The Art of Digital Curation
Co-operative Stewardship of Net-Based Art

Colin Post

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Résumé de l'article

Les artistes utilisent depuis longtemps les technologies numériques et en réseau de manière critique et créative pour explorer de nouvelles formes d'art et de nouveaux modes de diffusion des oeuvres d'art. Les oeuvres d'art en ligne sont souvent créées dans l'intention de les voir circuler en dehors des espaces institutionnels traditionnels, et nombre d'entre elles sont partagées via des plateformes gérées par des artistes, lesquelles nécessitent des pratiques de conservation différentes de celles des musées ou des galeries commerciales. Cet article se penche sur une plateforme spécifique gérée par des artistes appelée Paper-Thin et qualifie les activités impliquées dans la gestion de la plateforme de conservation numérique dans un sens polysémique – à la fois la conservation d'oeuvres d'art numériques et l'intendance de l'information numérique dans un écosystème technologique complexe. Alors que les universitaires et les professionnels du patrimoine culturel ont développé des stratégies de préservation innovantes pour les oeuvres d'art numériques et sur nouveaux médias conservés dans des collections institutionnelles, l'entretien continu des oeuvres d'art partagées via ces espaces alternatifs en réseau est en grande partie réalisé conjointement par les artistes et les conservateurs de ces plateformes. S'inspirant de la théorie sociologique d'Howard Becker sur les mondes de l'art comme réseaux d'acteurs coopératifs, cet article décrit les schémas du travail coopératif engagés dans la création, l'exposition et l'entretien de l'art en ligne. L'article souligne l'importance, pour les professionnels du patrimoine culturel, de comprendre les pratiques de curation numérique des artistes, car ces plateformes en réseau gérées par des artistes démontrent des approches émergentes de l'intendance de la culture numérique qui vont au-delà du paradigme de la conservation.

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The Art of Digital Curation

Co-operative Stewardship of Net-Based Art

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ABSTRACT Artists have long engaged with digital and networked technologies in critical and creative ways to explore both new art forms and novel ways of disseminating artworks. Net-based artworks are often created with the intent to circulate outside traditional institutional spaces, and many are shared via artist-run platforms that involve curatorial practices distinct from those of museums or commercial galleries. This article focuses on a particular artist-run platform called Paper-Thin, characterizing the activities involved in managing the platform as digital curation in a polysemous sense – as both the curation of digital artworks and the stewardship of digital information in a complex technological ecosystem. While scholars and cultural heritage professionals have developed innovative preservation strategies for digital and new media artworks housed in institutional collections, the ongoing care of artworks shared through networked alternative spaces is largely carried out co-operatively by the artists and curators of these platforms. Drawing on Howard Becker's sociological theory of art worlds as networks of co-operative actors, this article describes the patterns of co-operative work involved in creating, exhibiting, and then caring for Net-based art. The article outlines the importance, for cultural heritage professionals, of understanding the digital-curation practices of artists, as these artist-run networked platforms demonstrate emergent approaches to the stewardship of digital culture that move beyond a custodial paradigm.

RÉSUMÉ Les artistes utilisent depuis longtemps les technologies numériques et en réseau de manière critique et créative pour explorer de nouvelles formes d'art et de nouveaux modes de diffusion des œuvres d'art. Les œuvres d'art en ligne sont souvent créées dans l'intention de les voir circuler en dehors des espaces institutionnels traditionnels, et nombre d'entre elles sont partagées via des plateformes gérées par des artistes, lesquelles nécessitent des pratiques de conservation différentes de celles des musées ou des galeries commerciales. Cet article se penche sur une plateforme spécifique gérée par des artistes appelée *Paper-Thin* et qualifie les activités impliquées dans la gestion de la plateforme de conservation numérique dans un sens polysémique – à la fois la conservation d'œuvres d'art numériques et l'intendance de l'information numérique dans un écosystème technologique complexe. Alors que les universitaires et les professionnels du patrimoine culturel ont développé des stratégies de préservation innovantes pour les œuvres d'art numériques et sur nouveaux médias conservés dans des collections institutionnelles, l'entretien continu des œuvres d'art partagées via ces espaces alternatifs en réseau est en grande partie réalisé conjointement par les artistes et les conservateurs de ces plateformes. S'inspirant de la théorie sociologique d'Howard Becker sur les mondes de l'art comme réseaux d'acteurs coopératifs, cet article décrit les schémas du travail coopératif engagés dans la création, l'exposition et l'entretien de l'art en ligne. L'article souligne l'importance, pour les professionnels du patrimoine culturel, de comprendre les pratiques de curation numérique des artistes, car ces plateformes en réseau gérées par des artistes démontrent des approches émergentes de l'intendance de la culture numérique qui vont au-delà du paradigme de la conservation.

New Media, Enduring Challenges

Throughout the history of computer networks, artists working across genres and media have been interested in the creative potential of these technologies. Poets, painters, sculptors, composers, and performers have experimented with networked technologies to explore new artistic processes as well as to advance new forms and means for distributing artworks through websites, email lists, and other networked spaces.[2] For example, Douglas Davis's *The World's First Collaborative Sentence* (1994–) consists of a sentence initiated by the artist on a website to which any other web user could add.[3] First exhibited at the Whitney Museum of American Art and subsequently donated to that institution's permanent collection, the sentence is still available for viewers to add to; viewers can also see an archived "historic version" (even though many of the links that early contributors added to the sentence have since rotted).[4] In the introduction to a book documenting the *Net Art Anthology* – a massive undertaking by the arts organization Rhizome to preserve and re-present 100 historically significant Net-based artworks[5] – Michael Connor seeks a broad definition for the wide and varied practices that characterize Net-based art as "artful participation in network culture."[6] Not so easily bounded as discrete or static objects, Net-based artworks often rely on the playing out of participatory interaction between artists and audiences in networked spaces.

Howard Besser observes that the distinct aesthetic features of Net-based artworks also make them particularly challenging to preserve: many of these artworks comprise numerous interrelated components distributed across networks and depend on particular configurations of hardware and software for the intended

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2   Rachel Greene provides an important overview of how artists were engaging with the Web at a pivotal moment in the late 1990s. See Rachel Greene, "Web Work: A History of Internet Art," *Artforum* 38, no. 9 (2000): 162–67, 190.

3   Douglas Davis, "The Work of Art in the Age of Digital Reproduction (An Evolving Thesis: 1991–1995)," *Leonardo* 28, no. 5 (1995): 381–86.

4   Whitney Museum of American Art, "Douglas Davis: The World's First Collaborative Sentence – Launched 1994, Restored 2013," Whitney Museum of American Art, 1994, https://whitney.org/artport/douglas-davis.

5   The online manifestation of the anthology can be found here: https://anthology.rhizome.org/.

6   Michael Connor, "Net Art's Material: Making an Anthology," in *The Art Happens Here: Net Art Anthology*, ed. Michael Connor, Aria Dean, and Dragan Espenschied (New York: Rhizome, 2019), 9.

aesthetic experience.[7] Responding to these challenges, several arts organizations, including the Solomon R. Guggenheim Foundation, Rhizome, the Walker Art Center, and the Daniel Langlois Foundation, formed the Variable Media Network (VMN) in the early 2000s to advance the conservation methods and tools needed to migrate, emulate, or entirely recreate artworks with non-obsolete technologies,[8] notably by engaging artists and audiences as active stakeholders in defining the core essence of the works to be preserved. Instead of attempting to maintain these inherently dynamic artworks in fixed forms, the variable media approach embraces change itself as the foundation of a conservation paradigm.

Over the past two decades, cultural heritage professionals have developed innovative preservation strategies for Net-based artworks that carry forward the variable media approach. The Guggenheim first commissioned Shu Lea Cheang's piece *Brandon* (1998–1999), a series of interactive websites recounting the life of Brandon Teena, a tragic victim of transphobic violence. Working in concert with the artist, an interdisciplinary conservation team at the museum has recently restored the piece to function in current web browsers, adapting aspects of the piece that no longer functioned, like Java applets, or that diverged from now-dominant web design practices, like pop-ups.[9] Rhizome has become an international leader in digital art conservation, shepherding the development of web archiving and web emulation tools that artists and institutions alike can use to document Net-based artworks in their original contexts.[10] The above-mentioned *Net Art Anthology* is a landmark initiative in the history of digital preservation that has seen curators and conservators utilize a wide variety of tools and techniques to document, reconstruct, and restore Net-based artworks spanning the period from the 1980s to the present.

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7   Howard Besser, "Longevity of Electronic Art," in *Proceedings of the International Cultural Heritage Informatics Meeting: Cultural Heritage and Technologies in the Third Millennium* (Milan: International Conference about Culture and Heritage Online, 2001), 263–75, http://besser.tsoa.nyu.edu/howard/Papers/elect-art-longevity.html.

8   For an overview of the Variable Media Network's efforts, see the webpage at https://www.variablemedia.net/e/index.html. The following publication brings together essays that describe variable media methods and tools and case studies of the variable media approach in action: Alain Depocas, Jon Ippolito, and Caitlin Jones, eds., *Permanence through Change: The Variable Media Approach* (New York: Guggenheim Museum; Montreal: Daniel Langlois Foundation for Art, Science, and Technology, 2003).

9   Deena Engel, Lauren Hinkson, Joanna Phillips, and Marion Thain, "Reconstructing *Brandon* (1998–1999): A Cross-Disciplinary Digital Humanities Study of Shu Lea Cheang's Early Web Artwork," *Digital Humanities Quarterly* 12, no. 2 (2018), http://www.digitalhumanities.org/dhq/vol/12/2/000379/000379.html.

10 Rhizome (website), accessed June 2, 2021, https://rhizome.org/software/.

However, these strategies have largely been deployed for artworks in the care of traditional cultural heritage institutions, such as Cheang's piece in the Guggenheim's collection, or for a select crop of artworks that possess sufficient historical significance to merit intensive conservation and restoration treatments, such as those in the *Net Art Anthology*. Rhizome's efforts are path-breaking and will hopefully set the stage for others to expand this work, but they currently represent rare examples of professional conservation care being extended to Net-based artworks circulating outside traditional institutional collections. While some museums have grown collections of Net-based artworks – principally, major institutions that have remits to collect modern and contemporary art and that also boast curatorial, registrational, and educational staff with the requisite expertise to drive these collecting decisions – these are the exceptions to the rule.[11]

Even in those institutions that have energetically launched Net-based art collecting programs, the resources needed to sustain these efforts and to maintain works already in collections have not always been stable. Verena Kuni warns that many Net art initiatives begun in the late 1990s and early 2000s – including the Guggenheim's – ground to a halt when the dot-com bubble burst,[12] providing an important reminder of the precarity of digital collections even in the most established of institutions. More recent examples that demonstrate that institutions do remain committed include Matters in Media Art,[13] a collaboration between the New Art Trust, the Museum of Modern Art, the San Francisco Museum of Modern Art, and the Tate, which ran from 2005 to 2015 and developed thorough guidelines and recommendations for managing digital art collections from acquisition through to long-term preservation. As with the VMN before it, though, this collaboration involved around a handful of institutions with existing collections of new media art. While promising and important, these professional efforts have also illustrated the limited range of institutions with Net-based art collections and attendant digital preservation programs.

