and getting their digital hands dirty.

### **1.11 Outreach and Advertising**

There is an enduring conceptual misunderstanding about electronic records. Several headline events have occurred to help perpetuate the myth of government agencies and business organizations archiving and retaining massive amounts of electronic communications and personal information. This data, whether phone conversations, emails, or text messages, is thought be retained, edited, and/or deleted somewhere, by someone. Examples of these headline events: the National Security Agency [NSA] recording telephone conversations of millions of Americans; the Central Intelligence Agency's [CIA] supposed deleting of the entire agency's email archive; government officials using their personal email accounts to conduct government business as a method to avoid disclosure; and others.<sup>53</sup> Misconception of electronic records, what they are and what is done with them, is not a new occurrence. NARS also encountered conceptual problems in the era of machine readable electronic records. This misunderstanding by Americans equated to records as paper/hardcopy records and that government records as only official papers.<sup>54</sup> Lost knowledge is the failure of all these misunderstandings. Archives, those that accession and maintain electronic records, need to conduct outreach programs for preventing these misconceptions and make the public aware of what is and is not being retained of their

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<sup>53</sup> Welna, David. "The CIA Wants To Delete Old Email; Critics Say 'Not So Fast'" National Public Radio. November 20, 2014. Accessed November 21, 2014. doi:<http://www.npr.org/2014/11/20/365474273/the-cia-wants-to-delete-old-email-critics-say-not-so-fast?sc=17&f=1001>.

"Benghazi Panel Asks Clinton To Hand Over Her Email Server." NPR. Accessed March 23, 2015. <http://www.npr.org/blogs/thetwo-way/2015/03/20/394355939/benghazi-panel-asks-clinton-to-hand-over-her-email-server>.

<sup>54</sup> Turnbaugh, Roy C. "What Is an Electronic Record?" In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 27.



electronic documentation. Failure of this outreach will eventually lead to a digital dark-age, which will be discussed in the next chapter.

As internet communication is essential for society today, conversion of collection description and finding aids for use in the electronic medium has also become essential. “The process for archivists has been something akin to librarians who spent decades in massive retrospective conversion projects to convert from paper catalogs to digital online catalogs.”<sup>55</sup> This conversion trend has been extremely useful for both patrons and archivists. Both conversion and born-digital finding aids has been the first step towards creation of electronic archives for many organizations. However, facilities limited in staff or expertise, which have been collecting electronic records, have left digital materials idle or unprocessed while the electronic finding aids were created and established to make the electronic records known to patrons. One effect of this is that facilities, “now receive more inquiries about the collections, accompanied by an expectation of rapid responses.”<sup>56</sup> Creating an awareness of a facility’s limitations in reference service related to electronic records may not be a great idea, but reaching out to researchers to inform them of request processing times and other constrictions of fulfilling their requests helps to alleviate expectations of immediate/rapid response. Increased use of materials, electronic or otherwise, is always welcomed by archivists. With limited staff and budgets, the additional strain on the facility staff and operations must be weighed in the consideration of increased usage. The internet will become an even more important means of access, outreach, and advertisement as

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<sup>55</sup> Prom, Christopher J., and Ellen D. Swain. *College and University Archives: Readings in Theory and Practice*. Society of American Archivists, 2008, p.14.

<sup>56</sup> Ibid.

search engines, such as Yahoo!, Google, Bing, MSN, Duckduckgo.com, Ask.com, and Amazon, begin to index web content more widely and more deeply.<sup>57</sup>

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<sup>57</sup> Prom, Christopher J., and Ellen D. Swain. *College and University Archives: Readings in Theory and Practice*. Society of American Archivists, 2008, p.14.

## **CHAPTER 2: PROBLEM ISSUES OF THE PAST AND PRESENT**

### **2.0 Introduction**

Continuing difficulties and complications of electronic archives is just as problematic in the present as they were decades ago. Evolution of technology certainly, but various other complications through usage, have surpassed temporary solutions enacted along the way. Cultural developments through social media have further complicated the complex difficulties of preserving electronic documentation. Societal influences on electronic records creation and retention are and will continue to create new problems for archiving electronic records.

### **2.1 Migration Tracking**

How can we know the electronic records on a system are the original and complete files that they are supposed to be? Integrity: the term is synonymous for archival methodology. Integrity has become the belief that what records an archive possesses are the true documentation and evidence of the past. Knowing the provenance of records and keeping accurate management of those records is fundamental to maintaining integrity. Application of integrity to electronic records archives is tricky. The trust established by archives through custodianship of hardcopy materials has lent confidence to electronic archives. As there are few means to track the movement and access of electronic records, the acceptance of ERA integrity is a blind faith. The sophistication of database programs and other management software may not be ready for this step, so there is work to be done.

### **2.2 Scalability**

As the increase in use of information technology rises, the mass creation of new electronic records will exceed hardcopy and electronic records collections of the past by many orders of magnitude. The ability to increase and scale up a facility's electronic storage capacity is

of high importance now, when a small effort of planning can prevent large failures in system infrastructures and management software. “This issue requires more depth of treatment than dismissal on the grounds that digital storage is becoming cheaper by the year.”<sup>58</sup> Adaptable systems infrastructure and information management methodology has not been sufficiently elaborated, developed, tested, or evaluated to cope with current and future needs of archival storage for most facilities. Research in this area of preservation technology needs to come to grips with the problem of scalability.<sup>59</sup>

Archivists cannot organize their electronic collections in a linear focused mindset. The megabytes of records you have today could be terabytes, petabytes, or more tomorrow. As traditional hardcopy collections growth was calculated, so eventually will electronic records. However, the predictability of accessioning and processing should be manageable for facilities which have established electronic archives and have developed tested collections and management policies. Becoming inundated by electronic records is bound to occur to new electronic records collections. Having the ability to increase storage, access, and management will help in alleviating bottlenecks and backlogs.

### **2.3 Context-aware Digital Entities**

Context-aware digital entities is one possible avenue of electronic archives management technological advancement. The ability of an entity, for example let us use a text file, to know where/when it was created, where it is stored [meaning physical location as well as electronic system(s)], who (and when someone) accesses or manipulates the contents of the file, what changes are made or added to the contents or to the file’s settings, and what limitations are set on

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<sup>58</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 7.

<sup>59</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 318.

itself to prohibit any unauthorized alterations to the file or its contents. The activity log of the file can never be altered, deleted, or halted; the life-chronology is the element which will provide provenance and verify the integrity of the entity.<sup>60</sup>

There has been progress in this concept, although there are significant technological problems in creation and analysis of the functionality and behavior of digital entities.<sup>61</sup> Perhaps someday there will be a means for an entity to express its lifecycle through a chronology. The existence of such a context-aware entity could cause privacy and security concerns. These concerns will have to be the consequence of integrity.<sup>62</sup>

## **2.4 Modes of Communication**

“Not only has information that had previously been captured on paper migrated to digital, but so too has much telephone conversation.”<sup>63</sup> Traditionally, telephone conversations, communications logs and resulting metrics were records lost for lack of means of documentation. With endemic loss of telephone conversation, the loss of documentation need not be the case with email communications and future telephone conversation. Email communications have irrevocably superseded both print correspondence and telephone communications as the primary means of communication. Preservation of these born-digital electronic records, to include digital telecommunications, has become easier, yet the common proliferation has allowed complacent perceptions of the technology which has created failure in retention practices. Personal papers collections of now and the future will be less substantial because of this standard practice of

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<sup>60</sup> Abi-Char, Pierre E., Abdallah M'hamed, Bachar El-Hassan, and Mounir Mokhtari. "Privacy and Trust Issues in Context-Aware Pervasive Computing." In *Trust Modeling and Management in Digital Environments from Social Concept to System Development*, edited by Zheng Yan. Hershey, PA: Information Science Reference, 2010.

<sup>61</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 321.

<sup>62</sup> Roussos, Yannis, Yannis Stavrakas, and Vassia Pavlaki. "Towards a Context-Aware Relational Model." 2005-2006. Accessed February 25, 2015. <http://ceur-ws.org/Vol-136/190.pdf>.

<sup>63</sup> Prom, Christopher J., and Ellen D. Swain. *College and University Archives: Readings in Theory and Practice*. Society of American Architects, 2008, p. 19.

society. Personal and private email correspondence has suffered tremendously from lack of archival practices. Although the issues of private electronic mail correspondence and recorded telephone conversations are fraught with legal questions, archivists should engage these potential archival resource issues.<sup>64</sup>

## **2.5 Preservation Longevity**

The term ‘longevity,’ as applied to electronic records, is ambiguous in several aspects. With the current state of technology, there are no certainties for true permanent preservation. There is no indication of how long an electronic record can be preserved. Current digital longevity processes require intensive manual intervention to ensure preservation. “Unless handled correctly, such transformations call into question the authenticity, quality and trustworthiness of the preserved entity.”<sup>65</sup> Longevity is also connected to: scalability issues, methods of retention, storage capacities, ingest rates, accessibility, and migration. The “corollary of trustworthiness and scalability are mechanisms to determine collection completeness, and to detect and correct anomalies.”<sup>66</sup> As current processes are manual and subject to human error, can automation and advanced processes be integrated into management processes which would provide better detection of faults within collections and when information is incomplete?

Every facility which retains electronic records will have to make difficult decisions for the planned lifecycle of the electronic archive. What constitutes essential records; what format and organization should records be kept; what exactly are mid-term or long-term preservation

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<sup>64</sup> Prom, Christopher J., and Ellen D. Swain. *College and University Archives: Readings in Theory and Practice*. Society of American Archivists, 2008, p. 19.

<sup>65</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 321.

<sup>66</sup> Ibid.

time spans? Organizations face a multitude of unique concerns dependent on their collections and archival mission statement.<sup>67</sup>

A solution of planning and sustaining longevity of electronic record records can be through the preservation functionality built into archival systems which create and manage them. Create a practical preservation strategy with the end in mind. A sufficiently robust, effective, and affordable electronic records archiving system will ultimately depend on an infrastructure of common standards, methods, and tools made available through collective efforts of the archival field.<sup>68</sup> Trends have proven that technologists, creating systems for the business/commerce world, have been able to provide the means to concoct mechanisms for similar purposes. “Methodologies had been developed in the United States to manage twentieth century government records, to select those with permanent value, arrange and describe them, make them available for use, and take steps to ensure their longevity.”<sup>69</sup>

## **2.6 File Formats and Metadata**

Different file type formats require different kinds of strategic approaches to ensure that files can be accessed in the future. There are some formatting issues which may have properties that put preservation processes at risk or prohibit them altogether. Electronic archives will need planning and predictive measures to enable formats of multiple types to be preserved along with the appropriate metadata. Technology developers and archivists must assess the impact on preservation that current and future file types might have on embedded information description.

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<sup>67</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 7.

<sup>68</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 322.

<sup>69</sup> Turnbaugh, Roy C. "What Is an Electronic Record?" In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 29.

Inclusion of preservation attributes within new file formats, in advance of completed development and open market distribution, could provide advantages in preservation practices.

Creating metadata, embedded within or attached to files, is a labor intensive and thus expensive venture to engage in for most common file types. The greater challenge will be the maintaining the content and substance of metadata. “The meaning of metadata itself changes over time, what we might describe as ‘metadata drift’.”<sup>70</sup> It has become certain that new tools are needed to track provenance of metadata. “It will not always be possible or economical to preserve all of the features and functionality of original digital entities, but we lack metrics for measuring what is acceptable loss.”<sup>71</sup>

The difficulty of preservation will only increase given the variety and complexity of electronic record types. Sophistication and vigorous evolution of materials will become prevalent in carrying content consisting of combinations of text, graphic designs, photographic objects, linked/embedded data, hyperlinks, video files, and etc.<sup>72</sup> As paper tape, magnetic tape, punch-cards, magnetic disks of varying size and construction were once used to record information for processing a generation or more ago, today’s electronic records constitute an even larger moving target.<sup>73</sup>

## **2.7 Organizational Capabilities**

“The ways in which records are manifested are changing dramatically, largely due to a seemingly ever-increasing number and variety of records making technologies that are not

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<sup>70</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 321.

<sup>71</sup> Ibid.

<sup>72</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 8-9.

