

## The .txtual Condition: Digital Humanities, Born-Digital Archives, and the Future Literary

Matthew Kirschenbaum <mkirschenbaum\_at\_gmail\_dot\_com>, University of Maryland

### Abstract

In 1995 in the midst of the first widespread wave of digitization, the Modern Language Association issued a Statement on the Significance of Primary Records in order to assert the importance of retaining books and other physical artifacts even after they have been microfilmed or scanned for general consumption. “A primary record,” the MLA told us then, “can appropriately be defined as a physical object produced or used at the particular past time that one is concerned with in a given instance” (27). Today, the conceit of a “primary record” can no longer be assumed to be coterminous with that of a “physical object.” Electronic texts, files, feeds, and transmissions of all sorts are also now, indisputably, primary records. In the specific domain of the literary, a writer working today will not and cannot be studied in the future in the same way as writers of the past, because the basic material evidence of their authorial activity — manuscripts and drafts, working notes, correspondence, journals — is, like all textual production, increasingly migrating to the electronic realm. This essay therefore seeks to locate and triangulate the emergence of a .txtual condition — I am of course remediating Jerome McGann’s influential notion of a “textual condition” — amid our contemporary constructions of the “literary”, along with the changing nature of literary archives, and lastly activities in the digital humanities as that enterprise is now construed. In particular, I will use the example of the Maryland Institute for Technology in the Humanities (MITH) at the University of Maryland as a means of illustrating the kinds of resources and expertise a working digital humanities center can bring to the table when confronted with the range of materials that archives and manuscript repositories will increasingly be receiving.

For *jjm2f*

### I.

In April 2011 American literature scholars were buzzing with the news of Ken Price’s discovery of thousands of new papers written in Walt Whitman’s own hand at the National Archives of the United States. Price, a distinguished University of Nebraska English professor and founding co-editor of the digital Walt Whitman Archive, had followed a hunch and gone to the Archives II campus in College Park looking for federal government documents — red tape, essentially — that might have been produced by the Good Gray Poet during Whitman’s tenure in Washington DC as one of those much-maligned federal bureaucrats during the tumultuous years 1863-1873. Price’s instincts were correct: to date he has located and identified some 3000 official documents originating from Whitman, and believes there are still more to come. Yet the documents have value not just or perhaps not even primarily *prima facie*, because of what Whitman actually wrote. Collectively, they also constitute what Friedrich Kittler once called a discourse network, a way of aligning or rectifying (think maps) Whitman’s activities in other domains through correlation with the carefully dated entries in the official records. “We can now pinpoint to the exact day when he was thinking about certain issues,” Price is quoted as saying in the *Chronicle of Higher Education* [Howard 2011a].

Put another way, the official government documents written in Whitman’s hand are important to us not just as data, but as metadata. They are a reminder that the human life-world all around us bears the ineluctable marks and traces of our passing, mundane more often than not, and that these marks and tracings often take the form of written and inscribed documents, some of which survive, some of which do not, some of which are displayed in helium- and water-vapor filled cases, and some of which lie forgotten in archives, or brushed under beds, or glued beneath the end papers of books. Today such documents are as likely to be digital, or more precisely *born-digital*, as they are to be physical artifacts. A computer is, as Jay David Bolter observed quite some time ago, a writing space — one which models, by way of numerous telling metaphors, a complete working environment, including desktop, file cabinets, even wallpaper. Access to someone else’s computer is like finding a key to their house, with the means to open up the cabinets and cupboards, look inside the desk drawers, peek at the family photos, see what’s playing on the stereo or TV, even sift through what’s been left behind in the trash.

The category of the born-digital, I will argue, is an essential one for what this issue of *DHQ* names as *the literary*. Yet it is still not well-understood. In 1995, in the midst of the first widespread wave of digitization, the Modern Language Association felt it urgent to issue a Statement on the Significance of Primary Records in order to assert the importance of retaining books and other physical artifacts even after they have been microfilmed or scanned for general consumption. “A primary record,” the MLA tells us, “can appropriately be defined as a physical object produced or used at the particular past time that one is concerned with in a given instance” [MLA 1995, 27]. Though the retention of such materials is still by no means a given, as recent commentators such as Andy Stauffer have shown, the situation in

1

2

3

4

which we find ourselves today is even more complex. Today, the conceit of a “primary record” can no longer be assumed to be coterminous with that of a “physical object.” Electronic texts, files, feeds, and transmissions of all sorts are also now, indisputably, primary records (for proof one need look no further than Twitter hashtags such as #Egypt or #Obama). This is the “.txtual condition” of my title. In the specific domain of the literary, a writer working today will not and cannot be studied in the future in the same way as writers of the past, because the basic material evidence of their authorial activity — manuscripts and drafts, working notes, correspondence, journals — is, like all textual production, increasingly migrating to the electronic realm. Indeed, as I was finishing my first draft of this essay the British Library opened its J. G. Ballard papers for public access; it is, as one commentator opines, likely to be “the last solely non-digital literary archive of this stature,” since Ballard never owned a computer. Consider by contrast Oprah *enfant terrible* Jonathan Franzen who, according to *Time Magazine*, writes with a “heavy, obsolete Dell laptop from which he has scoured any trace of hearts and solitaire, down to the level of the operating system” [Grossman 2010]. Someday an archivist may have to contend with this rough beast, along with Franzen’s other computers and hard drives and USB sticks and floppy diskettes in shoeboxes.

In fact a number of significant writers already have material in major archives in born-digital form. The list of notables includes Ralph Ellison, Norman Mailer, John Updike, Alice Walker, Jonathan Larson (composer of the musical *RENT*), and many others. Perhaps the most compelling example to date is the groundbreaking work that’s been done at Emory University Library, which has four of Salman Rushdie’s personal computers in their collection among the rest of his “papers.” One of these, his first — a Macintosh Performa — is currently available as a complete virtual emulation on a dedicated workstation in the reading room. Patrons can browse Rushdie’s desktop file system, seeing, for example, which documents he stored together in the same folder; they can examine born-digital manuscripts for *Midnight’s Children*, and other works; they can even take a look at the games on the machine (yes, Rushdie is a gamer — as his most recent work in *Luka and the Fire of Life* confirms). Other writers, however, have been more hesitant. Science fiction pioneer Bruce Sterling, not exactly a luddite, recently turned over fifteen boxes of personal papers and cyberpunk memorabilia to the Harry Ransom Center at the University of Texas but flatly refused to consider giving over any of his electronic records, despite the fact that the Ransom Center is among the places leading the way in processing born-digital collections. “I’ve never believed in the stability of electronic archives, so I really haven’t committed to that stuff,” he’s quoted as saying [Howard 2011b].