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11   Beryl Graham, "Modes of Collection," in *New Collecting: Exhibiting and Audiences After New Media*, ed. Beryl Graham (London: Routledge, 2017), 37.

12   Verena Kuni, "Why I Never Became a Net Art Historian," in *Net Pioneers 1.0: Contextualizing Early Net-based Art*, ed. Dieter Daniels and Gunther Reisinger (Berlin: Sternberg Press, 2010), 191.

13   "Guidelines for the Care of Media Artworks," Matters in Media Art, accessed June 4, 2021, http://mattersinmediaart.org/.

The Digital Curation of Net-Based Art

At present, cultural heritage institutions are capturing a fleetingly narrow snapshot of artistic engagement with networked technologies, the full scope of which includes Net-based art on artist's websites, online exhibition platforms, and other alternative gallery spaces. I suggest that post-custodial approaches and digital-curation practices, which have largely been developed in the archives and information science fields, can inform new strategies for stewarding Net-based art outside of traditional institutional collections. Post-custodial approaches "disaggregate" professional archival praxis from physical custody over archival records,[14] advancing other methods for engaging with records and record creators – often in addition to taking custody over some portion of archival materials – to ensure the longevity of this information.[15] As Christian Kelleher argues, post-custodial approaches are crucial for enabling archivists to meet professional and moral imperatives to preserve the histories of communities not otherwise represented in institutional collections, while importantly involving those communities as active stakeholders in the archival process.

For digital cultural materials specifically, post-custodial approaches provide frameworks and methods for proactively stewarding fragile digital objects that are at risk of being lost to obsolescence long before they pass over the custodial threshold. In advocating for post-custodial approaches to managing the growing body of digital materials across all sectors of society, Terry Cook offers a prescient diagnosis: "We have paper minds trying to cope with electronic realities."[16] Cook goes on to state that "archivists and information professionals must . . . move from being passive custodians to active documenters, from managing the actual record to understanding the conceptual context, business processes, and functional purpose behind its creation."[17] This echoes

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[14] Christian Kelleher, "Archives without Archives: (Re)locating and (Re)defining the Archive through Post-Custodial Praxis," *Journal of Critical Library and Information Studies* 1, no. 2 (2017), 14.

[15] As Greg O'Shea and David Roberts emphasize, "Post-custodialism does not mean non-custodial." See Greg O'Shea and David Roberts, "Living in a Digital World: Recognising the Electronic and Post-Custodial Realities," *Archives and Manuscripts* 24, no. 2 (1996): 292.

[16] Terry Cook, "Electronic Records, Paper Minds: The Revolution in Information Management," in "*All Shook Up*": *The Archival Legacy of Terry Cook*, ed. Tom Nesmith, Greg Bak, and Joan M. Schwartz (Chicago: Society of American Archivists; Ottawa: Association of Canadian Archivists, 2020), 178.

[17] Cook, "Electronic Records, Paper Minds," 189.

Besser's suggestion that conservators of digital artworks "may need to become more like both archivists and cultural anthropologists," accumulating documentary materials and striving to capture the cultural context in which a work was made.[18] For Net-based artworks dependent on rapidly changing technologies and mercurial cultural contexts though, this archival-anthropological preservation work is urgent – needed when artworks are initially created and shared on artist's websites and other online exhibition platforms. At some later date, future art historians and museum curators who recognize current Net-based artworks as historically significant will likely have nothing substantial to collect – unless proactive efforts are made now.

Approaches to the collection and care of Net-based art in archival repositories[19] are also instructive for museum professionals. Net-based artworks – constituted through many interrelated documents of varying types, formats, and functions that fully make sense only when taken as more than the sum of their parts – often resemble archival collections more than singular and unique art objects. As John Roeder reflects in a consideration of digital artworks as records, the meaning of these works "depends upon their history of existence, their relation to the technology and techniques by which they were made, and the systems of signification in their creators' cultures. . . . In this respect they are like records."[20] As with other kinds of records, the ongoing care of Net-based artworks demands a broader scope, accommodating more than just institutional holdings, understanding too how these cultural materials are created and persist in "communities of records."[21]

However, post-custodial strategies for Net-based art must be grounded in an understanding of the archiving, documenting, and memory work already being done in digital arts communities; and cultural heritage professionals must be prepared to make radical changes in their own ways of working. In his sociological analysis of art worlds, Howard Becker argues that artworks are produced, exhibited, and experienced through patterns of co-operative activity, though new

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18   Besser, "Longevity of Electronic Art."

19   The Rose Goldsen Archive of New Media Art in the Cornell University Library is a good example of this. "Rose Goldsen Archive of New Media Art," Cornell University Library, accessed June 9, 2021, https://goldsen.library.cornell.edu/.

20   John Roeder, "Art and Digital Records: Paradoxes and Problems of Preservation," *Archivaria* 65 (Spring 2008): 162.

21   I borrow this term from Jeannette Bastian's work on post-custodial archival approaches. See Jeannette Bastian, *Owning Memory: How a Caribbean Community Lost Its Archives and Found Its History* (Westport, CT: Libraries Unlimited, 2003).

art forms often involve significant adaptations to the way things were previously done.[22] Steve Dietz, a long-time curator at the Walker Art Center, notes, "Abstract Expressionist painting changed the size of museum galleries. Video installation introduced the black box to the white cube."[23] As discussed above, Net-based art has already prompted new collecting and conservation practices in arts institutions and art worlds more broadly, though further changes are needed to preserve a diverse cultural record of artistic activity engaged with networked technologies. A major shift, which I elaborate in the rest of the article, is how artists and curators working outside established institutions are taking on this labour of documenting, conserving, and generally stewarding artworks shortly after the point of creation.

To illustrate in detail the co-operative efforts involved in creating, staging, and then caring for Net-based artworks outside traditional cultural heritage institutions, I present a case study of an online artist-run platform called Paper-Thin.[24] I characterize the work that goes into sustaining this platform as digital curation in a polysemous sense: as both the actions involved in exhibiting digital artworks and the actions needed to maintain digital information over time for current and future users.[25] Digital curation in this latter sense has largely been developed by librarians, archivists, and other information professionals working with a range of communities to manage digital information holistically across its life cycle, from creation through to long-term preservation.[26] In practice, digital curation overlaps in significant ways with post-custodial archival approaches, as both emphasize the need to establish relationships between cultural heritage professionals and communities of record that extend beyond the direct transfer of materials into institutional collections. For digital curation specifically, a major aspect of this work is for information professionals to encourage and support data creators and initial communities of users to move archival practices "upstream," taking actions early on that will help ensure the longevity

22   Howard S. Becker, *Art Worlds* (Berkeley, CA: University of California Press, 1982), 309–12.

23   Steve Dietz, "Collecting New-Media Art: Just Like Anything Else, Only Different," in Graham, *New Collecting*, 71.

24   Paper-Thin (website), accessed June 9, 2021, https://paper-thin.org/.

25   This latter sense is a paraphrase of the canonical definition found in Neil Beagrie, "Digital Curation for Science, Digital Libraries, and Individuals," *International Journal of Digital Curation* 1, no. 1 (2006): 4.

26   Sarah Higgins, "The DCC Curation Lifecycle Model," *International Journal of Digital Curation* 3, no. 1 (2008): 135–40.

and integrity of those digital objects for later users.[27]

   For art worlds, the information science sense of digital curation detailed above introduces some confusion to existing roles and practices: a curator selects and arranges artworks for exhibitions, and a conservator is tasked with the long-term care of artworks. As I explain in this article, I see the work that artists and digital art curators undertake as a mode of digital curation that encompasses both the information science and art worlds' senses of what it means to steward cultural objects across their life cycles. In creating and sharing Net-based artworks, artists and digital art curators carry out critical caretaking activities that resemble the data curation done by archivists and other information professionals, though integrated into a creative practice. Much as Peter Buneman contrasts two cultures of digital curation[28] – those of archivists who manage collections of digital information and scientists who work with digital research data – the digital curation of artists and that of cultural heritage professionals may seem to have little in common aside from both involving computers and both using the terminology of curation. But artists face similar issues in the early life of Net-based artworks to those cultural heritage professionals face later on, and the curation activities of this initial community of record influences the material and cultural life of the artwork, even as it passes to later stewards. The shared frame of digital curation serves to make connections between the artists, curators of alternative arts spaces, and others who carry out labour early on and the professional stewards who are responsible for shaping an enduring digital visual arts heritage.

Paper-Thin: A Case Study of an Artist-Run Platform

Curated by two artists, Cameron Buckley and Daniel Smith, Paper-Thin aims to catalyze the exploration of digital and networked technologies for new modes of artistic production and dissemination. Significantly, Buckley and Smith have

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27   For a good case study of this from the scientific domain, see Jillian C. Wallis, Christine L. Borgman, Matthew S. Mayernik, and Alberto Pepe, "Moving Archival Practices Upstream: An Exploration of the Life Cycle of Ecological Sensing Data in Collaborative Field Research," *International Journal of Digital Curation* 3, no. 1 (2008): 114–26.

28   Peter Buneman, "The Two Cultures of Digital Curation," in *SSDBM '04: Proceedings of the 16th International Conference on Scientific and Statistical Database Management* (Los Alamitos, CA: IEEE Computer Society Press, 2004), 7.

not only developed digital-curation practices in order to exhibit these Net-based artworks but also approach Paper-Thin as an archives that persists after the initial exhibition. Buckley and Smith have solicited artists to participate in three networked exhibitions, or "volumes."[29] For the first two volumes, artists contributed virtual reality (VR) works, which the curators integrated into a shared environment created in the game engine Unity;[30] viewers could experience them directly through a web browser or by downloading them to a local machine (see figure 1). Paper-Thin v3 was a site-specific installation at the 2018 HubWeek Festival in Boston,[31] for which the curators devised a networked drawing application that enabled artists to compose digital sketches at a distance that were then executed on paper by a computer numerical control (CNC) drawing machine set up in the exhibition space. The curators recruited 14 artists to take part in seven improvisational and collaborative drawing sessions held throughout the festival. Viewers in Boston witnessed artists working synchronously in different parts of the world to craft drawings realized by a machine (see figure 2).