<sup>73</sup> Turnbaugh, Roy C. "What Is an Electronic Record?" In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 30.



recordkeeping technologies and the transformation of the workplace and work patterns. These changes will govern how organizations will have to conduct recordkeeping.”<sup>74</sup> The development of organizational capacity capable of capturing and sustaining digital entities depends upon further research either into how technologies can be effectively redeployed/reengineered or new technology produced to conduct the preservation function. However created, electronic records creators can be encouraged to alter their systems and programming, as it is in their best interest.<sup>75</sup> The integration of an organization’s resources, an IT department’s knowledge and skills with the archives section, will create the force-multiplier of capability to retain new complex electronic records. Core organizational purposes, guided by archival retention planning, should govern an organization’s structural aims and objectives. Beginning with the basis for the creation of business processes, which in turn drives information creation and gathering processes, information management needs and information management architectures can be designed to support organization operations and fulfill records retention goals.<sup>76</sup>

With the introduction of composite electronic records, there has been little change to the meaning of what is ‘recordness’. The fundamental definition underlying the meaning of ‘record’ has yet to change, at least not yet. However the documentation is defined as ‘recordworthy’ by organizations; it is becoming clear that richer and more challenging electronic records are emerging with multimedia and hypermedia content.<sup>77</sup> Especially organizations with financial,

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<sup>74</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 16.

<sup>75</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 322.

<sup>76</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 4.

<sup>77</sup> *Ibid*, p. 16.

economic, and personnel resource can further advance the archival field in electronic records preservation.

There have been hindrances and failures of organizational converging of capabilities by the pursuit of universal solutions. Compartmental or incremental convergence of policies and practices could provide a better solution for large and/or complex organizations, such as universities. On the reverse of preservation convergence goals is, “a balkanized profession, one that lacks the structures to sanction and communicate accepted practices, is incapable of producing successful universal solutions.”<sup>78</sup> Application of preservation knowledge from archivists, technologist, and business managers needs to be assimilated and shared across the enterprise.<sup>79</sup> Any solutions need to be congruent with resources. Clinging to the notion of perpetual access and integrity of electronic records in whatever their present condition, operation, and location is perhaps the greatest hindrance of progress in this area.<sup>80</sup>

As an example of convergence of preservation policies and an organization wide sharing of preservation knowledge, The United States Marine Corps has initiated a training requirement to instruct all members of the organization on their individual responsibilities in contributing to electronic records collection and preservation.<sup>81</sup> As an annual training requirement, every year Marines will be informed of changes and updates to the greater organization’s preservation processes. As an organization with an aptitude for efficiency and strong appreciation of history,

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<sup>78</sup> Turnbaugh, Roy C. "What Is an Electronic Record?" In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 29-30.

<sup>79</sup> Slavin, Timothy A. "Implementing Requirements for Recordkeeping: Moving from Theory to Practice." In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 49.

<sup>80</sup> Turnbaugh, Roy C. "What Is an Electronic Record?" In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 29-30.

<sup>81</sup> Records, Reports & Directives Management Section, Head Quarters Marine Corps. "Electronic Records Management." United States Marine Corps, Marinenet. Accessed 2015. <http://www.mccs-sc.com/support/docs/training/hqmcrecordsmanagement.pdf>.

the Marine Corps recognizes the need for documenting their activities at every level and compartment of the organization's structure.

### **2.7.1 Cyber Security**

Cyber security is perhaps beyond the capability of the common archivist to control, except through mandating that it exist and be maintained. Granting access to original electronic records, thus allowing the possibility of loss of integrity, is a debatable issue. Whether through internet (remote) access or physical (in-person) access, cyber threats are a very real concern to archives and their digital material. The simple goal of cyber security is to prohibit malicious attempts to alter, corrupt, or delete electronic records. Information technology specialists should probably be relied upon to curate these concerns.

## **2.8 Legal Issues**

"Changes may be needed in legislation to create a legal environment(s) conducive to preservation and reuse of digital information."<sup>82</sup> Issues of access and ownership top the list of legal troubles for archives wishing to use electronic archives. "In the absence of any concerted effort on the parts of national professional associations, lawyers who may have little or no background in recordkeeping are writing these laws."<sup>83</sup> Legislation regarding the retention, recognition, and validity of electronic records is and will likely continue to be hotly debated.

Previously archival and records management professionals viewed legal concerns as a relatively distant apprehensive matter. Today, the mandates of legal procedures and correctness are pervasive throughout the preservation process, especially in relation to information technology and electronic records. New laws and statutes in the form of civil and criminal acts,

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<sup>82</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 322.

<sup>83</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 16.

national and international regulations, and rulings of judicial verdicts have created an avalanche of legality questions that has swept away traditional concepts. This has placed electronic record archives in a new legal world yet to be fully developed and interpreted.<sup>84</sup> “These changes demand, in sum, that we develop an awareness of these legal issues and that we approach our work in a collaborative partnership with the business and legal professionals in the enterprise if the most vital corporate resource, information, is to be protected and exploited for maximum value.”<sup>85</sup>

In the academic realm, human subjects review boards have been created to protect and maintain rights and ethics, to include electronic information about subjects in any shape or form. However, this control of data can prevent, stem, and deter the progress of electronic records archival practices. Digital oral history collections provide a perfect example of the challenges of conducting a born-digital material project, maintain the electronic database of the material [metadata included], and provide access to the materials, all while protecting the interests of the subjects.

## **2.9 Professionalization of the Electronic Archivist**

“Further development of digital archiving capabilities will require trained professionals with knowledge and skills in the technological, curatorial, and legal aspects of preservation, along with specific domain knowledge.”<sup>86</sup> These multi-hatted and motivated professionals are needed to fill the ranks of archivists working in electronic records archives. Cross training an archivist into the several essential disciplines would enable greater efficiency in staffing.

Adapting archival skills to the digital archival environment will be a unique occurrence to

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<sup>84</sup> Strickland, Lee S. "The Law of Electronic Information: Burgeoning Mandates and Issues." In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 109.

<sup>85</sup> Ibid, p. 109-110.

<sup>86</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 322.

archivists, records managers, and for most organizations in general. However, it should be archivists who determine what expertise is required. Substantial analysis of an organization's archival needs and goals will aid in devising the level of technical expertise for resolving records management and preservation problems. There is no doubt that professional development of future archivists will entail ample education in electronic records preservation methodology and technology. Areas such as sociology of organizations, communications, economics, and marketing, should not be overlooked as aspects of that education.<sup>87</sup>

“During the 1970s and continuing into the 1980s and 1990s, there was a generalized sense among records professionals that they were being pushed farther and farther into the background.”<sup>88</sup> Perhaps from the 2000s and into the present, this sense of prioritization of staffing has not diminished. Refusing to modernize staff organizational tables, failing to include technological skilled/educated new hires, and ignoring opportunities in staff training in information technology surely will result in obsolescence of archivists who will not adapt.<sup>89</sup>

## **2.10 Legacy Systems, Technology Obsolescence**

The relentless evolution of technology is unstoppable. Archivists can mitigate technological obsolescence through being proactive in maintaining an awareness of technology's progress. “Even if we accumulate vast archives of digital content, we may not actually know what it is.”<sup>90</sup> The tools of the archival trade will have to adapt to the new technological advances. Magnetic tape reel-to-reel readers, 5-inch floppy drives, 3.5-inch floppy drives, zip drives, and CD drives have or will go the way of ‘eight-track tapes, cassettes, Betamax, and VHS. “From the

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<sup>87</sup> Hedstrom, Margaret. "Understanding Electronic Incunabula: A Framework for Research on Electronic Records." *American Archivist* 54 (Summer 1991): 334-54, p. 353.

<sup>88</sup> Turnbaugh, Roy C. "What Is an Electronic Record?" In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 27.

<sup>89</sup> Ibid.

<sup>90</sup> Ghosh, Pallab. "Net Pioneer Warns of Data Dark Age." *BBC News*. February 13, 2015. Accessed February 14, 2015. <http://www.bbc.com/news/science-environment-31450389>.

point of view of the archive, forgetting is the ultimate transgression. But how reliable or foolproof are our digitized archives?"<sup>91</sup> Computer technology is not, relatively speaking, that old, but electronic archives already require 'data archaeologists' to decipher, interpret, and unlock the mysteries of early or specialized programming.<sup>92</sup> However much society attaches a sense of permanency to technology, "digital entities are fragile, prone to corruption, susceptible to misidentification, frequently poorly describe (if at all), difficult to track, and hard to maintain because of media, hardware and software obsolescence."<sup>93</sup>

## 2.11 Digital Dark Age

"It's one of the great ironies of the information age. If we don't find methods for enduring preservation of electronic records, this may be the era without a memory."<sup>94</sup> Less could be known about an individual today than an individual at the turn of the 20<sup>th</sup> century. For all of the personal identification information that exists, there are very few permanent records which will exist after the turn to 22<sup>nd</sup> century. Written letters, photographs, ledgers, journals, diaries, and et cetera offered glimpses and snapshots into lives of individuals a hundred years ago. A hundred years from now, how will we gain that same information? Will text messages, tweets, posts, and emails be available to reveal a person's character and historical developments, as documentation of past generation's notes and letters have done? "Vint Cerf, a 'father of the internet', says he is worried that all the images and documents we have been saving on computers will eventually be lost."<sup>95</sup> The 'Digital Dark Age' phrase that Cerf uses to describe the

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<sup>91</sup> Huyssen, Andreas. "Present Pasts: Media, Politics, Amnesia." *Public Culture* 12, no. 1 (2000): 21-38. Accessed February 20, 2015. [http://0-muse.jhu.edu.helin.uri.edu/journals/public\\_culture/v012/12.1huyssen.html](http://0-muse.jhu.edu.helin.uri.edu/journals/public_culture/v012/12.1huyssen.html), p. 26.

<sup>92</sup> Ibid.

<sup>93</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 317.

<sup>94</sup> Huyssen, Andreas. "Present Pasts: Media, Politics, Amnesia." *Public Culture* 12, no. 1 (2000): 21-38. Accessed February 20, 2015. [http://0-muse.jhu.edu.helin.uri.edu/journals/public\\_culture/v012/12.1huyssen.html](http://0-muse.jhu.edu.helin.uri.edu/journals/public_culture/v012/12.1huyssen.html), p. 26.

<sup>95</sup> Ghosh, Pallab. "Net Pioneer Warns of Data Dark Age." *BBC News*. February 13, 2015. Accessed February 14, 2015. <http://www.bbc.com/news/science-environment-31450389>.

potential historical record loss seems to be accurate. Cerf and many others fear the loss of so much impermanent data that future generations will have little or no record of the twenty-first century.<sup>96</sup>

Social media, such as Facebook and Twitter, could potentially become excellent sources of biographical material. However, these types of personal and social information sharing platforms are not owned by the individuals who use them. The corporations who operate the platforms ultimately control the information stored there. Can a Facebook profile be archived into a personally owned hard-drive? Will the platform or corporation periodically archive profiles for posterity? “Our life, our memories, our most cherished family photographs increasingly exist as bits of information - on our hard drives or in ‘the cloud’. But as technology moves on, they risk being lost in the wake of an accelerating digital revolution.”<sup>97</sup> Obsolescence of technology could also play a significant factor in retaining cultural memory. Aging formats, software programs, and hardware requirements have already cause selective amnesia through many divisions of society. Backwards compatibility may not always be an option or even possible.<sup>98</sup>

Cerf addresses his concerns about backwards compatibility, “The key here is when you move those bits from one place to another, that you still know how to unpack them to correctly interpret the different parts. That is all achievable if we standardize the descriptions.”<sup>99</sup>

Assurance of accessibility and readability of electronic records, now and in the future, is not guaranteed by any measure. Cerf provides the term ‘digital vellum’ as a descriptor of casting digital materials in a shroud of protection. The velocity of technological development has so far

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<sup>96</sup> Ghosh, Pallab. "Net Pioneer Warns of Data Dark Age." BBC News. February 13, 2015. Accessed February 14, 2015. <http://www.bbc.com/news/science-environment-31450389>.

<sup>97</sup> Ibid.

<sup>98</sup> Ibid.

