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CASE STUDY

## Why Do We Digitize? The Case for Slow Digitization

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In 1995, as part of the *Electronic Beowulf* project, Professor Kevin Kiernan of the University of Kentucky and David French of the British Library's Manuscript Conservation Studio took the British Library's Kontron digital camera, together with bulky computer and lighting equipment, to the Royal Library in Copenhagen to make digital images of the eighteenth-century transcripts of the *Beowulf* manuscript associated with the Danish antiquary Grimur Jónsson Thorkelin.<sup>1</sup> This would be the first time that digital images of manuscripts would be made in the Danish library. Having set up their equipment, Kiernan and French looked forward to showing the new technology to the Danish librarians. French switched on his lighting gear and the Royal Library plunged into darkness—the large lighting rigs and computing equipment had blown the venerable fuses of the Royal Library.

How far we have come in a very short period of time. The Royal Library in Copenhagen now has its own major digitization program and since 1997 has made freely available the digital facsimiles of dozens of manuscripts in its collections.<sup>2</sup> *Electronic Beowulf* 1.0 was released on a CD in 1999, and version 4.0 is now also available online.<sup>3</sup> The British Library is in the process of digitizing most of its manuscripts from the Anglo-Saxon period and currently has over 8,000 medieval manuscripts online. In 2016, the library announced a project with the Bibliothèque nationale de France to digitize eight hundred manuscripts from the period 700-1200.<sup>4</sup> Other important collections of medieval manuscripts have been mounted online, such as Matthew Parker's personal library at Corpus Christi College, Cambridge, which became freely available when Parker 2.0 was released in January 2018.<sup>5</sup> Resources such as these have become indispensable to scholars, who are increasingly supplementing them with their own images, now that researchers are permitted to use their own cameras in repositories such as the National Archives, Bodleian Library, and British Library.

The past twenty years have seen a revolutionary change in the ways in which scholars and the wider public access and use manuscripts. Among librarians, scholars, and other users, the consensus is that the increased availability of digital surrogates is a good thing, and digital technology is frequently portrayed as a means of democratizing the archive.<sup>6</sup> A cottage industry has grown up to demonstrate the value of digitization in the hope of making the case for more funding.<sup>7</sup> But this advocacy for digitization has discouraged the development of critical and reflective discussions on the way in which digitization is undertaken. There is a risk that digitization programs, by focusing on making "treasures" more widely available, will reinforce existing cultural stereotypes and canonicities. The criteria used to select manuscripts for digitization and the way they are presented online are very poorly articulated and require wider discussion and debate.

Since the advent of Google Books, many librarians and curators have been anxious to maximize digital coverage of their collections as quickly as possible. However, by seeking to rapidly digitize large numbers of books, manuscripts, and archives, archivists, librarians, and scholars may sacrifice many of the benefits that digital technologies offer for the exploration of manuscripts and books as textual artifacts. Too often, digitization is treated as a form of color microfilm, thereby offering distorted views of the manuscript and making it appear to be a simpler and more stable object than it really is. Digitization provides a constantly expanding toolbox for probing and analyzing manuscripts that goes beyond simple color imaging. Like archaeological artifacts, manuscripts should be explored gradually, using a variety of technical aids and methods, building a multifaceted digital archive of the manuscript.

It is worth pausing to assess what we mean by “mass” digitization in the context of manuscript scholarship. Mass digitization, in the Google Books sense, implies the digitization of millions of books in a highly reductive way, replicating texts rather than images of unique, handwritten items.<sup>8</sup> In the context of manuscripts, therefore, “mass” digitization is a misnomer: what we are discussing is the digitization and dissemination online of whole collections or libraries, replicating as closely as is possible—given conservation, handling, and delivery challenges of the original material—the model of access at scale to book and text collections for use by scholars and the public. Libraries are making a considerable investment to not only deliver access for scholars and the public but also to showcase their holdings. But should manuscript scholars support this style of mass digitization for manuscripts? If funding is available for digitization, should it instead be directed to efforts that exploit the armory of digital and scientific methods to gradually explore manuscripts in a more forensic fashion? Just as there is a movement for “slow food,” so might we conceive of developing a movement advocating “slow digitization,” in which rapid access is less important than the use of technological and other tools to gradually excavate the complex layers that make up each manuscript. By “slow digitization” we mean not just the delivery of high-resolution digital images as a form of “digital photocopying,” where a single image capture of each page of a manuscript is presented as the definitive view of the folio as an object, but the use of advanced imaging techniques, including 3-D, RTI, and hyperspectral imaging—as well as specialized images such as those captured by raking light from angles other than a camera held directly above a flattened leaf. These two approaches—slow and mass digitization—are by no means inimical, but they need to be held in balance. Digitization—whether mass or slow—is expensive, resources are limited, and the task of digitizing extant manuscripts is a significant one. The 2017 *ENUMERATE* study calculated that approximately 22% of Europe’s digital heritage has been digitized.<sup>9</sup> There are still many manuscripts to be digitized, and dreams of capturing human knowledge by digitizing everything have perhaps been too dominant in recent years. Scholars and libraries should collaborate to develop a better critical framework for the potential of digital delivery. In particular, there is a need to slow down, look around, and start digitizing in such a way that it helps us understand and encourages us to think more carefully about the manuscripts we are studying.

