

## The Best Laid Plans: Case Studies of the Loss of Four Early (1996-2003) Digital Humanities Websites

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### Abstract

This study examines factors contributing to the loss of four grant funded, free use digital humanities websites funded by the National Endowment for the Humanities' Education Development and Demonstration Program, 1996-2003: Decision Point! at Auburn University, Hawthorne in Salem at North Shore Community College (Danvers, MA), the New Deal Network at the Franklin and Eleanor Roosevelt Institute (Hyde Park, NY), and River Web at the University of Illinois at Urbana-Champaign. The evidence shows that website loss did not occur suddenly. In all four cases, organizations that accepted program funds to create online materials ultimately failed to develop or continue procedures to manage them effectively. As the organizations or organizational divisions that developed these websites struggled to sustain them or indicated an unwillingness to do so any longer, their creator(s) asked a college, university, or research library to take responsibility for them, without success. Online materials became subject to increased risk of loss in both contexts in part due to rapid technological change, often expressed in accelerating software product update cycles, combined with a general lack of funding and personnel available for addressing it after the end of grant period. Several other elements also played parts in website loss however, often shaping the ways in which technological developments and financial circumstances did their damage. In three instances website creators discovered that common vicissitudes of organizational life, including revised objectives, changing tactics used to achieve them, and new administrative personnel compromised website sustainability. In two cases administrators' responsibility for risk management led them to remove legacy websites made obsolete by new technology. In one case research pursuing technological innovation in the retrieval and management of large data sets contributed to the loss of a funded resource. Finally, simple, inexplicable failure also contributed to that website's demise. These four cases can provide a digital humanities community increasingly concerned about the sustainability of grant funded online materials with additional evidence of how technological change and financial shortfalls threaten these resources. In doing so, it can also show how more complex organizational dynamics often contribute to website loss.

### Introduction

Between 1996 and 2023, the National Endowment for the Humanities' Education Development and Demonstration (NEH-EDD) program provided financial support for 59 projects producing free-use digital humanities websites. A recent survey of this program's funded materials found that while 40 remained online in September 2020, 19 had become unavailable [VandeCreek 2022].<sup>[1]</sup> This study examines four of these lost NEH-EDD funded online resources: Decision Point! at Auburn University, Hawthorne in Salem at North Shore Community College (NSCC; Danvers, MA), the New Deal Network at the Franklin and Eleanor Roosevelt Institute (FERI; Hyde Park, NY), and River Web at the University of Illinois at Urbana-Champaign (UIUC). By the time of this article's preparation, information about many of the 19 lost websites had become scarce or nonexistent. However, sufficient data remained to consider the impact of the loss of these four. Moving from those instances supplying less information to those furnishing more, this inquiry provides a brief history of each website. The accounts frame several questions pertaining to legacy website sustainability <sup>[2]</sup> "How did the digital humanists that created the resources seek to sustain them?" "How did the institutions responsible for

presenting the four websites under review attempt to do so?” In the period that these websites remained online, “how effectively did they function? What factors contributed to their loss?” Finally, “what does the record of these websites’ loss tell us about the larger state of legacy website sustainability efforts in the period spanning 1996-2023?”

The evidence shows that website loss did not occur suddenly. In all four cases, organizations that accepted NEH-EDD funds to create online materials ultimately failed to develop or continue procedures to manage them effectively. As the organizations or organizational divisions that developed these websites struggled to sustain them or indicated an unwillingness to do so any longer, their creator(s) asked a college, university, or research library to take responsibility for them, without success.

The four histories include information from direct correspondences with website creators, project staff members, and technical personnel, as well as NEH records available online, organizational press releases, archival materials, magazine and newspaper articles, and other documents. In each case two major factors contributed to NEH-EDD grant recipients’ inability to sustain websites and libraries’ unwillingness to do so. Online materials became subject to increased risk of loss in part due to rapid technological change, often expressed in accelerating software product update cycles, combined with a general lack of funding and personnel available for addressing it after the end of a grant period. Several other elements also played parts in website loss however, often shaping the ways in which technological developments and financial circumstances did their damage. They combined in complex ways. In three instances website creators discovered that common vicissitudes of organizational life, including revised objectives, changing tactics used to achieve them, and new administrative personnel compromised website sustainability. In two cases administrators’ responsibility for risk management led them to remove legacy websites made obsolete by new technology. In one case research pursuing technological innovation in the retrieval and management of large data sets contributed to the loss of an NEH-EDD funded resource. Finally, simple, inexplicable failure also contributed to that website’s demise. A review of these four cases can provide a digital humanities community increasingly concerned about the sustainability of grant funded online materials with additional evidence of how technological change and financial shortfalls threaten these resources. In doing so, it can also show how more complex organizational dynamics often contribute to website loss.

## Literature Review

Free-use websites produced with short-term grant funding occupy an important position in the field of digital humanities. Many provide large searchable databases of primary source materials that do not appear anywhere else online [Burdick et al 2012, 9, 24, 57 92][Cantara 2006, 38–40][Cunningham 2010, 5–6][Maron et al 2014, 17] [Palmer 2004, 348][Trace et al 2017, 491]. Several authors have recently identified the time between the mid-1990s and approximately 2010 as a period in which online digital project development thrived [Holmes M et al 2023, ¶ 6] [Smithies et al 2019, ¶ 16] [Crompton 2023, ¶ 3]. While many digital humanists expected the online materials that they created to remain available in the long term, they remained largely unaware of the complex work and considerable cost required for websites’ continued availability [Maron et al 2014, 16][Edmond et al 2020, 1019]. By 2010 researchers had increasingly begun to take note of sustainability issues arising from this corpus [Cunningham 2010] [Kretzchmar et al 2010] [Maron et al 2014] [Kilbride 2016] [Sweeney et al 2017] [Smithies et al 2019, ¶ 2].

Analyses of the problem have often focused on technical and financial factors threatening legacy materials [Edmond et al 2020, abstract] [Jordanova 2019, 223]. Although multiple technical issues have threatened websites, researchers have frequently emphasized web software’s rapid update cycles and progress toward official deprecation [Smithies et al 2019, ¶ 36, 44] [Holmes M et al 2023, ¶ 8, 38, 43] [Holmes J et al 2023, ¶ 7] [Barone et al 2015, Section 3, ¶ 2] [Cohen and Rosenweig 2006, 240–243] [Clement et al 2013, 119] [Maron et al 2014, 9] [Barone et al 2015, Section three, ¶ 2]. They note that as each cycle passes without an update, databases and other types of web software became increasingly obsolete under what Langmead and Quigley have called “the intense pressures of digital innovation ” [Langmead et al 2015, 2]

Many researchers have encouraged organizations that developed free-use websites with grant funds manage the resources in an active, systematic manner by continuing to update and replace web technologies [Kretzchmar et al

2010, 439–440] [Maron et al 2014, 32] [Kilbride 2016, 483, 486] [Theide 2017, Section 2]. These activities require trained personnel or funds to outsource the work, however. Jessica Otis has pointed out that online digital projects have not fit neatly into well-established processes for funding humanities scholarship [Otis 2023a, ¶ 1] also see [McGann 2010, 4]. Three of the organizations examined in this study are public institutions of higher education. In this period many public colleges and universities faced shrinking state funding allocations, as well as reduced revenues derived from enrollments, especially after 2010 [Li 2017] [State Higher Education Executive Officers 2013, Introduction] [Undergraduate Enrollment in U.S. Colleges and Universities from 2011/2 to 2021/22]. Devoting funds to sustaining legacy websites represented a new departure in a context marked by many administrators and faculty members' lack of understanding of and skepticism toward digital humanities [Maron et al 2014, 5–6] [Brennan 2007] [Greetham 2012] [Grusin 2013]. In many cases host institutions could not provide the staff time or financial wherewithal needed to update website software after grant support had ended. In one case reviewed by [Barone et al 2015], a website became unavailable as database and server technology advanced. The site's database became incompatible with current operating systems and failed. Since the original project grant period had expired, team members could not find the funds needed to reprocess the data for use in a different database engine [Barone et al 2015, Section 3, ¶ 2].