<sup>99</sup> Ibid.

demonstrated that practical methods of sustaining the antiquated technology to run concurrent with the new are not easily obtained. How can we know that standards of the future will still be able to interpret the technology of the past?<sup>100</sup>

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<sup>100</sup> Ghosh, Pallab. "Net Pioneer Warns of Data Dark Age." BBC News. February 13, 2015. Accessed February 14, 2015. <http://www.bbc.com/news/science-environment-31450389>.



## **CHAPTER 3: SURVEY RESULTS**

### **3.0 Introduction and Methodology**

The method of conducting this study was to sample the practices and opinions of research facilities, focusing on archives type organizations. The sampling was to discover trends related to the use, preservation, management, and awareness of electronic records. This information could help lead to sharing best practices and avoiding failures. The participants of this survey were: Archivists, Records Managers, Librarians, and other research services staff. Their participation in the survey was voluntary and anonymous.

The research study was conducted online at [surveymonkey.com](http://surveymonkey.com) as a means of convenience and as expeditious for participants. By using an online survey collector, with communications being conducted through electronic mail, the 1,505 research facility email addresses would automatically qualify participants as having electronic records through their communications and through their websites where the addresses were obtained. Archives, Libraries, and other research facilities from throughout the United States, at least a dozen facilities from each state, were invited to participate. Use of these electronic systems indicated that they were more inclined to retain or be familiar with electronic records as part of their operations or collections.

The survey was created October 2014 and was being prepared until the date of issue in January, 2015. Initial invitation emails were sent 5 January 2015. The survey was open for participation 5 January through 3 April, 2015. A reminder email was sent to all potential participants who had not yet accessed the survey on 26 February 2015. A final reminder email was sent to the remaining unresponsive invitees on 16 March 2015. All 279 respondents completed the survey; there were no partially completed surveys.

### **3.1 Survey Dispersal**

The need for an efficient dispersal procedure for the invitation emails to the online survey was essential for the timeframe of the project. The respondent tracking functions of surveymonkey.com provided a great administrative and time saving benefit. The tracking function provided a further layer of anonymity for respondents. When an email was sent to a research facility's organizational mailbox or to an individual at the facility, a uniquely coded hyperlink was provided. The hyperlink, once selected, directed the participant to the survey website.

The text of the email disclosed the purpose of the communication and the concept for the thesis project. Included was a general description of the survey and how the data would be used. It was made clear that no personal information was required to participate in the survey and their responses to survey questions would be anonymous. By selecting the hyperlink the participants agreed to volunteer their information, thus agreeing to informed consent. The participants had access and could return to their survey for changes during the open phase of the survey.

### **3.2 Results Analysis**

The correlation of data collected through the online survey was performed by the surveymonkey.com website correlation function. The auto-tabulation and the author's calculations are how data was tabulated into graphs and percentages. Total participation in the survey was: 279 responses out of 1505 emailed invitations; indicating an 18.5% response rate. However, there were 17 email addresses which proved to be non-active or incorrect. Accounting for those 17 addresses, this drops the potential respondent total to 1,488. Therefore 279 responses of 1,488 provides an 18.8% response rate. There was an immediate 'opt out' total of 17 potential respondents who chose not to participate, a 1.1% opt out rate.

### 3.2.1 Survey Question 1

Q1: What type of institution is your facility?

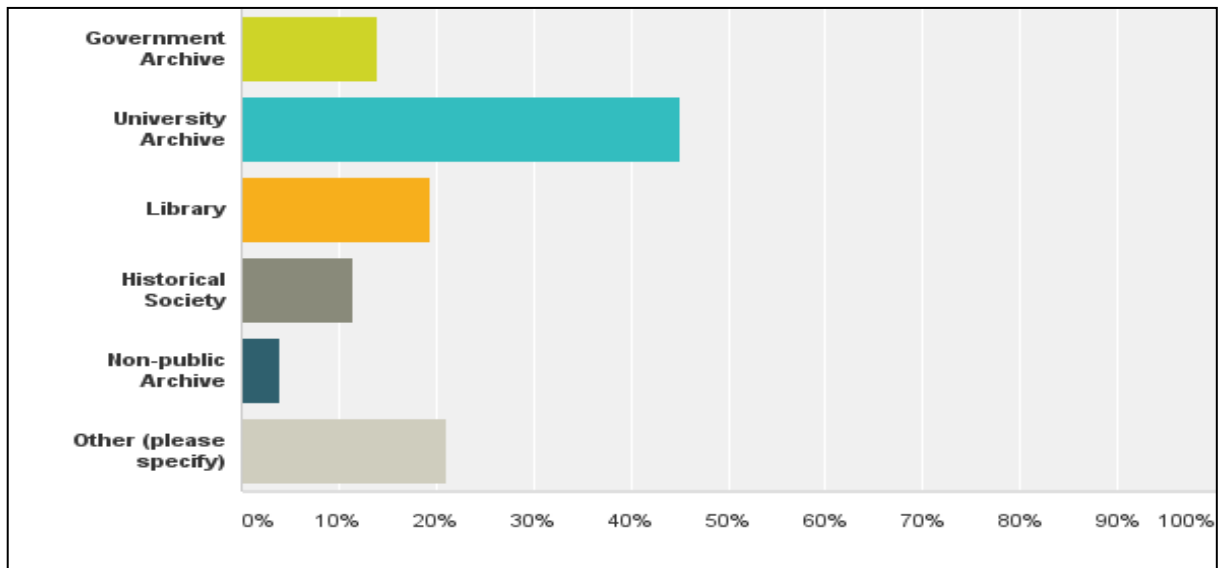


Figure 1

Answer Choices	Responses
Government Archive	13.98% 39
University Archive	45.16% 126
Library	19.35% 54
Historical Society	11.47% 32
Non-public Archive	3.94% 11
Other (please specify)	21.15% 59
<b>Total Respondents: 279</b>	

Figure 2

Many responses in the ‘Other’ category indicated that a facility was both an archive and a library. Analysis of the respondent explanations could allow for the ‘Other’ category to be generally split to the Archive options and ‘Library.’ Other typical answers indicated that the research facility was a museum with a partial archival function or as a unique records management organization.

### 3.2.2 Survey Question 2

Q2: Who handles your facility's information technology needs relating to archiving electronic records? (select all that apply)

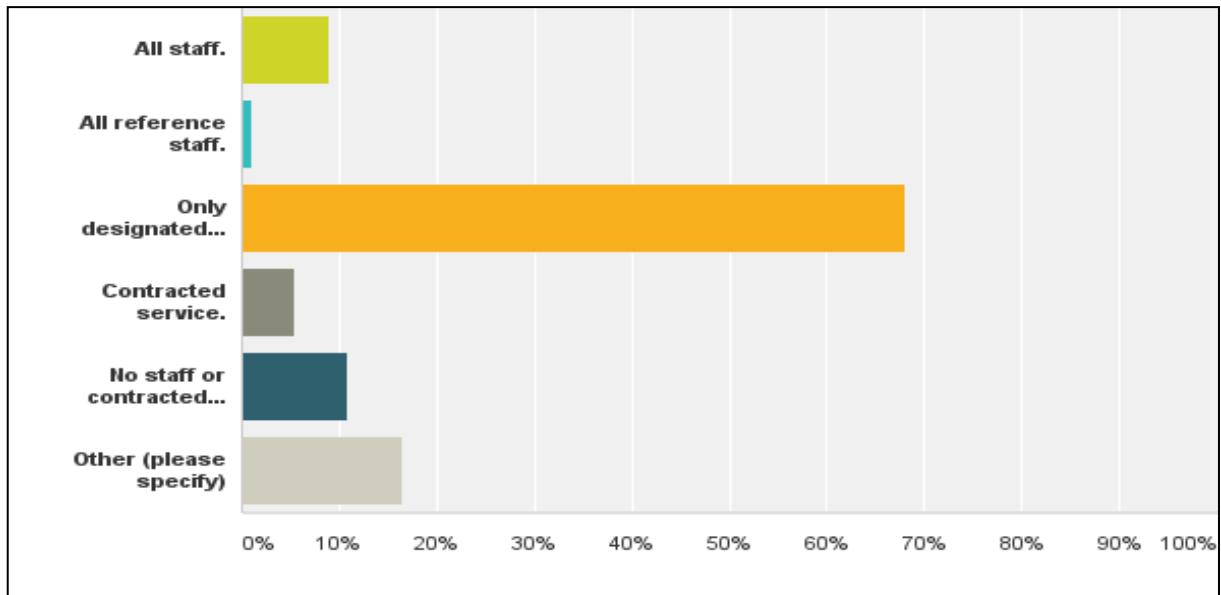


Figure 3

Answer Choices	Responses
All staff.	8.99% 35
All reference staff.	1.08% 3
Only designated staff.	67.99% 189
Contracted service.	5.40% 15
No staff or contracted service.	10.79% 30
Other (please specify)	16.55% 46
Total Respondents: 278	

Figure 4

With a large majority of responses (67.99%) indicating that only designated staff are allowed access to and management of a facility's Information Technology, it is clear that the highly technical and specialized knowledge of these systems is not common to all staff.

### 3.2.3 Survey Question 3

Q3: If your facility does not have a collections policy for electronic records, does it plan to create a policy?

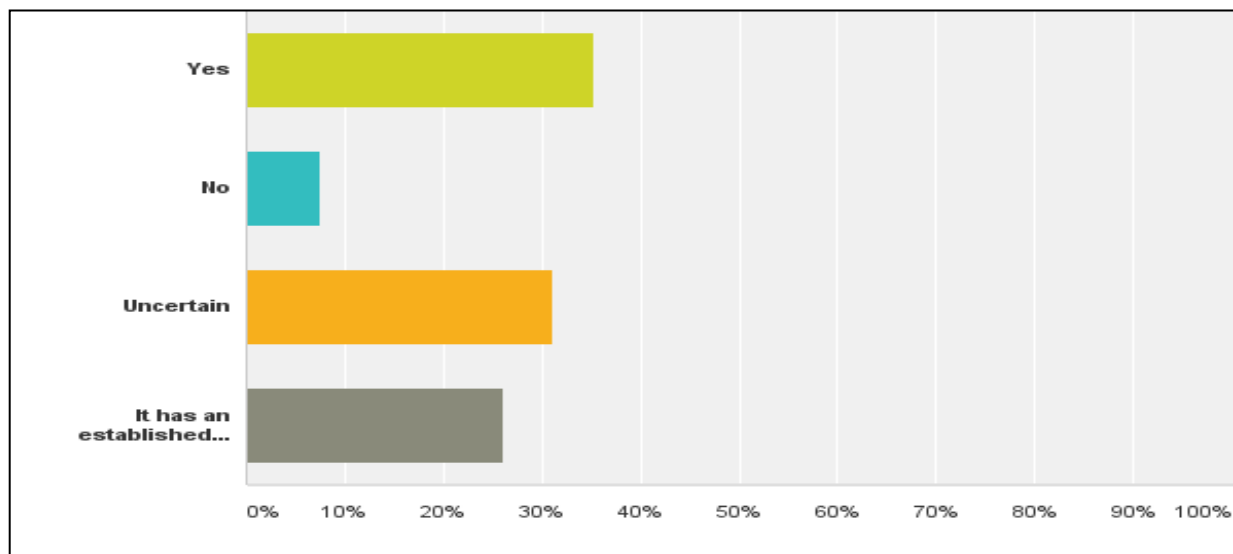


Figure 5

Answer Choices	Responses	
Yes	35.38%	98
No	7.58%	21
Uncertain	31.05%	86
It has an established collections policy for electronic records	25.99%	72
<b>Total</b>		<b>277</b>

Figure 6

The high percentage of both 'yes' and 'Uncertain' is surprising. That there are so many facilities which have no established collection policy for electronic records is an indicator of complacency or a 'wait and see' attitude. Furthermore, that a high percentage of respondents answered that they are uncertain of their facility's current or future collection policy demonstrates other issues such as lack of coordination, communication, or planning of policy within their organization which has failed to prepare and inform the respondents of electronic record collections intentions. At a minimum, formulating plans and contemplating possible

policies should be conducted to prepare for the eventuality of possessing electronic records collections.

That almost 26% of respondents reported that their organization already has an established collections policy for electronic records is promising. The advancement of technology requires forward thinking in creating the contingency options of collection, processing, maintenance, and accessibility policies. Those facilities which have instituted policies or have them at the ready, are better prepared for the adoption of electronic collections as the primary focus of archival services.