The advantages of mass digitization articulated by Hughes in 2003—access to collections by distant and disparate audiences, protection of rare and fragile items from handling, and the ability to reuse and analyze content in new and innovative ways using digital tools and methods—have held up well.<sup>10</sup> However, large-scale manuscript digitization is often subject to cost and time limitations (due to the nature of many short-term, grant-funded projects that are still the primary model for digitization) that necessitate implementation of the fastest and least-expensive technical and workflow solutions. Similarly, selection of content for digitization is often driven by risk-averse approaches to collections presentation, handling, and conservation, limiting what can be made available with existing resources. More significantly, despite the enormous investment in the digitization of manuscripts and other cultural materials since the 1990s, the amount of research into the impact of digitization on scholarship is limited, as is research into user requirements prior to digitization.<sup>11</sup> What audiences is the digitization of archive and library materials intended for? Is it intended to transform research and scholarship? If so, is digitization fulfilling its claims and what are its strengths and weaknesses? Is the investment of libraries, galleries, and museums in digitization justified? While books and articles enthusiastically advocating digitization have been published, ranging from Peter Robinson’s pioneering 1993 study, *The Digitization of Primary Textual Sources*, to the 2011 report prepared for the UK Joint Information Systems Committee, *Inspiring Research, Inspiring Scholarship*, there have been few attempts to critically appraise the scholarly and other

benefits of digitization.<sup>12</sup> The literature is dominated by a range of “how-to” books chiefly aimed at information professionals, such as the handbooks published by Melissa Terras, Lorna Hughes, Anna E. Bülow, and Jess Ahmon.<sup>13</sup> The most recent overall survey of digitization activity by Margaret Cou tts is chiefly focused on analyzing the different strategies adopted when selecting material for digitization, the various funding models used, and the potential for collaborative work.<sup>14</sup> There is little discussion in Cou tts’s book of how digitization might relate to the needs of scholars. There is an assumption in most of these publications that the conversion of manuscripts, books, and other historical artifacts to digital form is a mechanically straightforward process, in which “one size fits all.” Their main concern is with designing efficient work flows and paying attention to the management implications of digital life cycles. The significant gap in research on the impact of digitization on scholarship is a theme we will return to in this essay.<sup>15</sup> It has meant that we lack a critical framework for the digitization and dissemination of manuscripts, and that much digitization does not draw on the evidence of use (and re-use) of digital images to inform future initiatives.<sup>16</sup> Even more fundamentally, it has become commonplace that users/scholars are not consulted about the selection and digitization of materials for most large-scale archive and library digital initiatives.

The main benefit of digitization is still generally considered to be the promotion of remote access to the holdings of museums, galleries, and archives, so that people who cannot readily visit these institutions in person can explore their holdings. Cokie Anderson and David Maxwell declare that “One of the boons of the web is the online availability of the treasures of the world’s libraries and museums. . . . Barriers to access have been removed, and the cultural record is available to searchers anytime, anywhere.”<sup>17</sup> Similarly, Simon Tanner and Marilyn Deegan state that “To achieve a Digital Britain that is digitally literate, educated and ready to exploit new technologies, the treasure house of British content has to be digitized comprehensively.”<sup>18</sup> For Tanner and Deegan, such beautiful content and validated data will generate economic impact, research innovation, and social benefits. There are of course other benefits to digitizing manuscripts. These include the ability to enhance images and see details not readily visible in the original item. Digital images can be used to reunite dispersed archives, such as the early Buddhist texts found in caves in Dunhuang, China.<sup>19</sup> Digital images can also be used by libraries to support preservation strategies, by providing a surrogate and thereby reducing wear and tear on the original document. Nevertheless, the consensus is that “the number one reason for digitizing materials is to improve accessibility.”<sup>20</sup>

When digital images of manuscripts first became available it was by no means evident that their primary value would be in supporting remote access. In the early 1990s, it was not practicable to make large numbers of digital images available via networks. This capability only emerged with the spread of the World Wide Web and improvements in network capacity. Peter Robinson, writing in 1993, listed the primary benefits of digitization in terms of its superiority to microfilm: computer images will not decay as they are copied; they will not get scratched in use; a single digital image can in theory be easily located, whereas the location of microfilms and the process of winding through the reel of film is very time-consuming. The ability to distribute images over a computer network was toward the bottom of Robinson’s list of the advantages of digitization.

The contrast between the different way in which libraries used microfilm and digital images is striking. Starting in the 1940s, microfilm was promoted by libraries as a preservation medium that would protect and document fragile items at risk of damage and destruction. This enabled large-scale microfilm programs to be funded from library preservation budgets. The existence of these preservation microfilms, which can now be digitized, has facilitated the creation of such digital packages as *Early English Books Online* and *Eighteenth Century Collections Online*. However, doubts about the long-term life of digital images meant that they were slow to supplant microfilm as a preservation medium; and consequently, the chief value of digital images has come to be seen as their ability to support remote access. Because digitization has been perceived mainly as a means of enhancing access, it is treated by libraries and museums as an additional call on funds and as something of a luxury. The British Library, for example, has been reluctant to use its grant-in-aid in support of digitization and has tended to fund digitization activity through external partnerships, which can sometimes result in commercial arrangements that restrict access, creating resources of limited use for scholarship.