While Paper-Thin resembles a gallery in some ways, in that the curators recruit artists to participate in exhibitions of artistic activity, Buckley and Smith conceptualize it as a platform. This is not in the sense of a social media platform, where a broad user base contributes content and individuals may form communal ties and relationships, but rather in the sense, developed by Olga Goriunova, of an art platform. For Goriunova, art platforms emerge from the complex interactions of human and machinic agents, organized over and through networked systems and plugged into processes of subjectification and creativity.[32] This resonates with Buckley and Smith's approach to Paper-Thin as a driver of artistic experimentation with the aim of actively seeking out new art forms and means of disseminating art. While not necessarily bound to particular pieces of hardware or software, art platforms do follow an organizational aesthetics, coalescing and amplifying creative energies and artifacts generated

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29 Buckley and Smith refer to each iteration of Paper-Thin as a volume. In the text, I refer to the volumes as v1, v2, or v3.

30 Unity (website), accessed December 21, 2020, https://unity.com/.

31 HubWeek 2018 (website), Internet Archive, June 6, 2020, https://web.archive.org/web/20200606014558/https://2018.hubweek.org/.

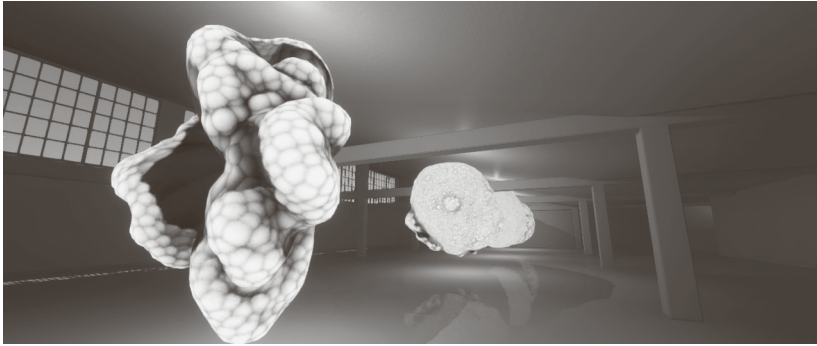32 Olga Goriunova, *Art Platforms and Cultural Production on the Internet* (New York: Routledge, 2012), 6.

FIGURE 1   *Andy Lomas,* Cellular Forms, *2015. Virtual reality, dimensions variable. Paper-Thin
v1, accessed September 10, 2019, https://paper-thin.org/.*

through the complex assemblage of many individuals and technologies "to the point of brilliance."[33]

   Complementing Goriunova's theorization of the organizational aesthetics that undergird online art platforms, I suggest that the frame of digital curation aptly characterizes the co-operative efforts involved in creating, exhibiting, documenting, and caring for Net-based artworks and related archival materials. Many of the activities that the Paper-Thin curators and participating artists undertake as part of their creative engagement with networked technologies, such as managing heterogeneous collections of files or struggling to work with data across less-than-interoperable systems, resemble work carried out by digital archivists. However, Paper-Thin also involves digital curation, in the sense of curating the digital, as artists and curators work collaboratively to create and present artworks in networked spaces. The technical and aesthetic dimensions of this curation blur and intersect as decisions involved in managing information across complex technological systems manifest in viewers' aesthetic experience of the volumes. Activities involved in creating and staging networked exhibitions, which Annet Dekker and Gaia Tedone describe as "networked co-curation,"[34]

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33   Goriunova, 41.

34   Annet Dekker and Gaia Tedone, "Networked Co-Curation: An Exploration of the Socio-Technical Specificities of Online Curation," *Arts* 8, no. 3 (2019): 1–14.

FIGURE 2   *Installation shot of Paper-Thin v3, 2018. HubWeek Festival, Boston, MA. Source: Photograph provided by Cameron Buckley and Daniel Smith.*

respond to the constraints and affordances of networked media ecologies, and creative efforts feed directly into efforts to sustain archival records of dynamic works. Digital curation in this polysemous sense is integral to artists' creative and archival practices, as artists and curators involved in platforms like Paper-Thin apply techniques that brilliantly orchestrate networked exhibitions and take on labour to steward the proliferating records generated by this creative activity.

While collections of artworks and archives representative of digital and new media artistic activity in the custody of libraries, archives, and museums are important components of cultural heritage, these are still exceptional within the broader holdings of institutions. Materials maintained within artists' personal archives, as part of art platforms or galleries' records, and circulated through online arts communities constitute the vital foundation of this cultural heritage. Costis Dallas critiques the "wild frontier" divide that has strongly demarcated digital-curation discourse, effecting both implicit and explicit distinctions between the professional care of digital information within institutions and the "messy" and "neglectful" vernacular practices of the creators of this informa- tion.[35] Rather than drawing a fine line between digital arts materials within and outside of cultural heritage institutions, I argue that the labour of artists and others in these arts communities must be understood in terms of digital curation and that these individuals must be recognized as participants in the co-operative stewardship of this cultural heritage.

Based on extensive research on Paper-Thin, sustained over the course of several years, I describe the digital-curation work involved in creating, maintaining, and stewarding a particular arts platform. I discuss the digital-curation practices that Buckley and Smith have developed across the three volumes, emphasizing the emergent responsibilities of digital arts curators and their shifting relation- ships with artists as they stage and care for Net-based art. Finally, I consider the implications of this research for cultural heritage professionals and institutions. Approaching the work of artists' communities on these terms is necessary for cultural heritage professionals to better understand their own roles as custodians of cultural materials in institutional collections and to envision and advance post-cus- todial approaches that intersect with – and extend beyond – these institutions.

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35   Costis Dallas, "Digital Curation beyond the 'Wild Frontier': A Pragmatic Approach," *Archival Science* 16, no. 4 (2016): 421–57.

Artists' Digital-Curation Skills and Competencies

Much as Cal Lee and Helen Tibbo identify parallels between digital curation and traditional archival activities like description, appraisal, or preservation,[36] the artist working with networked technologies might note surprising similarities between these bodies of professional practice and their own artistic practices. From the outset, scholars and archival practitioners have emphasized that digital curation encompasses digital information across its life cycle and that digital preservation issues are experienced by individual creators as well as archivists and other cultural heritage professionals.[37] While significant work has been done to understand both the skills and competencies needed by information professionals carrying out digital curation[38] and the ways information professionals can support the digital-curation needs of scholarly research communities,[39] more scholarship is needed to examine the digital-curation practices, and the requisite skills and competencies, of artists and other members of creative communities. Laura Molloy stresses this point in her research on performing arts practitioners, finding that many artists have a strong desire to create a documentary record of their live performances but lack the awareness, skills, and resources to care for digital materials generated from their practice over the long term.[40]

A number of scholars have highlighted the significance of artists' archives in recent years, although this research has typically foregrounded the perspective of information professionals working with artists' archival materials in different ways. Anna McNally, for instance, discusses the characteristics of artists' archives that make them especially unique and at times challenging with respect to traditional archival approaches.[41] Along these lines, Martin Skrypnyk uses the

36 Christopher A. Lee and Helen Tibbo, "Where's the Archivist in Digital Curation? Exploring the Possibilities through a Matrix of Knowledge and Skills," *Archivaria* 72 (Fall 2011): 123–68.

37 Beagrie, "Digital Curation for Science, Digital Libraries, and Individuals," 12.

38 Elizabeth Yakel, Paul Conway, Margaret Hedstrom, and David Wallace, "Digital Curation for Digital Natives," *Journal of Education for Library and Information Science* 52, no. 1 (2011): 23–31.

39 For one example of this kind of research data curation effort, see Michael Witt, Jacob Carlson, D. Scott Brandt, and Melissa H. Cragin, "Constructing Data Curation Profiles," *International Journal of Digital Curation* 4, no. 3 (2009): 93–103.

40 Laura Molloy, "Performances, Preservation, and Policy Implications: Digital Curation and Preservation Awareness and Strategy in the Performing Arts," *New Review of Information Networking* 20, no. 1–2 (2015): 190.

41 Anna McNally, "All That Stuff: Organising Records of Creative Process," in *All This Stuff: Archiving the Artist*, ed. Judy Vaknin, Karyn Stuckey, and Victoria Lane (Faringdon, UK: Libri Publishing, 2013), 97–108.

example of the filmmaker Chris Marker to consider how an archivist might draw on an artist's creative work to inform alternative approaches to the arrangement and description of the artist's personal archives.[42] Kathy Carbone reports on an artist-in-residence program at an archives as a way to expand approaches to outreach and access.[43] This research engages largely with how professionals can adapt existing archival practices to better handle artists' archival materials in institutional collections or better serve the needs of artists as users of archives.

For digital and Net-based art specifically, conservators, curators, and scholars have recognized artists' archival materials as essential resources guiding conservation decisions and providing deeper insight into the work. With the Daniel Langlois Foundation, Lizzie Muller and Caitlin Jones have assembled a robust archives supporting the conservation of several interactive installations by David Rokeby, which includes a wide range of documentation as well as interviews with the artist and audiences who have experienced the works.[44] Muller describes these as "indeterminate archives," as Rokeby's works have changed significantly over his decades-long career due to both advances in technologies and greater knowledge of digital technologies among audiences coming to his works; collecting these diverse documentary materials helps to capture this dynamic interaction between the artist's intent, the technology, and the audience's experience, which is core to the work.[45] As Hanna Hölling observes in her reflections on conserving the work of the pioneering media artist Nam June Paik, each archives of artworks is inherently indeterminate, defined by what is documented as much as by "ruptures in its record, its belatedness, and its heterogeneity."[46] Hölling describes reconstructing some of Paik's seminal works by assembling documentary materials scattered across institutions and drawing

42 Martin Skrypnyk, "The *Pillow Book* of Chris Marker: The Arrangement and Description of Personal Archives," *Archivaria* 79 (Spring 2015): 159–77.

43 Kathy Carbone, "Artists in the Archive: An Exploratory Study of the Artist-in-Residence Program at the City of Portland Archives & Records Center," *Archivaria* 79 (Spring 2015), 27–52.

44 See the archives for the work *Very Nervous System* (1983–): "David Rokeby, *Very Nervous System* (1983–)," la foundation Daniel Langlois pour l'art, la science et la technologie, accessed June 9, 2021, https://www .fondation-langlois.org/html/e/page.php?NumPage=2186.

45 Lizzie Muller, "Collecting Experience: The Multiple Incarnations of *Very Nervous System*," in Graham, *New Collecting*, 183–84.