### 3.2.4 Survey Question 4

Q4: Does your facility currently collect electronic records?

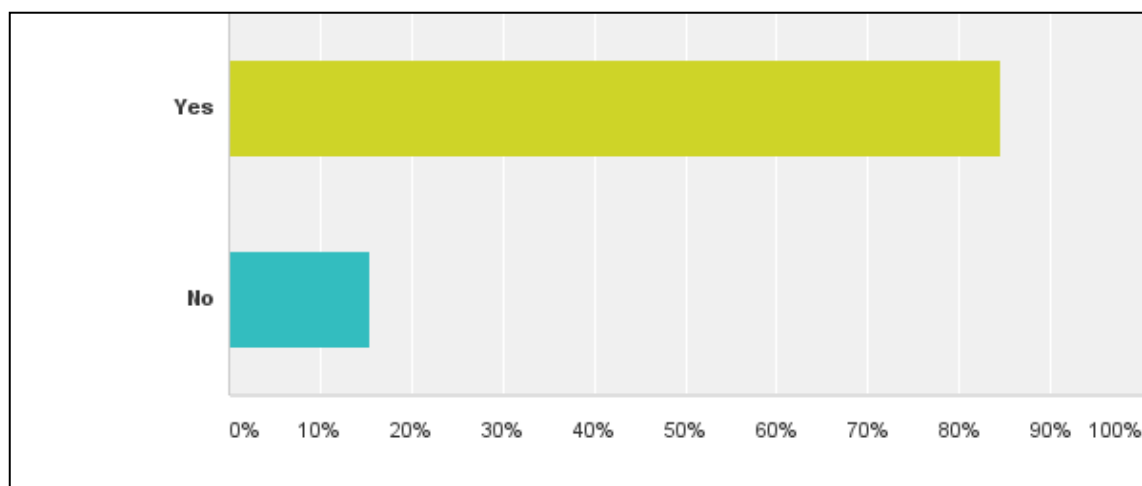


Figure 7

Answer Choices	Responses	
Yes	84.59%	236
No	15.41%	43
Total		279

Figure 8

With almost 85% of organizations accepting electronic records, there is an effort being made to integrate those records into collections. The collection of electronic records does not

necessarily mean that those records will be accessioned into permanent and accessible collections through conventional means.

### 3.2.5 Survey Question 5

Q5: Which type of electronic records does your facility collect? (select all that apply)

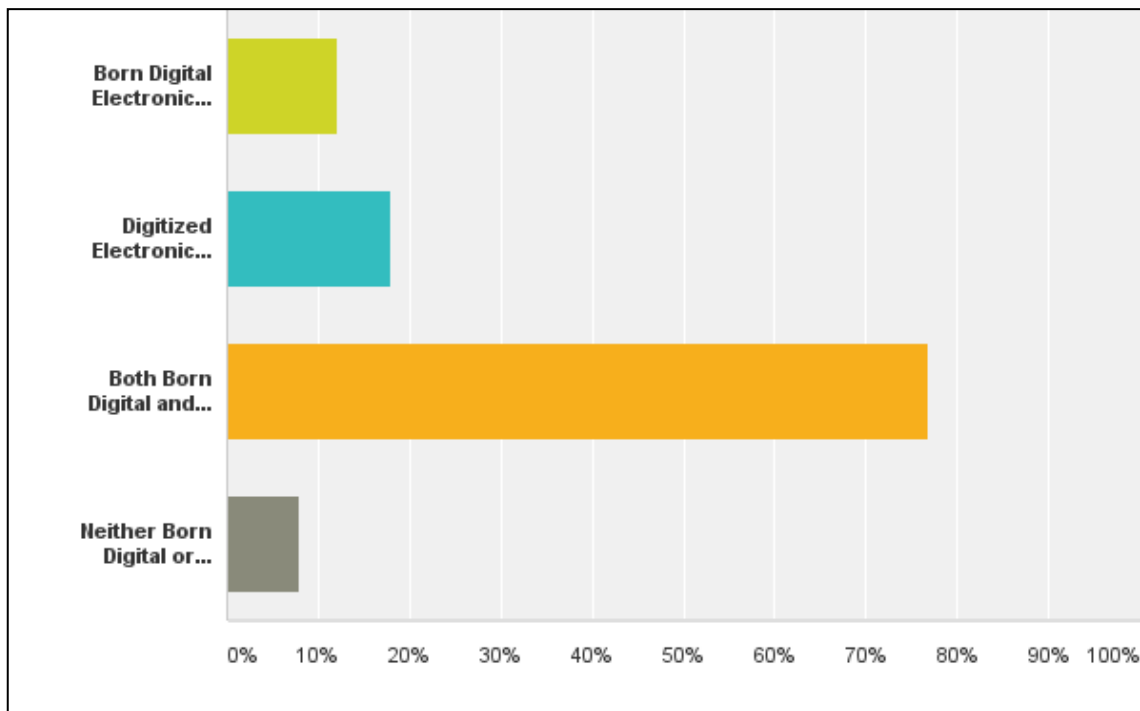


Figure 9

Answer Choices	Responses
Born Digital Electronic Records	12.17% 32
Digitized Electronic Records	17.87% 47
Both Born Digital and Digitized Electronic Records	76.81% 202
Neither Born Digital or Digitized Electronic Records	7.98% 21
Total Respondents: 263	

Figure 10

### 3.2.6 Survey Question 6

Q6: What is your facility's policy regarding accepting electronic records, born-digital or digitized copy, as part of your collections?

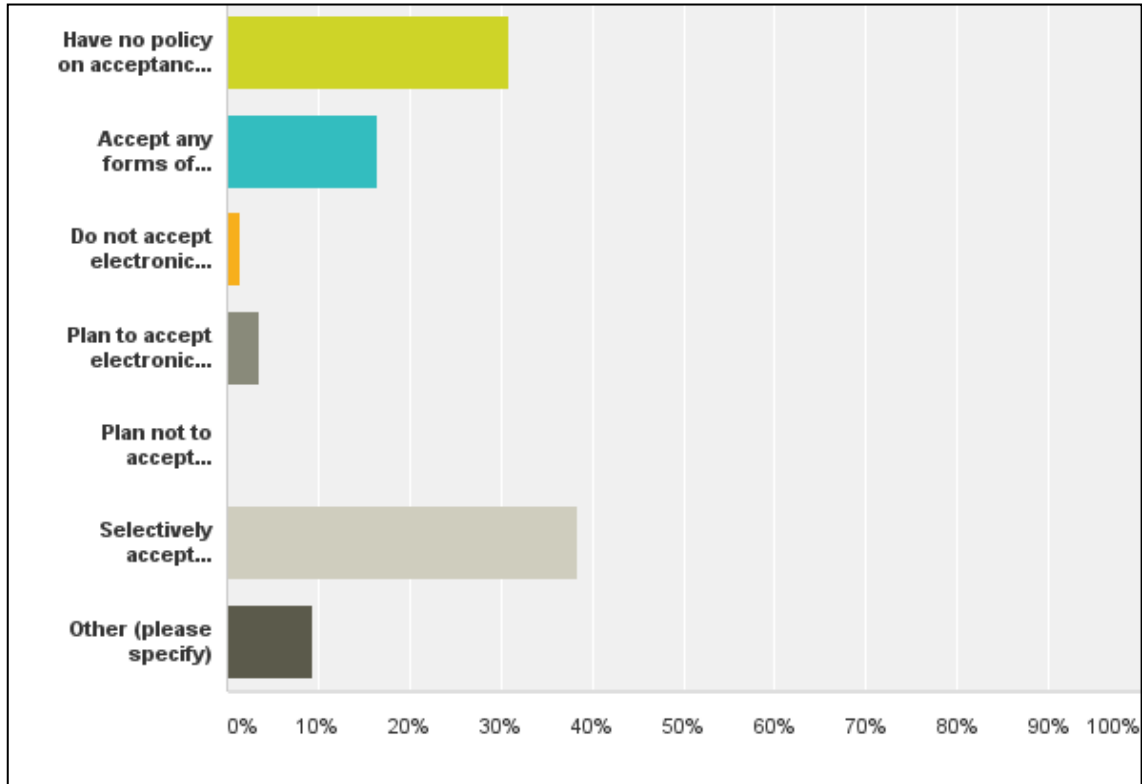


Figure 11

Answer Choices	Responses
Have no policy on acceptance yet.	30.82% 86
Accept any forms of electronic records.	16.49% 46
Do not accept electronic records.	1.43% 4
Plan to accept electronic records.	3.58% 10
Plan not to accept electronic records.	0.00% 0
Selectively accept electronic records.	38.35% 107
Other (please specify)	9.32% 26
<b>Total</b>	<b>279</b>

Figure 12



Responses indicate that either a facility has no policy defining criteria and providing guidance of acceptance or that the facility selectively chooses what they will/can accept. This indicates that caution or lack of capability is largely hindering acceptance of electronic records. There is, however, a percentage of facilities which do accept all formats of electronic records.

### 3.2.7 Survey Question 7

Q7: What is your facility's policy for preservation storage of electronic records? (i.e. storage and migration)

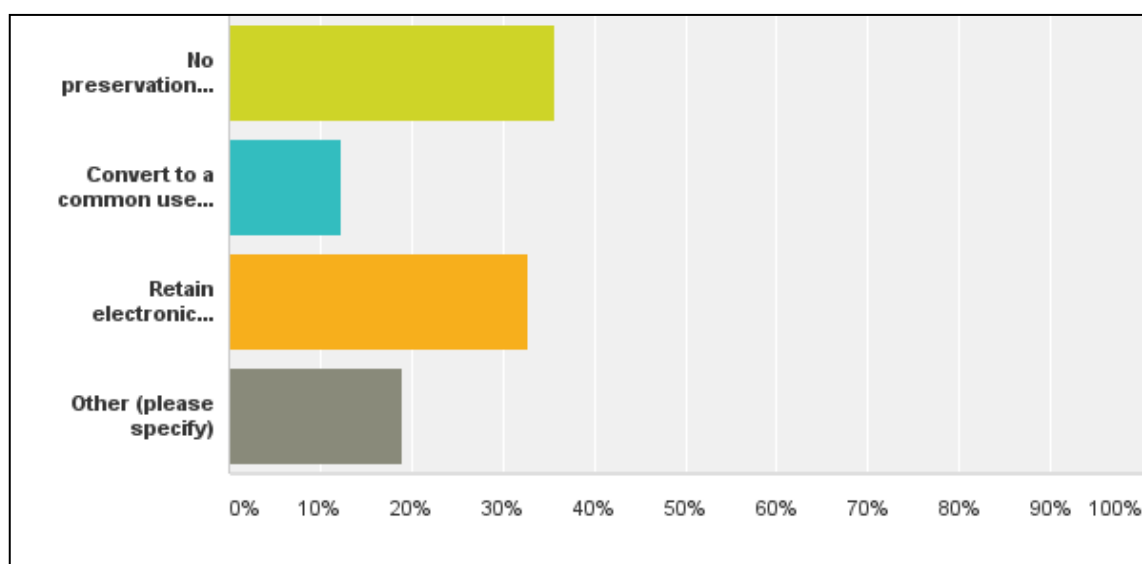


Figure 13

Answer Choices	Responses
No preservation policy	35.77% 98
Convert to a common use format (xml or another type)	12.41% 34
Retain electronic record's original file type and format	32.85% 90
Other (please specify)	18.98% 50
<b>Total</b>	<b>274</b>

Figure 14

### 3.2.8 Survey Question 8

Q8: How does your facility allow search access to electronic records? (select all that apply)

