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"[Microfilm] promised to have an impact on the intellectual world comparable with that of the invention of printing," wrote one scholar in the 1930s.[1] Microphotography was "one of the most important developments in the transmission of the printed word since Gutenberg," claimed another enthusiastic author.[2] Leading librarians in research universities, the Library of Congress and the Council on Library Resources touted microfilm as the way of the future, and many in the library community followed their lead.[3] The technology has not lived up to the predictions of fervent devotees, but it has become a staple in archives and libraries around the world. Since its adoption in American libraries starting in the 1930s, microfilm has particularly satisfied the archival function of preservation. As an analog technology it bears resemblances to the medium of paper, but it creates surrogates of original items as digitization does, thus straddling a divide between paper and digital.

From microfilm's widespread adoption by the 1950s and 1960s to its fading popularity in the glow surrounding electronic media, archivists have had to evaluate the strengths and weaknesses of this particular format.[4] The preservation potential is high, yet some authors have noted that users often dislike microfilm, avoiding it when possible.[5] Archivists have also debated the merits of microfilm for preserving the authenticity and integrity of records. While many praised it initially as a stable and tamper-evident format, more recently a re-evaluation of surrogates has placed new emphasis on the materiality of paper originals for the context they provide in addition to the information content – valuable context that is lost in a surrogate, irretrievably so if the original is discarded after reproduction.[6] These changes and debates in archival practice are relevant for today's challenges, for while in many ways digitization is relatively new territory, archivists' long experience with microfilm technology can provide important lessons, templates, and points to consider regarding surrogate medium selection, standards creation, and the archival values of authenticity and preservation. In turn, surrogate production – whether the medium is microfilm or digital bits – can benefit from further consideration of originals as artifacts and can borrow from scholarship on the essential properties of electronic records to make well-informed decisions about preservation reformatting.

Archival Principles at Stake

[1] Robert C. Binkley, cited in Susan A. Cady, "The Electronic Revolution in Libraries: Microfilm Deja Vu?," *College and Research Libraries* 51, no. 4 (July 1990): 375.
[2] Ibid., Frederick Kilgour, cited.
[3] Nicholson Baker, *Double Fold: Libraries and the Assault on Paper* (New York: Random House, 2001), 73, 82.
[4] Cady, "The Electronic Revolution in Libraries," 383-384.
[5] Ibid., 383; Baker, *Double Fold*, 39-40; Kathleen Arthur et al., *Recognizing Digitization as a Preservation Reformatting Method*, Prepared for the ARL Preservation of Research Library Materials Committee (Association of Research Libraries (ARL), June 2004), Appendix 1; Kenneth C. Kirsch and Albert H. Rubenstein, "Converting from Hard Copy to Microfilm: An Administrative Experiment," *Collection Management* 2, no. 4 (May 30, 1979): 279.
[6] Baker, *Double Fold*, 104-105.

International Standards Organization (ISO) records management standard 15489-1 delineates the requirements for good records and recordkeeping, including the three elements of content (message), context (circumstances surrounding creation and use), and structure (physical characteristics and organization).[7] In order to maintain sound records, recordkeeping systems must preserve the reliability, integrity, and authenticity of the documents. Reliability refers to the authority and trustworthiness of records; integrity is being "complete and unaltered;" and authenticity refers to records that "can be proven . . . to be what [they] purport to be."[8] Archival definitions of these terms have remained stable when dealing with digital objects, even as the implications for the maintenance of electronic records are drastically different. Sharon Adam wrote in relation to digital records that "integrity speaks to the object's standing in relationship to its original form whereas authenticity speaks to whether or not the object is truly what it claims to be."[9] As will be seen, archivists had to consider how these elements were defined and applied to microfilm as distinct from paper-based documents, and their choices have the potential to set a precedent for dealing with digital materials as well.

Further study of the concept of authenticity reveals that in practice it may not be as straightforward as it appears to be in the ISO standard definition. As Heather MacNeil and Bonnie Mak argue, authenticity is a construct of a particular environment, a "social construction that has been put into place to achieve a particular aim."[10] Authenticity can be understood as remaining true to oneself, as being original, and as presenting a trustworthy, factual statement. The ISO standard seems to emphasize the last definition, and much of the archival literature portrays microfilm as a trustworthy medium that cannot be easily tampered with or altered and that faithfully conveys the intellectual content of an item. The advantages of microfilm's integrity over easily-altered digital documents are now being mitigated by strategies for certifying trusted digital repositories and a Digital-Surrogate Seal of Approval (DSSA), but these developments take time and microfilm will continue to be used in the interim.[11] Yet recently some have drawn attention to the shortcomings of surrogates like microfilm and digitized copies.[12] This perspective argues for the value of structure and context found in original materials, which can be lost, ignored, or obscured in the reformatting process. The frenzy to microfilm and digitize can propagate a problematic view of information as immaterial and divorced from its physical manifestation, destroying or hiding the richness of its materiality and all that can be learned from the particular way in which the information is displayed.[13] The