46 Hanna Hölling, *Paik's Virtual Archive: Time, Change, and Materiality in Media Art* (Berkeley, CA: University of California Press, 2017), 146.

on sources far outside museum archives, including the memories of Paik's family, friends, and colleagues.[47]

Even for artists as renowned as Paik, new media works are not exhaustively documented in institutional collections. For emerging artists or artists working outside collecting institutions, the burden of proactively creating archives documenting inherently variable works is on the artists themselves. In an earlier exploratory study,[48] I found that artists engaged with digital and networked technologies shared common preservation issues, such as media obsolescence and complex technical dependencies; while artists differed in their attitudes toward these issues, with some deeply concerned about the integrity of specific works and others open to the "natural" decay of their works, all actively maintained archives that both documented their artistic careers and coursed through their current projects. The present research builds on this earlier work by focusing on a rich case study of how artists develop these digital-curation practices in the context of a particular arts platform.

Social Worlds of Digital Art Curation

While the present research has focused on a case study of Paper-Thin, I have sought to understand how artists' digital-curation labour proceeds in the context of broad and diverse social worlds. As mentioned above, Becker argues that art is created, exhibited, and understood through patterns of co-operative activity.[49] Becker notes that – in addition to artists – curators, art handlers, critics, audiences, and conservators all interact with artworks in varying ways that shape both their material lives and cultural significance. Rather than one all-encompassing art world, Becker proposes many art worlds, each constituted through distinct configurations of people, organizations, and resources. These configurations solidify over time, resulting in conventions for the creation and exhibition of art, but these patterns of co-operative activity are also sites of negotiation and change. Distinct from the experimentations or innovations of

47   Hölling, 149.

48   Colin Post, "Preservation Practices of New Media Artists: Challenges, Strategies, and Attitudes in the Personal Management of Artworks," *Journal of Documentation* 73, no. 4 (2017): 716–32.

49   Becker, *Art Worlds*, 1.

individual artists, changes in art worlds endure only when they form the basis for new modes of co-operative activity.[50]

The use of digital and networked technologies in the creation and exhibition of art continues to dramatically impact art worlds in both manifest and as yet untold ways. While my research surfaced many actors and technologies across diverse social worlds shaping the current state of digital arts curation, I focus on one significant shift in the present paper: the pronounced role that artists and curators play in the care of digital artworks and related archival materials early on. These caretaking activities take place in networks of co-operating actors, albeit largely outside the purview of the traditional stewards of artistic heritage. Paper-Thin is an example of such a pattern, a model that I describe as a *networked alternative*, referencing a long history of artist-run alternative gallery spaces in which artists work together in new ways as they take control over the creation, exhibition, and ongoing care of artworks.[51] There are many examples of alternative spaces throughout the history of digital and new media art, such as Squeaky Wheel Film & Media Art Center in Buffalo, New York, which has featured digital art exhibitions, technology education programming, and access to media production equipment.[52] In addition to the major collecting institutions discussed above, these community organizations can play a vital role in maintaining archival collections documenting the history of digital and networked art. For instance, Squeaky Wheel recently digitized a collection of at-risk U-matic tape recordings of its public-access cable program *Axlegrease* from the 1980s and 1990s.[53]

Unlike community arts organizations, though, Paper-Thin is a much smaller-scale effort of two artists working voluntarily to maintain a platform for experimenting with new technologies. Paper-Thin is more akin to the alternative galleries at 98 and 112 Greene Street, non-commercial artist-run spaces in SoHo, active in the early 1970s, that featured experimental artistic events like poetry readings by Bernadette Mayer and temporary installations by Gordon Matta-

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50   Becker, 309.

51   Jacki Apple, ed., *Alternatives in Retrospect: An Historical Overview 1969–1975* (New York: The New Museum, 1981), https://archive.newmuseum.org/print-ephemera/6427.

52   Squeaky Wheel (website), accessed June 8, 2021, https://squeaky.org/.

53   "Axlegrease, the U-matic Tape Years," Squeaky Wheel, accessed June 8, 2021, https://squeaky.org/exhibitions-eventsarchive/squeaky-wheel-axle-grease-archive/.

Clark.[54] While part of a longer history of establishing spaces for art outside traditional museum settings, staging networked art exhibitions necessitates new kinds of co-operative activity, involving communities outside the arts and driving the acquisition of novel technical skills. Another distinguishing feature is that Paper-Thin's curators not only work with artists to stage these networked exhibitions but also then play important roles in documenting and stewarding these Net-based artworks. Although Buckley and Smith have taken on the primary responsibility for the digital-curation activities and have contributed the bulk of the resources, time, and energy required to sustain the platform, I argue that the digital curation of networked alternatives is inherently co-operative – as the curators work with artists to negotiate technical challenges, drawing on community-generated information sources like software development forums and YouTube videos to troubleshoot issues – if not always collaborative.

Methods and Study Design

My research design was informed by Becker's theorization of art worlds as well as Anselm Strauss's work on social worlds.[55] I wanted to identify the many actors, technologies, organizations, and sociocultural issues shaping artists' digital curation of artworks and related archival materials. Starting from Paper-Thin as a central point, I reached out to artists who had contributed work to this platform and then asked each artist to put me in touch with another individual who had played some part in shaping how they care for their artworks and archives. In addition to interviewing the Paper-Thin curators and participating artists, I conducted semi-structured interviews with other curators, private collectors, artistic collaborators, and professional conservators (n = 27). The semi-structured interviews included questions that asked participants to reflect on their practices for creating, staging, and then caring for artworks, prompting participants to elaborate on the particular technologies they used, the issues they encountered, and the skills they needed to address those issues. To gain more detail on the kinds of information needed to carry out these digital-curation

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54   Mary Delahoyd, "Seven Alternative Spaces: A Chronicle, 1969–1975," in *Alternatives in Retrospect: An Historical Overview 1969–1975*, ed. Jacki Apple and Mary Delahoyd (New York: The New Museum, 1981), 13.

55   Anselm Strauss, "A Social World Perspective," *Studies in Symbolic Interaction* 1 (1978): 119–28.

activities, I also asked each participating artist to provide me with an example of an information source they had used in their practice; these examples spanned from theoretical and historical texts to software documentation manuals.

I drew on the grounded theory tradition, initiated by Strauss and his colleague Barney Glaser,[56] to design the study, collect data, and conduct analysis. Glaser and Strauss developed new methods for studying social phenomena that emphasized grounding analyses entirely in data derived from research participants, although Kathy Charmaz has critiqued this "blank-slate" assumption, acknowledging that both researchers and participants bring conceptions and perspectives that shape the construction of knowledge.[57] For myself, I recognized that I came to this research from a perspective heavily influenced by my archival background and training. I wanted neither to perpetuate the "wild frontier" divide between professional and non-professional digital-curation practice nor to communicate to the participants a sense that there was some "right way" to care for their materials. In the interviews, I often frankly acknowledged to the participants that, even among professionals, best practices for digital curation remain contested and that the perspectives of creators and other stakeholders are valued by professionals.

The analysis consisted primarily of the iterative and interrelated processes of coding the interview transcripts and constructing situational analysis maps. Situational analysis, a further root in the grounded theory tree, integrates critical theoretical perspectives and foregrounds an ecological understanding of social phenomenon as constituted through the complex interrelationships between human and non-human actors and shaped by a broad range of sociocultural factors.[58] This enduring albeit dynamic arrangement of relationships forms the "situation" at the heart of the method, though as Clarke, Friese, and Washburn acknowledge, there is no straightforward way to bound this situation.[59] For this research, the situation under consideration is the digital curation of artworks on a networked arts platform.

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56 Barney Glaser and Anselm Strauss, *The Discovery of Grounded Theory: Strategies for Qualitative Research* (Chicago: Aldine de Gruyter, 1967).

57 Kathy Charmaz, *Constructing Grounded Theory*, 2nd ed. (Thousand Oaks, CA: Sage, 2014), 13–17.

58 Adele E. Clarke, Carrie Friese, and Rachel S. Washburn, *Situational Analysis: Grounded Theory After the Interpretive Turn*, 2nd ed. (Thousand Oaks, CA: Sage, 2018).

59 Clarke, Friese, and Washburn, 17.

As Clarke, Friese, and Washburn have derived and adapted this concept of the situation from social worlds theory, this method resonates with Becker's approach, described above, which sees art worlds as social worlds and is well suited to theorizing digital curation as an inherently social process shaped by a range of socio-technical and socio-cultural factors. Complementing the qualitative coding techniques common to grounded theory, situational analysis offers a suite of mapping techniques that researchers can use to understand and interpret the relationships among the various actors and issues at play in any given situation. As with qualitative coding of interview data in constructivist grounded theory, situational analysis mapping is an iterative and interpretive analytical process that involves making and remaking maps as the understanding of the situation develops; it also involves extensive analytical inquiry into the various relationships represented on the maps. Throughout the coding and mapping processes, I reflected on my analyses in research memos.[60]

Over the course of the research, I drew numerous maps for each participating artist and eventually aggregated these into a social worlds/arena map (figure 3) that represents the wide range of communities, social roles, technologies, and other factors that shape the digital curation of works on artist-run platforms. A goal of social worlds/arenas maps is to establish broader (if admittedly simplified) contexts for given situations, placing the experiences of the individual study participants within the frame of collective activities and processes.[61] Drawing on both Strauss and Becker, I defined the social worlds as representing the concentrations of co-operative activity that form around shared processes, organizations, sites, discourses, and technologies; whereas I defined the arenas as broader domains of socio-political activity, where issues that cut across many social worlds are negotiated.[62] Social worlds are porous and can be mutually constitutive, as entities and processes active in one world impact others; likewise, the overlap of arenas represents issues at the intersection of these larger domains. On the map for this research, the two larger ovals are the arenas; the smaller circular shapes are the social worlds; and the elements are the various actors, technologies, and sites constituting the co-operative

60   Clarke, Friese, and Washburn, 130, 138.

61   Clarke, Friese, and Washburn, 154–60.

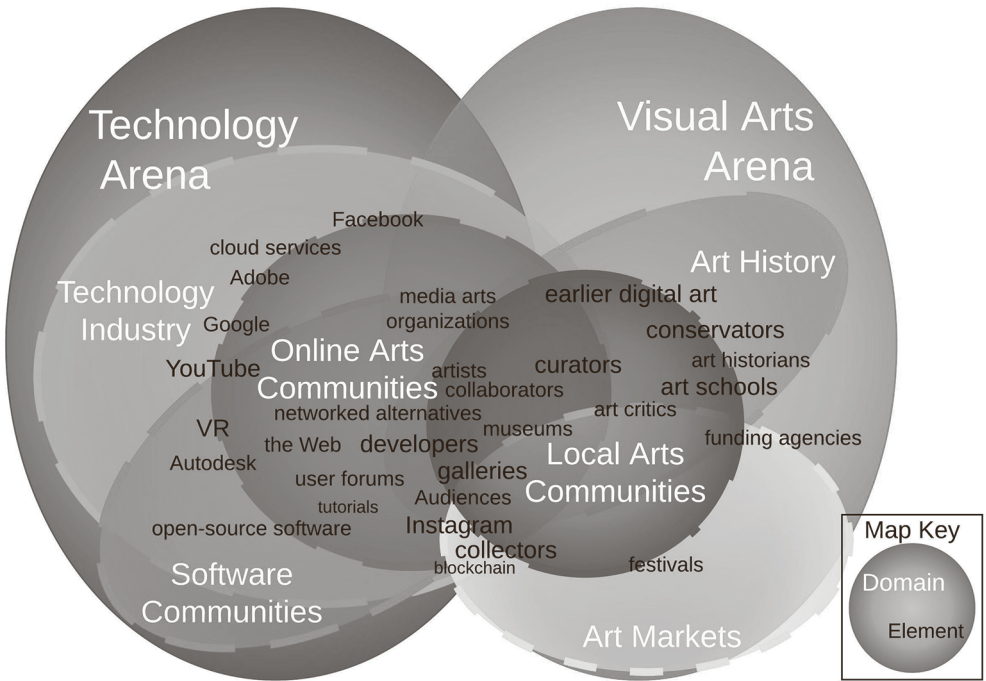62   Strauss, "A Social World Perspective," 122–24.