In this context researchers have proposed two alternatives. Many have called for the creators of grant-funded, free-use websites to preserve the materials in web archives [Brown 2006] [Mansanes 2006] [Gomes et al 2014]. Several publications have observed that this approach would not secure materials residing within a database, however [Barone et al 2015, Discussion, paragraph 1] [Pennock 2013, 11]. [Carlin 2018, 1]. Concerned observers have also encouraged libraries to take responsibility for sustaining legacy digital humanities websites originally developed elsewhere within their larger organization, or even outside of it altogether. [Cunningham 2010] [Kretzchmar et al 2010, 439, 442] [Kunda et al 2011, 901–903] [Kilbride 2016, 483] [Sweeney et al 2017] [Lucky et al 2018, 194]. None have examined libraries' financial capacity for doing so.

In 2019 James Smithies and co-authors noted the large number of grant-funded materials that had disappeared from the live web after their grant support ran out and argued that the trend had brought research in the field to an inflection point [Smithies et al 2019, ¶ 1]. Other digital humanists reviewing older websites' status concurred and explored how this situation had come about. They found that in many cases an attempt to achieve active management produced an ad hoc system of sustainability measures lacking dedicated funding and specific protocols. Although legacy materials often survive online, they are becoming increasingly obsolete [VandeCreek 2023] [Otis 2023b, Section 2, ¶ 1–2]. Joanna Tucker characterizes legacy websites as materials in limbo [Tucker 2022, 107]. Another study describes them as slowly fading away, becoming “digital wastelands” [Barats et al 2020]. In 2023 digital humanities developers at the University of Victoria (CA) concluded that sustaining online materials using technology requiring regular updates had proven to be an unmanageable task [Holmes J et al 2023, ¶ 7]. They went on to note that this was not an unusual situation. Their research, conducted as a part of the Endings Project, suggested that it had become the norm for legacy digital humanities websites [Holmes M et al 2023, ¶ 14–15].

The emergence of the Endings Project marked a sea change in the discussion and practice of website sustainability. Its members have designed and implemented a method for converting legacy websites including databases to a more durable, albeit limited, format [Holmes M et al 2023] [Holmes J et al 2023, ¶ 22]. They argue that this approach dramatically increases online resources' chances of survival and encourage other organizations seeking to sustain digital humanities websites to put it to use [Holmes M et al 2023, ¶ 44–45]. Several large American digital humanities centers have begun to do so [Otis 2023b, Section 4, ¶ 1–8] [Foley et al 2023] [Viglianti 2018]. These developments provide an opportunity to look back on earlier practices in specific organizational contexts from a historical perspective and consider the Endings Project's approach to website sustainability from a critical perspective.

A review of the histories of four NEH-EDD websites that disappeared from use will provide additional information about how the reckoning that Smithies, et al., and the Endings Project have identified came to be. This article will use the case study method that informed several recent discussions of legacy website sustainability but provide a greater level of detail and discuss events in chronological order [Davis 2019] [Cummings 2023] [Otis 2023b]. Although the cases generally bolster researchers' emphasis on how rapid technological change and financial shortfall undermined legacy websites' viability to the point of failure, they also support Margaret Hedstrom's argument that common types of

organizational change hinder librarians and archivists' attempts to preserve digital materials [Hedstrom 2003, ix]. She discusses how changes in an organization's direction, purpose, and management influence efforts to curate libraries and archives' digital collections, but also mentions their relevance to online resources. To date, other researchers have not pursued her latter observation in detail. Each type of organizational change, alone or together, can prevent the planning, policymaking, and resource allocation activities that comprise the substance of successful digital resource management [Hestrom 1997, 190]. Revised organizational goals and new administrative personnel undermined the online status of Hawthorne in Salem and the New Deal Network. These events took place within single organizations, but the history of River Web and additional aspects of the New Deal Network's history also demonstrate how events within other organizations, or other units of a larger organization, shaped legacy website sustainability. In each case they changed the partnership arrangements that had developed and sustained projects.

Hedstrom's emphasis on digital materials' organizational context also sheds new light on research that has noted that websites relying on obsolete web technology made the networks on which they resided vulnerable to malicious hackers [Smithies et al 2019] [Cummings 2023, ¶ 15–16] [Holmes J et al 2023, ¶ 21] [Otis 2023b, Section 2, ¶ 2]. Decision Point! and Hawthorne in Salem each relied on outdated web software and provided bad actors with ready opportunities to enter Auburn University and NSCC's information technology networks, respectively. Aware that hackers gaining access to their network might easily gather sensitive data, administrators at each institution removed NEH-EDD funded materials from use. Their actions introduce a new dimension to the discussion examining administrators' roles in sustaining legacy digital humanities websites. Authors encouraging grant recipient organizations and libraries to manage legacy websites in an active manner have often understood administrators as potential providers of funding and personnel needed to sustain online materials [Kretzchmar et al 2010, 439–440, 442] [Maron et al 2014, 32] [Kilbride 2016, 483, 486] [Theide 2017, Section 2] [Cunningham 2010, 5–6] [Kunda et al 2011, 901–903] [Kilbride 2016, 483] [Lucky et al 2018, 194]. However, they have not recognized the fact that administrators or managers must also act in keeping with formal responsibilities to protect their organization and its members in a variety of ways. In addition to stewarding an organization's good name, these include duties to protect the interests of the organization's members, prevent its financial loss, and follow legal guidelines in order to avoid its prosecution or civil liability [Beaudin 2015] [Demers et al 2017, 105–106] [Blodgett et al 1997] [Joshi et al 2017] [Stoneburner et al 2002]. Auburn University and NSCC administrators acted in keeping with these duties when they removed Decision Point! and Hawthorne in Salem, respectively, from the live web.

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The record also shows how another aspect of technological change affected online materials' sustainability. At UIUC research projects seeking to develop means for the assembly and management of very large data sets contributed to River Web's undoing. Students tested new tools for extracting data from websites on River Web and eventually crashed it, causing the loss of its data. Economic historians and historians of technology have examined how technical innovation often undermines existing production methods and business models in the marketplace, a process they have identified as "creative destruction" [Schumpeter 1942] [Swedberg 2008] [Godin 2008]. In this case technical innovation, or rather the pursuit of it, proved destructive in more than an abstract sense.

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UIUC's failure to recover River Web's data also illustrates a common type of organizational experience that Hedstrom has not considered: failure to adhere to specific policies that help organizations to reach their larger goals. This type of failure may occur due to individual human beings' mistakes, byzantine bureaucratic processes, general organizational dysfunction, or other unknown factors. The available evidence does not reveal how information technology professionals employed at a large research university renowned for its achievements in Computer Science failed to back up online materials, but regardless of its cause, this lapse prevented River Web team members from recovering the materials that they produced with NEH-EDD funds. Failures that occur without leaving a documentary trail or individuals willing to discuss them often may prevent further documentation or analysis, but they remain regular events in organizations of all sizes. As such, research should acknowledge their occurrence and significance.