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[7] Philip C. Bantin, *Understanding Data and Information Systems for Recordkeeping* (New York: Neal-Schuman, 2008), 27.
[8] Ibid., 32-33.
[9] Sharon Adam, "Preserving Authenticity in the Digital Age," *Library Hi Tech* 28, no. 4 (2010): 596.
[10] Heather Marie MacNeil and Bonnie Mak, "Constructions of Authenticity," *Library Trends* 56, no. 1 (Summer 2007): 26.
[11] James A. Jacobs and James R. Jacobs, "The Digital-Surrogate Seal of Approval: A Consumer-Oriented Standard," *D-Lib Magazine* 19, no. 3/4 (March 2013), doi: 10.1045/march2013-jacobs.
[12] See for example Michele Cloonan, "Whither Preservation?," *The Library Quarterly* 71, no. 2 (April 2001): 231–42; Marlene Manoff, "The Materiality of Digital Collections: Theoretical and Historical Perspectives," *Portal* 6 (2006): 311–25; Katherine N. Hayles, "Translating Media: Why We Should Rethink Textuality," *Yale Journal of Criticism* 16 (2003): 263–90.
[13] Robert Bee, "The Importance of Preserving Paper-Based Artifacts in a Digital Age," *The Library Quarterly* 78, no. 2 (April 2008): 179.

mistakes of the past in defining the essential characteristics of an authentic record – or surrogate – can help guide digitization practices, even as we learn from work on the properties of digital records.

In addition to the authenticity and integrity of records, the core archival function of preservation must be considered in light of microfilm's and digitization's affordances, and access is a necessary corollary of preservation. Helen Forde wrote that "preservation of archives is the means by which the survival of selected material is ensured for enduring success . . . [P]reservation and access are two parts of the same mission."[14] Both microfilming and digitization fit in well with this definition of preservation; fragile original documents can be protected from the wear and tear of use, while their contents can be read without the risk of damage. Some documents have been preserved only in microfilm, such as poor-quality newspapers whose originals have since deteriorated or been discarded; access to the information is still possible only through microfilm.[15] However, controversy remains over best practice when in order to extend an item or its content's longevity, some irreversible change or harm must be enacted – is "destroying to preserve" ever an ethical choice?[16]

Regardless of the particular preservation action in question, a component of preservation is permanence. When following a preservation strategy, archivists must consider the longevity of a particular medium. James O'Toole wrote about the idea of "permanent records," a term often used unreflectively in the archival profession to refer to records of value that should be kept indefinitely. A recurring vision for American preservationists has been the idealistic goal of keeping records "as near forever as the power and sagacity of man will effect," optimistically expressed in the nineteenth century as historical societies formed, and again revived in the mid-twentieth century when it seemed new technologies – including microfilm – might make permanent preservation possible.[17] The sheer volume of records being produced after World War II and the relentless, uphill battle of conservation led to a tempered view of permanence and more targeted efforts towards records with "intrinsic value." There emerged shades of meaning to "preservation": collecting original documents, conservation actions performed on those originals, and retention of information in a different format – an all-important distinction to make. Microfilm adheres to the third definition, offering a stable, reliable medium with little intervention needed if stored in optimal conditions – some predicted it could last up to five hundred years.[18] Yet despite the promise of preservation microfilm to protect informational content, even the highest-quality film cannot provide information found only in the original medium such as paper quality or ink type, and furthermore users tend to have less enthusiasm for the format than librarians and archivists.[19] Digitized copies face a similar challenge of information capture, even as they require more maintenance to remain usable and are more agreeable to users.

Archivists have tended to maintain a distinction between the permanence of documents themselves and the information contained therein. This distinction can prove problematic but is

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[14] Helen Forde, *Preserving Archives* (London: Facet, 2007), 1.
[15] William H. Leary, "Preservation Microfilming at the National Archives," *Microform Review* 16, no. 4 (Fall 1987): 287.
[16] Baker, *Double Fold*, 22.
[17] James M. O'Toole, "On the Idea of Permanence," *American Archivist* 52, no. 1 (Winter 1989): 16, 19.
[18] Heather Brown et al., "The Role of Microfilm in Digital Preservation," *Microform and Digitization Review* 41 (June 2012): 66.
[19] Cady, "The Electronic Revolution in Libraries: Microfilm Deja Vu?" 383; Baker, *Double Fold*, 170-171.