The patchwork pattern of funding available for digitization means that a strategic approach to the selection of material for digitization has not been widely adopted. The selection of materials is often an opaque process that does not draw on an analysis of user requirements, largely due to the pragmatic and piecemeal nature of digitization, which is often driven by availability of short-term funding directed at specific projects.<sup>21</sup> Programs like those in Germany, where the German Research Foundation has launched an initiative for the digitization of nearly all surviving medieval manuscripts in Germany, are unusual.<sup>22</sup> Packages such as *Early English Books Online* and *Eighteenth Century Collections Online* achieve extensive coverage of early modern and modern printed materials, but only by means of piggybacking on earlier microfilm products. In other cases, such as historic British newspapers from the eighteenth and nineteenth centuries, the different funding models adopted for digitization have split the archive, with some newspapers made available via partnerships with Gale-Cengage and others via a subscription-only service through the family history company, Findmypast (illustrating how commercial partnerships for digitization can restrict access). As Margaret Coultts has recently emphasized, patterns of digital coverage of the holdings of libraries and archives are very fragmented and piecemeal.<sup>23</sup>

These problems reflect a lack of consensus as to what criteria should be adopted in selecting material for digitization. Libraries frequently undertake digitization programs in response to ad hoc managerial requirements rather than any strategic need. Thus, the British Library's priority in digitizing the most "highly used and important part" of its newspapers collections was dictated by the need to close a branch library in North London and provide access to the newspapers in its building at St Pancras.<sup>24</sup> Similarly, the priority currently given by the British Library to the digitization of its sound recordings is due to preservation issues posed by the magnetic tape and other media on which the archive is stored.<sup>25</sup> Lorna Hughes in her 2004 manual on digitization advocates the use of decision trees in selecting material for digitization, but most of the criteria she lists concern such managerial issues as cost, intellectual property, and technical infrastructure. Hughes states that "informational content" is a key factor in this assessment, but does not indicate how this should be appraised.<sup>26</sup> Cokie Anderson and David Maxwell suggest that priority should be given to digitizing material that is unique, fragile, and in high demand, since this would support improved access to restricted materials.<sup>27</sup>

There is no consistent pattern as to what has been digitized and why. Some digital collections were apparently made simply because suitable funding was available, such as the British Library's digitization of more than nine hundred Greek manuscripts, which was supported by the Stavros Narchos Foundation.<sup>28</sup> In other cases, long-standing print projects have been migrated to a digital environment in order to reduce costs and increase the number of images available, such as the British Academy's *Corpus of Romanesque Sculpture*.<sup>29</sup> Other digitization projects form part of wider editorial endeavors, such as the edition of the *Fine Rolls of Henry III*.<sup>30</sup> There is also great variability in the standard for and presentation of images of manuscripts. The images from the class of Ancient Petitions in the UK National Archives are greyscale scans from microfilm that are downloaded individually via the National Archives Online shop. The British Library's digitized manuscripts on the other hand are color images derived from high-resolution scans presented in a custom-built viewer. Initiatives such as the International Image Interoperability Framework (IIIF) are allowing images to be shared and presented in a more flexible fashion, but nevertheless the way in which digital images of manuscripts, archival documents, and other artifacts are selected and made available is a varied and haphazard patchwork.

Despite the piecemeal nature of much manuscript digitization, one trend has been very evident in digitization activities since their inception—an emphasis on the digitization of "treasures." For many libraries and archives in the 1990s, it was natural to demonstrate the value of their new World Wide Web site by including images of such treasures as the Declaration of Independence (Library of Congress), Magna Carta (British Library) or the last letter of Mary Queen of Scots (National Library of Scotland). The stress on "treasures" followed from the assumption that the chief function of digitization was to increase access. Headlines describing how such and such a cultural treasure had "gone on the internet" became a staple of the 1990s. This preoccupation with cultural treasures and canonical works during the first

phase of engagement with digital and network technologies was particularly evident for the medieval period. The most elaborate and innovative projects have been directed towards the canonical treasures: Chaucer, *Beowulf*, the Exeter Book, *Piers Plowman*, Sir Gawain, the Auchinleck Manuscript and so on.

Paradoxically, there is a risk that an emphasis on digitizing cultural treasures will undermine the claim that digitization opens up and democratizes access to cultural heritage. If digital libraries merely reiterate and reinforce long-standing cultural narratives and stereotypes, rather than enabling the exploration of forgotten and neglected collections, then they can become agents of cultural exclusion. As Nancy Proctor has commented, “Just adding ‘access points’ to the museum through new technologies and media—creating what has been called ‘the multi-platform museum’—is unlikely to change the fundamental structures of the museum-audience discourse, and in fact may simply be reinforcing existing systems and hegemonic systems of power.”<sup>31</sup>

In the wake of the announcement of Google Books in 2004, many librarians and archivists felt not only that “boutique digitization” would become less prominent but also that it was important to develop strategic projects of mass digitization that might compete with Google.<sup>32</sup> An argument in favor of such larger-scale projects is that they might reduce the emphasis on “treasures” and celebrity manuscripts. Indeed, it has been claimed that one benefit of Europeana, an early response to Google Books that currently offers access to over fifty-four million art objects from Europe, was that it would enhance access to a “long tail” of cultural artifacts.<sup>33</sup> However, as far as the middle ages is concerned, it is not necessarily the case that larger-scale digitization meant a move away from “treasures.” One of the first large-scale manuscript digitization projects at the British Library focused on illuminated manuscripts from the royal library, described by the library as “dazzling artefacts” and “a treasure trove of illuminated manuscripts.”<sup>34</sup> Other projects focused on such well-known and canonical collections as the Parker Library at Corpus Christi College, Cambridge. There is no medieval equivalent of the eighteenth-century *Proceedings of the Old Bailey*, where a digital edition has opened up a major historical source that was previously extremely difficult to access.