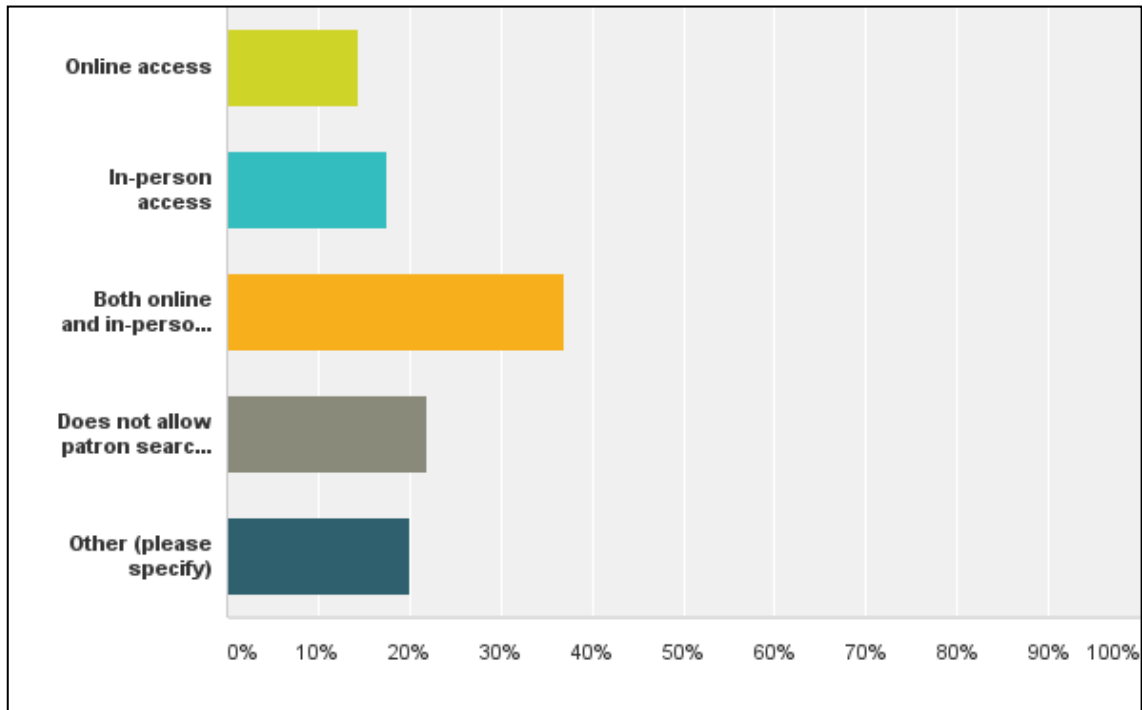


Figure 15

Answer Choices	Responses
Online access	14.34% 40
In-person access	17.56% 49
Both online and in-person access	36.92% 103
Does not allow patron search access	21.86% 61
Other (please specify)	20.07% 56
Total Respondents: 279	

Figure 16

### 3.2.9 Survey Question 9

Q9: When has your facility collected electronic records? (select all that apply)

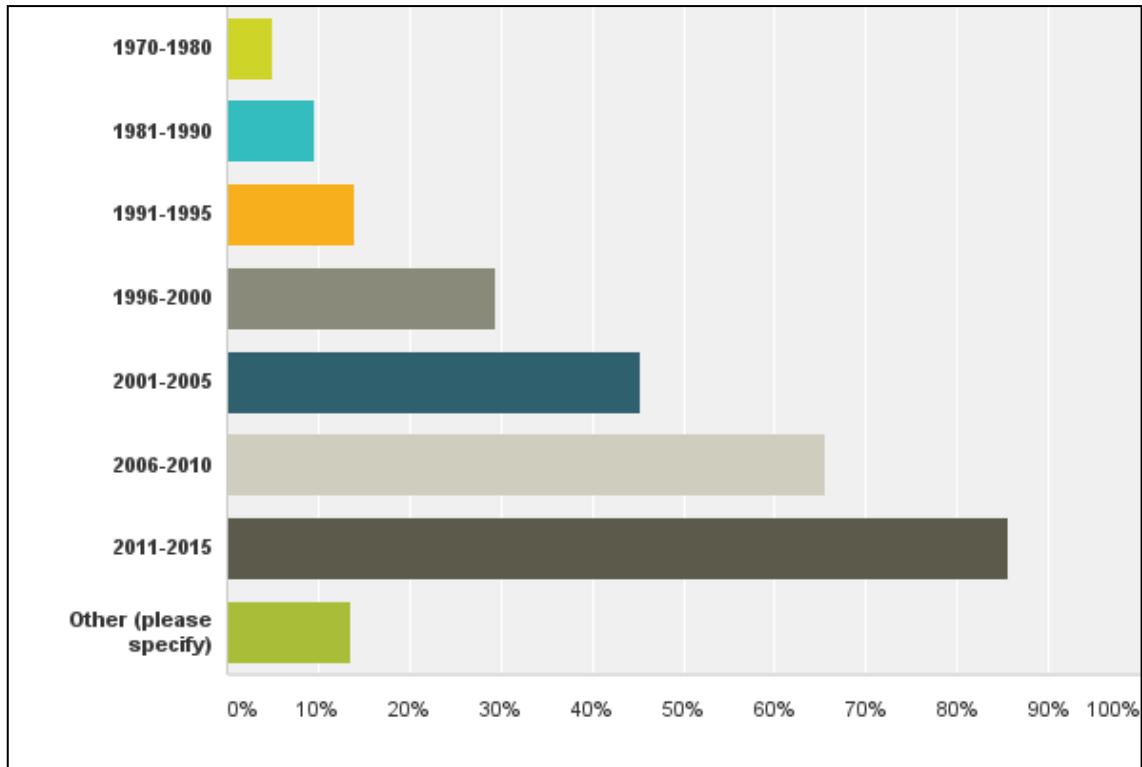


Figure 17

Answer Choices	Responses
1970-1980	5.04% 13
1981-1990	9.69% 25
1991-1995	13.95% 36
1996-2000	29.46% 76
2001-2005	45.35% 117
2006-2010	65.50% 169
2011-2015	85.66% 221
Other (please specify)	13.57% 35
<b>Total Respondents: 258</b>	

Figure 18

Some of those that selected the “Other” category specified that they collected electronic records selectively and did not offer continuous open accessioning. Some also described accepting electronic records for short periods of time, a single year or two, and then not accepting records until several years later; again, only accepting for a short period of time.

There were also a few respondents that specified that the electronic records they were collecting were of digitized materials and were unsure as to what timeframe they should select. The confusion being that the original documents were of pre-1900s, for example, but the digitized files were of recent creation. Several of these respondents should have selected “2011-2015”. With these adjustments, the total percentage of respondents would be over 90% for the “2011-2015” category.

### 3.2.10 Survey Question 10

Q10: How does your facility manage electronic records collections?

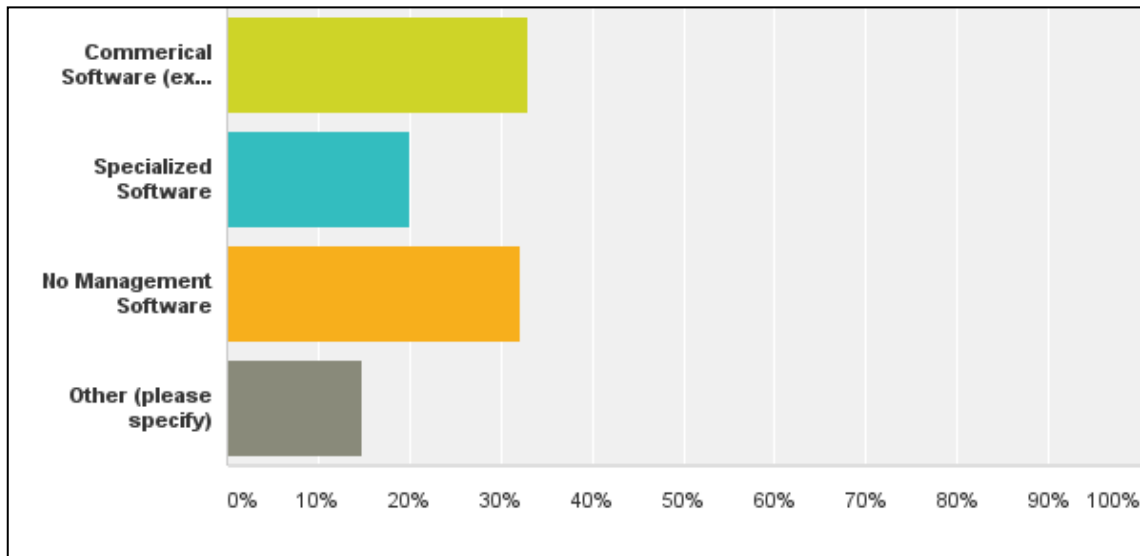


Figure 19

Answer Choices	Responses	
Commerical Software (ex: PastPerfect, Microsoft Office, etc.)	32.96%	89
Specialized Software	20.00%	54
No Management Software	32.22%	87
Other (please specify)	14.81%	40
<b>Total</b>		<b>270</b>

Figure 20

Those that selected “other” indicated programs such as: Customized or in-house designed archival database systems, ARCHON, ArchiveSpace, combination of open-source programing with in-house designed software, DSpace, PastPerfect, and others. Several respondents said they did not know what kind of software or system was used to manage their electronic records. A few respondents replied that their parent organization maintained and managed their electronic records for them.

### 3.2.11 Survey Question 11

Q11: Where does your facility house its electronic records collections? (select all that apply)

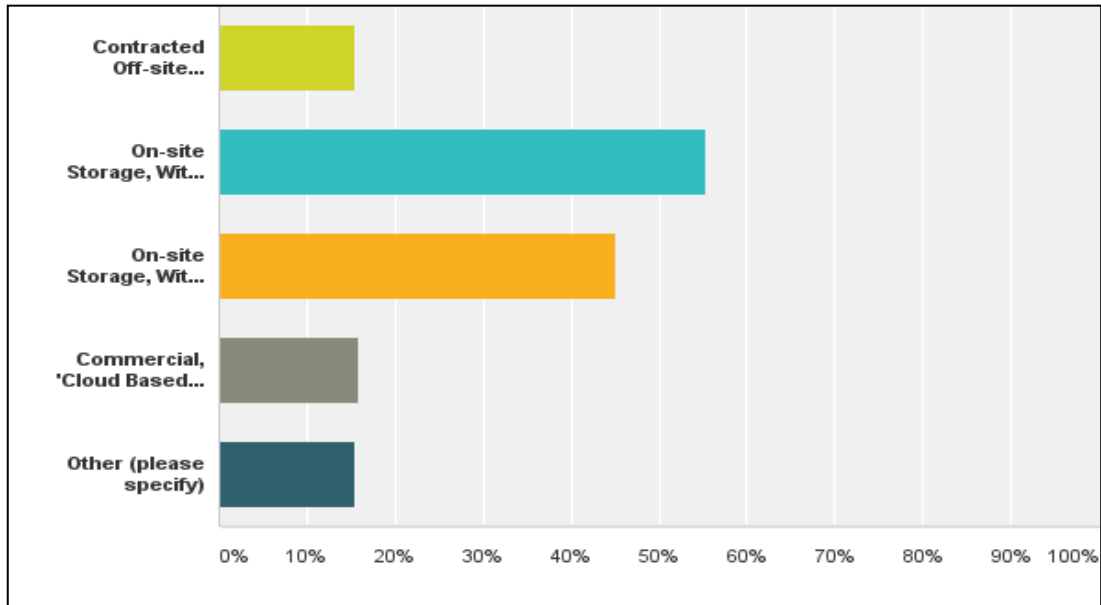


Figure 21

Answer Choices	Responses
Contracted Off-site Storage	15.38% 40
On-site Storage, Within Greater Organization's Storage	55.38% 144
On-site Storage, Within Archives Unit Storage	45.00% 117
Commercial, 'Cloud Based' Storage	15.77% 41
Other (please specify)	15.38% 40
Total Respondents: 260	

Figure 22

### 3.2.12 Survey Question 12

Q12: Which areas has your facility encountered electronic record issues? (select all that apply)