Technology Arena

Visual Arts Arena

Facebook

cloud services

Adobe

Art History

Technology Industry   Google

media arts organizations

earlier digital art

conservators

YouTube

Online Arts Communities

artists collaborators

curators

art historians

art schools

art critics

networked alternatives

museums

VR   the Web developers

funding agencies

Autodesk

user forums

galleries

Local Arts Communities

tutorials

Audiences

open-source software

Instagram

collectors

festivals

blockchain

Software Communities

Art Markets

Map Key

Domain

Element

FIGURE 3   *Social worlds and arenas map of artists and curators involved in the care of net-based art.*

activities at play in these social worlds.[63] The positioning of both the domains and the elements are intentional, indicating points of overlap, crossover, and mutual constitution. Though this is necessarily simplified, the map presented here can be used as a lens through which to view the findings discussed below and to situate the following discussions of particular individuals, organizations, artworks, and technologies as part of collective processes within dynamic social worlds and arenas full of hotly contested issues.

63   A complete description of how I conceptualized these arenas and social worlds can be found in my dissertation, which is based on this research. Colin Post, "Networked Alternatives: Digital Curation and Artistic Production on Artist-Run Platforms" (PhD dissertation, The University of North Carolina at Chapel Hill, North Carolina, 2020), 287–93.

Curation as Co-Construction

In creating the volumes of Paper-Thin, Buckley and Smith have worked co-operatively with artists to make sure that artworks and artistic efforts will not only cohere into an aesthetic whole but will also function technically on the platform. From initially interacting with the artists through to staging the exhibitions online and then maintaining the exhibitions so that they continue to function in a dynamic technological ecosystem, the curators navigate a field of contingencies: the particular artistic ideas driving discrete artworks and incorporated into the exhibition as well as the affordances and limitations of the specific technologies used by the artists. While curation in physical exhibition spaces can be seen as a mutually creative process shaped by both artist and curator, the technological dependencies of digital and Net-based artworks also force this interaction to focus on specific technical issues that need to be addressed in order for the artworks to function at all. As Brenna Murphy, an artist who contributed work to v2, describes, "It just wasn't me handing in a piece of work, but it was more like [Smith] was facilitating how the work could function."[64] In addition to the typical kind of co-operative work needed to stage an exhibition, Paper-Thin also involved artists and curators in patterns of troubleshooting and learning about technologies in order to make artworks function in the virtual exhibition space.

Buckley and Smith recall the installation of *HWBMx8* (2016) by Daniel Baird and Haseeb Ahmed as a particularly intense example of this process. As part of Baird and Ahmed's series *Has the World Already Been Made?*, the artists have assembled a library of 3-D scans of architectural motifs that they then sample in striking combinations. The piece contributed to v1 places the interior of a cave, lined with painted prints of the artists' hands, within the façade of the Metropolitan Museum of Art, juxtaposing sites associated with the enshrined canon of art history and the origins of human artistic activity. Baird and Ahmed shared .STL files with Buckley and Smith; this format is intended for 3-D printing, and the data contained in the files does not directly translate into VR assets in Unity. Working from the 3-D scan, Buckley and Smith had to essentially recreate the artwork in an entirely different digital format. As Dekker and Tedone assert, this hybridized role of the curator – not just culling and arranging artworks but necessarily working across different

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64   Brenna Murphy, interview with the author, January 3, 2019.

digital tools and exerting creative agency to shape artworks included in exhibitions – is the foundation of online art curation.[65]

Beryl Graham and Sarah Cook argue that the challenges posed by exhibiting new media art in both physical and online spaces present "opportunities to rethink curatorial practice" at a fundamental level.[66] Curators exhibiting participatory digital artworks confront institutional structures resistant to viewers "touching the art," along with the limitations of physical spaces designed to display paintings and sculptures. Kristin Lucas, an artist recommended for the study by a Paper-Thin participant, describes numerous considerations that affect *Dance with flARmingos* (2017), an augmented-reality wetland environment populated with funky virtual flamingos, which groups of participants navigate with iPads and HoloLenses.[67] For the installation to work effectively, though, participants need sufficient space to avoid interference among the multiple iPads and just-right lighting for the HoloLenses. Lucas concludes that, in addition to budgeting for a dedicated developer to adapt the installation to a new exhibition setting, "you really have to have controlled conditions that most places cannot provide you with."[68] Graham and Cook suggest that curators need to adapt their approaches as the pieces they work with become more like an "artist's blueprint" for participation than objects in a gallery.[69] Although there are key differences between artist-run platforms and the galleries and museums associated with curators, curation for new media, unlike for other art forms, generally involves co-constructive processes.

As Buckley and Smith have gained experience as curators, they have developed more sophisticated methods for navigating and orchestrating this co-constructive process. Both v1 and v2 involved embedding a VR environment into a website, and for both these volumes, Buckley and Smith solicited work from a wide range of artists and then integrated it all into a shared VR exhibition space. However, important lessons learned from staging v1 helped Buckley and Smith streamline the process for v2, as the curators were able to anticipate many of the snags in

65   Dekker and Tedone, "Networked Co-Curation," 3.

66   Beryl Graham and Sarah Cook, *Rethinking Curating: Art after New Media* (Cambridge, MA: MIT Press, 2010), 2.

67   Kristin Lucas, "Experience," Dance with FlARmingos, accessed June 9, 2021, http://www.dancewithflarmingos.net /experience.html.

68   Kristin Lucas, interview with the author, May 30, 2019.

69   Graham and Cook, *Rethinking Curating*, 137.

the co-constructive process that they had encountered in v1. For v1, the curators had added new works to the shared VR exhibition space on a monthly basis. While this established a rhythm for working with the artists and a schedule for audiences wishing to regularly visit the space, it also required Buckley and Smith to routinely rework the VR environment in Unity to accommodate the slightly different ways participating artists had created their pieces. Smith notes that elements like lighting effects and textures could change from artwork to artwork and dramatically impact previously installed pieces, and he describes each new installation as "unbreaking the entirety of the space."[70] This need to rework the overall VR environment for the discrete artworks to cohere in the exhibition space amplified the co-constructive processes elaborated above for adapting individual pieces to function within Unity in the first place and had become a laborious burden by the conclusion of v1.

The final two installs of v1, pieces by Andy Lomas (see figure 1) and Hugo Arcier (see figure 4), provided glimpses of how this co-constructive process might be improved. Both Lomas and Arcier came with significant experience in working with 3-D modelling software and contributed pieces that required minimal coaxing to function in the VR exhibition space. The curatorial inter-actions with these artists focused less on technical troubleshooting and more on enhancing the conceptual and experiential aspects of the works. As Smith summarizes, "Toward the end of v1, that was a moment for Cameron and I where we were like, 'Okay, we want to do this for v2.' We want to be working with artists who can do more of the work . . . and then we also want to only do totally dynamic installations. That's part of the reason that everything is moving in v2. It's very different."[71] More than sculptures ported into a virtual space, Lomas and Arcier's interactive pieces morph and transform as viewers move around them. As installed in the exhibition space, the resulting artworks took full advantage of the dynamic capabilities of VR as an artistic medium, realizing Buckley and Smith's curatorial intentions for the platform – to fully explore the artistic possi-bilities of networked digital technologies.

Learning from both the successes and challenges of v1, Buckley and Smith initiated v2 with a more streamlined curatorial process that anticipated some of the key technical difficulties encountered in the previous volume. To avoid

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70   Daniel Smith, interview with the author, January 13, 2019.

71   Smith, interview, January 13, 2019.

FIGURE 4   *Hugo Arcier, Degeneration I, 2007. Virtual reality, dimensions variable. Paper-Thin v1, accessed December 22, 2020, https://paper-thin.org/.*

negotiating the mess of migrating across disparate 3-D modelling software environments, Buckley and Smith created a skeleton virtual exhibition space in Unity for v2 and shared this, along with documentation, with all the participating artists to ensure that they contributed works compatible with the environment from the outset. This documentation begins with a line that some archivists might wish to adapt and include in communications with donors of digital materials: "We're neat freaks because the project breaks if we don't have common organization between all artists. Please bear with us, and follow the rules below."[72] This gradual honing of a curatorial skill set and approach resonates with Abigail De Kosnik's description of the crucial "amateur" archival labour that sustains online fan-fiction archives. As De Kosnik suggests, these repertoires for digital curation – the actions and coordinated activities of community curators driving processes of cultural production – may be the aspect of digital culture that becomes codified and preserved over time, even as specific technologies become obsolete and particular cultural objects become inaccessible.[73]

72   Installation instructions provided to participating artists for v2. Buckley and Smith made a copy available to me for the purposes of the research.