One of the few critics to express doubts about the value of digitization for medieval studies has been the literary scholar A. S. G. Edwards. In an article in the *Times Literary Supplement* in 2013 entitled “Back to the Real?” Edwards argued that scholars were becoming too dependent on surrogates and were not referring back to the original manuscript when necessary.<sup>35</sup> Edwards also expressed concern that libraries were using the availability of digital surrogates to restrict access to original manuscripts. Above all, Edwards raised doubts about the assumption that making images of manuscripts more widely accessible is inherently a good thing. In particular, he discussed the digitization of the fourth-century Greek biblical manuscript, the *Codex Sinaiticus*.<sup>36</sup> Edwards had been told that the online *Codex Sinaiticus* received about 10,000 hits a month. Edwards observed that “That might seem a strong justification for digitization. But it seems doubtful whether even a small fraction of that number have the appropriate training—codicological, linguistic and textual—to approach the work in an informed way. If my audience analysis is even broadly correct, the British Library is investing not in scholarship, but in a new branch of the entertainment industry.”<sup>37</sup> Edwards concluded by wondering whether this investment might not be better directed towards the library’s conservation budget and to providing training in bibliography.

Edwards’s criticisms are misdirected. While Edwards makes a valuable point that more thought is required as to how digitization supports wider public access, the use of the *Codex Sinaiticus* digitization as an example is unconvincing, since this was a project that was primarily intended to support biblical scholarship. The online *Codex Sinaiticus* includes many features facilitating the detailed textual analysis of *Sinaiticus* in ways that would be difficult to achieve other than via digitization. The complex history of the *Codex Sinaiticus* means that different parts of the manuscript are to be found in the British Library, the National Library of Russia, Leipzig University, and Saint Catherine’s Monastery on Mount Sinai. The digital site draws together these dispersed components of the manuscript and enables it, for the first time, to be explored as a whole. This is particularly important in the case of the leaves from Mount Sinai, which were only discovered in 1976 and only became available for scholarly use with the creation of the digital edition. Moreover, the digital facsimile of the *Codex Sinaiticus* does not restrict the viewer to single perspectives. In addition to a “plain” view of

the manuscript, the digital facsimile also shows images made using raking light, which enables details such as corrections and the ruling of the manuscript to be more easily seen and analyzed.<sup>38</sup> The ability to magnify textual corrections and variants, many of which have been the subject of great controversy, is also of enormous value. A detailed conservation analysis of the *Codex Sinaiticus* was undertaken in the course of the project, and the digital presentation enables easy access to exhaustive conservation reports on each folio of the manuscript. The digital edition also incorporates fully searchable transcriptions and translations of the text.

The value of the digital *Codex Sinaiticus* is apparent when it is compared with the hard-copy facsimile of the *Codex Sinaiticus*, produced from the digital files, which the British Library sells for £495. The collector who purchased the hard-copy facsimile of *Sinaiticus* would find it truly baffling, since there is none of the scholarly apparatus and annotation that is provided online. This printed facsimile comprises just the raw manuscript. The only additional insight it provides that is not evident in the online version is the weight of the reconstituted manuscript—it is a very heavy book. In fact, it is the printed facsimile that seems to be more directed at collectors and that appeals to the entertainment industry.

Far from being designed solely to provide public access, measured through the number of hits, the digital *Codex Sinaiticus* embodies and supports textual scholarship at its most rigorous and uncompromising, providing biblical scholars with an enormous range of tools and information to explore this text to a degree of detail never before feasible. Such facilities as the comparison of images under plain and raking light, or examination of details at high magnification, make digital facsimiles very powerful tools for the detailed scholarly examination of manuscripts. While the online *Codex Sinaiticus* does attract a lot of public interest, this is an incidental aspect of the project. The justification of the cost and effort of the online *Codex Sinaiticus* lies in its ability to support and advance scholarship.

Such an analysis raises doubts as to whether there should be such a strong emphasis on access as a justification for digitization. The value of many digital projects lies in their ability to support the exploration of features of manuscripts and other artifacts that cannot readily be investigated in any other way. While these projects allow wider public access to these manuscripts, such access is an incidental benefit of digitization. The primary value of these projects is in the way they support detailed scholarly research and analysis. During the 1990s, many librarians adopted the slogan “access not collections.” Yet paradoxically, the growth of imaging and network technologies resulted in a renewed focus on rare and special items such as the *Codex Sinaiticus*, which were essential to libraries in establishing their digital presence. Digitization affirms the importance of scholarship and collections as much as it enhances access.

However, while the *Codex Sinaiticus* illustrates the potential of digital facsimiles to offer scholars new and exciting facilities, it must be admitted that many digital presentations lack the sophistication of the online *Sinaiticus*. Too often, digital facsimiles of manuscripts are little more than color microfilms. This is because librarians have taken Google Books as the model for large-scale digitization. At the heart of Google Books is the assumption that a book is a simple one-dimensional artifact and that the information in it can be easily searched. In the case of printed books, this assumption is difficult enough, since it is an axiom of historical bibliography that no two copies of a book from the hand-press period (and often later) are the same. Comparison of textual variations, illustrations, binding, and provenance in different copies of a printed edition can all be very instructive. Google Books will never cover the whole of human knowledge as expressed in print (itself a small sliver of human knowledge) until it has digitized every copy of every book, pamphlet, and paper ever printed.<sup>39</sup>

If mass digitization of printed books presents problems, large-scale digitization of manuscripts raises even more complex issues. While optical character recognition of handwriting is still in development, we cannot search a large collection of digital manuscripts in the same way as the printed material in Google Books. In any case, for manuscripts, the text is not the only point of interest. We are concerned with illustrations, decorations, *mise-en-page*, scribal practice, inscriptions, provenance, and much else. We might use a digital image to examine the *ductus* of a scribe in enormous detail. Or we

might wish to compare images of dozens of illuminated pages in order to investigate common features of layout or color palette. The questions we commonly ask about manuscripts require many different views and cannot be satisfied by a single image.

