

Contextualizing Digital Reformatting in the History of Preservation Knowledge: Timeline and Research Directions

Zack Lischer-Katz
Rutgers University, School of Communication & Information

Abstract

This research builds a timeline of the development of preservation knowledge drawn from key texts in the field of the history of preservation in order to establish the larger historical and cultural trends shaping digital reformatting as a sociotechnical practice in information institutions. The timeline integrates key events, inventions and standards in the development of preservation knowledge from the 19th century to the present time, and charts and periodizes particular intellectual trends that integrate technological and institutional change into the development of preservation knowledge, focusing primarily on the U.S. context. From these trends, the author identifies a potential area of future research on digital reformatting that draws on perspectives from research in the sociology of standards.

Keywords: Preservation history; digital reformatting; infrastructure; standards

doi: 10.9776/16599

Copyright: Copyright is held by the author.

Contact: zack.lischerkatz@rutgers.edu

1 Introduction

Digital reformatting can be seen to be moving information institutions beyond their traditional roles in terms of collecting, organizing, preserving and providing access to information, to engaging in practices of digital production and distribution. Rather than a neutral conduit of information transmission, digitization is becoming understood as a cultural practice that produces historical artifacts in their own right. Mak (2014) suggests digital surrogates carry traces of the cultural and historical processes of their creation. Conway (2015) suggests digital collections themselves can be seen as documents of their own creation.

This research constructs a timeline that captures the history of preservation knowledge in order to establish the historical trends in which digital reformatting emerges in the United States as a legitimized institutional practice within preservation knowledge. The timeline is built from existing texts in the history of preservation.

2 Literature Review

Existing research literature in information studies has touched upon the social and historical dimensions of preservation knowledge, ranging from qualitative studies of the social construction of the values of document formats (Yakel, 2001), ethnographic studies of preservation practices (Gracy, 2001, 2003, 2004, 2007a, 2007b), surveys of the adoption of archival standards across and within institutions (Donaldson and Conway, 2010; Donaldson and Yakel, 2013), studies of the quality of digital copies (Conway, 2013, 2015), and studies using discourse analysis of the debates surrounding the adoption of preservation file formats (Lischer-Katz, 2014).

3 Method

In order to begin to understand the context of digital reformatting and its emergence in the U.S. context, this research draws on existing preservation histories to chart the development of preservation knowledge by plotting key events, inventions and standards on an online timeline. This historical analysis is limited to the first emergence of preservation as a distinct institutionalized field of knowledge beginning in the 19th century and continuing to the present, and it focuses primarily on the U.S. context of the emergence of digital reformatting.

The timeline was constructed based on historical information drawn from existing literature from preservation history including Grove's (1966) history of early preservationist John Murray; Higginbotham's (1990) history of American library preservation, 1876-1910; Buckland's (1996) study of the invention of microfilm rapid selectors, 1920-1940; Cloonan's (2015) edited collection of writings on preservation; Ogden's (1979) study of the impact of the 1966 Florence Floods on the preservation literature, 1956-1976; Darling and Ogden's (1981) history of the preservation in the United States, from 1956-1980; Frick's (2010) history of the film preservation movement in the United States, 1920-2009; and Perrault's (2005) review of the history of microfilm. Information about more recent historical events has also been gathered

by reviewing research on the history of digital libraries, including Dalbello's (2005a; 2005b) study of the experiences of key personnel in the construction of the Library of Congress's National Digital Library Project, 1995-2000; Reed, et al's (2013) report on the adoption of digitization standards at the National Archives and Records Administration; and Liew's (2009) review of digital library work, 1997-2007. In addition, reports (Fleischauer, 2010) and bibliographies ("Resource list for standards...", 2010) related to the development of standards at the Library of Congress and the Federal Agencies Digitization Guidelines Initiative (FADGI) provided insight into recent work being done to develop standards for digital reformatting.

The timeline was constructed using online timeline software, Tiki-Toki (www.tiki-toki.com), and is publically available here: <http://www.tiki-toki.com/timeline/entry/484475/History-of-Preservation/>.

4 Analysis

Three trends in the history of preservation knowledge emerge through this historical overview: *Empirical inquiry and the rationalization of work, standardization, and centralization* of preservation knowledge.