73   Abigail De Kosnik, *Rogue Archives: Digital Cultural Memory and Media Fandom* (Cambridge, MA: MIT Press, 2016), 71.

While the technical limitations Buckley and Smith have imposed on works submitted to the platform may seem like an undue constraint on the creativity of the participating artists,[74] working with and against the affordances of artistic media has always been fundamental to creative activity. The compatibility and interoperability (or lack thereof) of various hardware and software present a markedly different context for artistic creativity than do the physical traits of paint and canvas, but artists similarly respond to the distinct characteristics of digital media as part of the artistic process. In a manifesto on making artistic digital games, Anna Anthropy urges would-be designers to respond inventively to these limitations: "Difference is valuable, and creative accidents and jury-rigs help us achieve it. Imperfection is an invaluable tool when making games."[75] Murphy describes how parsing through these technical details – and contriving inventive workarounds – has become central to her artistic practice: "My creative process is so technical already . . . troubleshooting how the cables are going to be run from here to here, I would definitely count that as part of my creative practice . . . that feels less creative, but it is still part of the practice."[76]

The adoption of new technologies not only changes the nature of individual artistic practices but also impacts how artists work together with curators to stage group shows in shared exhibition spaces, adding the complications of coordinating technical requirements across multiple artists and diverse artistic projects. Buckley and Smith reflect that their streamlined approach to curating v2 certainly helped to address some of the curatorial challenges they encountered in v1, though not without foreclosing some possibilities for collaborative co-construction of the exhibition. Martina Menegon remarks that she greatly enjoyed participating in v2 and benefited directly from her collaboration with the curators, who helped her to create a flesh-like texture for the wall of her exhibition space (see figure 5). While her participation was creatively rewarding in some ways that are not possible with traditional exhibitions, she reports missing out on the unplanned inter-artist collaboration that can more readily emerge over the course of in-person exhibitions:

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74   In fact, Buckley and Smith recount that one artist did resist the boundaries of the pre-set exhibition space and contributed a piece that ultimately needed to be displayed in a separate Unity environment.

75   Anna Anthropy, *Rise of the Videogame Zinesters: How Freaks, Normals, Amateurs, Artists, Dreamers, Dropouts, Queers, Housewives, and People Like You Are Taking Back an Art Form* (New York: Seven Stories Press, 2012), 125.

76   Murphy, interview, January 3, 2019.

> If you have an exhibition in a real gallery . . . you can feel the
> room, see how it's being filled with other artworks and adapt your
> work or the position of your work or the lighting of your work
> with the others. I couldn't do it in the virtual galleries because
> you cannot get the project file with all the scripts and all the files
> from the other artists. . . . Unity gives you the possibility of collab-
> orating, but you could not collaborate with all of the things.[77]

Menegon's work exemplifies the fully dynamic paradigm that Buckley and Smith aimed for with v2. The piece consists of digital replicas of the artist's body, which unpredictably proliferate, rocket, and skew around visitors in the exhibition space – a surreal self-portrait that viewers can truly become immersed in. But differences between the virtual and physical exhibition contexts make some artistic practices more difficult, even as the online platform opens up new artistic trajectories.

In staging these networked exhibitions, Buckley and Smith balance this range of factors to coordinate the work of all the participating artists in co-constructing the platform. Through digital-curation practices that demonstrate the polysemous sense of the term – curating digital artworks and curating digital information – the curators and artists work co-operatively to not only bring together artworks in a unified aesthetic experience but also wrangle the technical infrastructure necessary to make this viewing experience possible. The skills and technical knowledge involved in handling these artworks as data cannot be separated from the curatorial process of selecting and contextualizing these artworks on an exhibition platform, such that this repertoire can be understood inclusively as digital curation.

Beyond Paper-Thin, curators and artists working with digital and networked technologies have developed what I characterize as digital-curation practices to advance diverse modes of exhibition both online and offline. As Graham and

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77 Martina Menegon, interview with the author, February 16, 2019. I shared a draft of this paper with Menegon, and, some two years after the initial interview, she observed that her thinking around collaborating in virtual spaces has continued to develop. While still noting the differences between virtual and in-person collaborations, Menegon now finds that this inter-artist collaboration can be achieved in virtual exhibition spaces as well.

FIGURE 5   *Martina Menegon*, I'll Keep You Warm and Safe in My People Zoo, *2016. Virtual reality, dimensions variable. Paper-Thin v2, accessed December 22, 2020, https:// paper-thin.org.*

Cook outline, festivals like Ars Electronica[78] and media labs like V2_[79] form bridges between artistic and technological methods of cultural production that expressly leverage this inherent interdisciplinarity of new media art.[80] As an artist-run platform for experimenting with new technologies, Paper-Thin fits within this larger history of digital art curation. However, an exceptional aspect of Buckley and Smith's curatorial practice is their commitment to maintaining artists' contributions to the platform well after the point of exhibition. Both aspects of Paper-Thin – as a space for artistic experimentation and as an archives of that activity – are integral to the conceptualization of the project and are reflected in Buckley and Smith's digital-curation efforts, which extend beyond the co-construction of the platform.

78   Ars Electronica (website) accessed June 9, 2021, https://ars.electronica.art/news/en/.

79   V2 (website), accessed June 9, 2021, https://v2.nl/.

80   Graham and Cook, *Rethinking Curating*, 237.

Total Archives and Variable Archives

In the archival and information science sense, *digital curation* refers to stewardship across the entire life cycle of digital materials. The Paper-Thin curators also approach the curation of artworks featured on the platform with a scope that extends beyond the initial exhibition. An early description of the platform recovered from an archival web capture from 2015 states, "These virtual installations will remain indefinitely accessible as both object and archive."[81] Taking part in this research several years later, the curators reaffirm that they continue to approach Paper-Thin as an archives, though their thinking on this issue has developed across the three volumes. Along with maintaining a collection of all works that have been featured on the platform in their personal archives, the curators treat each volume as an experiment in the shape and nature of the platform itself as an archives; each volume is "an opportunity to question or reconsider how we can approach the model of an art archive."[82]

As described above, the first two volumes of the project consist of VR environments built in Unity, and the entirety of these volumes remains available for download via the Paper-Thin site. Emphasizing this essential conceptual aspect of these initial volumes of the project, Buckley and Smith encourage visitors to download the volumes, with the aim of proliferating the constituent data for v1 and v2. Buckley and Smith envision this as more than a backup of the project, which they maintain on multiple hard drives; they see it as an experimental reworking of the relationship between the viewer and the exhibition space: "It's almost as if, by visiting the museum, you're helping to preserve it – not just by paying admission, but by actually owning the art when you leave."[83] Absent mechanisms for coordinating with the dispersed visitors (like myself) who have downloaded Paper-Thin data onto their local machines, Buckley and Smith lack the means to press these viewers into the service of stewarding the Paper-Thin archives. Rather than actualizing a distributed digital preservation infrastructure, this invitation to download the project has a conceptual heft that shapes the viewers' experience. Approaching the platform through the frame of

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81   Paper-Thin (website), Internet Archive, November 28, 2015, https://web.archive.org/web/20151128165417/http://www.paper-thin.org/.

82   Cameron Buckley and Daniel Smith, interview with the author, February 9, 2019.

83   Buckley and Smith, interview, February 9, 2019.

digital curation, the viewer enacts the archives in order to access the artworks: to transfer, execute, interpret, and ultimately experience the digital information constituting the project.

The initiation of v3 marked a significant shift in Buckley and Smith's conceptualization of Paper-Thin as an archives. For Buckley and Smith, the Unity builds represent a "total archives" of v1 and v2. What viewers download today is the same package that viewers downloaded when the volumes first launched. In contrast, v3 was a site-specific installation and cannot be recreated again in a comprehensive way. Visitors to the Paper-Thin exhibition at the HubWeek Festival witnessed artists collaborating synchronously and remotely via a networked drawing application; while artifacts were produced as a result of this interaction, the performance of artists negotiating this complex human–machine interface was itself the artwork. The traces left by these performances do constitute an archives of v3, but according to a very different paradigm and involving a quite different curatorial approach. In addition to capturing the drawings created by the participating artists, Buckley and Smith configured the application so that it captured the artists' sketching inputs as G-Code coordinates that represented each gesture in minute detail. A widely used programming language for delivering instructions to CNC machines,[84] G-Code data is compact and straightforward enough to be legible to humans with a bit of training. Unlike the Unity builds for v1 and v2, which depend on a specific configuration of proprietary hardware and software to be experienced by humans, the G-Code generated from v3 can be interpreted quite readily by a number of software applications, other CNC machines, or even manually by humans (with sufficient will and patience).[85]

In comparing v3 to v1 and v2, Smith directly cites Richard Rinehart and Jon Ippolito's notion of variable media, specifically their comparison of the works of Eva Hesse and Sol LeWitt, to illustrate this concept.[86] Both Hesse and LeWitt experimented with new media[87] in an expanded sense – Hesse manipulated

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84   Marti Deans, "G-Code for CNC Programming (2020 Update)," Autodesk, May 24, 2018, https://www.autodesk.com/products/fusion-360/blog/cnc-programming-fundamentals-g-code/.

85   As of this writing, Buckley and Smith have not publicly released the data from v3, though in the course of the research, they discussed plans for doing so.

86   Richard Rinehart and Jon Ippolito, *Re-Collection: Art, New Media, and Social Memory* (Cambridge, MA: MIT Press, 2014), 3–7. This work stems directly from the earlier Variable Media Network discussed in the introduction.

87   Rinehart and Ippolito define *new media* in a sense that extends beyond just digital technologies to include all manner of non-traditional media, such as neon lights and latex, the use of which necessarily alters processes

latex into vibrant, diaphanous sculptures, and LeWitt wrote out instructions for paintings designed to be executed any number of times on any wall of appropriate size – but Hesse's works have deteriorated rapidly, while LeWitt's pieces can be recreated afresh as needed. As Smith points out, v1 and v2 are like Hesse's sculptures: locked into a particular set of material conditions in order to be authentically experienced. Just as Hesse's latex has grown brittle, the hardware and software environments required to run v1 and v2 will age and fall into disuse. Formally and conceptually, the G-Code archives of v3 resembles the instructions for LeWitt's wall paintings. Neither is dependent on a specific media, and neither strives to forever fix some original aesthetic experience. Rather, both archives provide the foundation for new versions of the works to be recreated time and again, likely in media and forms not anticipated by the artists themselves.

Rinehart and Ippolito put forward LeWitt's work as an illustration of a variable media approach to art stewardship – and the care of digital cultural materials more generally – in which an artwork can be recreated in different media over time such that its essence is sustained even if the original material falls apart or the technologies needed for the work have become obsolete. Rinehart and Ippolito suggest that re-creation is a valid and valuable stewardship approach to include alongside methods like format migration and emulation. Even more, they argue that a paradigm based in reinterpretation over time is especially resonant with digital cultural practices: "The solution for preserving new media culture lies not in attempting to circumvent its variability with outdated notions of fixity, but rather in embracing the essential nature of the medium and transforming its greatest challenge into a defense against obsolescence."[88] Rinehart and Ippolito do not disregard storage, migration, and emulation as digital-curation approaches, but rather suggest that these existing techniques all have limitations and that cultural heritage professionals can develop additional

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and expectations for creating, exhibiting, curating, and stewarding artworks. Many artists who began to explore these new media in the mid-20th century were concerned with aesthetic and conceptual issues similar to those that have concerned the artists who began to explore digital technologies in subsequent decades. In part because these artistic explorations call into question established ideas of what constitutes the work of art and of how art is experienced, and in part because much of this new media is far less stable than traditional artistic media, new media art in this expanded sense also requires the development of new approaches to conservation and preservation.