We don’t really know then to what extent discoveries on the order of Ken Price’s will remain possible with the large-scale migration to electronic documents and records. The obstacles are not only technical but also legal and societal. Sterling’s brand of techno-fatalism is widespread, and it is not difficult to find jeremiads warning of the coming of the digital dark ages, with vast swaths of the human record obliterated by obsolescent storage. And hard drives and floppy disks are actually easy in the sense that at least an archivist has hands-on access to the original storage media. The accelerating shift to Web 2.0-based services and so-called cloud computing means that much of our data now resides in undisclosed locations inside the enclaves of corporate server farms, on disk arrays we will never even see or know the whereabouts of.

For several years I’ve argued this context has become equally essential for thinking about what we now call the digital humanities, especially if it is to engage the objects and artifacts of its own contemporary moment. Yet the massive challenges facing the professional custodians of the records of history, science, government, and cultural heritage in the roughly three and a half decades since the advent of personal computing have been left largely unengaged by the digital humanities, perhaps due to the field’s overwhelming orientation toward things past, especially things in the public domain pastures on the far side of the year 1923 B©, before copyright. The purpose of this essay, therefore, is to locate and triangulate the emergence of the .txtual condition — I am of course remediating Jerome McGann’s influential notion of a “textual condition” — amid our contemporary constructions of the “literary,” along with the changing nature of literary archives, and lastly activities in the digital humanities as that enterprise is now construed. In particular, I will use the example of the Maryland Institute for Technology in the Humanities (MITH) at the University of Maryland as a means of illustrating the kinds of resources and expertise a working digital humanities center can bring to the table when confronted with the range of materials that archives and manuscript repositories will increasingly be receiving.

## II.

Jacques Derrida famously diagnosed the contemporary fixation on archives as a malady, an “archive fever”: “Nothing is less reliable, nothing is less clear today than the word ‘archive,’” he tells us [Derrida 1995, 90]. In one sense that is indisputable: the work of recent, so-called “postmodern” archives thinkers and practitioners such as Brien Brothman, Terry Cook, Carolyn Heald, and Heather MacNeil have all (as John Ridener has convincingly shown [Ridener 2009]) laid stress on core archival concepts, including appraisal, original order, provenance, and the very nature of the record. The archives profession has thus witnessed a lively debate about evidence, authenticity, and authority in the pages of its leading journals and proceedings. Derrida would also remind us of the etymological ancestry of archives in the original Greek *Arkhe*, which does double duty as a form of both custodianship and authority; yet as a modern and self-consciously theorized avocation, the archives profession is in fact relatively young. The first consolidated statement of major methodological precepts, the so-called Dutch Manual, was published in 1898. In the United States, the National Archives and Records Administration that is the repository of the Whitman papers recovered by Ken Price did not even exist as a public institution until 1934; and the American archives community would not have a coherent set of guidelines until the 1957 publication of Theodore Roosevelt Schellenberg’s *Modern Archives: Principles and Techniques*. (There Schellenberg staked out a philosophy of practice for American archives in the face of a massive influx of

records from rapidly expanding post-war federal agencies.)

Today's changes and transitions in the archives profession are brought about not only by the rise of the born-digital but also the popularization and distribution — arguably, the democratization — of various archival functions. Archival missions and sensibilities are now claimed by activist groups like Jason Scott's Archives Team, which springs into action, guerilla fashion, to download endangered data and redistribute it through rogue torrent sites, or else the International Amateur Scanning League and the Internet Archive, as well as the signature Citizen Archivist initiative of Archivist of the United States David Ferriero. The public at large seems increasingly aware of the issues around digital preservation, as people's personal digital mementos — their Flickr photographs and Facebook profiles, their email, their school papers, and whatever else — are now regarded as assets and heirlooms, to be preserved and passed down. Organizations such as the National Digital Information Infrastructure and Preservation Program (NDIIPP) in the United States and the European WePreserve coalition have each gone to great lengths to build public awareness and engage in outreach and training. Still, the personal information landscape is only becoming more complex. Typical users today have multiple network identities, some mutually associating and some not, some anonymous some not, some secret some not, all collectively distributed across dozens of different sites and services, each with their own sometimes mutually exclusive and competing end user license agreements and terms of service, each with their own set of provisions for rights ownership and transfer of assets to next of kin, each with their own separate dependencies on corporate stability and commitments to maintaining a given service or site. For many now their born-digital footprint begins literally in utero, with an ultrasound JPEG passed from Facebook or Flickr to family and friends, soon be augmented by vastly more voluminous digital representations as online identity grows, matures, proliferates, and becomes a life-long asset, not unlike financial credit or social security, and perhaps one day destined for Legacy Locker or one of the other digital afterlife data curation services now becoming popular.

9

At the same time, however, the definition of archives has been codified to an unprecedented degree as a formal model or ontology, expressed and embodied in the Open Archival Information System, a product of the Consultative Committee for Space Data Systems adopted as ISO Standard 14721 in the year 2002. This point is worth reinforcing: over the last decade the OAIS has become *the* canonical authority for modeling workflows around ingest, processing, and provision of access in an archives; it establishes, at the level of both people and systems, what any archives, digital or traditional, must do in order to act as a guarantor of authenticity:

10

The reference model addresses a full range of archival information preservation functions including ingest, archival storage, data management, access, and dissemination. It also addresses the migration of digital information to new media and forms, the data models used to represent the information, the role of software in information preservation, and the exchange of digital information among archives. It identifies both internal and external interfaces to the archive functions, and it identifies a number of high-level services at these interfaces. It provides various illustrative examples and some "best practice" recommendations. It defines a minimal set of responsibilities for an archive to be called an OAIS, and it also defines a maximal archive to provide a broad set of useful terms and concepts. [Consultative Committee for Space Data Systems 2002]

The contrast between the fixity of the concept of archives as stipulated in the OAIS Reference Model and the fluid nature of its popular usage is likewise manifest in the migration of "archive" from noun to verb. The verb form of archive is largely a twentieth-century construction, due in no small measure to the influence of computers and information technology. To archive in the realm of computation originally meant to take something offline, to relegate it to media which are not accessible or indexical via random access storage. It has come to do double duty with the act of *copying*, so archiving is coterminous with duplication and redundancy. In the arena of digital networking, an archive connotes a mirror or reflector site, emulating content at remote hosts to reduce the physical distance information packets have to travel. In order to function as a reliable element of network architecture, however, the content at each archive site must be guaranteed as identical. This notion of the archive as mirror finds its most coherent expression in the initiative now known as LOCKSS, or Lots of Copies Keep Stuff Safe, the recipient of multiple multi-million dollar grants and awards from public and private funding sources.