key to allowing microfilm or digital copies as substitutes for original documents, and echoes the mindset of preservationists in the nineteenth century who edited and published transcribed collections, producing many copies to ensure the content was saved.[20] In current understandings of permanence and preservation, the term "records of enduring value" is favored over "permanent records." As microfilm became a widespread medium to safeguard these records of value, the need for standardized production materials, film sizes, and quality testing became evident. In order to form standards and come to an agreed-upon definition for the term "archival," often used interchangeably with "permanent," the International Standards Organization (ISO) and American National Standards Institute (ANSI) in the early 1990s established four levels of life expectancy to be used in various standards for film quality: medium-term (10 years), long-term (100 years), permanent value/archival acetate base film (100 years), and permanent value/archival polyester base film (500 years).[21] The idea of "permanent records" had to be modified and given a more realistic expectation. And notions of preservation have continued to change; scholars have identified a shift in the "once-and-forever" definition, based on microfilm's ability to ensure longevity of paper-based materials without much upkeep, to an "all-the-time" notion of preservation associated with the constant maintenance required for digital objects.[22] In describing long-term preservation, the OAIS reference model defines long term as "long enough to be concerned with the impacts of changing technologies, including support for new media and data formats, or with a changing user community."[23]

Microfilm and Digitization: Lessons Learned

Microfilm offers some clear benefits including cost-savings, space efficiency, and duplication of records for preservation, and libraries began to take advantage of these starting in the 1930s. Concern for the preservation of vital records through wars, nuclear or otherwise, contributed to the enthusiasm in subsequent decades. Particularly during the information explosion after World War II, libraries and businesses alike sought a method to manage burgeoning records.[24] Such was the hype around this technology that in 1957 Jerry McDonald wrote "The Case Against Microfilming," published in the *American Archivist*, as a corrective against the "countless articles and speeches [that] have been delivered to the businessman glorifying, glamorizing, and justifying the virtues and 'cure-all' properties of microfilming."[25] McDonald described several cases of disappointed expectations, negative experiences with poor quality filming and badly planned projects, "the result [of which] is that many companies aren't in a position to state positively that they have honest, legible copies of their records."[26] Many microfilm projects never underwent a quality control process, and may be considered complete

[20] O'Toole, "On the Idea of Permanence," 16.
[21] Harold H. Dorfman, "Microfilm Preservation," *International Journal of Micrographics & Optical Technology* 9, no. 3 (1991): 138.
[22] Michèle V. Cloonan and Shelby Sanett, "Preservation Strategies for Electronic Records: Where We Are Now - Obliquity and Squint?," *American Archivist* 65, no. 1 (Spring-Summer 2002): 85.
[23] The Consultative Committee for Space Data Systems, *Reference Model for an Open Archival Information System (OAIS), Recommended Practice CCSDS 650.0-M-2* (Washington, DC: June, 2012), 1-1.
[24] Cady, "The Electronic Revolution in Libraries," 379; Margaret M. Weis, "The Case for Microfilming," *American Archivist* 22, no. 1 (January 1959): 16.
[25] Jerry McDonald, "The Case Against Microfilming," *American Archivist* 20, no. 4 (October 1957): 345.
[26] Ibid., 351.

even if some pages are illegible or missing.[27] A response to McDonald's objections rightly pointed out that many of the difficulties with microfilming were a problem with people, rather than the technology. Forethought and quality control could mitigate many issues, while acknowledging microfilm as one option among many would avoid a one-size-fits-all strategy.[28]

As digital technologies have eclipsed microfilm as the preferred archival surrogate medium, many authors have seen digitization as the "new microfilm." While there are clear differences in what these technologies can offer and in the challenges they present, some parallels can be drawn. Reflection on microfilm's impact on archival values such as authenticity and permanence can help guide the profession's interactions with electronic tools. After all, while the two may seem to be at odds when archivists choose one over the other, in reality they may both be integrated into a document's life cycle in an archive. Microfilm is a "well-established bridge technology in digitization efforts."[29] In some cases, a microfilm image is the only remnant of degraded or discarded originals, and it can be safely scanned when an original often cannot. One example of the pairing of microfilm and digitization is the United States Newspaper Program. Funded by the National Endowment for the Humanities and assisted by the Library of Congress, the program ran from 1982 to 2011 to preserve newspapers on microfilm, partnering with state and local institutions across the country. Some of the resulting microfilms are now being digitized and made available online through the National Digital Newspaper Program.[30]

Microfilm and digitization can be paired in other ways as well. From a risk management/disaster recovery perspective, microfilm offers longevity and data integrity, and because it can contain both human-readable and computer-readable data, it can feasibly be used to store digital data in Computer Output Microfilm (COM) and provide a data back-up that can later be reconverted to digital. While not appropriate for dynamic, interactive digital projects, it can be a viable storage medium for static data. Furthermore, one of the limitations of microfilm has been the poor quality of color film, but recent experimentation has produced promising developments in high-quality, durable color film which can also be partnered with electronic preservation. Brown, et al. showed how microfilm can easily be incorporated into both the Digital Curation Centre (DCC) curation lifecycle and the Open Archive Information System (OAIS) functional model of archival storage, particularly in the "preservation action" sections.[31]