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Smithies et al.'s 2019 examination of factors threatening the sustainability of legacy digital humanities websites noted security breaches at a number of institutions making materials available online by the use of unmaintained software applications. The authors then declined to examine these events and their causes in further detail "out of respect for [these organizations'] situation," and went on to describe their largely successful practices in their own lab at King's

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College, London. They hoped that a discussion of their solutions to common sustainability problems might “make it easier for other teams to share their experiences and request the resources needed to mitigate issues” [Smithies et al 2019, ¶ 9, FN 5, ¶ 10]. The discussion went on to suggest that other teams might report sustainability failures rather successes, however. It proposed that digital humanists and associated technologists should not understand their struggles as embarrassments best concealed from administrators, funders, and colleagues. Rather they should perceive them as “research opportunities for developing enhanced methodologies” [Smithies et al 2019, ¶ 12]. This article responds to that cue by providing faculty and staff members at four organizations with an opportunity to report on their experiences with website loss. Although it describes unhappy events that many individuals associated with each organization might regard as best forgotten, Smithies, et al.’s reasoning remains compelling. Recording and analyzing cases of legacy website failure provides information and insight that discussions of disasters averted simply cannot. The cases can indeed provide opportunities to develop enhanced methods, and organizations devoted to teaching, learning, and research should understand them from this perspective.

The evidence presented in the following histories of four NEH-EDD funded websites supports recent assertions, including that of Smithies and his co-authors, that work in the field of online digital humanities has reached an important juncture that requires a close evaluation of legacy websites’ future prospects. It shows that NEH-EDD funded materials produced in very different organizational contexts — including a 501c3 organization, a community college, and two large research universities — disappeared from the live web. A complex mix of factors produced this website loss over time periods ranging from 11 to 19 years. Although a familiar combination of technical and financial factors played a large role in each case, common forms of bureaucratic change, administrators’ responsibility to manage risk and avoid liability, different forms of technological innovation itself, and simple, seemingly inexplicable failure also contributed to website loss. Scholarship discussing a wide range of subjects, from those close at hand like digital preservation to more distant like network security, risk management, and the history of technology, has in several cases pointed the way to these factors. Before members of the digital humanities community decide how to respond to the precarious state of so many legacy websites, we should examine their histories in greater detail.

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## **Part I: Network Security and Legacy Website Sustainability**

### **A: Decision Point! (Auburn University)**

#### **I: Initial Success**

In May 2001 John Saye, Professor of Curriculum and Teaching in Secondary Social Sciences at Auburn University, received an NEH-EDD award of \$225,000. It supported the development of a website examining important issues and events in the United States’ civil rights movement. NEH-EDD funding allowed the project team to expand and refine an existing online resource called “Decision Point!”, which facilitated problem-centered instruction in United States history [National Endowment 2001]. The website placed high school students in Spring 1968 immediately following the assassination of Dr. Martin Luther King, Jr. It asked student teams to act as civil rights leaders, determining how they should continue the struggle for racial equality and justice in the United States. The website presented discussions of three general strategies that informed movement activism at that time: working within the legal system, nonviolent protest, and Black Power. It also included a database containing multimedia content documenting and discussing events related to the civil rights movement of the 1950s and 60s, such as period newspaper clippings, television footage and music, personal accounts, and interviews with movement participants. In addition to making these materials available in a searchable format, the site presented them thematically in three strands representing the primary change strategies. Each strand also included an original interpretive essay, an event timeline, and a menu of available materials organized by document type [Saye et al 1999, 481] also see [Saye et al 2002].

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Student teams performed research with the benefit of what the grant’s principal investigators described as an integrated electronic notebook. It contained a set of categorizing questions that a historian might use to organize evidence pertaining to an event, as well as an opportunity to record research activities in a journal format. Saye and collaborator Thomas Brush of Indiana University further described these additional materials as a set of scaffolding tools for collecting, analyzing, and evaluating historical evidence and offering conclusions. Using the website’s tools, student

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teams constructed persuasive presentations supporting their approach to continued civil rights activism in 1968 [Saye et al 1999, 472–473, 481–482]. Saye and Brush found that participating students responded to the website enthusiastically and achieved improved learning levels. In a 1999 publication the collaborators recounted their experience with the site and emphasized scaffolding materials' great potential for supporting teachers using primary sources in history instruction. They went on to describe the website as an initial expression of an ongoing project seeking to build a sustainable model for multimedia-supported, problem-based social studies learning [Saye et al 1999, 496–498].

## II: Software Obsolescence and Project Takedown

The 2001 award from the NEH-EDD program allowed the project team to expand the Decision Point! site and update or replace software presenting it online. They had created the original resource in the early days of online, multimedia learning environments and used Macromedia Flash and a 2002 version of MySQL to replace applications that had become obsolete. The team had also created numerous embedded videos with Quicktime software, which they continued to use in an updated form. The new software supporting Decision Point! initially performed well but became obsolete itself after the end of the grant period in 2005 [Fox 2021, Section 3]. “We limped along for a few years with a greatly diminished feature set before shutting it down,” Saye recalled. <sup>[3]</sup> Decision Point!'s outdated software never experienced a complete failure leading to the site's sudden disappearance from the live web in the manner that Barone, et al. describe. In fact, it remained functional until 2015. Rather, the website created a problem of far greater significance to university administrators.

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## III: Security Concerns

In 2014 Saye and Brush's universities each experienced significant data breaches [Pagilery 2015]. Shortly thereafter, information technology administrators at both institutions took notice of the Decision Point! site. Saye recalled that they grew concerned that its dated software presented large network security vulnerabilities. The administrators informed the project team that if they wanted to continue to make the site available, they would have to rebuild it in a form that did not provide hackers with such an inviting target. “It got to the point that we would have to completely recreate all of the features of the database using new software tools, Saye recalled. At that point we did not have the funds, or frankly the energy, to undertake such a large task.”<sup>[4]</sup> Saye asked the Auburn University Libraries to take responsibility for Decision Point! but found that they were unwilling to do so. Like the professor and his team, the university library had no funds or personnel available for the “massive code rewrite ” required to make Decision Point! safe. <sup>[5]</sup>

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Decision Point! faced security concerns in a context marked by cybercriminals' increasing attempts to find and exploit vulnerabilities in information technology networks. Vulnerabilities often appear in the software used to present materials online. Software vendors or, in the case of open-source applications, a developer community, routinely release new code, or patches, to correct these issues. Website administrators can secure the applications that they use by applying these patches. In 2015, the year that Auburn University removed Decision Point! from service, technologists responding to one survey identified over 5,500 new web service vulnerabilities [Symantic Internet Security Threat Report 2016]. Cybersecurity expert Malcolm Harkins argued that an escalating cycle of risk related to online materials had become unmistakable by that time [Harkins 2016, 129].