Although scholars often require many different views of a manuscript, most libraries only offer a single digital perspective. Online collections of digitized manuscripts are frequently presented in viewers that restrict how the image can be used and manipulated, limiting the user to scrolling through the manuscript. The emergence of the IIIF standard is making for greater flexibility and exchange, promising to eliminate the “silozation” of images discussed by Coutts, but the presentation of images is still heavily mediated. Librarians talk of material being “digitized” as if it is a once-and-for-all process, with little sense that further digital imaging or the use of specialist techniques such as multispectral imaging or reflectance transformation imaging (RTI) may in the future reveal new information about the manuscript.<sup>40</sup> Mass digitization projects such as Google Books see the holdings of libraries and museums as finite resources that can be readily transferred to new media. Yet manuscripts like the Lindisfarne Gospels, *Beowulf*, or the Hengwrt manuscript of *The Canterbury Tales* do not easily give up their history. The exploration and investigation of these cultural artifacts will continue for as long as they survive. Digital technology has much to contribute, but it is not a one-off activity, rather; it is an extended process of exploration and investigation.

The tenth-century Benedictional of St Æthelwold, London, British Library, Additional MS 49598, a beautifully illuminated volume of episcopal blessing made by the scribe Godeman for the personal use of the Bishop of Winchester Æthelwold, is among the British Library’s digitized manuscripts. At the time of writing, it can be freely viewed online but only in a Flash-based image viewer that prevents downloads and restricts the ability of the user to alter the order of the images.<sup>41</sup> This restrictive viewer will presumably shortly be replaced by the library’s new universal viewer that allows downloads and is IIIF-compliant.<sup>42</sup> However, the difficulties with the online presentation of the Benedictional of St Æthelwold lie not in the restrictions imposed by the image viewer but rather in the way in which its online presentation conceals significant features of the manuscript.

In 1994, William Schipper drew attention to the fact that, with the aid of raking light, dry point marks made by Godeman to assist in putting the manuscript together can be seen.<sup>43</sup> For example, on f. 58v, the words “Deus qui dignationis,” apparently the first line of a blessing, are written in dry point in the margin. On folios 60 and 60v, the words “tiburti & ualeriani” and “Georgii” can be made out, apparently referring to liturgical festivals. These dry-point construction marks were made by Godeman to assist him in assembling the complex sequence of blessings in the manuscripts. Some of these marks are extremely clear, so that they can even be made out in the 1910 black-and-white photographic facsimile.

However, none of these dry-point construction marks, vital clues to the history of this manuscript, can be seen in the digitized version of the Benedictional of St Æthelwold on the British Library’s website. Dry-point annotations of this kind are extremely difficult to spot, even with the manuscript in front of you. It is frequently necessary to experiment with different forms of sidelighting to make them out. The flat LED lighting panels used for the kind of mass digitization of manuscripts undertaken by the British Library flood the manuscript with light and obscure evidence such as dry-point annotations. Consequently, none of the evidence described and partly photographed by Schipper, and also apparent in the 1910 photographic facsimile, is evident in the digital representation of the manuscript. There are probably many more annotations apart from those found by Schipper. Digital imaging can assist in tracing them, but it requires a different approach to that currently adopted by the British Library. For example, RTI imaging, which allows the user to move the position of the light source, can potentially assist in tracing dry-point annotations. A scholar seeking to investigate the history of the Benedictional of St Æthelwold would require access not only to high resolution color images of the manuscript but also to a set of RTI images to help seek further dry-point marks.

The British Library’s gallery of digitized manuscripts also includes Cotton MS Vitellius A XV, a composite manuscript containing, in its second half, the Nowell Codex that includes the only known medieval text of *Beowulf*.<sup>44</sup> The manuscript is fundamental evidence as to the origins and date of *Beowulf* that remain the subject of vigorous scholarly

debate. The manuscript was badly damaged in a fire in 1731 and conserved in the nineteenth century, so that many readings in the poem are uncertain.<sup>45</sup> However, it is not sufficient for scholarly analysis of *Beowulf* to have a straightforward set of color images under normal lighting conditions. Because of the fire damage and subsequent use of chemical reagents, many passages in *Beowulf* can only be read using ultraviolet light. This has been recognized for many years, and in the facsimiles published by the Early English Text Society in 1959 and by Early English Manuscripts in Facsimile in 1963, using photographs prepared in 1957 by the British Museum, some folios were reproduced under normal light and others under ultraviolet light.<sup>46</sup> However, the selection of which folios should be shown under ultraviolet light seems to have been made not by the editors of the facsimiles but by the British Museum photographer, and users of the facsimiles were not given the option of comparing the appearance of folios under different lights. An advantage of digitization is that it is easier to offer alternative shots under different lighting conditions. The British Library's digitized manuscripts gallery, however, does not avail itself of this possibility and simply presents *Beowulf* throughout under normal lighting. Substantial sections of the text are effectively invisible, and there are many readings that can be seen in the 1959 and 1963 facsimiles that do not appear in the digitized version.