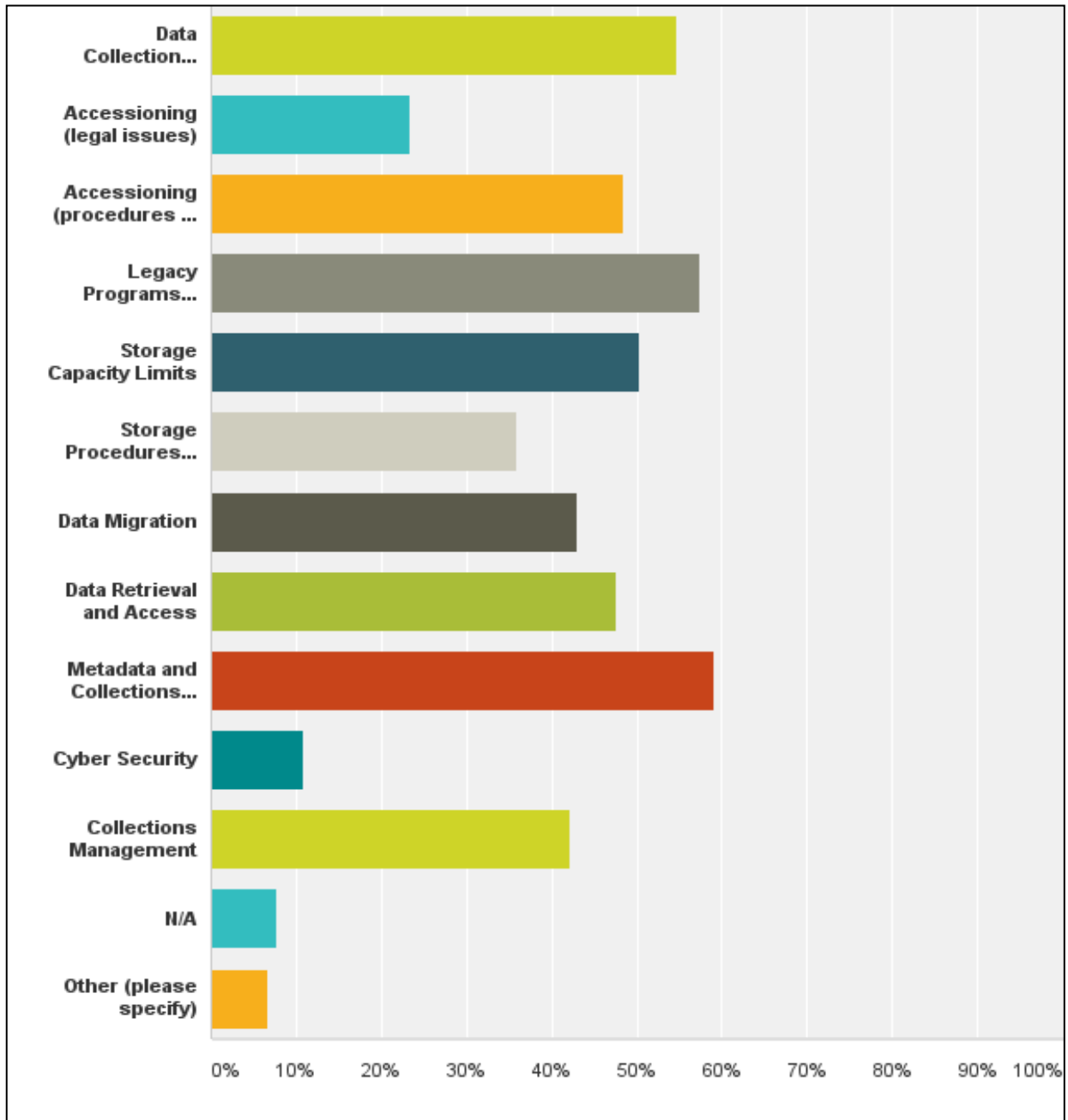


Figure 23

Answer Choices	Responses	
Data Collection (donation and records gathering policies)	54.69%	140
Accessioning (legal issues)	23.44%	60
Accessioning (procedures and methods)	48.44%	124
Legacy Programs (outdated or unusable formatting)	57.42%	147
Storage Capacity Limits	50.39%	129
Storage Procedures (corrupted data and/or loss of information)	35.94%	92
Data Migration	42.97%	110
Data Retrieval and Access	47.66%	122
Metadata and Collections Information	58.98%	151
Cyber Security	10.94%	28
Collections Management	42.19%	108
N/A	7.81%	20
Other (please specify)	6.64%	17
<b>Total Respondents: 256</b>		

Figure 24

Four categories were selected by over half of the respondents: Metadata and Collections Information; Storage Capacity Limits; Legacy Programs; and Data Collection. Metadata and Collections Information led the survey question with the highest selection at 58.98%. Obviously, problems with metadata and metadata management need to be addressed.

Lowest scoring problematic category was Cyber Security with 10.94%. As information technology management is usually controlled by staff other than archivists, respondents may not have direct knowledge or awareness of cyber security issues. With limited or no online access to most archival databases, cyber security has not been of high importance and appears to remain of tertiary concern for individual facilities. Cloud based information corporations are also well prepared to handle cyber security and may not disclose security threats.



With hindsight or in subsequent surveys, several of these problematic issues should be given their own question and a comment section to help in explaining the difficulties encountered. Those respondents that selected “other” wrote interesting and helpful suggestions for additional categories. A few of the additional categories were: financial support, large scale digitization practices, description standards, prioritization, and staffing issues, among others.

### 3.2.13 Survey Question 13

Q13: How important are electronic records to providing service to your researchers?

	Not Important	Little Importance	Neutral	Somewhat Important	Very Important	Total	Weighted Average
(no label)	3.23% 9	10.04% 28	18.28% 51	35.48% 99	32.97% 92	279	3.85

Figure 25

### 3.2.14 Survey Question 14

Q14: How important will electronic records archives be to the development for your facility’s reference service?

	Not at all	Will be slightly important	Will be just as important as textual records	Will be significantly important	Will dominate reference service	Uncertain	Total	Weighted Average
(no label)	1.10% 3	10.99% 30	32.60% 89	42.12% 115	6.59% 18	6.59% 18	273	3.62

Figure 26

### 3.2.15 Survey Question 15

Q15: Does your facility use analytics tracking of its electronic archives?

Answer Choices	Responses	
Yes	24.81%	67
No	58.89%	159
Unknown	16.30%	44
<b>Total</b>		<b>270</b>

Figure 27

Analytics tracking has become very useful for improving collections management practices and especially for focusing digitization project prioritization. Knowing where your online patrons are researching and what collections they have interests in will allow better allocations of staff, time, and money to support those collections. Analytics of what web content is being downloaded and how long researchers are viewing pages has improved website design. Featuring particular records of highly used collections leads to greater use of that collection. Also featuring or associating records of other, similar, collections could introduce greater activity to those collections.

### 3.2.16 Survey Question 16

Q16: Is scalability considered in your facility's planning and use of electronic archives?

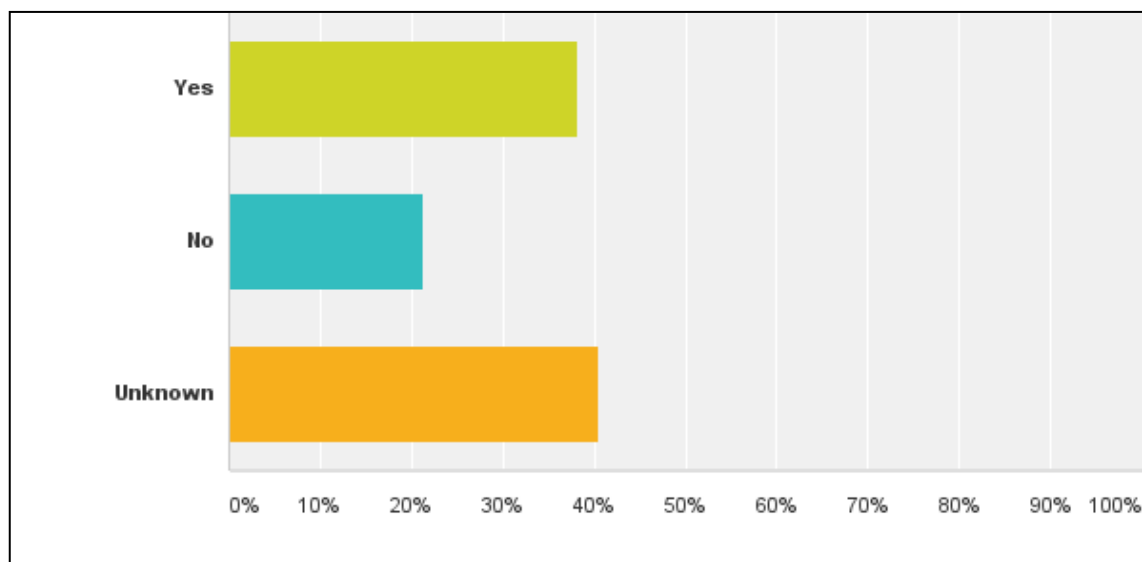


Figure 28

Answer Choices	Responses	
Yes	38.24%	104
No	21.32%	58
Unknown	40.44%	110
<b>Total</b>		<b>272</b>

Figure 29

The strategic planning concept of scalability has yet to become a concern for most archives. The ability to increase the scale and capacity of archival electronic record systems is a distant but proliferating issue. Scalability needs be considered early in an archives' collections management plan for electronic records. With the tremendous volume of potential electronic records in use today, archival storage of those electronic records must be considered.

### **3.3 Survey Conclusions**

One of the major misconceptions about electronic records is what a definitive definition of an electronic record is. It seems that respondents to the survey had their own opinion of electronic records and what constitutes an electronic record from their perspective.

Benefits of the Study: The benefits of this study will be the discovery of indications and trends towards policies, procedures, technology, communication techniques, and information sharing cooperatives; all which could lead to the betterment of collection, use, and preservation of materials at archival and research facilities. Additional benefits could be the discovery of mistakes, failures, and difficulties to avoid. The lessons learned from these problems and issues can allow research facilities to: improve their preservation programs; improve their reference service; increase their ability to communicate and share with researchers and other facilities; proceed with materials collection programs with greater ability to understand the complexities and benefits of electronic records; and allow greater conduct of a facility's mission of preservation and information sharing.

## **CHAPTER 4: CONCLUSIONS AND SUGGESTIONS**

### **4.0 Introduction**

Providing the expertise, access, and reliability needed for an electronic archive appears to be a daunting feat to accomplish. Every archive is sure to have its own unique problems and goals; however, there are management, concept, and policy issues which all archives need to consider. Several recommendations and discussions of these topics are provided.

### **4.1 Development of Records Management Policies**

Adapting existing management policies for electronic records may not be a practical solution. Creating unique and innovative policies should be considered, even encouraged, in managing electronic records. Richard Barry points out major issues with management policies, “How can we continue to meet legitimate requirements for operational continuity, corporate memory, future research, and changing organizational needs such as knowledge and content management requirements that may be at odds with other recordkeeping requirements – in short, recordkeeping and information usage needs – without becoming inundated with trivial data?”<sup>101</sup> Motivations should adjust policies to broaden the scope of opportunities and at the same time maintain enough focus to achieve an organization’s goals.

### **4.2 Knowledge Economy**

A popular concept for the world economy is the shift towards a knowledge based economy. Archives, and especially electronic archives, will be in an advantageous position within the knowledge-based economic scenario. For electronic archives to exploit their advantages, they need to prepare for the possibility of this shift. Ross and Hedstrom speak to this preparation, “This transformation requires effective digital preservation and curation solutions as

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<sup>101</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 7-8.

part of the infrastructure for a knowledge-driven economy. If cultural institutions are to extend their missions of preserving society's cultural heritage and intellectual capital into the digital age they need more reliable and more affordable digital archiving methods, systems, and technologies."<sup>102</sup>

Bruce Dearstyne continues to comment on the corporations and big players positioning themselves for the economic shift, "The information world is moving at lightning speed, and its destiny is controlled by information product-and-service producers such as Microsoft and IBM; by customers' changing expectations and demands; by government policies; and by institutional Chief Information Officers, among others."<sup>103</sup> Archives of any size have the ability to participate in the knowledge economy. However, archives tend to be deprived of the guidance and inspiration to develop the prepositioning policies.

#### **4.3 New and Experimental Research Projects in Digital Preservation**

If they haven't already, archives must create a digital presence: A website, Facebook page, Twitter account, online database, or any electronic presence which suits the goals and operations of the research facility. Richard Barry comments in his article, "There is a greater symbiosis between work and technology. People do sometimes put the technology cart in front of the organizational horse, intentionally or otherwise, and at times with very good results."<sup>104</sup>

Putting that first electronic records step forward can open a new world for archives.

Experimenting with electronic records collections could be a risky venture, but the potential benefits are worth the risks.

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<sup>102</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 317.