Even as microfilm can be used in concert with digitization, the archival community's experiences with it can also offer lessons for the use of electronic surrogates. Indeed, practitioners have already benefited from their collective experience with an earlier surrogate medium. First, while some dream of a "paperless society," the reality is that new technologies rarely completely supplant old ones.[32] Early microfilm enthusiasts envisioned enormous space

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[27] Baker, *Double Fold*, 45-46.
[28] Weis, "The Case for Microfilming," 15.
[29] Brown et al., "The Role of Microfilm in Digital Preservation," 65.
[30] Birdie MacLennan, Tom McMurdo, and Megan Kilb, "Vermont Digital Newspaper Project: From Reel to Real," *The Serials Librarian: From the Printed Page to the Digital Age* 64, no. 1–4 (2013): 151–52; National Endowment for the Humanities, "U.S. Newspaper Program," http://www.neh.gov/us-newspaper-program; National Endowment for the Humanities, "National Digital Newspaper Program," http://www.neh.gov/divisions/preservation/national-digital-newspaper-program.
[31] Brown et al., "The Role of Microfilm in Digital Preservation," 67.
[32] For more on the idea of a paperless society and reasons why it has proved unrealistic, see Abigail J. Sellen and Richard Harper, *The Myth of the Paperless Office* (Cambridge, MA: MIT Press, 2002).

savings with libraries stocked full of microfilm reels and few original books, and digitization initially seemed to many to offer similar cost savings and efficiencies.[33] High expectations have since been tempered by the reality of limited resources, user preferences, the affordances of different materials, and the cost of surrogate creation and maintenance. One author wrote, 'It is easy to overstate – and underestimate – the transformative power of a new technology, especially when we do not yet understand the full implications of its many applications."[34] Keogh's 2013 survey of 217 libraries that already held microfilm found that 94% were still acquiring data in that format, refuting predictions of its obsolescence.[35] Just as microfilm failed to replace paper, digital objects will supplement rather than fully replace other more established forms.

Another parallel between microfilm and digitization that archivists and librarians have learned from is the need for accepted standards whether at the regional, national, or international level. In the early years of microfilm the projects were often of inconsistent size and poor quality, resulting in "redox" or oxidation spots on deteriorating film in the 1960s and again in the 1980s; this was largely solved by the addition of potassium iodide and then selenium during the production process.[36] The development of national and international standards offered uniformity and quality control, but they were not codified until the late 1980s and early 1990s. The trial-and-error experimental process is perhaps a necessary component of technology development; policies are often reactionary rather than proactive because no one could anticipate the need. As one archivist wrote, "until microfilm entered our preservation toolkit, we had very few true standards."[37] Standardization of digital formats and practices followed a similar process and is ongoing, but practitioners have learned from what worked and did not work in the creation of earlier standards. In 2004 digitization was recognized as a preservation reformatting method by the Association of Research Libraries. A joint ANSI and ARMA International task force drafted the Digital Records Conversion Process Standard and called for further collaboration in generating records and information management (RIM) standards.[38] Other initiatives like the OAIS reference model, the Audit and Certification of Trustworthy Digital Repositories (ISO 16363), and the International Research on Permanent Authentic Records in Electronic Systems (InterPARES) projects, among others, continue to influence and develop emerging standards for digital reformatting and preservation.[39]

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[33] Baker, *Double Fold*, 79-81; Abby Smith, "Why Digitize?" (Washington, D.C.: Council on Library and Information Resources, February 1999), http://www.clir.org/pubs/reports/pub80-smith/pub80.html.
[34] Cady, "The Electronic Revolution in Libraries," 382.
[35] Patricia Keogh, "Decisions in Resource Management," *Library Collections, Acquisitions, and Technical Services* 36, no. 1–2 (2012): 11.
[36] James M. Reilly, "Stability of Black-and-White Photographic Images, with Special Reference to Microfilm," *Microform Review* 17, no. 5 (December 1988): 271-272.
[37] Ellen Cunningham-Kruppa, "Digitization for Preservation: Far Too Many Benefits over Microfilming," *Microform and Imaging Review* 33, no. 4 (2004): 203.
[38] Arthur et al., *Recognizing Digitization as a Preservation Reformatting Method;* Nancy Kunde, "Getting It Done - Collaboration and Development of the Digital Records Conversion Standard," *American Archivist* 72, no. 1 (Spring-Summer 2009): 146. See also "RLG Guidelines for Microfilming to Support Digitization," supplement to *RLG Microfilming Publications* (Research Library Group, 2003).
[39] Center for Research Libraries, "ISO 16363/TDR," http://www.crl.edu/archiving-preservation/digital-archives/metrics-assessing-and-certifying/iso16363; "InterPARES Project," http://www.interpares.org/.