11

An archives as a noun (and a plural one at that) was the very antithesis of such notions. Not lots of copies, but one unique artifact or record to keep safe. Unique and irreplaceable; or "records of enduring value," as the Society of American Archivists says in its definition. But no digital object is ever truly unique, and in fact our best practices rely on the assumption that they never can be. As Luciana Duranti has put it, "In the digital realm, we can only persevere our ability to reconstruct or reproduce a document, not the document itself." There is a real sense, then, in which the idea of archiving something digitally is a contradictory proposition, not only or primarily because of the putative instability of the underlying medium but also because of fundamentally different understandings of what archiving actually entails. Digital memory is, as the German media theorist Wolfgang Ernst has it in his brilliant reading of archives as "agencies of cultural feedback" [Ernst 2002], a simulation and a "semantic archaism." "What we call memory," he continues, "is nothing but information scattered on hard or floppy disks, waiting to be activated and recollected into the system of data processing" [Ernst 2002, 109]. In the digital realm there is a real sense, a *material* sense, in which archive can only ever *be* a verb, marking the latent potential for reconstruction and reconstitution.

12

This palpable sense of difference with regard to the digital has given rise to a series of discourses which struggle to articulate its paradoxical distance and disconnect with the ultimately unavoidable truth that nothing in this world is ever truly immaterial. Nick Montfort and Ian Bogost have promoted "platform studies" as a rubric for attention to the physical constraints embodied in the hardware technologies which support computation; in Europe and the UK, "media archaeology" (of which Ernst is but one exemplar) has emerged as

13

the heir to the first-wave German media theory pioneered by Friedrich Kittler; Bill Brown, meanwhile, has given us “thing theory”; Kate Hayles, “media-specific analysis”; Wendy Chun favors the conceit of the “enduring ephemeral”; I myself have suggested the dualism of forensic and formal materiality, and I have seen references in the critical literature to continuous materiality, vital materiality, liminal materiality, and weird materiality as well. All of these notions find particular resonance in the realm of archives, since an archives acts as a focalizer for, as Bill Brown might put it, the *thingness of things*, that is the artifactual aura that attends even the most commonplace objects. The radical reorientation of subjectivity and objectivity implicit in this world view is also the ground taken up by the rapidly rising conversation in object-oriented ontology (OOO), including Bogost (again) in *Alien Phenomenology*, as well as various strains of post-humanism, and the new materialism of political philosophy thinkers like Diana Coole and Samantha Frost.

Clearly, then, questions about objects, materiality, and things are once again at the center of a vibrant interdisciplinary conversation, driven in no small measure by the obvious sense in which digital objects can — demonstrably — function as a “primary records” (in the MLA’s parlance), thereby forcing a confrontation between our established notions of fixity and authenticity and the unique ontologies of data, networks, and computation. Abby Smith puts it this way:

14

When all data are recorded as 0’s and 1’s, there is, essentially, no object that exists outside of the act of retrieval. The demand for access creates the “object,” that is, the act of retrieval precipitates the temporary reassembling of 0’s and 1’s into a meaningful sequence that can be decoded by software and hardware. A digital art-exhibition catalog, digital comic books, or digital pornography all present themselves as the same, all are literally indistinguishable one from another during the storage, unlike, say, a book on a shelf. [Smith 1998]

The OAIS reference model handles this Borgesian logic paradox through a concept known as Representation Information, which means that it is incumbent upon the archivist to document all of the systems and software required to recreate or reconstitute a digital object at some future point in time — a literal object lesson in the sort of unit operations Bogost now advocates to express the relationships between “things.” “[I]n order to preserve a digital object,” writes Kenneth Thibodeau, Director of Electronic Records Programs at the National Archives and Records Administration, “we must be able to identify and retrieve all its digital components.”

15

Here I want to go a step further and suggest that the preservation of digital objects is *logically inseparable* from the act of their creation — the lag between creation and preservation collapses completely, since a digital object may only ever be said to be preserved *if* it is accessible, and each individual access creates the object anew. One can, in a very literal sense, *never* access the “same” electronic file twice, since each and every access constitutes a distinct instance of the file that will be addressed and stored in a unique location in computer memory. The analogy as it is sometimes given is if one had to build a Gutenberg press from scratch, set the type (after first casting it from molds, which themselves would need to be fabricated), and print and bind a fresh copy of a book (first having made the paper, spun the sewing thread, mixed the glue, etc.) each and every time one wanted to open one. In the terms I put forth in *Mechanisms*, each access engenders a new logical entity that is forensically individuated at the level of its physical representation on some storage medium. Access is thus duplication, duplication is *preservation*, and preservation is creation — and recreation. That is the catechism of the .txtual condition, condensed and consolidated in operational terms by the click of a mouse button or the touch of a key.

16

### III.

In May of 2007 the Maryland Institute for Technology in the Humanities (MITH) at the University of Maryland acquired a substantial collection of computer hardware, storage media, hard-copy manuscripts, and memorabilia from the author, editor, and educator Deena Larsen. MITH is not an archives in any formal institutional sense: rather, it is a working digital humanities center, with a focus on research, technical innovation, and supporting new modes of teaching, scholarship and public engagement. While this poses some obvious challenges in terms of our responsibilities to the Larsen Collection, there are also some unique opportunities. Without suggesting that digital humanities centers summarily assume the functions of archives, I want to describe some of the ways in which MITH was positioned to embrace the opportunity to receive a large complex assemblage of born-digital materials, how the availability of these materials has furthered a digital humanities research agenda, and how that research agenda is in turn creating new models for the stewardship of such a collection.