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Colleges and universities often provide online intruders with easy pickings and suffer disastrous effects. A journalist noted that “cyberattackers use cutting-edge technologies and methods to exploit university systems that are, in some cases, woefully outdated and outmatched”[Campbell nd]. A 2014 *New York Times* article noted that data breaches had occurred at dozens of universities in recent years. In 2012 alone, over 50 institutions, including Harvard, Stanford, Cornell, and Princeton, had experienced data loss in this way [Pelroth 2014]. Hackers' activities place valuable intellectual property produced by faculty members and students' research at risk [McKenzie 2021]. One case that became the subject of detailed reporting discussed another specific risk confronting college and university administrators. In 2014 cybercriminals compromised a database containing names, Social Security numbers, birth dates, and university identification numbers for faculty, staff, and students at the University of Maryland. These materials, the stuff of identity theft, provided recipients of the data with opportunities to commit a range of financial crimes [Pelroth 2014]. Another case showed that network incursions through websites also produced large, unbudgeted

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expenses. Indiana University's 2014 data breach led the institution to take actions to identify and address the means by which attackers gained entrance, requiring an expenditure that industry observers estimated at over \$1,000,000 [O'Neil 2014]. Researchers noted that in addition to costing universities and colleges large sums of money, data loss exposed them to considerable regulatory penalties and civil liability for damages [Beaudin 2015][Demers et al 2017, 105–106].

## **IV. Discussion**

Recent reviews of legacy website sustainability have noted that obsolete websites expose host organizations' networks to hacking activity but have not documented an instance in which administrators identified that threat, nor its effect on a website's online presence. Decision Point's history does so. It illustrates how a combination of technical and financial factors led to the loss of a legacy website. The evidence shows that Auburn University Libraries declined to take responsibility for rebuilding Decision Point! and continuing to make it available online. In doing so, they referred to its obsolete software and their lack of institutional resources in the general terms that researchers studying legacy website sustainability have often described. University administrators' subsequent activities related to Decision Point! created a more specific and complex scenario that that publications in this field have not considered, however. Researchers have urged creators and supporters of legacy materials to help administrators to recognize legacy websites' value so that they might provide institutional resources for sustaining the materials. In this case, however, Auburn University officials recognized that Decision Point! had become a network security hazard and removed it from use. All managers or administrators accept a number of common obligations, including that of protecting their organization and its members from external threats, financial loss, prosecution, and civil liability. If advocates of active management have understood administrators as sources of financial and human resources to sustain legacy websites, this episode also shows that specific, widely recognized elements of administrative responsibility obliged them to end Decision Point!'s online existence.

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## **B: Hawthorne in Salem (North Shore Community College)**

### **I: Collaborative Success**

In June 2000, Professor Teresa L. Whitney of NSCC received an NEH-EDD award of \$247,600 for a project entitled "Nathaniel Hawthorne in the Museum and the Classroom: A Collaboration of Salem Museums and English Instructors" [National Endowment 1999]. In a grant period that lasted through February 2005 team members produced the Hawthorne in Salem website. An examination of a 2006 version of the site available through the Internet Archive's Wayback Machine revealed that NSCC had produced it with the collaboration of the Peabody Essex Museum, the House of Seven Gables Historic Site, and the Salem Maritime National Historic Site, all located in close geographical proximity to NSCC. Hawthorne in Salem provided primary sources and interpretive materials in sections entitled "Life and Times," "Literature," "Buildings and Houses," "Explore," "Scholars' Forum," and "Archives" [Hawthorne in Salem 2006].

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### **II: Organizational Change, Security Concerns, and Project Breakdown**

Whitney and her collaborators built and hosted the website on a server administered by NSCC's Department of Information Technology. For 15 years after the end of the project's grant period, the college provided the professor with funds to retain freelance information technology specialists to update and otherwise support Hawthorne in Salem. In 2018, NSCC faced the problem of shrinking enrollment, and college administrators directed resources to increasing the size of the student body. A college vice president withdrew Hawthorne in Salem's funding, which at that time amounted to approximately \$5,000 per year. The website experienced an extended period without technical support and became obsolete. <sup>[6]</sup>

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Aware of Hawthorne in Salem's obsolescence but unwilling to devote financial support to it, NSCC administrators directed the college library to take responsibility for the site <sup>[7]</sup> Library staff members lacked access to software designed to host digital library materials online. They began an attempt to present the site via the LibGuides platform that they used to provide online information about library resources, but, Whitney recalled, they found that it "did not allow the use of the database on the fly, so each database record had to be copied separately." This approach quickly

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became impracticable. Library staff realized that they did not have the time required to complete the project and stopped work.<sup>[8]</sup> A September 2020 review of the site's online status failed to find Hawthorne in Salem available at its original URL [VandeCreek 2022]. It apparently reappeared shortly thereafter, only to succumb again after what the college's Information Technology Director described as "a malicious attack" in early 2023. NSCC administrators had recently become aware of harmful data breaches at neighboring colleges.<sup>[9]</sup> Journalists reported that similar events increasingly led to hackers' demands for ransom in exchange for stolen data [D'Agostino 2022][Schwartz 2023]. By 2023 costs related to a data loss through network incursion at an institution of higher education increased to an average of \$3.7 million [Donadel 2023]. In this context, NSCC administrators identified Hawthorne in Salem as a network security risk and removed the site from service in February 2023.

Whitney asked the college's Director of Information Technology to identify specific security concerns that the website created. She received a reply that mentioned several factors. First, the administrator noted that the Hawthorne in Salem site resided on a server using a Linux operating system. Had the site employed a Windows operating system, he believed that his team could have protected it from attacks with the Crowdstrike utility used to discourage incursions on other NSCC websites. He also mentioned the fact that the project used an obsolete version of Linux, Red Hat version 5. In addition, the site's database employed MySQL, PHP, and Perl scripts, each in obsolete versions. In order to address these issues, he determined that his staff would need to build a new server, upgrade to Red Hat 7, update the obsolete server software to render it secure, and then migrate the site to the new platform. He emphasized that this work would require more time than his department could devote to the project unless the college administration approved it, and he knew they would not. <sup>[10]</sup>

In March 2023 a small number of materials originally produced for the Hawthorne in Salem website appeared at the same URL, apparently within NSCC's network security framework, now entitled "Hawthorne at Salem." Whitney explained that it reflected the work that NSCC librarians had completed while attempting to migrate the original site materials to the LibGuide platform in 2019 and 2020. <sup>[11]</sup>[Hawthorne at Salem 2023]. Whitney, NSCC administrators, and NSCC librarians deserve recognition for attempting to keep Hawthorne in Salem online, but their efforts have produced a website that adds new aspects to Tucker's description of legacy resources in limbo. Providing a limited quantity of data, without search function, under a slightly different name, it exists in a state of de facto loss. Introductory text on the new website's front page suggests that it remains online principally in hopes of attracting an institution willing to adopt it for future use: "The Hawthorne in Salem site at [www.hawthorneinsalem.org](http://www.hawthorneinsalem.org) had to be removed from the internet because of security vulnerabilities. Some of the material from the site is available on this lib guide. We hope to be able to expand this lib guide site to include more of the original Hawthorne in Salem material, but we may have to attempt to find another institution to host the site. If your institution is interested in hosting the site, please contact Terri Whitney."