88   Rinehart and Ippolito, 47–48.

methods that leverage the inherent variability of digital media.[89]

While Rinehart and Ippolito direct their argument primarily to cultural heritage professionals, urging archivists and conservators to reassess canonical definitions of authenticity and originality, they recognize artists and other cultural producers as key stakeholders in advancing both the conceptual framework for a variable media paradigm as well as specific methods and practices for re-creating works in this way. In fact, cultural heritage professionals can study how cultural producers are already working in and through variable media archives to inform this conceptual and technical development, of which Paper-Thin is a prime example. Across the Paper-Thin volumes, Buckley and Smith, together with the participating artists, have grappled with the challenges of caring for digital culture and have responded to these challenges in and through their creative practices. As a platform, Paper-Thin will not need to be stewarded by professional archivists and conservators at some later stage in its life cycle but represents a massive digital-curation effort underway from the point of inception.

Arts Curator as Digital Curator

Buckley and Smith have honed their curatorial approaches – and the artists who have participated in Paper-Thin have developed their artistic practices – in shifting art worlds, as the means for creating, exhibiting, collecting, and preserving artworks continue to transform along with the broader social and cultural context impacted by globalized digital and networked technologies. As elaborated in the preceding sections, one of the significant shifts Paper-Thin illustrates is a changing relationship between curators and artists, as Buckley and Smith actively work with artists to adapt pieces to function on the platform and then take on stewardship responsibilities for the materials featured on the platform for the foreseeable future. In addition to broader changes in curatorial, exhibition, and conservation practices, the role of the arts curator has also expanded. Many participants in the study described arts curators acting as digital curators, particularly as they recounted their experiences working with other galleries, institutions, and arts spaces beyond Paper-Thin.

89 Rinehart and Ippolito, 53.

As mentioned in the description of the study design, I asked artists who contributed work to Paper-Thin to connect me with other individuals who had served as sources of information pertinent to archiving or preservation issues. Several artists referred me to other curators of digital and networked arts spaces similar to Paper-Thin, namely Caroline Turner – who co-founded and directed the IRL Gallery[90] in Cincinnati, Ohio, from 2016 to 2018 before putting the project on hiatus to pursue graduate education – and Paul Slocum, who directs the And/Or Gallery in Pasadena, California.[91] In my interviews with Turner and Slocum, they both described carrying out digital-curation tasks such as ensuring interoperability across different technologies needed to stage an exhibition and tacitly taking on voluntary stewardship responsibilities for artworks and related archival materials after the point of exhibition.[92]

Turner started IRL shortly after completing her undergraduate arts education with a goal similar to that of the Paper-Thin curators: facilitating artistic experimentation with digital and networked technologies. While Paper-Thin v1 and v2 featured entirely online exhibitions, Turner leveraged networked technologies to produce VR artworks made by artists from around the world but staged in an alternative gallery space in Cincinnati. Turner pursued a curatorial approach similar to those of the initial Paper-Thin volumes, soliciting participation from artists and then actively co-constructing the exhibitions using VR technologies. In the case of IRL, Turner credits her partner Ian, who has professional 3-D modelling experience, as an essential collaborator in the curatorial process; he applied his expertise to execute artists' ideas in VR and to address other technical issues as they arose. Jack Burnham references artists like Donald Judd and Robert Morris, who pioneered new artistic practices in the 1960s through collaborations with industrial fabricators and engineers to create large-scale sculptures and installations, to highlight the shifting roles of those involved in creative processes characteristic of a "systems esthetic."[93] For Burnham, the communications networks

90   IRL Gallery (website), accessed January 15, 2021, http://irl.gallery/.

91   And/Or Gallery (website), accessed January 22, 2021, http://www.andorgallery.com/.

92   In addition to these two galleries, which were specifically mentioned by study participants, other notable examples of art galleries that have exhibited and provided commercial representation for artists working with digital technologies include bitforms (https://bitforms.art/) and TRANSFER Gallery (http://transfergallery.com/). Further research into the digital-curation practices of gallerists would complement the present research on artist-driven curation.

93   Jack Burnham, "Systems Esthetics," *Artforum* 7, no. 1 (1968).

connecting artists to vast bodies of information and expertise are core aspects of the works themselves. The co-constructive curation driving Paper-Thin and IRL follow in this art-historical vein; though the collaboration is focalized between curator and artist, both seek out additional technical information from sources in their immediate communities and via online forums and videos.

As with Paper-Thin, IRL was an alternative arts space run by emerging artists. Turner frames this co-constructive approach to curation as a value-added proposition that attracted artists to contribute work and helped to jumpstart the gallery: "We have to have some sort of edge. VR was that, and even more so that we were able to produce the piece. We would state directly in the email, 'We want to let you know that we have the capacity to produce a VR piece. Ian can help you model it.'"[94] Similar to the way Buckley and Smith interacted with artists contributing to Paper-Thin, Turner worked with artists possessing a range of technical skills and knowledge. Zachary Norman, who exhibited pieces at IRL and Paper-Thin v2, brought previous experience working with VR and, in both cases, was able to carry out the bulk of the 3-D modelling work on his own, relying on occasional consultation to troubleshoot specific technical issues. For other IRL exhibitions, artists emailed back and forth, discussing ideas, which Turner and Ian then realized in full. Across this spectrum, though, Turner affirms that the co-constructive process of staging VR exhibitions is mutually beneficial: both artist and curator gain a deeper understanding of the creative potential of these technologies through the collaboration, and both artist and gallery garner increased visibility from the networked dissemination of the work.[95]

Though it also features art engaged with digital and networked technologies, And/Or follows a more traditional gallery model, representing and selling work by a roster of artists and featuring rotating exhibitions of work by these and other visiting artists in a physical gallery space. While this curatorial approach differs somewhat from those of Paper-Thin and IRL, in which a co-constructive process shared between curator and artist is part of the driving concept for the platform, Slocum reports carrying out many similar digital-curation tasks in order to adapt works and get them functioning in the gallery space. As Slocum describes it, this

[94]   Caroline Turner, interview with the author, January 18, 2019.

[95]   Though IRL featured in-person exhibitions, Turner places almost equal importance on the circulation of documentary images online via the IRL website and social media feeds. Several other participants in the study similarly emphasized the significance of the online circulation of images of artworks, even for pieces that were not digital or Net-based in the first place.

troubleshooting proceeds as a negotiation between himself and the artists: "I'll work with the artist to figure out the solutions. . . . In the show we have up now, there's a lot of stuff that used to run on old computers, that now we're showing through emulation. I had to work with some of the artists in the show to sort out various problems like that."[96] The exhibition Slocum refers to, *Video Game Art, 1970–2005*,[97] involved intricate restoration work for a number of older pieces. For *Mike Builds a Shelter* (1983), a game made by the artist Michael Smith and a programming collaborator for the Commodore 64, Slocum had to go through the original code to figure out how to get the game working again on a contemporary machine. Although And/Or exhibitions showcase pre-existing pieces that typically were not purposefully made for the space – even occasionally featuring historic works like *Mike Builds a Shelter* – Slocum has learned skills and draws on bodies of knowledge pertinent to digital curation as much as arts curation.

Slocum also sells new work to collectors in addition to restaging older works, and both involve digital preservation considerations. For many of the works exhibited in the gallery and the pieces sold to collectors, Slocum has devised a media player that can accommodate a range of works in various formats and file types.[98] Built with the widely used Raspberry Pi computer and equipped with standard input/output interfaces, the media player was designed with the intent that it could be easily maintained over time. As Slocum describes the rationale for these decisions, "Forty years in the future, it should be easy to find those boards, easy to find the power supply. It doesn't have any moving parts on it. It's all things like that that I'm thinking about."[99] In addition, Slocum plans to release the software for the device so that later curators, collectors, or preservationists will have the documentation needed to restage a historic work.

The same preservation risks that Slocum (and many of the other participants in the study) identify – poorly documented software, difficult-to-replace hardware, limited interoperability between components – are also those taken on by cultural heritage professionals tasked with the care of digital collections, and Slocum's

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96 Paul Slocum, interview with the author, January 3, 2019.

97 And/Or Gallery, "Show #32: Video Game Art 1970–2005," And/Or Gallery, accessed January 18, 2021, http://www.andorgallery.com/shows/32.html.

98 LZX Industries, "Andor 1 Media Player," LZX Industries, accessed January 19, 2021, https://lzxindustries.net/products/andor-1-media-player.

99 Slocum, interview, January 3, 2019.

approach resembles the way an archivist or conservator might address these issues via well-documented and well-supported technologies. Slocum, Turner, Buckley, and Smith have developed this orientation toward the ongoing stewardship of the works they curate – a perspective that integrates archival considerations and practices extending well beyond the point of initial exhibition. Unlike a professional archivist, though, these curators have tacitly and voluntarily taken on these responsibilities. Two artists in the study, Norman and Menegon, expressly mention relying on the persistent online presence of Paper-Thin v2 as a source of documentation for their work. While the curators have had informal discussions with artists about maintaining an archives of works featured in their respective spaces, the curators face not only preservation threats but also the difficulties of sustaining precarious, wholly voluntary efforts.

Uncertain Ends

The study participants recognize in many ways the fragility of artworks created with new technologies still largely untested against the forces of time and obsolescence, and many have grappled with the loss or significant alteration of older works. Already, Paper-Thin v1 has fallen out of joint with current web technologies. Buckley and Smith employed a now-deprecated plug-in[100] to embed v1 in a browser while they awaited Unity support for WebGL,[101] a web standard for integrating 3-D graphics into webpages that promises to be more enduring than a proprietary plug-in. Sterling Crispin, an artist who participated in v3, describes the tension between wanting to explore the artistic potential of a new technology and weighing concerns about the resulting work's longevity: "It's tricky. As an artist, I feel like I get so in love with an idea that I want to pursue it whatever the cost, even if it's not archival, and if someone buys it, it's going to be a nightmare. Sometimes you just need to make the thing anyway."[102] According to Crispin, concerns over the "archivability" of an artwork might inhibit an

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100 Jonas Echterhoff, "Unity Web Player Roadmap," *Unity* (blog), October 8, 2015, https://blogs.unity3d .com/2015/10/08/unity-web-player-roadmap/.