4.1 Empirical Inquiry and the Rationalization of Work

Empirical inquiry and the rationalization of work refers to the work beginning in the first half of the 19th century to apply scientific methods to the development of preservation knowledge. Application of scientific approaches were complemented by the rationalization of all manner of preservation technology, technique and administration. This was most evident in the development of material techniques. Material techniques concerned the shaping of micro and macro storage environments through architecture, heating and cooling, air filtration and lighting controls, fire suppression systems and special containers; chemical and physical treatments including deacidification, lamination and rebinding; and copying techniques using Photostat, Xerox copying, photography and microphotography. Administrative techniques were developed around the establishment of guidelines and procedures for implementing material techniques that could be adopted in a top down fashion and systematically adopted throughout an organization or across different organizations.

4.2 Standardization

While it took decades for a systematic approach to preservation to develop as a distinctive institutionalized field, even before preservation coalesced as a professional field efforts at *standardization* worked to develop ways of systematically considering risks to items and collections, and for evaluating appropriate and legitimized techniques and tools. Efforts at *standardization* can be seen as both a particular mode of constructing preservation knowledge and a means for transmitting it. Work conducted by large organizations such as the Library of Congress to standardize digitization practices continues to play a significant role in the institutionalization of preservation knowledge for the wider preservation field.

4.3 Centralization

Standardization can be seen to support efforts at the *centralization* of preservation knowledge. The development of preservation as a field has been shaped by initiatives designed to centrally concentrate expertise. Through nation-wide initiatives funded by the Library of Congress and the National Endowment for the Humanities, the development of preservation knowledge tended to move from labs of experts and large national organizations to other libraries. The goal of standards development is that the standards will be applied by all other preservation organizations, promoting uniformity across space, time and scale.

5 Future Research Directions

These trends suggest information studies research in this area should draw on perspectives from the sociology of standards to better understand how systematized and standardized forms of knowledge are shaping the field of preservation, particularly in the context of digital reformatting.

5.1 Sociology of Standards

Research in the sociology of standards offers guidance for studying the social and institutional effects of standards and standardization. Timmermans and Epstein (2010) suggest that standards and standardization are "ubiquitous but underestimated phenomena that help regulate and calibrate social life by rendering the modern world equivalent across cultures, time, and geography" (p. 70). Standards embed classifications (Bowker and Star, 1999). Busch (2011) suggests that "standards are where language and the world meet" (p. 3).

The sociology of standards is open to studying all social processes related to standards development and their social consequences. Backhouse, et al. (2006) note that earlier studies on standards have typically ignored the social influences and effects related to standardization. Sociology of standards research looks at the role of standards as instruments of power (Backhouse, et al.), the ways in which standards impact local practices (Dunn, 2009), the social processes that shape standards and technology (Brunsson and Jacobsson, 2000; Millerand, et al., 2012) the classification systems that standards embody (Bowker and Star, 1999; Lampland and Star, 2009), and the ways in which standards shape infrastructures (Star and Ruhleder, 1996).

5.1.1 Understanding technical and social dimensions of standardization

Formal standardization projects, often seen as a technical process can be studied in terms of the social processes that shape the development of a standard. Brunsson and Jacobsson (2000) suggest

Although the standards involved are often called ‘technical’, they are constructed in processes that appear to be anything but technical (Guillet de Monthoux 1981; Schmidt and Werle 1998). Technological development is not linear, nor does it automatically mean that the best standard wins (Pinch and Bijker 1984; Hawkins, Mansell and Skea 1995). (p. 9)

Studying social dimensions of standardization would contribute to understanding how particular digital reformatting systems become successful and what their impact is on local practice.

5.1.2 Impact of standards on local practice

Standards can be studied in terms of how they shape local practice. Dunn (2009) suggests “when standards are used to dictate practice or to grade products, they often replace *metis* -- the unwritten practical know-how that local producers gain over the years” (p. 18). Donaldson and Yakel (2013) and Donaldson and Conway (2010) studied the adoption of the PREMIS metadata standard in archives, and their findings suggest that the adoption of standards may be disruptive to local practices and existing infrastructures.