Microfilm and Digitization: Ongoing Lessons

However, these advances in standardization and quality control in both microfilming and digitization projects do not address potential harm done to records in the process, nor do they acknowledge the information lost in such a migration. As microfilm use became ubiquitous in libraries and archives, considerations for the originality and authenticity of records were eclipsed by concern for integrity of the informational content. Microfilm was seen as a reliable and trustworthy medium if high quality images and film were used; the film had high integrity, as it was easy to tell if the film strip was "complete and unaltered" or had been tampered with or manipulated.[40] In one of MacNeil's definitions of authenticity, authentic as "trustworthy in the eyes of the law," microfilm records were as faithful to an original event as the documents they represented. Society's concept of authenticity adjusted to include microfilm copies of documents. As MacNeil noted, authenticity "does not inhere in the record itself but is actively constructed in accordance with theoretical and methodological assumptions operative within [a specific social and institutional] framework. . . [A]uthenticity is not a fixed notion, but is an idea that is shaped by a range of factors; the meaning of authenticity changes depending on its context and purpose."[41] Thus microfilm was generally conceived as authentic enough for recordkeeping requirements.

During the heyday of microfilm, few archivists seem to have identified a conceptual difference between the authenticity of the original item and that of its image, but instead focused on the reliability of the medium. Many articles discussed the longevity of microfilm, contrasting it to fragile and corruptible digital data even as born-digital records became more commonplace.[42] Unlike electronic hardware and software that quickly becomes obsolete, all one really needs to read microfilm is light and magnification.[43] But little attention was given either to the editorial role of the archivist in deciding what to microfilm, or to the loss of information in the physical format of the document. If content, structure, and context are key to records, what is lost when one of these elements is altered? Most practitioners did not seem to think that reformatting significantly altered these components, privileging content over structure and context. At first, documents were sometimes destroyed after being microfilmed, and even when not they were sometimes sent to remote storage, making it more difficult for users to see the original.[44] Nicholson Baker reported that between 1950 and 2001, the Library of Congress reduced their paper newspaper holdings from over 67,000 volumes to only a few thousand by extensive microfilming and deaccessioning of the originals.[45]

Yet the acceptability of microfilm as an authentic substitute for an original has been question in recent years, particularly in light of similar questions raised with digitization. An authentic record is "one that can be proven . . . to be what it purports to be," and microfilm is not the record itself, but a copy. Microfilm reproductions are not authentic in the sense of being "original." They retain the content information while the context and structure are altered, and no

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[40] Bantin, *Understanding Data and Information Systems for Recordkeeping*, 32-34.
[41] MacNeil and Mak, "Constructions of Authenticity", 46.
[42] Brown, "The Role of Microfilm in Digital Preservation," 65; Smith, "Why Digitize?"; Reilly, "Stability of Black-and-White Photographic Images with Special Reference to Microfilm," 278; Patricia Keogh, "Decisions in Resource Management," 8-9; Jerry Dupont, "Passing the Baton: One Intermediate Technology Meets Another," *Legal Information Management* 3, no. 3/4 (2003): 191-192.
[43] Jerry DuPont, "Passing the Baton," 194–95.
[44] Leary, "Preservation Microfilming at the National Archives," 287.
[45] Baker, *Double Fold*, 34.

matter the surrogate quality, important information is lost when the material form is changed. As those who study material culture know, "objects give material form to the rules and belief patterns of those who trade, purchase, or use them," and documents as well as artifacts are objects, conveying insights into their creators and users.[46] Librarians and archivists must decide what meanings and properties of a record must be preserved, a choice which has always been part of their curatorial duty but which is complicated in reformatting decisions. What properties or elements are essential to the document? How much can be altered before the veracity or integrity is compromised? Archivists are intimately familiar with generating description and finding aids as surrogates to maintain intellectual control over collections, never conflating the guide for the item itself; but they seemed to forget that microfilm is a surrogate as well and missed the importance of the tactile physicality of an original document.[47]

While few archivists would lightly destroy an original, the "intrinsic value" of an item meriting preservation is difficult to measure, and perhaps in the rush to microfilm and then to digitize, something important has been lost. By viewing records as "immaterial texts," abstract information housed in a medium without significance, we lose the value of the physical – which has helped literary scholars, book scholars, and social historians do their work. Many people forget that documents are artifacts too, as much as statues or other objects. Patricia Battin's phrase, "preservation is access, and access is preservation," is harmful if taken to the extreme.[48] The loss of context and the introduction of surrogate error are some of the consequences of overzealous reformatting, reducing the meaning of the work as a whole. From the paper's composition to the ink's ingredients to marginalia, the format of a document has much to say. Large national projects like the United States Newspaper Program, which microfilmed more than 140,000 newspaper titles and over 65 million pages across the country, as well as the Brittle Books Foundation which microfilmed and then discarded many decrepit books slowly deteriorating from acidification, are not without controversy. They can be viewed as some of the "success stories" of microfilm technology, or as the "carnage" of indiscriminate reformatting.[49]