### III: Discussion

In this case rapidly changing web software and reduced financial resources again produced an obsolete NEH-EDD funded resource that became a substantial network security risk to its home institution. The record shows that NSCC's experience differs from Auburn University's in several significant respects, however. Unlike their peers at Auburn, NSCC officials originally provided funds for updating and otherwise maintaining Hawthorne in Salem's software after the end of the project's grant period. When falling student enrollments reduced the institution's budget and drew administrators' sustained attention, NSCC officials diverged from Auburn's course of action once more. They directed the college library to devise another way, compatible with the institution's existing network security measures, to keep the website online. In this effort NSCC librarians grappled with the results of outdated software and a lack of institutional resources directly, where Auburn library officials had only mentioned them when refusing to adopt Decision Point! Working solely with resources already at hand, including a content management system designed to present guides to library materials in a non-searchable format, they failed to produce a usable website. When hackers attacked the original NEH-EDD funded version of Hawthorne in Salem, NSCC officials reprised Auburn's experience in one crucial respect, however. In taking the website down, they acted on the basis of an administrator's duty to protect their organization and its members from harm in a variety of forms.

## Part II: Organizational Partnerships, Technological Change, and Legacy Website Sustainability

### A: The New Deal Network (The Franklin and Eleanor Roosevelt Institute)

#### I: Prize Winner

In January 1996 Thomas Thurston of FERI in Hyde Park, New York began building an online resource documenting American society and politics in the New Deal era (1933-1941). The New Deal Network website first appeared online on October 1 of that year, hosted at nearby Marist College. The resource also benefited from the contributions of the Franklin D. Roosevelt Presidential Library and International Business Machines Corporation (IBM). The presidential library provided content for digitization. FERI lacked the expertise necessary to develop a website and database, but IBM provided a senior programmer who led the team that designed them. The New Deal Network website attracted significant national media attention and quickly grew to contain over 3,000 photographs as well as political cartoons, audio clips, speeches, letters, and other documents from the period. In addition to records from the Roosevelt Presidential Library, these included materials scanned from the collections of the National Archives, the Library of Congress, and several museums and private collections [New Deal Launched] [New Deal Network 1997]. Fifteen sets of teachers and students around the country, which the project team called the Civilian Computer Corps, also created locally based web projects describing and documenting the Great Depression and New Deal's impact on their own communities. Thurston linked their finished projects to a section of the New Deal Network site devoted to classroom instruction. In 1997 the National Endowment for the Humanities' "EdSITEment: The Best of Humanities on the Web" program selected the New Deal Network for online recognition [NEH New Deal 1998].

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In May 1998 Thurston began work on a new grant from the NEH-EDD program [National Endowment 1997]. Administered by FERI, the award provided \$209,922 to expand the New Deal Network web site. The funds helped Thurston to double the number of available primary sources. They also provided for the addition of audio and video files and curricular materials [NEH New Deal 1998]. The New Deal Network website eventually came to include seven sections: classroom, documents, features, links, forums, photographs, and This Month in New Deal History posts. Although IBM and Marist College did not take part in the grant project, Thurston's place of employment moved to a new project partner, Columbia University Teachers College's Institute for Learning Technologies. A combination of funds provided by the NEH award, FERI, and the Institute for Learning Technologies paid Thurston's salary. In July of 1998 Thurston presented an NEH-funded teachers' workshop at Vassar College in Poughkeepsie, New York. There teachers acquired skills to allow them to enhance their existing online study modules and produce new interactive student projects [Civilian 1999]. The next year the New Deal Network won the American Association for History and Computing's prize for the year's best online, multimedia history project. <sup>[12]</sup>

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#### II: Organizational Dynamics and Project Abandonment

During the New Deal Network's NEH-EDD grant period, Thurston continued to provide additional services to FERI, creating and maintaining the institute's website, developing other special projects, and traveling to conferences at the institute's expense.<sup>[13]</sup> However, a change in FERI leadership coincided with the end of the New Deal Network's NEH-EDD grant period in April 2001. At this point FERI, an organization with a 2005 annual budget of less than \$2.1 million, assumed sole responsibility for the online presentation and management of the project website [Roosevelt Institute 2005]. With a new leader in place, no new grant funding at hand, and Columbia Teachers College's Institute for Learning Technologies having expressed no further interest in the site, FERI withdrew support for Thurston's position in May 2002. <sup>[14]</sup>

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The Franklin D. Roosevelt Presidential Library and Museum, which had served as one of the project's original partners and on whose campus FERI was located at the time, did not step forward to host the site <sup>[15]</sup> Although the record does not reveal a specific cause or consideration informing Marist College, IBM, and Columbia University Teachers College's withdrawals from the project effort, it does so in this case. A representative for the library indicated that it declined to move the New Deal Network website to its network because the organization had changed its approach to digital

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materials. Library staff members had gone on to re-digitize many of the same materials that it had contributed to the New Deal Network using different procedures and standards, then made them available in its own, new digital library website.<sup>[16]</sup>

At FERI, administrators asked Thurston if he cared to continue to maintain the New Deal Network site without pay. He declined, after which FERI removed all references to Thurston's role in the project from the site. After taking a new position at Yale University in 2004, Thurston repeatedly contacted FERI, offering to move the site there, but he received no response.<sup>[17]</sup> The New Deal Network site remained online in the state that Thurston left it in 2002. In May 2016 FERI, renamed the Roosevelt Institute, removed the resource from service after 14 years without software updates or other maintenance.<sup>[18]</sup> Institute officials did not respond to requests for comment on the New Deal Network project and website or its removal from the web.

The site's 2016 removal from the web followed a larger revision of the Institute's name and mission. FERI's 2007 Internal Revenue Service 990 form showed that it changed its website URL from [www.feri.org](http://www.feri.org) to [www.rooseveltinstitute.org](http://www.rooseveltinstitute.org) during the preceding year [Roosevelt Institute 2007]. The Roosevelt Institute's 2009 990 form indicated that it had moved its offices from Hyde Park, New York to Lexington Avenue, Manhattan. Its 990 form from the following year expanded the organization's mission statement from "To inform new generations of the ideals, values and achievements of Franklin and Eleanor Roosevelt" to include "and to inspire the application of their spirit of optimism and innovation to the solution of current problems through conferences and other educational programs" [Roosevelt Institute 2009] [Roosevelt Institute 2010]. As the New Deal Network website remained in the limbo of obsolescence, the institute changed direction. It moved away from its prior role as a non-governmental arm of the Franklin D. Roosevelt Presidential Library to add a new dimension to its organizational mission and identity. The record does not reveal institute officials' reasons for removing the New Deal Network site in 2016. Perhaps they recognized that its obsolescence made it an inviting target for malicious cybercriminals. Even if they did not, organizational changes had pulled the Institute away from the project's original historical focus.

### III: Discussion

Looking back in 2021, Thurston remarked that he "assumed that it [the website] would continue to be maintained. In the interim, the Roosevelt Institute went through changes in leadership and direction and in the end the New Deal Network was not a priority of theirs."<sup>[19]</sup> His analysis of the situation resembles Hedstrom's discussion of how common forms of organizational change may affect attempts to preserve and sustain digital materials in single organizations, and indeed large changes in the project's host organization undermined its online viability. However, the record also shows that other organizations' changes in direction and focus affected the website. FERI relied on partners to provide the historical source materials and technical capacity that it could not, as well as a portion of Thurston's compensation, throughout the project's brief life. When these partners ceased their contributions and FERI and Thurston did not attract new partners, FERI soon proved incapable of and/or uninterested in sustaining the resource. Organizational partnerships can help to produce digital humanities websites, but partners' changing missions and the various means by which they seek to realize their goals can also unravel partnerships. This can also lead to website loss, particularly when an organization that led partners, but relied heavily on them, lacks the institutional capacity to go on alone.