17

Deena Larsen (b. 1964) has been an active member of the creative electronic writing community since the mid-1980s. She has published two pieces of highly-regarded hypertext fiction with Eastgate Systems, *Marble Springs* (1993) and *Samplers* (1997), as well as additional works in a variety of outlets on the Web. A federal employee, she lives in Denver and is a frequent attendee at the annual ACM Hypertext conference, the meetings of the Electronic Literature Organization (where she has served on the Board of Directors), and kindred venues. Crucially, Larsen is also what we might nowadays term a “community organizer”: that is, she has an extensive network of correspondents, regularly reads drafts and work in progress for other writers, and is the architect of some landmark events, chief amongst them the CyberMountain writers’ workshop held outside of Denver in 1999. As she herself states:

18

I conducted writers workshops at these conferences and even online. We worked together to develop critiques — but more importantly methods of critiques — of hypertext, as well as collections of schools of poetry, lists and groups. And thus I have been lucky enough to receive and view texts in their infancy — during the days when we thought

floppy disks would live forever. And thus I amassed this chaotic, and perhaps misinformed treasure trove that I could bequeath to those interested in finding the Old West goldmines of the early internet days. [Larsen 2009]

What this means for the collection at MITH is that in addition to her own writing and creative output, Larsen also possessed a broad array of material by other electronic literature authors, some of it unpublished, unavailable, or believed otherwise lost, effectively making her collection a cross-section of the electronic writing community during its key formative years (roughly 1985-2000). The files contain multiple versions of nationally recognized poet William Dickey's electronic works, Dickey's student work, nationally recognized poet Stephanie Strickland's works, M.D. Coverley's works, Kathryn Cramer's works, *If Monks had Macs*, the *Black Mark* (a hypercard stack developed at the 1993 ACM Hypertext conference), *Izme Pass*, Chris Willerton's works, Mikael And's works, Jim Rosenberg's works, Michael Joyce and Carolyn Guyer's works that were in progress, Stuart Moulthrop's works, George Landow's works and working notes, textual games from Nick Montfort, *Coloring the Sky* (a collaborative work from Brown in 1992-94), and Tom Trelogan's logic game. Most of the data are on 3½-inch diskettes (over 800 of them) or CD-ROMs. The Deena Larsen Collection also includes a small number of Zip disks, and even some audiovisual media such as VHS tapes and dictation cassettes. The hardware at present consists of about a dozen Macintosh Classics, an SE, and a Mac Plus (these were all machines that Deena used to install instances of her *Marble Springs*), as well as a Powerbook laptop that was one of her personal authoring platforms. All of this is augmented by a non-trivial amount of analog archival materials, including hard-copy manuscripts, newspaper clippings, books, comics, operating manuals, notebooks (some written in Larsen's encrypted invented personal alphabet), syllabi, catalogs, brochures, posters, conference proceedings, ephemera, and yes, even a shower curtain, about which more below.

19

Some may wonder what led Larsen to MITH in the first place. The circumstances are particularized and not necessarily easily duplicated even if that were desirable. First, Deena Larsen and I had a friendly working relationship; we had met some years ago on the conference circuit, and I had corresponded with her about her work (still unfinished) editing William Dickey's HyperCard poetry. MITH was also, at the time, the institutional home of the Electronic Literature Organization, and our support for ELO signaled our interest in engaging contemporary creative forms of digital production as well as more the more traditional cultural heritage that is the mainstay of digital humanities activities. The Electronic Literature Organization, for its part, had a record of raising questions about the long-term preservation and accessibility of the work of its membership: at a UCLA conference in 2001, N. Katherine Hayles challenged writers, scholars, and technologists to acknowledge the contradictions of canon formation and curriculum development, to say nothing of more casual readership, in a body of literature that is obsolescing with each new operating system and software release. The ELO responded with an initiative known as PAD which produced the widely-disseminated pamphlet *Acid-Free Bits* that furnished writers with practical steps they could take to begin ensuring the longevity of their work, as well as a longer, more technical and ambitious white paper, "Born Again Bits," which outlined a theoretical and methodological paradigm based on an XML schema and a "variable media" approach to the representation and reimplementing of electronic literary works. Given ELO's residency at MITH, and MITH's own emerging research agenda in these areas (in addition to the ELO work, the Preserving Virtual Worlds project had just begun), Larsen concluded that MITH was well positioned to assume custody of her collection.

20

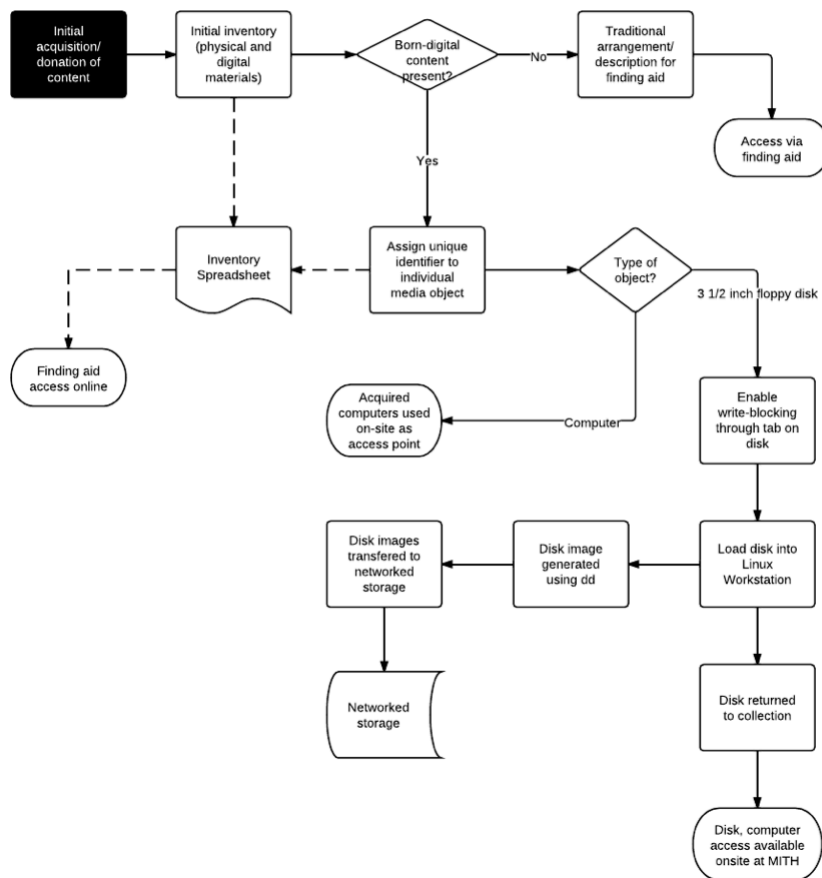
From MITH's perspective, the Deena Larsen Collection was an excellent fit with our mission and sense of purpose as a digital humanities center. Our emerging research agendas in digital preservation argued in favor of having such a collection in-house, one that could function as a testbed and teaching resource. Our connections at the University of Maryland's Information School, which includes an archives program, further encouraged us in this regard. Finally and most frankly, MITH was in a position to operate free of some of the limitations and constraints that a library special collections unit would face if it acquired the same material. Because our institutional mandate does *not* formally entail the stewardship of records of enduring value, we enjoy the privilege of picking and choosing the things we think will be interesting to work on. There are no deadlines with regard to processing the collection nor is it competing with other processing tasks. We were free to create our own workflows and milestones, which was essential given the experimental nature of much of the material. We are free to experiment and take risks and, even, dare I say it, mess up.