101 Khronos Group, Inc., "Web GL: Open GL ES for the Web," Khronos Group, accessed January 19, 2021, https:// www.khronos.org/webgl/.

102 Sterling Crispin, interview with the author, December 7, 2018.

artist from pursuing an idea altogether, putting the preservation-cart before the creative-horse. Furthermore, time and resources expended on the care of older works cannot be dedicated to the exploration of new ideas.

Still, artists recognize the benefit of maintaining an archives of these works, supporting a key finding of my earlier exploratory research: that artists place importance on personal archives documenting their professional careers even if their artworks are intentionally ephemeral or otherwise difficult to preserve in a stable form.[103] Sarah Rothberg and Gabe Barcia-Colombo, two artists and colleagues teaching new media art at New York University, both of whom were recommended for the present study, via the snowball sampling method, by Paper-Thin participants, stress to their students the need to develop skills along with critical perspectives on the long-term care of their art. As Rothberg describes this,

> When you're making an interactive artwork . . . you always have to think about where it's going to be, what kind of hardware it's going to run on, are the people you're making it for going to understand what it is they're supposed to do, or do they need to be onboarded. All of that plays into if you're trying to make something that's going to last and be able to be viewed in 10 or 20 years. What's your plan for that? The fact is, students don't really think that way at all. It comes off as a silly question. In 10 years, they'll think back and say, "Yeah, we're glad that Sarah told us that."[104]

Although Rothberg does not put it in these terms, artists must cultivate digital-curation expertise to sustain careers as artists working with digital technologies. For many digital and Net-based artworks to be seen even shortly after the point of creation requires active, if not proactive, effort on the part of artists, curators, and other interested stakeholders.

As I have outlined, curators of networked alternative arts spaces (in many cases, artists themselves) are already playing essential stewardship roles after the point of initial exhibition, but these curators face similar resource constraints as the artists contributing work to the spaces. While several of the artists in the

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103 Post, "Preservation Practices of New Media Artists," 727.

104 Sarah Rothberg, interview with the author, December 13, 2018.

study have exhibited with major museums or have sold work to private collec-
tors, the prevailing sentiment is that digital art remains marginal to mainstream
art worlds. In 2012, Claire Bishop described a persistent "digital divide," in that
new media art has been relegated to a specialized sphere that is largely unrecog-
nized in major museum shows, arts publications, festivals, and arts prizes, even
as digital technologies become ever more important in shaping contemporary
life.[105] The sudden amplification and expansion of virtual art exhibitions in the
midst of the ongoing COVID-19 pandemic, which has forced the mainstream art
world online like all other sectors of society, only throws into relief how little
attention was previously paid to this domain of creative activity.

Regardless, artists have forged new arts communities in both online and
in-person spaces, in many cases intentionally exploring digital and networked
technologies as means to sidestep the trappings of mainstream art worlds. The
social worlds/arenas map derived from the research (figure 3) illustrates the wide
array of individuals, organizations, groups, and non-human actors that artists
engaged with digital and networked technologies interact with in the creation,
exhibition, and ongoing care of their work. Notably, these artists intersect with
software development communities, often traversing both sets of social worlds.
Mark Dorf, a participant in v2, recounts a telling example about posting a question
about using the RGBD Toolkit[106] to a Google Group only to get a direct response
from the developer and an offer to troubleshoot the issue in-person at the artist's
studio. Platforms like Paper-Thin are the fruit of these emergent communities,
which bring together individuals with skill sets encompassing art and technology.

In and through these communities, artists are developing digital-curation skills
and approaches to maintain archives of their work. However, these dispersed
archives will not cohere into a digital visual arts heritage absent the involvement
of established institutions with social and technological infrastructure sufficient
to pass these artworks and archival materials on to future generations. Given
that many artists and curators steward these materials early on, with limited
support and resources, little of this work will last long enough to benefit from
this professional stewardship. Claudia Hart, an artist recommended by a Paper-

105 Claire Bishop, "Digital Divide: Contemporary Art and New Media," *Artforum* 51, no. 1 (2012): 436.

106 RGBD Toolkit began as a hack of the Xbox Kinect and has since developed into the commercial product
Depthkit, software for creating interactive 3-D films. See Depthkit Beta (website), accessed January 21, 2021,
https://www.depthkit.tv.

Thin participant, has experimented with a huge range of digital technologies over several decades but has only recently received recognition from collectors, institutions, and larger commercial galleries. This has provided Hart with the motivation – and resources – to recover and restore many older works, but she sympathizes with the countless other media artists with extensive careers who have found this recognition too late, or not at all. Phillip Stearns, an artist earlier on in his career and a participant in v3, states that he has already had to make difficult decisions to stop investing resources in the care of artworks. As Stearns sums it up, "It's, when do I stop caring about other people not caring, and just get rid of the work?"[107]

Test Beds for Post-Custodial Curation

Cultural heritage institutions do not need to keep comprehensive records of artistic engagements with digital and networked technologies, but in my opinion, the institutions responsible for this task are currently building a foundation on sand, and this will lead to a woefully incomplete digital visual arts heritage. As Rinehart and Ippolito caution, the dominant custodial model for cultural heritage institutions is itself a threat to new media culture: with an overemphasis on the storage of discrete objects and a strict adherence to conservative policies for preserving those objects in their "authentic" or "original" state, institutions risk rendering dynamic cultural practices as "passive, silent, and dead."[108] Rinehart and Ippolito suggest that these institutions may be resistant to approaches that involve proliferating copies, expanding the creative agency of audiences, or embracing variable recreations of works – all of which are characteristic of the digital-curation practices of Paper-Thin and other networked alternative arts spaces.

The long-term, professional stewardship of Net-based art specifically – and digital culture more generally – needs to better align with the ways these materials are created, used, and cared for earlier on. To this point, Dekker calls for "networks of care" that involve professionals, non-experts, and artists working

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107   Phillip Stearns, interview with the author, November 26, 2018.

108   Rinehart and Ippolito, Re-Collection, 75.

together, ideally over open systems, with shared access to archival documents.[109]
As I have suggested above, this community-oriented shift in digital art steward-
ship resonates deeply with post-custodial approaches to archiving. As Gerald
Ham argues in his initial articulation of a "post-custodial era," the growing prev-
alence of digital information technologies prompts a dramatic re-evaluation of
how archival institutions carry out their social function as stewards of cultural
heritage, highlighting outreach to and coordination with the archival efforts of
community groups, businesses, and public libraries as key strategies.[110] The scale
and societal importance of digital infrastructure today has far surpassed that
of the early 1980s, but Ham's essential point is even more salient now. Rather
than fighting against the massively distributed nature of digital infrastructure
by centralizing digital materials in bounded collections, cultural heritage insti-
tutions and professionals can leverage this infrastructure for the care of digital
cultural production. Writing 10 years after Ham, David Bearman dramatically
advanced this conception of post-custodial archives, arguing that the distrib-
uted nature of digital infrastructure had made the custodial model of archives an
"indefensible bastion."[111]

While the archival profession has not abandoned this bastion in the intervening
years, professional archivists have increasingly adapted practices and adopted
approaches to work directly with the communities who create, use, and care
for cultural materials early on. Cook describes this pronounced reorientation
of professional archival practice toward community engagement as a paradigm
shift,[112] one that responds in part to the preservation and documentary challenges
raised by digital cultural production but that also reflects a recalibration of the
archivist's authority in relation to the many others with a stake in cultural memory.
As Cook's treatment exemplifies, post-custodial approaches to archives, broadly
conceived, necessitate both social and technological changes to archival practice.
To develop the "open museum" that Rinehart and Ippolito describe – a model that

109   Annet Dekker, *Collecting and Conserving Net Art: Moving beyond Conventional Methods* (London: Taylor &
      Francis, 2018), 91.

110   F. Gerald Ham, "Archival Strategies for the Post-Custodial Era," *American Archivist* 44, no. 3 (1981): 213.

111   David Bearman, *Archival Management of Electronic Record*s (Pittsburgh: Archives & Museum Informatics, 1991),
      14–24.

112   Terry Cook, "Evidence, Memory, Identity, and Community: Four Shifting Archival Paradigms," *Archival Science* 13,
      no. 2–3 (2012): 95–120.

borrows ideas from libraries, archives, and museums to facilitate wide circulation of digital cultural materials and to equip users with tools for copying and inventively recreating those works[113] – will require new technological infrastructure but also new patterns of co-operative activity to effectively make use of this infrastructure in transformed social worlds.

A major takeaway from my research is that cultural heritage institutions and professionals play a rather limited role in the social worlds of artists engaged with digital and networked technologies. This lack of engagement is detrimental not only to the artists and curators involved in the creation and initial care of Net-based artworks but also to cultural heritage professionals. Artists and curators involved in networked alternative arts spaces could certainly benefit from resources like secure digital storage space or professionally developed digital-curation training materials designed for artists. But cultural heritage professionals could also benefit from deepening relationships with artists and gaining insight into digital-curation approaches native to the communities of record.

Networked alternative arts spaces are test beds where the technologies and co-operative practices needed for innovative digital-curation practices are currently being explored. Platforms like Paper-Thin put into practice a post-custodial archival paradigm in which creators and curators work co-operatively from the outset – first, to make new forms of cultural production possible and, then, to sustain the ongoing experiential use of the resulting cultural products. Developing specific methods to better integrate established cultural heritage institutions into the dynamic social worlds of artists will require further research that is grounded in extensive conversations with artists, curators, and others involved in these social worlds – and that foregrounds pressing questions about remuneration; support for artists' labour; and the nature of ownership, custody, and control over cultural production. To close, I would like to offer a hurried sketch in the service of advancing these conversations: I envision both artists and cultural heritage professionals co-operating as memory workers under a sweeping digital-curation remit, with artist-run platforms and institutional repositories alike acting as nodes in the circulation of artworks.

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[113]   Rinehart and Ippolito, *Re-Collection*, 94.

BIOGRAPHY Colin Post is an assistant professor in library and information science at the University of North Carolina Greensboro, where he teaches and conducts research in the area of archives and special collections. Dr. Post completed his MA in art history and PhD in information science at the University of North Carolina Chapel Hill. His dissertation research explored how artists working creatively with digital and networked technologies curate and preserve their artworks and related personal archival materials. In his ongoing research, Dr. Post is developing collaborative strategies for professional memory workers and memory institutions to support digital curation efforts in creative communities. In addition, Dr. Post currently serves as the Chair of the Association for Library and Information Science Educators (ALISE) Community Building Committee.