5.1.3 Standards as instruments of power

Standards have also been studied as instruments of power (Hanseth and Monteiro, 1997). Backhouse, et al. (2006) studied how “power operates silently but relentlessly in the generation and institutionalization of a standard”, and identified “the power mechanisms required for a standard to evolve from an idea into an obligatory passage point for organizations and agencies” (p. 414).

From this perspective the production and dissemination of national and international standards can be seen to perpetuate trends towards centralized preservation programs in which standards are set by larger organizations, such as the Library of Congress for adoption by smaller organizations.

5.2 Summary

These perspectives drawn from the sociology of standards provide new research directions in information studies for understanding information infrastructures and practices of digital reformatting in terms of the social, political and economic forces that shape standards development. Sociology of standards approaches encourage us to consider how digital reformatting standards embed classifications and exert power effects on individuals and institutions.

6 Conclusion

The timeline that was produced and the interpretive analysis conducted in this research identified important trends over the 150 year history of institutionalized preservation knowledge, focusing primarily on the U.S. context. Drawing attention to the historical construction of preservation knowledge and its technologies helps pave the way for investigation into the infrastructures, standards and materialities that are embedded in digital reformatting systems and often become transparent over time to their users (Star and Ruhleder, 1996). Understanding the historical trends in preservation knowledge within which digital reformatting emerges offers insight into how digital reformatting is mediating access to collections and documents and the important role played by standards and standardization.

7 References

Backhouse, J., Hsu, C. W., & Silva, L. (2006). Circuits of power in creating de jure standards: Shaping an international information systems security standard. *MIS Quarterly*, 30, 413-438.

- Bowker, G., & Star, S. L. (1999). *Sorting things out: Classification and its consequences*. Cambridge, MA: MIT Press.
- Brunsson, N., & Jacobsson, B. (2000). *A world of standards*. Oxford: Oxford University Press.
- Busch, L. (2011). *Standards: Recipes for reality*. Cambridge, MA: MIT Press.
- Cloonan, M. V. (2001). W(h)ither preservation? *The Library Quarterly*, 71(2), pp. 231-242.
- Conway, P. (2010). Preservation in the age of Google: Digitization, digital preservation, and dilemmas. *The Library Quarterly*, 80(1), 61-79.
- Conway, P. (2013). Preserving imperfection: Assessing the incidence of digital imaging error in HathiTrust. *Digital Technology & Culture*, 42(1), 17-30.
- Conway, P. (2015). Digital transformations and the archival nature of surrogates. *Archival Science*, 15(1), 51-69.
- Dalström, M., & Hansson, J. (2012). 'As we may digitize' – Institutions and documents reconfigured. *Liber Quarterly*, 21(3/4), 455-474.
- Donaldson, D., & Conway, P. (2010). Implementing PREMIS: A case study of the Florida Digital Archive. *Library Hi Tech*, 28(2), 273-289.
- Donaldson, D., & Yakel, E. (2013). Secondary adoption of technology standards: The case of PREMIS. *Archival Science*, 13, 55-83.
- Dunn, E. C. (2009). Standards without infrastructure. In M. Lampland and S. L. Star (Eds.), *Standards and their stories: How quantifying, classifying, and formalizing practices shape everyday life* (pp. 118-121). Ithaca, NY: Cornell University Press.
- Edmondson, R. (1998). *A philosophy of audiovisual archiving*. Paris: UNESCO.
- Gracy, K. F. (2001). *The imperative to preserve: Competing definitions of value in the world of film preservation*. PhD Dissertation, University of California, Los Angeles.
- Gracy, K. F. (2003). Documenting the process of film preservation. *The Moving Image*, 3(1), 1-41.
- Gracy, K. F. (2004). Documenting communities of practice: Making the case for archival ethnography. *Archival Science*, 4(3-4), 335-365.
- Gracy, K. F. (2007a). Moving image preservation and cultural capital. *Library Trends*, 56(1), 183-197.
- Gracy, K. F. (2007b). *Film preservation: Competing definitions of value, use, and practice*. Chicago: Society of American Archivists.
- Hanseth, O., & Monteiro, E. (1997). Inscribing behavior in information infrastructure standards. *Accounting, Management & Information Technology*, 7(4), 183-211.
- Lampland, M. & Star, S. L. (2009). Reckoning with standards. In *Standards and their stories: How quantifying, classifying, and formalizing practices shape everyday life* (pp. 3–31). Ithaca & London: Cornell University Press.
- Lischer-Katz, Z. (2014). Considering JPEG2000 for video preservation: A battle for epistemic ground. In *iConference 2014 Proceedings* (p. 1056 - 1065), Berlin, Germany.
- Mak, B. (2014). Archaeology of a digitization. *Journal of the Association for Information Science and Technology*, 65(8), 1515-1526.
- Millerand, F., Ribes, D., Baker, K. S., & Bowker, G. C. (2013). Making an issue out of a standard: Storytelling practices in a scientific community. *Science, Technology & Human Values*, 38(1), 7-43.
- Star, S. L., & Ruhleder, K. (1996). Steps toward an ecology of infrastructure: Design and access for large information spaces. *Information Systems Research*, 7(1), 111-134.
- Timmermans, S., & Epstein, S. (2010). A world of standards but not a standard world: Toward a sociology of standards and standardization. *Annual Review of Sociology*, 36, 69-89.
- Yakel, E. (2001). The social construction of accountability: Radiologists and their record-keeping practices. *The Information Society*, 17, 233-245.