An alternative approach to the digitization of the *Beowulf* manuscript is illustrated by the *Electronic Beowulf* project edited by Kevin Kiernan, on which Prescott worked in the 1990s.<sup>47</sup> One of the advantages of digital imaging is that it makes ultraviolet photography much easier and safer, and *Electronic Beowulf* took advantage of this by making hundreds of images of readings under ultraviolet light that can be accessed from hyperlinks, so that ultra-violet and normal light readings can be easily compared. Moreover, when the manuscript had been conserved in the nineteenth century, its burnt edges had been protected by paper frames. The retaining edges of these frames conceal hundreds of letters in the manuscript. These can be read with a fiber-optic light, but only a digital camera had sufficient agility to record the backlighting of these hidden letters. The *Electronic Beowulf* provided for the first time a photographic record of these hidden letters and made them available to users of the digital facsimile through hyperlinks. The *Electronic Beowulf* also included early transcripts and collations of the poem, providing a rich archive of material on the transmission of this text.<sup>48</sup>

The plain, unvarnished version of *Beowulf* presented in the British Library's digitized manuscripts gallery is a diminished version of the manuscript, in which a great deal of significant information is missing. It is in many ways less useful than the 1959 and 1963 black-and-white facsimile that included ultraviolet images. The *Electronic Beowulf*, by contrast, provides an enriched representation of the manuscript, including much material that would otherwise be difficult and time-consuming to assemble. This does not mean that *Electronic Beowulf* is a substitute for the original manuscript. Rather, it is a record of a further stage in the exploration and analysis of this manuscript, which has continued since it was first identified in the eighteenth century and will continue for as long as English is spoken. Although *Electronic Beowulf* is freely accessible, the ultimate justification is not access. It is a resource for those who want to explore the history of *Beowulf* and understand its text more deeply.

The reason for this odd treatment of Cotton MS Vitellius A XV in the British Library's digitized manuscripts gallery is due to the current preoccupation of librarians with maximizing digital coverage in the name of access. Libraries want to (as one librarian put it to me) "ensure a consistent user experience" by making images available in a standard form through a common viewer, even if this makes a nonsense of the manuscript. The pressure on libraries by their political paymasters to enhance access and compete with Google encourages them to try and put manuscripts through a digital sausage machine. Moreover, librarians are anxious to demonstrate that they are ready for a digital age and that they have come to terms with digitization by being able to report substantial sections of their collections as "digitized." This is a futile hope, since there will always be new requests for higher-resolution images, images of particular details, images under special lighting conditions, and so on. Digitization is not a one-off process but a technical continuum.

The best reaction to this is not, as Tony Edwards argues, to "return to the real," but rather to think carefully about how and why digitization is undertaken. In the case of medieval manuscripts, and "treasures," this might prompt a move away from bulk digitization of collections selected for pragmatic reasons and a preoccupation with access, instead

leading toward an emphasis on digital tools in support of detailed scholarly analysis of the manuscript in collaboration with scholars—of whom we should always ask, prior to embarking on any digitization project: what do users want? How are they involved in selection for digitation of unique and special collections? The process of assembling the special lighting shots in *Electronic Beowulf* took years and was very expensive. Like scholarship itself, such digitization is a slow process, part of the long-term exploration of the manuscript. Perhaps we need to abandon the Silicon Valley fascination with speedy change and rapid rollout and move toward a concept of “slow digitization.” Just as the slow food movement recognizes the importance of accrued knowledge and culture in local food tradition, so a slow digitization movement might insist on the importance of gradually exploring and accumulating knowledge and understanding of a particular manuscript.<sup>49</sup>

“Slow digitization” would gradually explore the different layers of evidence in a manuscript, just as an archaeologist might very slowly and carefully examine a pot. Rather than creating one single digital representation of a manuscript to support “access,” the use of a variety of digital tools to gradually explore a manuscript in-depth can generate an archive of information about one single manuscript that, as well as supporting scholarship, also provides a much deeper educational experience. The project by Professor William Endres (of the University of Oklahoma) on the eighth-century St Chad Gospels at Lichfield Cathedral has used many different types of digital imaging to create a rich digital archive providing many different perspectives on this manuscript.<sup>50</sup> While 3-D images are very eye-catching, they also have great potential for research, for example, by allowing extremely accurate measurements of illuminations to be made. Endres has also prepared multispectral imaging of St Chad Gospels that has helped substantiate new findings on the number of scribes who worked on the manuscript. RTI imaging is helping to identify dry-point annotations and documenting the state of pigments. Comparison of digital images with earlier microfilms and facsimiles also has great potential, and Endres has developed a historical overlay tool that enables the state of pigment in the illuminations at different times to be easily assessed. Endres’s St Chad Gospels project is a prime illustration of how a “slow digitization” approach can yield rich scholarly dividends.