Such concerns with surrogates have largely been raised in the past 20 years. In 1995, the Modern Language Association (MLA) published a document declaring that "the advantages of the new forms in which old texts can now be made available must not be allowed to obscure the fact that the new forms cannot fully substitute for the actual objects in which those earlier texts were embodied at particular times in the past."[50] A few years later Nicholson Baker leveled a scathing criticism of libraries' past practices with microfilming which harmed and then discarded many original newspapers and books. While his arguments often failed to take into account the realities of limited resources, the impossibility – and undesirability – of preserving everything,

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[46] Richard Grassby, "Material Culture and Cultural History," *Journal of Interdisciplinary History* 35, no. 4 (Spring 2005): 592.

[47] Cunningham-Kruppa, "Digitization for Preservation: Far Too Many Benefits over Microfilming," 201; Graham Jefcoate, "Preservation of Access? Developing Strategies for Microfilming Digitization," *LIBER Quarterly: The Journal of European Research Libraries* 13, no. 2 (June 2003): 104.

[48] Bee, "The Importance of Preserving Paper-Based Artifacts in a Digital Age," 181.

[49] Mark Sweeney, "The National Digital Newspaper Program: Building on a Firm Foundation," *Serials Review* 33, no. 3 (2007): 188; Cady, "The Electronic Revolution in Libraries," 380; Bee, "The Importance of Preserving Paper-Based Artifacts in a Digital Age," 189.

[50] Modern Language Association of America, "Statement on the Significance of Primary Records," *Profession 95* (New York: MLA, 1995): 27.

and the core missions of libraries and archives, information professionals would do well to take heed and consider more carefully how the original physical format adds nuance and context to the informational content of an item.[51] What will the user miss if they use a surrogate, foregoing the potential benefits of viewing the item as an artifact, and is it worth that loss?

The Council on Library and Information Resources also began to address these issues in the 2001 publication, *The Evidence in Hand: Report of the Task Force on the Artifact in Library Collections*. Defining artifacts as "original, unreformatted materials," the task force aimed to "articulate a general context or framework for formulating and evaluating institutional policies on how best to preserve and make accessible artifactual collections and how to ensure their continued access for research and teaching needs, however those needs evolve."[52] Best practice for preservationists has already identified certain qualities that merit preservation of the original: age, evidential value, aesthetic value, scarcity, associational value, market value, and exhibition value.[53] The features of originality, faithfulness (authenticity), fixity, and stability inhere in items of evidentiary value, and "when the items are reformatted onto newer media for preservation or other purposes, those qualities inalienable to the original may be lost."[54] Some qualities can be reliably well-preserved through the use of precise benchmarking formulas that ensure detailed capture of visual qualities such as the smallest letters of text or stroke width of an image.[55] Standards such as ISO 6199:2005 and the British National Preservation Office's 2000 *Guide to Preservation Microfilming* now dictate what data in the document is essential to retain in a microform, prescribing that "all information visible in the original must be visible in subsequent copies, whether digital or analog," with objective measures to verify fidelity.[56]

Still, these technical standards do not address the materiality of the item: what can the physical format tell users about the creator's intentions and purposes, his or her historical context, the culture in which she or he lived, and can such information be faithfully reproduced? *The Evidence in Hand* begins to address such artifactual qualities and includes an appendix with some detailed considerations for retaining items in the original format, but these are appropriate primarily for published books and still fairly narrow in focus. The other sample preservation selection policies in the appendix, from Harvard University and Cornell University, are much less detailed.[57] Further study is needed to evaluate more numerous and more recent preservation policies, for it is unclear if many institutions have taken heed of the *Evidence in Hand* report or how they are evaluating items for reformatting, including how much they consider the materiality of their artifacts beyond practical questions such as the ease of reformatting.

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[51] Richard J. Cox, "Don't Fold Up: Responding to Nicholson Baker's *Double Fold*," *Archival Outlook* (April, 2001): 9, 13-14; Ross Harvey, "Appraisal and Selection," *DCC Digital Curation Manual*, S. Ross and M. Day, eds. (2006), 8 http://www.dcc.ac.uk/resources/curation-reference-manual.

[52] Stephen G. Nichols and Abby Smith, *The Evidence in Hand: Report of the Task Force on the Artifact in Library Collections* (Washington, D.C.: Council on Library and Information Resources, November 2001), v.

[53] Ibid., 9.