21

Professional archives create workflows to manage the many steps involved in the appraisal, accession, arrangement, description, and preservation of the documents and records entrusted to their care. Once a deed of gift had been signed, our initial efforts consisted in what an archivist would term arrangement and description, eventually resulting in a pair of Excel spreadsheets which function as finding aids (see Figure 1, below, for a schematic of our complete workflow). No effort was made to respect the original order of the materials, an archival *donnée* that makes sense for the records of a large organization but seemed of little relevance for an idiosyncratic body of materials we knew to have been assembled and packed in haste. Several things about the collection immediately became apparent to everyone who worked on it. First and most obviously, it was a hybrid entity: both digital and analog materials co-existed, the digital files themselves were stored on different kinds of media and exhibited a multiplicity of different formats, and most importantly of all, the digital and analog materials manifested a complex skein of relationships and dependencies. *Marble Springs* alone (or portions thereof) exists in multiple digital versions and states on several different kinds of source media, as well as in bound drafts of Larsen's MA thesis, in notes and commentary in her journals, and as a sequence of laminated screenshots mounted on a vinyl shower curtain and connected by colored yarn to map the affective relations between the nodes. Second, as noted above, the Collection was not solely the *fonds* of Deena Larsen herself; it includes numerous works by other individuals, as well as third party products such as software, some of it licensed and some of it not, some of it freeware, abandonware, and greyware. (This alone would likely have proved prohibitive had special collections

22

here on campus sought to acquire this material; while the deed of gift makes no warrant as to copyright, the provisions of the Digital Millennium Copyright Act raise questions about the legality of transferring software without appropriate licensing, a contradiction that becomes a paralyzing constraint when dealing with a large, largely obsolesced collection such as this.) The Larsen Collection is thus a *social* entity, not a single author's papers. Finally, of course, the nature of the material is itself highly ambitious, experimental, and avant garde. Larsen and the other writers in her circle used software that was outside of the mainstream, and indeed sometimes they invented their own software and tools; their works often acknowledge and include the interface and hardware as integral elements, thus making it difficult to conceive of a satisfactory preservation program based on migration alone; and much of what they did sought to push the boundaries of the medium and raise questions about memory, representation, and archiving in overtly self-reflexive ways.



**Figure 1.** Provisional workflow for managing born-digital collections at MITH. Image courtesy of Marty Gengenbach, School of Information and Library Science, University of North Carolina at Chapel Hill. Used by permission.

None of this, I hasten to add, is new or unique to the Deena Larsen Collection in and of itself. All archival collections are “hybrid” and “social” to greater or lesser degrees, and all of them present challenges with regard to their materiality and their own status as records. But the Larsen Collection dramatizes and foregrounds these considerations in ways that other collections perhaps do not, and thus provides a vehicle for their hands-on exploration in a setting (MITH) that thrives on technical innovation and intellectual challenges.

23

In late 2011, Bill Bly, also an Eastgate author, agreed to consign his own considerable collection of electronic literature and author's papers to MITH, where it now joins Deena's materials. The two collections thus constitute a very substantial resource for those interested in the formative years of the electronic writing community. In time, we also hope to build functional connections to other archival collections of writers in Larsen and Bly's circle, notably the Michael Joyce papers at the Harry Ransom Center, and Duke University Library, which has collected the papers of Judy Malloy and Stephanie Strickland. The Deena Larsen Collection was one of several collections surveyed in a multi-institutional NEH-funded report on “Approaches to Managing and Collecting Born-Digital Literary Content for Scholarly Use,” and is currently being used as a testbed for the BitCurator environment under development by MITH and a team from the University of North Carolina at Chapel Hill's School of Information and Library Science. Other users have included graduate and undergraduate students at the University of Maryland. Recently we have also begun seeing external researchers seek access to the collection, requests which we are happy to accommodate. Leighton Christiansen, a Master's student in the Graduate School of Library and Information Science at the University of Illinois, spent several days at MITH in April 2011 researching the *Marble Springs* materials as part of his thesis on how to preserve the work. In May 2011, Deena herself visited the collection, for a two-week residence we immediately dubbed “Deenapalooza.” The MITH conference room was converted to something resembling a cross between a conservator's lab and a digital ER, as, first with Bill Bly, and then with Leighton (who returned) they worked to create a collaborative timeline of early electronic literature, restoring several key

24

works to functionality in the process, including Deena's never before seen 2nd edition of *Marble Springs*. A visit from a team of ACLS-funded scholars working on early electronic literature is planned for the coming year. The image gallery below documents some of the holdings in the University of Maryland's Larsen and Bly Collection — consider it a proleptic archaeology of a future literary.



#### IV.

My first computers were Apples. I had a IIe and a IIc growing up, and, at my father's insistence both remained boxed at the back of a closet long after I had moved on to other hardware (and away from home). When my parents sold their house, however, I had to take custody of the machines or see them in a dumpster. I decided to relocate them to MITH, along with hundreds of 5¼-inch diskettes and a stack of manuals and early programming books. Not long afterwards Doug Reside arrived with his collection of Commodores, early software (including a complete run of Infocom's interactive fiction titles), and old computer magazines. Visitors to MITH began noticing our vintage gear. The calls and emails began. "I have a TRS-80 Model 100... are you interested?" "What about this old Osborne?" "You know, I just found some Apple III disks..."