<sup>103</sup> Dearstyne, Bruce W. "Riding the Lightning: Strategies for Electronic Records and Archives." In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p.141.

<sup>104</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 4.

The creation of new digitation projects and databases is becoming less difficult and cumbersome. Ross and Hedstrom have poignantly listed a steps to establishing and maintaining electronic record archives: “(a) concentrate on a specific aspect of digital preservation; (b) focus on tangible deliverables; (c) place more emphasis on engineering and computer science that is informed by archival issues and long-term digital preservation requirements, and (d) recognize that digital entities are the raw materials for the industries of the 21st century – intellectual capital.”<sup>105</sup> Small, local, or financially limited facilities could utilize the resources which make them unique and special to create a disproportionate electronic version of themselves.

Asymmetrical availability or accessibility of electronic materials from small archives will allow for greater patronage of those digital collections, which otherwise might not have the in-person capacity to accommodate.

#### **4.4 Rethink Research Process Framework**

Electronic records practices have developed enough that they now possess their own characteristics. Commonly known and used today, yet still relatively new, archivists and records managers continue to let slip from their grasp the opportunities electronic records can provide. The complexity and intricate nature of ERA offers the chance to reconsider the traditional framework of the research process. The skillful navigation of access procedures with archives and other research facilities no longer requires advanced knowledge of specific facilities or even the physical, in-person, appointments. The traditional elements and steps to conducting research have become merely conventional. Ross, Seamus, and Hedstrom state, “electronic records issues [span] all archival functions and may challenge basic archival theory and practice.”<sup>106</sup> There are

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<sup>105</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 318.

<sup>106</sup> Hedstrom, Margaret. "Understanding Electronic Incunabula: A Framework for Research on Electronic Records." *American Archivist* 54 (Summer 1991): 334-54, p. 335.

alternate concepts of research framework, which the discussion of is beyond the scope of this writing, but the source of these proposed approaches is electronic archives. A serious analysis of research technique is possible and archivists could be the enabling factor.

#### **4.5 Addressing Obstacles**

Recognition of obstacles prohibiting the creation and development of electronic archives is the first step in solving problems. “The word ‘record’ carries a lot of legal and cultural freight,” this freight, or problematic branding of electronic records, that Turnbaugh points to contributes to the hesitancy and the ‘wait and see’ approach.<sup>107</sup> In the customary use of the term, ‘record’ is associated with paper documents. People, throughout the archival field, are comfortable with that connotation and are timid towards rapid change, especially of the paradigm shift possibilities of electronic records. Turnbaugh states, “The qualities of paper documents include the capability of being read without intervention by a machine, a reasonably durable form that resists alteration, and a tangible rather than a virtual reality.”<sup>108</sup> This point appears to be one of many fallback excuses to shy away from electronic archives. Ignoring the obstacles is not going to make them go away.

Ross, Seamus, and Hedstrom remark that, “Organizational, legal, cultural, social, and financial obstacles also need to be addressed.”<sup>109</sup> These obstacles should be used to educate archivists and records managers, in some cases re-educate, to prepare for the future. Preparation begins with the recognition of the largely unprepared state of research facilities to accommodate electronic records. Institutions charged with delivering preservation and access mandates are

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<sup>107</sup> Turnbaugh, Roy C. "What Is an Electronic Record?" In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 29.

<sup>108</sup> Ibid.

<sup>109</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 318.



finding it difficult to acknowledge their lack of preparation because the core technologies and skills are not available throughout the archival world.<sup>110</sup> We need to start somewhere.

#### **4.6 Preservation Standards**

Preservation standards are and will be essential to supporting the field-wide framework establishment, systems codification, and programming compatibility. Ross, Seamus, and Hedstrom state an excellent point on this issue, “Digital archiving standards could form the basis for commercial products and services for which the potential mark is substantial. Products that would enable individual content creators to produce digital objects that are archive-ready with little or no additional effort could have an enormous impact on driving down preservation costs.”<sup>111</sup> Progress has been made in this endeavor. However, there are too many uncertainties and variations to make a substantial impact on the archival field as a whole.

Individuals, minor/independent facilities, and organizations without influence on the creation of standards have little or no chance to effect great change; any standardization will need to be instituted through government or significant initiatives. These organizations will need to have notable leverage such as: Society of American Archivists [SAA], Council of State Archivists [CoSA], Academy of Certified Archivists [ACA], National Association of Government Archives and Records Administrators [NAGARA], among many other organizations. A cautionary point made by Bruce Dearstyne is applicable to this issue, “Professional associations follow rather than lead in the electronic records and archives arena. Our professional associations find it increasingly challenging to cope with technology,

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<sup>110</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 318.

<sup>111</sup> *Ibid*, p. 322.

proactively anticipate members' needs, shift to Web-based services, attract and hold younger professionals, and at the same time lead and shape the professional field."<sup>112</sup>

Richard Barry has made a strong statement on the situation of archival standards at the international level:

Much collaboration has been done at the international level including such efforts as the United Nations study, *Managing Electronic Records: Issues and Guidelines* (1990), and the recent and ongoing ISO-sponsored development of an international standard for recordkeeping (ISO 15489) that was based on a standard developed in Australia (AS 4390). ISO 15489 is an excellent standard for recordkeeping practices; but [it] is at too high a level of abstraction to certify trustworthy recordkeeping EDMS and other software applications. The US DoD 5015.2 Records Management Application standard, approved by the Archivist of the United States for use throughout the Federal Government, and widely used voluntarily at state and local levels and in the private sector and academia, can and is being used to certify such applications. A similar international standard at this level is badly needed to gain the needed support of software developers. This is more important than ever. We need the collaboration of software developers to make it happen.<sup>113</sup>

Are there really 'best practices,' for the archival field as a whole, which can be used to create unified standards? Should we instead emphasize that facilities examine their own systems and particular needs; to make their own decisions about what standards and practices are

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<sup>112</sup> Dearstyne, Bruce W. "Riding the Lightning: Strategies for Electronic Records and Archives." In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p.141.

<sup>113</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 17.

appropriate for them, regarding their electronic records? Wrestling with these issues has and will continue until a convention of standards is created by the archival field or when technological development forces its own standards upon archive science.

#### **4.7 Practical Results**

Having electronic records-related deliverables to publish and showcase can be greatly aid the research facility in generating further electronic archives efforts. Digitization of photographs, art, and artifact collections have been widely used to publicize archival collections through websites and social media. Practical results of digital projects have the potential to jumpstart ever larger electronic archives initiatives. Also through pragmatic applications of digital projects, Ross, Seamus, and Hedstrom comment that, “Emphasis must be put on the production of exploitable outcomes through the development of methods and practical tools.”<sup>114</sup>

#### **4.8 Adjust Collection Efforts**

Collection efforts and policies to obtain electronic records should either be created or revised on a regular basis. Christopher Prom suggest, “Now, the widespread use of personal computers raises the prospect that the opportunity to acquire the ‘papers’ of faculty, including their research and correspondence, may be lost at the very time when it is technically possible to capture a more complete record of their activity.”<sup>115</sup> Prom’s article focused on academic electronic records but the principle is easily applied to all select persons from which an archive would wish to collect electronic records. Still focusing on academic and university based

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<sup>114</sup> Ross, Seamus, and Margaret Hedstrom. "Preservation Research and Sustainable Digital Libraries." *International Journal on Digital Libraries* 5, no. 4 (2005): 317-24. doi:10.1007/s00799-004-0099-3, p. 322.

<sup>115</sup> Prom, Christopher J., and Ellen D. Swain. *College and University Archives: Readings in Theory and Practice*. Society of American Architects, 2008, p. 18.

collection efforts, Prom states, “Faculty hard drives contain a wealth of information, and archivists need to work with faculty to assure retention of important documentation.”<sup>116</sup>

There are simple steps to backup, copy, and archive a person’s own electronic records. Archivists need to encourage and teach the use of these processes, especially for persons of interest from whom the research facility wishes to receive collections. Unlike postal correspondence sent between someone’s grandparents, detailing the developing courtship and affections, there will be an absence of similar correspondence and documentation from a couple using today’s technology. Text messages and other types of electronic messaging have caused a superabundance of non-archived communication. There are solutions to preserving these communications and other forms of electronic records. Working with programmers, software developers, and the public could bring an awareness to the hazards of the cultural memory loss.

#### **4.9 Cost and Efficiency, Time and Money**

Is the creation of electronic archives worthy of the investment? The worth of the time and money to be paid for the development and sustainment of electronic records archives is proving to be beneficial. Technical attributes aside, for now inclusion of electronic records should be considered yet another records collection to add to an archive, although with a host of its own particular preservation issues. ERA is not a new science and archivists should have been preparing for these changes. This work is not getting any easier either. ERA is no longer a ‘pie in the sky’ concept or dream. It is happening today and will continue to develop, with or without the archival field’s guidance. Archivists should be at the helm of that development, or at least navigating the course with technology specialists being our ‘wheel man’ on these projects. As Richard Barry comments on the aspects of ERA finding aids, “Unfortunately, information

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<sup>116</sup> Prom, Christopher J., and Ellen D. Swain. *College and University Archives: Readings in Theory and Practice*. Society of American Archivists, 2008, p. 18.

navigation aids historically have not kept up with advances in storage technology. Nor do they get cheaper by the year.”<sup>117</sup> The costs in time and money expenditures has not been balanced between the key areas of ERA creation and maintenance. Much greater coordination and leadership from archivists will be needed to better direct financial, technological, and organizational electronic archives.

Roy Turnbaugh provides a perspective on the need for better coordination and efficiency, “A growing chorus began to call attention to a fresh catastrophe, that of electronic records.”<sup>118</sup> His belief is that the successful tactics of reconditioning and updating the physical infrastructure of archival facilities in the 1980s and 1990s shuffled the priorities of long-term planning of archives. Turnbaugh continues, “On the one hand, professionals were able to point to visible, tangible consequences of neglect and offer clear solutions with firm price tags. On the other, the situation was fluid, confused, without clear direction, and without even a good model program to emulate. There was a vague awareness that the cost of dealing with electronic records could be enormous and continuing.”<sup>119</sup> Time and money are always limiting factors in planning. Archives must prepare organizationally and financially for their leap into ERA, the sooner the better.

#### **4.10 Conclusion**

Electronic records are great on any perfect day, when the electrical power is on, connections are fast, and computer systems are functioning. Those days just seem to be easier and productive. However, there is something to say about having the tangible records available as a back-up for those imperfect days, when systems are down, connections are slow, or the

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<sup>117</sup> Barry, Richard E. "Technology and the Transformation of the Workplace: Lessons Learned Traveling Down the Garden Path." In *Effective Approaches for Managing Electronic Records and Archives*, 1-22. Lanham, MD: Scarecrow Press, 2002, p. 7.

<sup>118</sup> Turnbaugh, Roy C. "What Is an Electronic Record?" In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p. 28.

<sup>119</sup> Ibid.

power is lost. Usage-wise, paper indexes consume time while electronic records offer the 'now generation' instant results. They also allow more creativity in how users search and in what they may discover. Augmenting that instant access are the additional items that users did not know they were looking for. Those similar subjects and documents can greatly expand their research. Electronic records ensure the future of archives and the perpetual need for archivists.

For over fifty years efforts have been made to understand and effectively preserve electronic records. Talking about the problems has generated awareness and aided in some progress. The prime motivation has simply been the necessity to serve patrons through electronic medium. Adapt to serve your researchers in their preferred means of communication or perish from lack of patrons. I believe it is time we begin to demand action within the archival community to solve these problems. We will need a revolution in archival methodology to avoid the 'digital dark age' that is quickly approaching. There is no single book, report, seminar, program, project, or research/development initiative which will produce the magic solution or even provide a fundamental set of tools to adequately deal with all aspects of electronic records and archives management.<sup>120</sup> It is disconcerting how easily electronic records can be deleted and swept away into the big recycle bin of oblivion. The converse of that worry is for electronic archives to be figuratively crushed and inundated by the magnitude of information already here and the magnitude of data waiting for us tomorrow. For a few bytes of historical importance to be buried and obscured in an avalanche of exabytes is quite as disheartening.

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<sup>120</sup> Dearstyne, Bruce W. "Riding the Lightning: Strategies for Electronic Records and Archives." In *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002, p.155.