[54] Ibid., vii.

[55] See Anne R. Kenney and Stephen Chapman, "Tutorial: Digital Resolution Requirements for Replacing Text-Based Material: Methods for Benchmarking Image Quality" (Washington, D.C.: The Commission on Preservation and Access, 1995), http://www.clir.org/pubs/reports/pub53/pub53.pdf; Cornell University Library, "Conversion: Benchmarking," *Moving Theory into Practice: Digital Imaging Tutorial*, https://www.library.cornell.edu/preservation/tutorial/conversion/conversion-04.html.

[56] Brown et al., "The Role of Microfilm in Digital Preservation," 71.

[57] Nichols and Smith, *The Evidence in Hand*, 94-95.

Whether or not the original is retained when reformatting for preservation, archivists must consider the question, what are the implications for the original and for users? Current guidance on digital reformatting offers many practical recommendations and considerations, but leaves deeper questions largely untouched. Cornell University Library's digital imaging tutorial, "Moving Theory into Practice," recommends that "the image surrogate must be rich enough to reduce or eliminate the user's need to view the original" and generally recommends that it meet all "research, legal, and fiscal requirements" but goes into no detailed guidance for navigating these concerns. Similarly, the tutorial includes some questions about document attributes to guide selection of materials ("Does the material lend itself to digitization? Can the informational content be adequately captured in digital form? Do the physical formats and condition of the material represent major impediments?"), and while these questions are useful they are very broad, and do not discuss weighing the benefits of electronic access against the loss of information in reformatting.[58] Similarly, the Library of Congress's Preservation Digital Reformatting Program includes selection criteria that include "characteristics of originals – originals in different physical formats and with different characteristics are suitable for digital reformatting" and "acceptability of the resulting digital object – the digital object . . . must meet the requirements of the custodial division and the Preservation Directorate."[59] Again, these criteria touch on the physical format and condition of objects, but do not urge librarians and archivists to consider the artifactual nature of their records.

These recommendations also overlook the potential detriment to patrons if they are provided with only a narrow, homogenous collection of surrogate items and denied or inhibited from viewing originals. As a sub-collection chosen from items already subjectively – although we hope responsibly – selected by the archivist in appraisal, reformatted items introduce an added layer of editorial choice.[60] Users may be missing some important perspectives found elsewhere in the collection that have been overlooked for microfilming, and this tendency can be exaggerated with digital resources if users consult only what is most conveniently accessed online. One author warned, "What is not digital will not exist, or may not matter, much, except for the sentimental, symbolic qualities of the artifact."[61] In order to comply with the Society of American Archivists' value of diversity, practitioners must think carefully and strategically about what documents to microfilm or digitize, analyzing how representative a collection they are creating for current and future users and what the implications of surrogate production may be for those users.[62] Reformatting always deprives the user of some original characteristics; for

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[58] Cornell University Library, "Conversion: Rich Digital Master," *Moving Theory into Practice: Digital Imaging Tutorial*, https://www.library.cornell.edu/preservation/tutorial/conversion/conversion-03.html; Cornell University Library, "Selection: Other Criteria," *Moving Theory into Practice: Digital Imaging Tutorial*, https://www.library.cornell.edu/preservation/tutorial/selection/selection-02.html.

[59] Library of Congress, "Preservation Digital Reformatting Program: Selection Criteria," *Preservation*, http://www.loc.gov/preservation/about/prd/presdig/presselection.html.

[60] Richard J. Cox, "Archivists and Collecting," *Encyclopedia of Library and Information Science*, 3rd ed. (Taylor and Francis: New York, 2009), 210-211.

[61] Paul Conway, "Tec(h)tonics: Reimagining Preservation," *College and Research Libraries News* 69, no. 10 (2008): 598-599.

[62] Paula De Stefano, "Use-Based Selection for Preservation Microfilming," *College and Research Libraries* 56, no. 5 (September 1995): 412-413; SAA Council, "SAA Core Values Statement and Code of Ethics," Society of American Archivists, http://www2.archivists.org/statements/saa-core-values-statement-and-code-of-ethics.

example in microfilm, illustrations like colorful art nouveau graphics or intricate woodcuts may be reduced to indistinct grayscale or black-and-white images.[63] Meanwhile some digitization projects do an admirable job of reproducing interactive items or unique formats, and yet the experience with the original cannot be reproduced.[64] The representativeness of surrogate collections, users' potential needs, and the suitability of surrogates must be carefully considered.