25

Initially the old computers were just interesting things to have around the office. Texture. Color. Conversation pieces. As MITH's research agenda around born-digital collections took shape, however, we began to realize that the machines served a dual role: on the one hand objects of preservation in and of themselves, artifacts that we sought to sustain and curate; but on the other hand, the vintage systems served as functional instruments, invaluable assets to aid us in retrieving data from obsolescent media and understanding the material affordances of early computer systems. This dual-use model sidesteps the OAIS mandate that information be retained in an "independently understandable" form. While the Reference Model acknowledges that such criteria will be "in general, quite subjective," the essential concept here is that of Representation Information, as introduced in section II above. Best practices for provision of Representation Information for complex born-digital objects, including software, are still very much evolving; one set of examples has been provided by the Preserving Virtual Worlds project, which has documented and implemented a complete OWL schema for its content packaging, though that kind of high-end curatorial attention is unlikely to scale. Indeed, in the case of the Larsen Collection, limited resources have meant limited measures. We knew that one early priority had to be migrating data from the original storage media, and so we have made an initial pass at imaging the roughly 800 3½-inch diskettes, with around an 80% success rate; however, the resulting images do not have any associated metadata ("Preservation Description Information" in OAIS parlance), and in practice we have maintained them merely as a "dark archive," that is an offline repository with no provision for general access.

26

Our best Representation Information is, one could argue, *embodied* in the working hardware we maintain for access to the original media. In other words, we rely largely on the vintage computers in the Larsen Collection for access to data in legacy formats. Bill Bly, when he

27

visited MITH, spoke unabashedly about the joy he felt in firing up the old hardware, the dimensions and scale of his real-world surroundings instantly contracting and realigning themselves to the 9-inch monochrome display of the Mac Classic screen, a once familiar focalizer. Nonetheless, the contention that so vital an aspect of the OAIS as Representation Information can be said to be “embodied” in a piece of hardware is bound to be controversial, so let me attempt to anchor it with some additional context.

Wolfgang Ernst, quoted earlier, has emerged as one of the more provocative figures in the loose affiliation of thinkers self-identifying with media archaeology. As Jussi Parikka has documented, for Ernst, media archaeology is not merely the excavation of neglected or obscure bits of the technological past; it is a methodology that assumes the primacy of machine actors as autonomous agents of representation. Or in Ernst’s own words, rather more lyrically: “media archeology is both a *method and aesthetics* of practicing media criticism [...] an awareness of moments when media themselves, not exclusively human any more, become active ‘archeologists’ of knowledge” [Parikka 2011, 239]. What Ernst is getting at is a semiotic broadening beyond writing in the literary symbolic sense to something more like inscription and what Parikka characterizes as “a materialism of processes, flows, and signals”; and the flattening of all data as traces inscribed on a recording medium which Ernst dubs “archaeography,” the archive writing itself. What separates digital media and practices of digital archiving radically from the spatial organization of the conventional archive (embodied as physical repository) is the so-called “time-criticality” of digital media, the inescapable temporality that accounts for observations such as Duranti’s about the errant ontology of digital documents. Indeed, while the chronological scope of the Larsen Collection is easily circumscribed, it resists our instinct toward any linear temporal trajectory. On the one hand, the avant garde nature of the material is such that traditional procedures of appraisal, arrangement and description, and access must be challenged and sometimes even overruled. On the other hand, however, the media and data objects that constitute the born-digital elements of the Collection are themselves obsolescing at a frightening rate. This ongoing oscillation between obsolescence and novelty, which manifests itself constantly in the workflows and routines we are evolving, is characteristic of the .txtual condition as I have come to understand it; or as Wolfgang Ernst puts it (2011), seemingly to confirm Bly’s observations above, “ ‘Historic’ media objects are radically present when they still function, even if their outside world has vanished” [Ernst 2011, 241].

28

While the OAIS never specifically stipulates it, the assumption is that Representation Information must ultimately take the form of human-readable text. The Reference Model does incorporate the idea of a “Knowledge Base,” and offers the example of “a person who has a Knowledge Base that includes an understanding of English will be able to read, and understand, an English text” [Consultative Committee for Space Data Systems 2002]. Lacking such a Knowledge Base, the Model goes on to suggest, Representation Information would also have to include an English dictionary and grammar. We have what I would describe as an epistemological positivism, one that assumes that a given chain of symbolic signification will ultimately (and consistently) resolve to a stable referent. Thus one might appropriately document a simple text file by including a pointer to a reference copy of the complete ASCII standard, the supposition being that a future member of the designated user community will then be able to identify the bitstream as a representation of ASCII character data, and apply an appropriate software decoder. Yet Ernst’s archaeography is about precisely displacing human-legible inscriptions as the ultimate arbiters of signification. The examples he gives, which are clearly reminiscent of Friedrich Kittler’s writings on the technologies of modernity, include ambient noise embedded in wax cylinder recordings and random details on a photographic negative, for instance (and this is my example, not Ernst’s) in the 1966 film *Blow-Up* where an image is placed under extreme magnification to reveal a detail that divulges the identity of a murderer. For Ernst, all of these semiotic events are flattened by their ontological status as data, or a signal to be processed by digital decoding technologies that makes no qualitative distinction between, say, a human voice and background noise. In this way “history” becomes a form of media, and the writing of the literary — its alphabetic semantics — is replaced by signal flows capturing the full spectrum of sensory input.

29

What becomes dubious from the standpoint of archival practice — affixing the OAIS concept of Representation Information to actual hardware and devices — thus becomes a legitimate mode of media archaeology after Ernst, and indeed Ernst has enacted his approach in the archaeological media lab at the Institute of Media Studies in Berlin, where “old machines are received, repaired, and made operational...all of the objects are characterized by the fact that they are operational and hence relational, instead of collected merely for their metadata or design value” [Parikka 2011, 64 [caption]]. A similar approach has been adopted by Lori Emerson at the University of Colorado at Boulder, where she has established an Archeological Media Lab: “The Archeological Media Lab...is propelled equally by the need to maintain access to early works of electronic literature...and by the need to archive and maintain the computers these works were created on.” More recently, Nick Montfort at MIT has opened the “Trope Tank,” a laboratory facility that makes obsolete computer and game systems available for operative use. Thus, the Deena Larsen Collection, housed within a digital humanities center, begins to take its place in a constellation of media archaeological practices that take their cues from both the professionalized vocation of archival practice as well as the theoretical precepts of media archaeology, platform studies, and related endeavors.

30

Media archaeology, which is by no means co-identical with the writings and positions of Ernst, offers one set of critical tools for coming to terms with the .txtual condition. Another, of course, is to be found in the methods and theoretical explorations of textual scholarship, the discipline from which McGann launched his ongoing program to revitalize literary studies by restoring to it a sense of its roots in philological and documentary forms of inquiry. As I’ve argued at length elsewhere, the field that offers to most immediate analog to bibliography and textual criticism in the electronic sphere is computer forensics, which deals in authenticating, stabilizing, and recovering digital data. One early commentator is prescient in this regard: “much will be lost, but even when disks become unreadable, they may well

31



contain information which is ultimately recoverable. Within the next ten years, a small and elite band of e-paleographers will emerge who will recover data signal by signal" [Morris 1998, 33]. Digital forensics is the point of practice at which media archaeology and digital humanities intersect. Here then is a brief .txtual tale from the forensics files.