7.1 Sources for Timeline

- Buckland, M. (1992). Emanuel Goldberg, electronic document retrieval and Vannevar Bush's Memex. *Journal of the American Society for Information Science*, 43(4), 284-294.
- Cloonan, M. (2015). *Preserving our heritage: Perspectives from antiquity to the digital age*. Chicago: Neal-Schuman.
- Darling, P. W., & Ogdan, S. (1981). From problems perceived to programs in practice: The preservation of library resources in the U.S.A., 1956-1980. *Library Resources & Technical Services*, 9-29.
- Dalbello, M. (2005a). A phenomenological study of an emergent national digital library, part I: Theory and methodological framework. *The Library Quarterly*, 75(4), 391-420.

- Dalbello, M. (2005b). A phenomenological study of an emergent national digital library, part II: The narratives of development. *The Library Quarterly*, 75(4).
- Faraday, M. (1843). Lecture on light and ventilation. Lecture given at the Royal Institution, April 7, 1843.
- Fleischauer, C. (2010). Format considerations in audio-visual preservation reformatting: Snapshots from the Federal Agencies Digitization Guidelines Initiative. *Information Standards Quarterly*, 22(2), 34-40.
- Frick, C. (2011). *Saving cinema: The politics of preservation*. Oxford University Press.
- Grove, L. E. (1966). John Murray and paper deterioration. *Libri: International Journal of Libraries & Information Services*, 16(3), 194-204.
- Gwinn, N. E. (1987). *Preservation microfilming*. Chicago: American Library Association.
- Higginbotham, B. (1990). *Our past preserved: A history of American library preservation, 1876-1910*. Boston: G.K. Hall & Co.
- Liew, C. L. (2009). Digital library research, 1997-2007: Organisational and people issues. *Journal of Documentation*, 65(2), 245-266.
- Ogden, S. (1979). The impact of the Florence flood on library conservation in the United States of America: A Study of the literature published, 1956–1976. *Restaurator*, 3, 1–36.
- PDT&C: A forty-year timeline. (2013). *Preservation, Digital Technology & Culture*, 42(4), 169-172.
- Perrault, A. H. (2005). Microforms: Marriages, mergers, and migrations. *School of Information Faculty Publications*, 27. Retrieved from http://scholarcommons.usf.edu/si_facpub/27
- Reed, J., Murray, K., & Jacobson, M. (2013). Digitization standards at the National Archives and Records Administration. In *Proceedings of Archiving 2013*, 211-215.
- Reilly, J. (2013). The Image Permanence Institute: An interview with James Reilly, IPI founder and director. *Preservation, Digital Technology & Culture*, 42(4), 215-217.
- Resource list for standards related to digital imaging of print, graphic, and pictorial materials. (2010, Jan. 28) Federal Agencies Digitization Initiative, Library of Congress. Retrieved from <http://www.digitizationguidelines.gov/guidelines/digitize-standards.html>