A number of similar projects are emerging. The Archimedes Palimpsest project at the Walters Art Gallery, which used multispectral imaging to recover text from a lost work of Archimedes in a palimpsest, was one of the earliest and most high-profile “slow digitization” projects.<sup>51</sup> Murray McGillvray’s Cotton Nero A X project at the University of Calgary is using a mixture of high-resolution imaging and multispectral imaging to challenge received wisdom about the manuscript containing *Sir Gawain and the Green Knight*.<sup>52</sup> Myriah Williams has recently used multispectral imaging to recover erased marginal additions from the Black Book of Carmarthen, the earliest collection of medieval Welsh poetry.<sup>53</sup> The most spectacular example of this approach among more modern projects is the recovery of David Livingstone’s field diaries through multispectral imaging.<sup>54</sup> The most technically innovative of the various “slow” projects at present is Brent Seales’s work at the University of Kentucky on the reading of text in carbonized papyri rolls from Herculaneum, which involves the use of advanced CT scanning techniques and the creation of new computer tools to read the concealed text.<sup>55</sup> Seales and his team have recently used their techniques to examine a charred scroll from En Gedi, which they found was “the earliest copy of a Pentateuchal book ever found in a Holy Ark and a significant discovery in biblical archaeology.”<sup>56</sup>

Multispectral imaging in particular offers great potential at present, but it has to be carefully prepared and undertaken if it is to produce results as dramatic as those of Myriah Williams. Preliminary study and investigation of the manuscript is one reason why such digitization has to be “slow.” Another is that investigations often have to be a collaboration between academic, curator, and imaging scientist, and may require substantial support from the institution where the manuscript is kept. However, such an investment of time and equipment will often yield major scholarly results, as is evident from many of the “slow” projects that have already been undertaken.

Another important point about “slow digitization” is that the digitization is just one part of a wider engagement with the manuscript and archive. The use of digital tools is simply another (and very fascinating) aspect of a long-term investigation of manuscripts, but they are just one approach among many: they are part of a continuum of copying

manuscripts and using them in novel ways. There is an argument that photographic, rotograph, and photostat images of manuscripts made since the invention of photographic processes are essential documentation that contribute to the biography of a manuscript, capturing changes in its condition and legibility over time, and casting new light on distinct aspects of its intellectual content. These images, and their associated documentation—letters and invoices commissioning new equipment and manuscript copies—should be collected and preserved alongside digital-image surrogates.<sup>57</sup> An experiment led by the authors, in collaboration with Endres and the National Library of Wales (NLW), demonstrates the full extent and potential of this approach, and the challenges associated with it. In 2013, the NLW digitized and published online its Chaucer Manuscripts (the Hengwrt *Canterbury Tales*, Peniarth MS 392; the “Merthyr Fragment” of *Canterbury Tales*; and the Boece, Peniarth 393D) as part of its participation in the Mellon-funded project “Interoperability for Medieval Manuscripts.”<sup>58</sup> The project also sent a team from Yale to carry out hyperspectral imaging of manuscripts, and Hughes worked with the archivists at NLW to gather the associated documentation of the Chaucer materials from the libraries archives, including letters from John Manly at the University of Chicago from 1926-39, that discuss visits to Aberyswith to consult the manuscripts, a history of rebinding and other conservation interventions on the manuscripts, as well as Manly and Edith Rickers’s authentication of the Merthyr Fragment.<sup>59</sup>

Interestingly, from the perspective of understanding how reproductions of manuscript images are used, there is a detailed exchange about Manly ordering photostats of the manuscripts for remote study, and photographs for illustrations. Manly and the librarians at NLW—John Ballinger, then William Llewellyn Davies—kept up a lively correspondence over the years, with an interesting record of “technology transfer”: when Manly observed fluorescence technology in use at the Huntington in 1930, he wrote to Ballinger to suggest that this new technology could be used for manuscript study. NLW were equally enthusiastic about the new technology and had already invested in fluorescence cabinet. Ballinger reported to Manly that staff and readers had had good results with the cabinets, with some readers spending “a whole day” reading “difficult” manuscripts under the lights.<sup>60</sup>

This collection is an excellent account of reprographic interventions and their use, and it presents an important biography of the Chaucer manuscripts at NLW, but the materials were not digitized or presented alongside the manuscript’s images. Endres was then invited to NLW in 2015 to conduct a full hyperspectral imaging of the three Chaucer manuscripts as part of a workshop funded by the ESF Network for Digital Methods in the Arts and Humanities (NEDIMAH) project. It was at this event that Prescott first introduced the idea of “slow digitization” as a challenge to scholars and librarians to provide the full documentation and imaging of a manuscripts.<sup>61</sup> However, all these elements—the Yale images, the Endres images, and the biographical materials—have yet to be presented to end users as a distinct resource: one that has been amassed slowly but that provides an important composite history of a set of manuscripts. What users have access to is the traditional digital images published by NLW as a “gallery” (<https://www.library.wales/discover/digital-gallery/manuscripts/> (<https://www.library.wales/discover/digital-gallery/manuscripts/>)).

The success or failure of projects that employ digital methods to study manuscripts does not hinge on whether or not the technology performs but rather on what it allows us to find out about the manuscripts. A recent article by Amanda Bevan and David Foster describing the work on reappraising and redating the compilation of Shakespeare’s will stresses that their first insights came as a result of making a photographic replica of the will.<sup>62</sup> By playing with this replica, they realized that the second page of the will might be part of a previously unknown will. This hunch was subsequently confirmed by multispectral imaging. Bevan and Foster describe in their article a playful, tactile, and incremental approach to their investigations that epitomizes “slow” digitization.