## B: River Web (The University of Illinois at Urbana-Champaign)

### I: Success Story

The River Web Project began when O. Vernon Burton, a historian at UIUC, took part in the volunteer effort to protect the community of East St. Louis, Illinois from the Mississippi River flood of 1993. While stacking sandbags, Burton realized that he could present materials documenting local history online in a searchable website [Burton and et al 2020, 132]. Burton had long used quantitative data in historical research, and in 1986 the new National Center for Supercomputing Applications (NCSA) at UIUC provided him with a Senior Research Scientist appointment. In 1993 Burton became Head of NCSA's Initiative for Social Sciences and Humanities [Burton 2023]. The university provided his new project with financial support and computer equipment, and in October 1996 he received \$50,000 from the NEH Education

Development and Demonstration program for activities to begin the following year [Burton 2023][River Web]. Working with several graduate students, Burton created a pilot website exploring the American Bottom region that surrounded East St. Louis, just below the confluence of the Missouri, Illinois, and Mississippi Rivers [Read 2003].

In a 2007 poster presentation explaining the project's goals, Burton and collaborators described the American bottom as a lens through which teachers, students, and lifetime learners might gain new insights into the historical record [Burton and et al 2007]. The website supported an active learning model that enabled users to explore source material themselves. Working with the Illinois State Museum, Burton and his team collected digital copies of historical resources from the area, including works of art, archaeological materials, photographs, census records, blues recordings, city directories, and other items [Read 2003][Burton and et al 2007]. The project team assembled these materials in a database. The River Web site's use of an online tool called "Page Graber" allowed users to present resources that they found in the database, interpret them, and share the results with each other online [Burton and et al 2007][River Web 2007]. This provided a means for people in the historically under-represented community to prepare online tours, which Burton described as an opportunity to reclaim a history that had often been collected in libraries across the river in St. Louis [Burton and et al 2020, 132].

River Web took a long view of the American Bottom's history. Each of its two sections included information documenting a discrete period and provided thematic interpretive materials devoted to the Environment, Economy, Technology, and Labor. The first section presented and analyzed aspects of the archaeological record and artistic work of the Mississippian culture (A.D. 800-1400) that built the nearby Cahokia mounds complex. The second featured material documenting and discussing East St. Louis' development in the nineteenth century. It focused on the city's emergence as a transportation and cultural hub, reviewing the development of steamboats, as well as the blues and other elements of the local cultural scene [River Web 2007].

In 2003 the Chronicle of Higher Education described RiverWeb as "something of a success story for historians interested in integrating technology into their work" [Read 2003, A37]. Shortly thereafter Burton and the River Web team became dissatisfied with the website they had developed, which presented static HTML pages and 72 dpi resolution images. Seeking to upgrade the site's available features, the team worked with a group of Information Science and Computer Science graduate students enrolled at UIUC who used its contents as a testbed for creating a new content management system. After this initiative failed to produce helpful results, the collaborators built a new site on a Wiki framework and attempted to develop an application that would automatically generate links between related content. Amidst this work, Burton later recalled, "disaster soon struck"[Burton and et al 2020, 138].

## II: Organizational Dynamics and Catastrophic Failure

NCSA had served and updated the River Web project website at no cost since its inception, but shortly after Burton's team began work on the third (Wiki) iteration of the website, NCSA adopted a center-wide cost-recovery model and began to charge \$10,000 per year for website hosting and support. River Web's creators could not find funds to pay this fee. They asked the University Libraries to take responsibility for the site, but its representatives declined, explaining that their policies did not provide for hosting websites developed outside the library itself <sup>[20]</sup> Finally, Burton and his team turned to the UIUC College of Liberal Arts and Sciences, which offered to provide web hosting services for \$5,000 per year. About a year after moving the resource to the new host, the project's development server suffered what River Web's creators described as "a catastrophic failure" that destroyed the website and its underlying data [Burton and et al 2020, 139]. The team moved to recover backup copies of their materials from the College of Liberal Arts and Sciences' Information Technology Department. Department policy included a provision for the automatic backup of data appearing online via its servers, but, Burton recalled, this "had stopped some six months earlier without anyone realizing [it]." Although the discovery of the oversight inadvertently saved other researchers' work from a similar fate, Burton noted that "the overwhelming majority of the project was now lost"[Burton and et al 2020, 139]. A 2002 version of River Web remained online in March 2023 on the Illinois State Museum website [River Web nd]. This version of the site also appeared in a CD ROM that accompanied Burton's 2002 publication *Computing in the Social Sciences and Humanities*[Burton Ed 2002].

NCSA's decision to begin charging a fee for web hosting began the process that destroyed River Web. Burton later recalled that two factors likely informed its action. First, the university faced a financial shortfall in 2008 and sought budget reductions in all units and divisions. Second, the professor noted that the move took place after the 2004 founding of the Illinois Center for Computing in Humanities, Arts, and Social Science (I-CHASS), of which he served as Founding Director. <sup>[21]</sup> [Burton 2023]. The university had provided seed funding to I-CHASS with the understanding that the new center would ultimately become self-sufficient through grant awards. The adoption of a cost recovery web hosting policy served to encourage scholars affiliated with I-CHASS to become more aggressive in seeking grant support for their work (Burton, 2023c). When River Web did not attract new grant funding to pay NCSA's hosting fee, its website stood in jeopardy.

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### III: The Varieties of Technological Change and Catastrophe

Burton also believed that the River Web project's collaboration with UIUC research activities, particularly data mining, contributed to the website's loss. When NCSA opened at UIUC in 1986 as one of the five original nodes in the National Science Foundation's Supercomputer Center Program, it raised a university long renowned for its engineering prowess and outstanding Information Science program to the forefront of scholarly inquiry using high-performance computing [U.S. News and World Report 2010] [National Science nd]. Student researchers enrolled in these programs became familiar with River Web as the site developed within NCSA and harvested material from it in bulk for use in projects seeking means to assemble, manage, and analyze very large quantities of data. After River Web's move to the UIUC College of Liberal Arts and Sciences, these students continued to collect data from the website at a similar scale. <sup>[22]</sup> The professor had not imagined that web harvesting would damage the site when he developed it, as it resided on NCSA servers. However, Burton and other team members came to believe that a server not outfitted in keeping with NCSA's standards eventually succumbed to the demands of student researchers still unfamiliar with best practices in the emerging field of online data collection. <sup>[23]</sup> Looking back, team member Simon Appleford noted that the system administrators at the College of Arts and Sciences "thought we were asking for a web hosting solution, whereas the server was being used for some relatively intensive compute processing."<sup>[24]</sup> A 2007 discussion of web data mining supported Burton and Appleford's understanding of the situation, emphasizing that these activities can subject web servers to significant strain [Liu 2007, 315]. Like Decision Point!, Hawthorne in Salem, and the New Deal Network, River Web experienced the effects of continued innovation in web software. Burton and his team began to address this problem when they moved River Web to a Wiki format. Nevertheless, intensive research activity at UIUC, pursued in hopes of creating similar technical innovations, completed the process of loss begun by NCSA's withdrawal of complimentary web hosting.