When making preservation reformatting decisions, librarians and archivists can learn from past mistakes with microfilm, such as sometimes overlooking the materiality of the original in favor of preserving disembodied "information." They must continue to expand on the work that reaffirms the material value of library and archives holdings, especially in relation to preservation reformatting. While the recent guidance mentioned above is a solid start, we must expand on such vague questions as "Does the material lend itself to digitization?" and such practical questions as "Do the physical formats and condition of the material represent major impediments?"[65]

Lessons from Digital Preservation

Even as practitioners profit from the lessons learned from microfilming, they may also benefit from applying some of the work done on electronic records to their analysis of analog records. With appropriate adaptations, the scholarship on the "significant properties" of digital objects could be applied to analog objects under consideration for reformatting, providing a more formalized and extensive framework than currently exists. Significant properties are defined as "those properties of digital objects that affect their quality, usability, rendering, and behavior."[66] Hedstrom and Lee developed a model of significant properties from high-level (underlying abstract form) to low-level (more concrete and technical, such as data type), some of which apply to all digital objects and some only to particular types. The model also accounts for internal composition and external relations, acknowledging the wider context of which the object is a part. Properties may be supported by the file format in general, observed by the user in a specific instance, measured by the computer processing the file, and/or directly intended by the creator. Hedstrom and Lee explain the benefits of a formal expression of the significant properties of a complex digital object: it can "provide the basis for more clearly articulating the range of available options and for documenting the trade-offs among them."[67] Developing a similar formalized model of significant properties that could apply to non-digital assets and that takes into account general considerations, format-specific concerns, the sources of significant properties, and their implications for meaning, structure, and broader context would be very useful for information professionals engaged in preservation reformatting, and would supplement already established best practices and recommendations.

In addition to further consideration of the significant properties of analog items – particularly those related to the physical format – when generating facsimiles, archivists must bear in mind the importance of metadata in the preservation process, retaining extensive

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[63] Baker, *Double Fold*, 4-5, 25.
[64] See for example Duke University's digitized anatomical fugitive sheets http://library.duke.edu/digitalcollections/rubenstein_fugitivesheets/ and glass lantern slides http://library.duke.edu/digitalcollections/gamble_glass_lantern_slides/.
[65] Cornell University Library, "Selection: Other Criteria," *Moving Theory into Practice: Digital Imaging Tutorial*.
[66] Margaret Hedstrom and Christopher A. Lee, "Significant Properties of Digital Objects: Definitions, Applications, Implications," Proceedings of the DLM Forum (2002): 218, http://www.ils.unc.edu/callee/sigprops_dlm2002.pdf.
[67] Ibid., 221.

metadata about their surrogates.[68] While this is obviously best practice for internal use, users may not have access to all the same metadata about the original and its surrogate, even when they would likely benefit from the consistent provision of such information when microfilm or electronic surrogates are displayed. To be sure this is likely standard practice in certain fields such as art history where information like the dimensions and medium are customarily shared with users, but a more widespread and consistent application may be helpful, such as recording a microfilmed text's physical dimensions or the original size of a scanned photograph. Knowing such details as the original's size, dimensions, medium, relationship to other collection components, etc. can help patrons envision the original item even as they use the surrogate, and remind them of the artifactual value of the original. It would also enhance transparency and reinforce trust in the repository. [69]

Conclusion

The introduction of microfilm ushered in changes to the archival profession, offering unprecedented advantages of space savings and long-term preservation of information. It also brought some challenges: disparate expectations between archivists and researchers, and the re-evaluation of key principles that guided archival practice: the meaning of authenticity, how it applied to surrogates, and the benefits and costs of preserving abstract content without the original physical structure. As newer technologies gain ascendancy, microfilm's popularity is waning. However, it may have seen its peak but it is not going to disappear. Some scholars have recommended microfilm over digitization for long-term preservation or suggested a hybrid approach that marries the best of both technologies.[70]

Standards development and a realistic assessment of the advantages of a new medium are some lessons that information professionals have learned from past experience. Others merit further discussion and reflection, the foremost of which is the intrinsic value of an original item which may be lost when reformatted to preserve the informational content. In some cases, the original is discarded, the context and structural information lost forever. Perhaps archivists are less likely today to rely on a surrogate alone, retaining both the original and the copy; in any case, they face the difficult and subjective task of determining what and how much information should be included in a surrogate. Librarians and archivists must continue to develop comprehensive, formalized and widely applicable criteria for evaluating the essential characteristics of original items when selecting for preservation reformatting, and faithfully link this information with the surrogates created for the benefit of users. As they continue to carry on their work of preserving and maintaining authentic records, archivists must always bear in mind the value of their collections as artifacts.

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[68] Ibid., 222.
[69] Adam, "Preserving Authenticity," 602.
[70] John Lauder, "Digitization of Microfilm: A Scottish Perspective," *Microform Review* 24, no. 4 (1995): 182; Roderic Vassie, "Microform and Digital Publishing," *Library Hi Tech News* 9, no. 10 (2007): 26, 29; Brown et al., "The Role of Microfilm in Digital Preservation," 68-69.

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