The digital tool is not a *deus ex machina*. It will not produce sudden dramatic findings. It is another weapon in our armory as manuscript scholars. Consequently, our path in using digital methods may not follow the systematic and rational approach of the project plan. A good example of this is another project that might be taken as illustrating “slow digitization.” The origins of *The Canterbury Tales* project date back to 1989 and sought to use computer methods to investigate the textual descent of *The Canterbury Tales*.<sup>63</sup> The original aim was to transcribe all the manuscripts and to

use collation programs to compare them. These would then be used to prepare a more authoritative reading edition. *The Canterbury Tales* project achieved great results, but not by these methods. The preparation of the transcripts as part of the project required a sustained and orderly reading of each manuscript. The need to look closely at how each catchword, flourish, and piece of punctuation functioned paved the way for a new understanding of these manuscripts. This led to a realization that many manuscripts were much earlier than previously thought, and ultimately paved the way for the claim made by Lynne Mooney that Adam Pinkhurst was the scribe of the Ellesmere and Hengwrt Manuscripts of *The Canterbury Tales*, and for the work by Mooney and Estelle Stubbs on the literary connections of clerks and officials associated with the City of London.<sup>64</sup> Despite the doubts recently raised about Mooney's identification of Pinkhurst, these are evidently major scholarly outcomes, and show that part of the benefit of "slow digitization" can be as much in engagement with the manuscripts as in the digitization itself.<sup>65</sup>

"Slow digitization" should not be an exclusive approach. One of the problems with more recent exercises in large-sale digitization is that they have been used to try and implement standardized and rigid approaches to digitization that are inappropriate in many cases. It may be that, in a time of limited resources, the utilitarian mass digitization gives the greatest good to the greatest number of people: but, in the absence of significant long-term analysis of the use of digital manuscript images, and systematic efforts to bring scholars into the selection process for digitization, there is a need for libraries and archives to create a healthier balance between different approaches to digitizing. Ultimately, there is a need to consider what digitization is actually for, and who digitization is for. At the heart of a "slow digitization" approach is a belief that digital scholarship should be eclectic, haphazard, hands-on, and experimental. One drawback of "slow digitization," as will be evident from the examples given above, is that such lengthy and intensive projects often tend to focus on canonical and iconic manuscripts. This does not need to be the case. The Imprint project, led by Philippa Hoskin at the University of Lincoln and Elizabeth New at Aberystwyth University, which is using forensic techniques to investigate fingerprints on medieval seals, is an example of a "slow" project that is opening up a neglected archival category.<sup>66</sup> Nevertheless, it is still important that digitization is also used to explore and increase awareness of neglected categories of document and manuscripts, and a bulk digitization approach can play an important role here.

The twentieth century saw two major trends in the use of technology in libraries.<sup>67</sup> One sought to reproduce and rapidly disseminate human knowledge as expressed in library collections. The arrival of microfilm encouraged pioneers like Eugene Power of University Microfilms to capture the contents of major libraries such as the British Museum and to seek to create something not dissimilar to H. G. Wells's vision of a World Brain. Many major digital packages derive from microfilm collections, and Google Books can be seen as a linear descendant of Wells and Power. The other major thread in the use of technology in libraries derived from exploration by pioneers, like the British Museum curator Edward Augustus Bond, of the potential of photography for the study of manuscripts or the work of the Benedictine monk Rudolph Kögel on the use of ultraviolet light to study palimpsests. It can be seen in the way in which the Chaucerian scholar John Manly encouraged libraries and museums to experiment with ultraviolet cabinets, promoting the use of such equipment at the British Museum and the National Library of Wales. Ideas of "slow digitization" look back to this tradition of making a suite of tools available to the scholar via a "laboratory" to understand and interpret the content of a manuscript. It is the needs of scholars that must drive the critical evaluation of new approaches to digitization, in collaboration with libraries and archives.



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### FOOTNOTES

1. We are grateful to Kevin Kiernan and Diane Scott for comments on earlier drafts of this essay. The responsibility for errors is ours. [↔]
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59. See Coutts, *Stepping Away from the Silos*. [↔]
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63. Peter Robinson, "New Methods of Editing, Exploring, and Reading *The Canterbury Tales*" (talk presented at the Accademia Nazionale dei Lincei, Rome, May 28, 1998), <http://cts.dmu.ac.uk/repository/robinson-1998/index.html> (<http://cts.dmu.ac.uk/repository/robinson-1998/index.html>). [↔]
64. Linne R. Mooney, "Chaucer's Scribe," *Speculum* 81 (2006): 97–138; Linne R. Mooney and Estelle Stubbs, *Scribes and the City: London Guildhall Clerks and the Dissemination of Middle English Literature, 1375–1425* (York: York Medieval Press, an imprint of Boydell & Brewer, 2013). [↔]
65. Most recently by Lawrence Warner, "Scribes, Misattributed: Hoccleve and Pinkhurst," *Studies in the Age of Chaucer* 37 (2015): 55–100. [↔]
66. Hollie Morgan, "Our 'Medieval' Wax and the Magical Aging Chamber," *First Impressions: The Imprint Project Blog*, May 2, 2017, <http://imprintproject.blogs.lincoln.ac.uk/> (<http://imprintproject.blogs.lincoln.ac.uk/>). [↔]
67. This interpretation is influenced by Robin Alston's 1993 lecture "The Battle of the Books," Humanist Discussion Group (website), posted September 10, 1993, <http://dhumanist.org/Archives/Virginia/v07/0175.html> (<http://dhumanist.org/Archives/Virginia/v07/0175.html>). [↔]

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