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### IV: Discussion

River Web's history provides further illustration of how financial concerns can compromise digital humanities websites, even at very large research universities with considerable internal funds. However, a closer review also shows how the financial issue arose in other contexts, including partnership arrangements. River Web developed from a longstanding collaboration among units within the same institution. NCSA provided Burton, a historian employed within UIUC's College of Arts and Sciences, with web hosting. Yet when NCSA helped to found I-CHASS, River Web faced an increased risk of loss. Previous research has suggested that the support of a digital humanities center has in specific cases helped grant-funded digital humanities websites to remain online long after their funding ran out [VandeCreek 2023]. By contrast, when a new center devoted to facilitating digital humanities work emerged at UIUC, it did so in an institutional arrangement that effectively withdrew in-kind support from River Web. Again, a partner organization's change in direction, however slight, proved fatal to a website.

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The 15-year-old record does not provide direct evidence of why UIUC Libraries declined to adopt River Web in the years immediately before its loss, but a subsequent inquiry sets its action in a familiar context. When asked if UIUC Libraries had revised its policy to provide for the adoption of legacy websites since River Web's failure in 2009, Kyle Rimkus, Librarian for Digital Programs and Partnerships and Associate Professor at that institution, reported that they had not. He stated that the libraries had long evaluated such requests on a case-by-case basis, and "in most cases they

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get turned down". He continued, noting that "It is incredibly difficult for libraries to sustain digital humanities projects" in which they have been involved from the start; "adopting orphaned projects from other parts of the university is an even more challenging and headache-inducing prospect." He concluded that, if legacy projects are to survive, "there needs to be a curatorial unit in the library which is strongly invested and engaged in the project's long-term success."<sup>[25]</sup> Rimkus' reference to a curatorial unit responsible for legacy websites likely stemmed from the University of Virginia Libraries' successful reconstruction of the Valley of the Shadow Project site. In that instance the university provided its library with \$100,000 and considerable staff time and effort to sustain a well-known online resource [VandeCreek 2023]. Rimkus suggested that this level of support did not exist at UIUC in 2009 and remained unavailable in 2023. Again, the never-ending challenge of keeping up with rapidly changing web software and a shortage of resources dedicated to doing so shaped library policy. When Burton and his team searched for a new hosting arrangement for River Web, that policy indirectly contributed to the website's loss.

## Conclusion

The creators of the four websites reviewed in this article intended that their online materials would continue to remain available for an extended period of time. Each carried on in the state that Joanna Tucker has identified as limbo, operating without grant funding but continuing to reach users. At Auburn University, Saye and his team limped along for years before administrators intervened to remove Decision Point! from the web. At NSCC, Whitney used college funding to develop an ad hoc means of updating Hawthorne in Salem before college officials discontinued that support and then moved the resource to an incompatible digital platform. Thurston built a network of teachers and students capable of supplying the New Deal Network site with a stream of new materials well into the future before his site lost its host institution's support. Vernon Burton and his team of graduate students were developing a wholly new way to present River Web's data online when they found themselves without the vast majority of it. In each setting, ambitious plans came to naught.

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## I: Websites Have Histories

Although website loss often seemed immediately to follow a single event, like an administrative dictat or server failure, in all four cases it occurred as a result of a complex set of developments playing out over a period of years. These cases show that websites have histories and that a historical approach can benefit the study and practice of legacy website sustainability. Historical analysis represents one of the humanities' core disciplines. The influential 2004 Companion to Digital Humanities begins with a review of the field's development to that date and goes on to provide historical reviews of various subfields [Hockey 2004]. Some scholars might dismiss an account of events taking place less than 30 years in the past as something less than history. However, an emphasis on documenting events, in detail, in a particular setting, in sequence, over a period of time, provides several major benefits to the discussion of legacy website sustainability. Documentation in detail increases the volume of data, the number of discrete events and developments related to website loss, that researchers and practitioners concerned about the future of legacy resources online can analyze. Understanding that attempts to sustain websites take place in specific organizational contexts can lead to a realization that each endeavor will not develop in an identical manner. Local circumstances affect how major factors already shown to influence website sustainability take effect in individual cases. Consideration of events and developments taking place in a given context in chronological order can reveal elements of causation in single cases, which can in turn provide evidence to be integrated into broader studies' findings. Together, the above considerations can produce a greater appreciation for complexity and nuance in the study and practice of legacy website sustainability.

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The record shows that in these cases concerned researchers' attempts to persuade organizations to take responsibility for legacy websites' active management, like website creators' plans for their extended use, bore no fruit. Sustainability efforts found disappointment in two contexts. Each website emerged with NEH-EDD funding in an organization or organizational unit other than a library, and website creators first sought to secure their materials' future there. As funded materials' online viability became increasingly precarious in these settings, digital humanists turned to libraries in hopes that they would take responsibility for sustaining the materials in the future. In three cases academics turned to their college or university library. In the fourth a digital humanist employed by a 501c3 organization appealed to a research library that had contributed to the project as a partner organization. None of these libraries stepped forward to

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take responsibility for sustaining these NEH-EDD funded websites.

## II: Histories Show Organizational Factors Impacting Website Sustainability

Researchers have identified rapid technological change, in the form of short web software update cycles, as a major cause of legacy digital humanities website loss. They have also emphasized a general shortage of resources available to underwrite the resulting steady stream of necessary updates as another. Each proved significant in NEH-EDD funded websites' original organizational context and libraries' decisions to stand aside in all four cases examined in this article. However, the available evidence shows that other factors also served to thwart attempts to establish active management in funded materials' original institutional settings. They often influenced when and how technological change and a paucity of resources took effect.

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Other factors affecting the websites under review included the changes of direction, focus, and management that Hedstrom identifies as influencing libraries' attempts to curate and preserve digital materials. Two cases examined in this study provide examples of changes in organizational focus and managerial personnel that contributed to website loss in single organizations. A new team of NSCC administrators focused on student recruitment and discontinued funding for Hawthorne in Salem's maintenance. At FERI, the installation of a new CEO preceded the organization's decision to withdraw support from the New Deal Network website's further development. Years later, a broader change in institutional objectives preceded the organization's decision to remove the website from use entirely.

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The same factor also shaped legacy websites' histories in another way. Researchers have noted that collaboration and partnerships often contribute to the development of new online digital humanities materials, but they have not recognized that these arrangements' changing terms or outright dissolution may cause website loss. The New Deal Network site emerged at FERI with significant support from partner organizations. As partners departed the project, FERI administrators found themselves lacking the resources they had provided and determined that the project could not move forward without them. At UIUC, one university unit's seemingly minor change of policy began a chain of events that led to River Web's loss.

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Organizational factors affecting legacy digital humanities websites sustainability increasingly include security concerns. Researchers and practitioners have suggested that obsolete websites are likely to attract hackers' intrusions but have not furnished specific examples of such acts or their consequences for legacy websites. Nor have they explored how administrators' awareness of this threat alone might affect legacy resources. The record shows that online intruders attacked an obsolete, NEH-EDD funded website at NSCC, leading administrators to remove it from further use. Hackers apparently did not exploit Decision Point! as a ready point of entry to Auburn University's network, but administrators removed it from use when they recognized its vulnerability. In both cases officials acted on an aspect of administrative duty that proponents of legacy websites' active management never anticipated, producing NEH-EDD funded resource loss rather than successful preservation. Individuals and groups concerned about the future of legacy digital humanities websites should not assume that integrating these resources into organizations' planning and resource allocation activities will chart a sure course toward sustaining them.