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Dearstyne, Bruce W., ed. *Effective Approaches for Managing Electronic Records and Archives*. Lanham, MD: Scarecrow Press, 2002.

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Mr. McCarter retired as Chief of the National Archives Still Photographs Branch. He has been a contributor and witness to the electronic records use, creation, and development at the National Archives. He speaks of Electronic Archives, its successes and problems.

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This article discusses the preservation of digital data for archival purposes. It also

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## APPENDIX A: SURVEY TEMPLAT

## Electronic Records Archives

**\* 1. What type of institution is your facility?**

- ☐ Government Archive
- ☐ University Archive
- ☐ Library
- ☐ Historical Society
- ☐ Non-public Archive
- ☐ Other (please specify)

**2. Who handles your facility's information technology needs relating to archiving electronic records? (select all the apply)**

- ☐ All staff.
- ☐ All reference staff.
- ☐ Only designated staff.
- ☐ Contracted service.
- ☐ No staff or contracted service.
- ☐ Other (please specify)

**3. If your facility does not have a collections policy for electronic records, does it plan to create a policy?**

- ☐ Yes
- ☐ No
- ☐ Uncertain
- ☐ It has an established collections policy for electronic records

**\* 4. Does your facility currently collect electronic records?**

- ☐ Yes
- ☐ No

## Electronic Records Archives

### 5. Which type of electronic records does your facility collect? (select all the apply)

- ☐ Born Digital Electronic Records
- ☐ Digitized Electronic Records
- ☐ Both Born Digital and Digitized Electronic Records
- ☐ Neither Born Digital or Digitized Electronic Records

### \*6. What is your facility's policy regarding accepting electronic records, born-digital or digitized copy, as part of your collections?

- ☐ Have no policy on acceptance yet.
- ☐ Accept any forms of electronic records.
- ☐ Do not accept electronic records.
- ☐ Plan to accept electronic records.
- ☐ Plan not to accept electronic records.
- ☐ Selectively accept electronic records.
- ☐ Other (please specify)

### 7. What is your facility's policy for preservation storage of electronic records? (i.e. storage and migration)

- ☐ No preservation policy
- ☐ Convert to a common use format (xml or another type)
- ☐ Retain electronic record's original file type and format
- ☐ Other (please specify)

### \*8. How does your facility allow search access to electronic records? (select all the apply)

- ☐ Online access
- ☐ In-person access
- ☐ Both online and in-person access
- ☐ Does not allow patron search access
- ☐ Other (please specify)



## Electronic Records Archives

### 9. When has your facility collected electronic records? (select all the apply)

- ☐ 1970-1980
- ☐ 1981-1990
- ☐ 1991-1995
- ☐ 1996-2000
- ☐ 2001-2005
- ☐ 2006-2010
- ☐ 2011-2015
- ☐ Other (please specify)

### 10. How does your facility manage electronic records collections?

- ☐ Commerical Software (ex: PastPerfect, Microsoft Office, etc.)
- ☐ Specialized Software
- ☐ No Management Software
- ☐ Other (please specify)

### 11. Where does your facility house its electronic records collections? (select all the apply)

- ☐ Contracted Off-site Storage
- ☐ On-site Storage, Within Greater Organization's Storage
- ☐ On-site Storage, Within Archives Unit Storage
- ☐ Commercial, 'Cloud Based' Storage
- ☐ Other (please specify)

## Electronic Records Archives

**12. Which areas has your facility encountered electronic record issues? (select all the apply)**

- ☐ Data Collection (donation and records gathering policies)
- ☐ Accessioning (legal issues)
- ☐ Accessioning (procedures and methods)
- ☐ Legacy Programs (outdated or unusable formatting)
- ☐ Storage Capacity Limits
- ☐ Storage Procedures (corrupted data and/or loss of information)
- ☐ Data Migration
- ☐ Data Retrieval and Access
- ☐ Metadata and Collections Information
- ☐ Cyber Security
- ☐ Collections Management
- ☐ N/A
- ☐ Other (please specify)

**\*13. How important are electronic records to providing service to your researchers?**

Not Important	Little Importance	Neutral	Somewhat Important	Very Important
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**14. How important will electronic records archives be to the development for your facility's reference service?**

Not at all	Will be slightly important	Will be just as important as textual records	Will be significantly important	Will dominate reference service	Uncertain
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**15. Does your facility use analytics tracking of is electronic archives?**

- ☐ Yes
- ☐ No
- ☐ Unknown

**16. Is scalability considered in your facilities planning and use of electronic archives?**

- ☐ Yes
- ☐ No
- ☐ Unknown

## Electronic Records Archives

**17. If you would like to receive a copy of the survey results, please provide contact information below. If you would also be willing to be contacted for more information, please select the option and provide your contact information.**

Name	<input type="text"/>
Company	<input type="text"/>
Address	<input type="text"/>
City/Town	<input type="text"/>
State/Province	<input type="text"/>
ZIP/Postal Code	<input type="text"/>
Email Address	<input type="text"/>
Phone Number	<input type="text"/>

## **APPENDIX B: GLOSSARY OF ACRONYMS AND TERMS**

ACA – Academy of Certified Archivists.

Amazon – One of the largest internet retailers. [amazon.com](http://amazon.com)

AOTUS – Archivist of the United States.

ARC – Archival Research Catalog.

AS 4390 – Australian law standardizing recordkeeping.

Ask.com – An online search engine.

Bing – One of the most popular internet search engines used in the United States.

CAMiLEON – Creative Archiving at Michigan and Leeds: Emulating the Old on the New.

CEDARS – Coupling Energetics and Dynamics of Atmospheric Regions.

CIA – Central Intelligence Agency.

CoSA – Council of State Archivists.

CSV - Comma Separated Values

C++ - This is a general-purpose programming language.

DROID - Digital Record Object Identification.

DoD 5015.2 – United States Department of Defense regulation for records management.

DSpace – This is an open source repository software package typically used for creating open access repositories for scholarly and/or published digital content.

Duckduckgo.com – An online search engine.

ERA – Electronic Records Archives.

ERPANET – Electronic Resource Preservation and Access Network.

Excel – A spreadsheet application by Microsoft Corporation.

Fedora – This is an operating system based on the Linux kernel.

FITS - Flexible Image Transport System.

Google – One of the most popular internet search engines. Specializes in internet-related services and products. [google.com](http://google.com)

HMS – Holdings Management System.

HTML – Hypertext Markup Language. A standardized coding language for defining text files to achieve font, color, graphic, and hyperlink effects on World Wide Web pages.

InterPARES – the International Research on Permanent Authentic Records in Electronic Systems

ISO 15489 – International stand for recordkeeping.

IT – Information Technology.

Javascript – Also known as Java.

JHOVE - JSTOR/Harvard Object Validation Environment.

JSON – A form of open source coding.

METS - Metadata Encoding and Transmission Standard. This is a metadata standard for encoding descriptive, administrative, and structural metadata regarding objects within a digital library.

MLR – Master Location Register.

MSN – Microsoft Network.

MySQL – ‘My’ is the name of the language creator’s daughter, SQL = Structured Query Language. This is a widely used relational database management system (RDBMS) and open-source programming language.

NAGARA – National Association of Government Archives and Records Administrators.

NAIL – NARA Archival Information Locator.

NARA – National Archives and Records Administration.

NARS – National Archives and Records Service.

NSA – National Security Agency.

OPA – Online Public Access.

PADI – Preserving Access to Digital Information.

PHP – P Hypertext Processor. This is a server side coding script.

PRONOM – This is a web-based technical registry to support digital preservation services, a public file format registry.

Ruby – A form of open source coding.

SAA – Society of American Archivists.

SGML - Standard Generalized Markup Language.

TXT – Text record. This is a file that carries machine-readable data.

XML - Extensible Markup Language. Also known as SGML.

XPath - XML Path Language. This is a query language for selecting nodes from an XML document.

Yahoo! – One of the largest internet search engines and internet related service corporations.

## APPENDIX C: ROGER WILLIAMS UNIVERSITY HUMAN SUBJECTS REVIEW BOARD APPROVAL

### ROGER WILLIAMS UNIVERSITY HUMAN SUBJECTS REVIEW BOARD

#### COVER SHEET FOR RESEARCH PROJECT PROPOSALS

Primary Investigator/Faculty Advisor: Dr. Jeremy Wells  
 Date of Submission: 10 Feb 2015  
 School/Department: Historic Preservation Program, School of Architecture, Art and Historic Preserv.  
 Names of Additional Researchers: N/A

Title of Research Project: Electronic Records Archives  
 Grant Funding Supporting this Research: N/A

**[Check one] Academic level for this project:**

☐ Faculty/Administration      ☒ Graduate      ☐ Undergraduate

**[Check one] Review sought by principal investigator:** Refer to the HSRB handbook guidelines. Note that the HSRB may change the review type.

☒ EXEMPT      ☐ EXPEDITED      ☐ FULL

**Researcher Code of Ethics:** I declare that I have read the Roger Williams University Statement of Researchers' Ethical Principles for the Protection of Human Subjects of Research and am familiar with my obligations thereunder. Furthermore, I agree to abide by that Statement of Ethical Principles adopted by Roger Williams University as part of the Human Subjects Review Board policy.

  
Investigator's signature

*For HSRB Board use only:*

Tracking #: GS-15-02-20

**[Check one] Committee decision regarding review:**

☐ EXEMPT      ☒ EXPEDITED      ☐ FULL

**[Check one] Approval status:**

☒ Approved  
☐ Resubmit

Jason Patch      2/26/15  
 Signature of Chairperson      Date

**All on-going projects must be renewed one year after the approval date.**

**APPENDIX D: INFORMED CONSENT FORM**

Thesis Project Title: Electronic Records Archives

Principal Investigator: Brian Knowles

The purpose of this study is to review the Archival Field's use and preservation of electronic records to discover best practices and failures. The number and type of participant will be determined by who and how many volunteers there are to participate in an online survey or to be interviewed.

**Procedures to be Followed:**

For the online survey- An email will be sent to a research facility's organizational mailbox or to an individual at the facility who is an Archivist or Records Manager. Within the email is a hyperlink, which once selected will direct the participant to the survey website (at Surveymonkey.com). The email will act as the Informed Consent Form and disclose the purpose of the communication and of the thesis project. Also included is a description of the survey and what the data will be used for. No personal information is required to participate in the survey and their responses to survey questions will be anonymous. The participant is agreeing to volunteer their answers and agreeing to the Informed Consent Form by selecting the survey hyperlink.

For an interview- The interviewee will be informed of the purpose and scope of the thesis project and provided this Informed Consent Form. They are voluntarily being interviewed for the purpose of gathering information and history about the Archival Field. No personal information or their facility's policies/procedures will be asked for during an interview. The interviews will be recorded in digital audio format only. The recordings will be retained and used only for author's reference and will not be released for public use.

**Time Duration of the Procedures and Study:** The online survey will be available to participants until 30 March 2015. Typical time to complete the survey is 15-25 minutes. Participants may return to the survey to update or complete the survey at any time, up until the closure date. The interviews will require 30 minutes – 1 hour. The interviews will be conducted as the interviewees are available and willing to participate. All interviews will be completed before 15 April 2015.

**Statement of Confidentiality:** Participant identification information will be held confidential by the thesis author and will not be disclosed in the thesis document. If the need should arise to use a name, a pseudonym will be used.

**Right to Ask Questions:** Should questions about the project arise, please contact the student conducting the project, Brian Knowles [email: bknowles012@g.rwu.edu, 314-775-5202], or contact the faculty advisor for the project, Dr. Jeremy Wells [email: jwells@rwu.edu , 401254-5338 , School of Architecture, Art & Historic Preservation, Roger Williams University, Bristol, RI 02809].



Compensation: No compensation will be offered to participants. Travel expenses will be the responsibility of the participants.

Voluntary Participation/Risks: Participation in the study is voluntary and that a participant can withdraw at any time. There are no foreseeable risks or issues to cause discomfort to the participants of the project.

This is to certify that I consent to or give permission for my participation as a volunteer in this research study. I have read this form and understand the content.

\_\_\_\_\_  
Participant's signature    Date

This is to certify that I have defined and explained this research study to the participant named above.

\_\_\_\_\_  
Brian Knowles    Date