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If the above factors frustrated attempts to establish successful, active management of NEH-EDD funded websites in their original organizational contexts, they also prevented libraries from stepping in to sustain them. When Auburn University library administrators declined to adopt Decision Point!, they noted that they lacked the funds to rebuild it in a form capable of meeting the university's security standards. At NSCC, the library that college officials asked to take responsibility for a similarly outmoded Hawthorne in Salem lacked the resources, including funds, personnel, hardware, and software, to rebuild it in a secure form. The Franklin D. Roosevelt Presidential Library's change of course toward the development of its own digital library contributed to the loss of the New Deal Network. No evidence documents UIUC libraries leaders' reasons for specifically declining to adopt River Web, but the record does show that they developed an unwillingness to adopt websites built in other units of the university due to the great technical difficulty and expense required to do so.

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Two factors affecting legacy website sustainability emerged in the record of the River Web project that did not appear in the other three cases. At UIUC, research attempting to develop new technology itself, rather than software changes

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created by research, contributed to the loss of the website. These activities did not interfere with attempts to devise a system of active management for River Web, nor did they discourage the university libraries from taking responsibility for it. Rather they provided the immediate cause of the server failure that destroyed the project's data. That failure should not have proved fatal to the website. University policy mandated automatic backups of materials that its divisions presented online, but UIUC College of Arts and Sciences' Information Technology staff members failed to follow it. Although the lack of backup data figures largely in an accounting of River Web's disappearance from use, the record provides no further clues as to why it occurred. Simple human fallibility may explain it. Readers' experiences with the bureaucracies that constitute institutions of higher learning may suggest a variety of other reasons why it occurred. A review of River Web's history cannot explain how a failure to backup data occurred, but it must acknowledge that it contributed to the site's demise. This suggests that seemingly random or unaccountable factors may help to hinder, or perhaps assist, legacy website sustainability efforts.

### III: The Complex Dynamics of Digital Humanities Website Sustainability

This article is the third in a series examining the issue of legacy digital humanities website sustainability. Its findings complement those of two earlier studies. The first publication found that 40 of 59 NEH-EDD funded websites created between 1996 and 2005 (68%) survived to 2020. Calculations based on the data collected indicated that the online resources under review enjoyed an average estimated online lifespan of 16.4 years [VandeCreek 2022, 99]. This far surpassed a previous estimate that found that free-use digital humanities websites remained online for an average of five years [Meneses et al 2019, 131].

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The second entry in the series reviewed legacy websites funded by the NEH-EDD program that had survived to 2020. It identified nine websites that provided enough documentary to sustain a historical inquiry. Of them, eight resources found online in 2020 remained there in 2022 [VandeCreek 2023]. This finding again suggested notable success in sustaining legacy online digital humanities materials, but the investigation also revealed several aspects of a more complex situation. As researchers had already discovered in other contexts, center staff members devised an ad hoc approach to legacy website sustainability, which often did not provide updates necessary to keep online materials' software compatible with changing web technology. Nor did they replace deprecated software. Without institutional resources to support these activities, the sites became increasingly obsolete. The case of the eighth sustained website once again presented evidence of success mixed with more problematic particulars. Although university administrators provided their library with resources to rebuild a popular online resource in conformity with information standards and current web technology, they produced a distinctly qualified accomplishment. Some 10 years after the completing the rebuilding project, the site's creator found it necessary to overhaul it again to keep pace with available technology and user expectations. He did so at another institution where he had recently retired as university president. In both cases rebuilding the website required large amounts of institutional resources and political capital, which many digital humanists may be unable to muster. The second article in this series closed by suggesting that grant-making organizations might administer a competitive process distributing funds for reconstructing them, either with new web software or in keeping with the Endings Project's emphasis on static websites.

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Recent publications have argued that digital humanities website sustainability efforts have reached an inflection point and can benefit from new approaches. While compelling, their contentions rest on a relatively narrow evidentiary record, largely comprised of observations made at two digital humanities centers. The second article in this series augmented this record by providing data showing that familiar methods and practices relying on database technology and other web software have become ineffective, in part due to a lack of institutional resources devoted to legacy materials. This article's review of four failed websites originally funded by the NEH-EDD program supplies still more supporting evidence for the "inflection point" hypothesis, but from a different perspective. Recent publications making this assertion have largely focused on factors that make present methods of sustaining legacy websites untenable, and which might cause resource loss in the future. By contrast, this discussion has examined factors that have already made four NEH-EDD funded websites unavailable for use. Some of this evidence documents events and processes bringing digital humanists and their online materials to grief in ways that authors discussing causes of legacy website loss have not considered.

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## IV: Beyond the Inflection Point: Examining the Prospect of Static Websites in Different Organizational Contexts

A fuller understanding of the complex ways in which website loss actually occurred can inform a more effective response to the present situation. The Endings Project's approach provides an excellent starting point for an expanded discussion of how creators of legacy digital humanities websites, as well as technologists and administrators, may be able to sustain them. Endings Project staff members have made a sound *prima facie* case showing that converting legacy websites using databases and other web technologies to a static format can promote their sustainability. However, this article's emphasis on examining website loss in specific contexts suggests that one size may not fit all. Even if reconstructing websites in static form produces improved sustainability in some cases, it may prove impracticable in others. Additional research can test the proposition that the construction of static websites can provide improved sustainability in different contexts. Granting organizations might fund projects rebuilding at-risk websites in a static format, while at the same time documenting and evaluating how organizations of different types, sizes, and financial means did so. "What costs can an organization expect to incur in the course of rebuilding a website in a static format?" "What expertise or other institutional capacity does this type of website reconstruction require?" "What drawbacks or sacrifices of function might a static website entail, as compared to a resource using database and other web software?" A more ambitious project might trace a single website or set of websites reconstructed in two formats, one employing updated web software and another as a static resource. It might compare and document costs associated with each, the amount of attention and expense each version of the site required for a length of time after the end of the grant period, and the sites' overall effectiveness. From this perspective researchers and practitioners might be able to determine effective ways forward toward improved legacy website sustainability.

### Notes

[1] This 2022 study also focused on organizational size, mission, and financial resources' correlation to successful long-term website preservation, understood as maintaining their presence and usability online. It concluded that while colleges and universities generally succeeded more often than other types of institutions, those devoted to research and enjoying financial resources (annual expenditures and endowment or total assets) of \$100 million or more in annual expenditure or endowment preserved funded materials online slightly less often than those organized principally for teaching and possessed of less than \$100 million in either category.

[2] In this article the term "legacy website" refers to a grant-funded resource remaining online after the end of its grant period.

[3] Author's correspondence with John Saye, 16 September 2019.

[4] Author's correspondence with John Saye, 16 September 16 2019.

[5] Author's correspondence with John Saye, August 8, 2023.

[6] Author's correspondence with Teresa L. Whitney, 12 April 2023.

[7] Author's correspondence with Teresa L. Whitney, 17 March 2023.

[8] Author's correspondence with Teresa L. Whitney, 14 February 2023.

[9] Author's correspondence with Teresa L. Whitney, 14 February 2023 and 12 April 2023.

[10] Author's correspondence with Teresa L. Whiteny, 27 March 2023.

[11] Author's correspondence with Teresa L. Whitney, 16 March 2023.

[12] Author's correspondence with Thomas Thurston, October 30, 2019.

[13] Author's correspondence with Thomas Thurston, 1 November 2021.

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