Paul Zelevansky found me through a mutual contact. I'd like to imagine the scene beginning with his shadow against my frosted glass door as if in an old private eye movie, but in truth we just exchanged e-mails. Paul is an educator and artist who in the 1980s published a highly regarded trilogy of artist's books entitled *The Case for the Burial of Ancestors*. One of these also included a 5¼-inch floppy disk with a digital production called *Swallows*. It was formatted for the same Apple II line of computers I once worked on, and programmed in Forth-79. For many years, Paul had maintained a vintage Apple that he would occasionally boot up to revisit *Swallows*, but when that machine gave up the ghost he was left with only the disks, their black plastic envelopes containing a thin circular film of magnetic media that offered no way to decipher or transcribe their contents. The bits, captured on disks you could hold in your hand, may as well have been on the moon.

32

So Paul came to see me, and we spent an afternoon in my office at the University of Maryland using my old computing gear and a floppy disk controller card to bring *Swallows* back to life (see Figure 15).

33



Figure 15. Components of a forensic media imaging workstation at the Maryland Institute for Technology in the Humanities.

The actual process was trivial: it succeeded on the first try, yielding a 140-kilobyte "image" file, the same virtual dimensions as the original diskette. We then installed an Apple II emulator on Paul's Mac laptop and booted it with the disk image. (An emulator is a computer program that behaves like an obsolescent computer system. Gaming enthusiasts cherish them because they can play all the old classics from the arcades and consoles, like the Atari 2600.) The emulator emitted the strident beep that a real Apple would have made when starting up. It even mimicked the sounds of the spinning drive, a seemingly superfluous effect, except that it actually provides crucial aural feedback — a user could tell from listening to the drive whether the computer was working or just hung up in an endless loop. After a few moments, *Swallows* appeared on the Apple II screen, a Potemkin raster amid the flotsam and jetsam of a 21st-century desktop display.

In February 2012, Paul released *Swallows 2.0*, which he describes as a "reworking" of the original. (The piece relies upon video captures from the emulation intermixed with new sound effects and motion sequences.) The disk image of the original, meanwhile, now circulates among the electronic literature community with his blessing. As satisfying as it was retrieving *Swallows*, however, meet-ups arranged through e-mail to recover isolated individual works are not a broadly reproducible solution. Most individuals must still be their own digital caretakers. In the 21st century, bibliographers, scholars, archaeologists, and archivists must be wise in the ways of a past that comes packaged in the strange cant of disk operating systems and single- and double-density disks.

34

## V.

The work of this essay has been in triangulating among the conditions of the future literary with the shape of its archives and the emergence of the digital humanities as an institutionalized field. Yet even as the material foundations of the archival enterprise are shifting as a result of the transformations wrought by what I have been calling the .txtual condition, archivists who are actively engaging with the challenges presented by born-digital materials remain a minority within their profession. The issues here are manifold: most have to do

35

with limited resources in an era of fiscal scarcity, limited opportunities for continuing education, and of course a still-emerging consensus around best practices for processing born-digital collections themselves, as well as the inchoate nature of many of the tools essential to managing digital archival workflows.

I and others have advocated for increased collaboration between digital archivists and digital humanities specialists. Yet collisions and scrapes and drive-bys on blogs and Twitter have also produced some unfortunate misunderstandings, many of them clustering around careless terminology (chief amongst which is doubtless the word “archive” itself — digital humanists have busied themselves with the construction of online collections they’ve dubbed “archives” since the early 1990s and suggestions for alternatives, such as John Unsworth’s “thematic resource collection,” have never fully caught on). Kate Theimer is representative of some of these tensions and frustrations when she insists “I don’t think it’s unfair to assert that some DHers don’t ‘get’ archives, and by ‘get’ I mean understand the principles, practice, and terminology in the way that a trained archivist does.” And, in a like vein, a blog posting from one digital humanist likewise invoking *Archive Fever* drew this stern comment: “Archival science is a discipline similar to library science. The[re] are graduate programs in this, and a Society of American Arch[iv]ists, which recently celebrated its 73rd birthday. So people have had these concerns long before Derrida in 1994” [Keathley 2010]. Or finally, as an archivist once said to me, “Yeah, I’ve had those conversations with scholars who come to me with a certain glimmer in their eye, telling me they’re going to problematize what I do.”

36

All three commentators are correct. Most important is not that digital humanists become digital archivists, but that each community think about how best to leverage whatever knowledge, insights, tools, and habits it has evolved so as to enter into fruitful joint collaborations. Over the last few years, because of the projects I’ve chosen to work on, I’ve been privileged to have an unusual degree of entrée into the deliberations and conversations within the professional archives community. What it comes down to is this: collaborating with archivists *means collaborating with archivists*. It means inviting them to your meetings and understanding their principles, practices and terminology, as well as their problems and points of view. It means acknowledging that they will have expertise you do not, respecting their disciplinary history and its institutions. Archivists are, as a community, exquisitely sensitized to the partial, peculiar, often crushingly arbitrary and accidental way that cultural records are actually preserved. They are trained to think not only about individual objects and artifacts but also about integrating these items into the infrastructure of a collecting repository that can ensure access to them over time, act as guarantors of their authenticity and integrity, perform conservation as required, and ensure continuance of custodianship.

37

Here then are some specifics I have considered as to how digital humanities might usefully collaborate with those archivists even now working on born-digital collections:

38

- Digital archivists need digital humanities researchers and subject experts to *use born-digital collections*. Nothing is more important. If humanities researchers don’t demand access to born-digital materials then it will be harder to get those materials processed in a timely fashion, and we know that with the born-digital every day counts.
- Digital humanists need the long-term perspective on data that archivists have. Today’s digital humanities projects are, after all, the repository objects of tomorrow’s born-digital archives. Funders are increasingly (and rightfully) insistent about the need to have a robust data management and sustainability plan built into project proposals from the outset. Therefore, there is much opportunity for collaboration and team-building around not only archiving and preservation, but the complete data curation cycle. This extends to the need to jointly plan around storage and institutional infrastructure.
- Digital archivists and digital humanists need common and interoperable digital tools. Open source community-driven development at the intersection of the needs of digital archivists, humanities scholars, and even collections’ donors should become an urgent priority. The BitCurator project MITH has undertaken with the School of Information and Library Science at UNC Chapel Hill is one example. Platforms like SEASR and Bamboo have the potential to open up born-digital collections to analysis through techniques such as data mining, visualization, and GIS, all of which have gained traction in digital humanities.
- Digital humanists need the collections expertise of digital archivists. Scholars in more traditional domains have long benefited from the knowledge of archivists and curators, who can come to know a collection intimately. In the same way, born-digital collections can be appraised with the assistance of the archivist who processed them, paving the way for discovery of significant content and interesting problems to work on. Likewise, archives offers the potential of alternative access models which are perhaps usefully different than those of the digital humanities community, which often insists upon open, unlimited access to everything in the here and now.
- Digital archivists need cyberinfrastructure. Here the digital humanities community has important lessons and insights to share. Many smaller collecting institutions simply cannot afford to acquire the technical infrastructure or personnel required to process complex born-digital materials. Fortunately, not every institution needs to duplicate the capabilities of its neighbors. Solutions here range from developing the means to share access to vintage equipment to distributed, cloud-based services for digital collections processing. Digital humanities centers have been particularly strong in furthering the conversation about arts and humanities cyberinfrastructure, and so there is the potential for much cross-transfer of knowledge here. Likewise, the various training initiatives institutionalized within the digital humanities community, such as the Digital Humanities Summer Institute, have much to offer to archivists.
- Digital archivists and digital humanists both need hands-on retro-tech know-how. Digital humanities curricula should therefore

include hands-on training in retro-tech, basic digital preservation practices like disk imaging and the use of a hex editor, basic forensic computing methodologies, exposure to the various hardware solutions for floppy disk controllers like the Software Preservation Society's KryoFlux, and introduction to basic archival tools and metadata standards, not only EAD but emerging efforts from constituencies like the Variable Media Network to develop schemas to notate and represent born-digital art and ephemera.

- Finally, digital archivists need the benefit of the kinds of conversations we've been having in digital humanities. I've learned, for example, that it's not obvious at many collecting institutions whether "digital archivist" should be a specialization, or whether archivists and personnel at all levels should be trained in handling digital materials at appropriate points in the archival workflow. This tracks strongly with conversations in digital humanities about roles and responsibilities vis-a-vis scholars, digital humanities centers, and programmers. The emergence of the alt-ac sensibility within digital humanities also offers a powerful model for creating supportive environments within archival institutions that are undergoing transformations in personnel and staff cultures.

This then is the research agenda I would put forward to accompany the .txtual condition, albeit expressed at a very high level. There is plenty of room for refinement and elaboration. But for those of us who take seriously the notion that the born-digital materials of today are the literary of tomorrow, what's at stake is nothing less than what Jerome McGann has pointedly termed "the scholar's art." This is the same impulse that sent Ken Price to the National Archives in search of scraps and jottings from Whitman, the bureaucratic detritus of the poet's day job. "Scholarship," McGann reminds us, "is a service vocation. Not only are Sappho and Shakespeare primary, irreducible concerns for the scholar, so is any least part of our cultural inheritance that might call for attention. And to the scholarly mind, every smallest datum of that inheritance has a right to make its call. When the call is heard, the scholar is obliged to answer it accurately, meticulously, candidly, thoroughly" [McGann 2006, ix].

39

Stirring words, but if we are to continue to answer that call, and if we are to continue to act in the service of that art, then we must commit ourselves to new forms of curricula and training, those tangible methods of media archaeology and digital paleography; we must find new forms of collaboration, such as those that might come into being between digital humanities centers or media labs and archives and other cultural heritage institutions; we must fundamentally reimagine our objects of study, to embrace the poetics (and the science) of signal processing and symbolic logic alongside of alphabetic systems and signs; and we must learn to form new questions, questions addressable to what our media now inscribe in the objects and artifacts of the emerging archives of the .txtual condition — even amid circumstances surely as quotidian as those of Whitman and his clerkship.

40

## Acknowledgements

A shorter and differently focused version of this essay is forthcoming in a collection entitled *Comparative Textual Media*, edited by N. Katherine Hayles and Jessica Pressman. I am grateful to them for allowing me to work from and significantly expand that base of prose in my contribution here. The several paragraphs in section IV concerning Paul Zelevanksy's SWALLOWS originally appeared in slightly different form in an essay entitled "Bit by Bit" in the *Chronicle of Higher Education*, March 10, 2012.

41

Numerous archivists and information professionals have been welcoming and generous in helping me learn more about their discipline, but in particular I am grateful to Paul Conway, Bradley Daigle, Rachel Donahue, Luciana Duranti, Erika Farr, Ben Fino-Radin, Jeremy Leighton John, Leslie Johnston, Kari Kraus, Cal Lee, Henry Lowood, Mark Matienzo, Jerome McDonough, Donald Mennerich, Courtney Mumma, Trevor Muñoz, Naomi Nelson, Erin O'Meara, Richard Ovenden, Trevor Owens, Daniel Pitti, Gabriela Redwine, Doug Reside, Jason Scott, Seth Shaw, Kate Theimer, and Kam Woods. I am also grateful to the anonymous readers for DHQ, as well as Jessica Pressman and Lisa Swanstrom, for their comments on drafts of this essay; and to the organizers and audience at the 2011 Digital Humanities Summer Institute, where portions of this were presented as the Institute Lecture. My dedication to Jerome McGann (his virtual essence) acknowledges the influence he has had throughout my thought and career.

42

## Works Cited

**Consultative Committee for Space Data Systems 2002** Consultative Committee for Space Data Systems. *Reference Model for an Open Archival Information System (OAIS)*. Washington DC: CCSDS Secretariat, 2002. <http://public.ccsds.org/publications/archive/650x0b1.pdf>.

**Derrida 1995** Derrida, Jacques. *Archive Fever*. Chicago: University of Chicago Press, 1995.

**Duranti 2010** Duranti, Luciana. "A Framework for Digital Heritage Forensics". Presented at *Computer Forensics and Born-Digital Content*, sponsored by (2010).

**Ernst 2002** Ernst, Wolfgang. "Agencies of Cultural Feedback: The Infrastructure of Memory". In Brian Neville and Johanne Villeneuve, eds., *Waste-Site Stories: The Recycling of Memory*. Albany: SUNY Press, 2002. pp. 107-120.

**Ernst 2011** Ernst, Wolfgang. "Media Archaeology: Method and Machine versus History and Narrative of Media". In Erkki Huhtamo and Jussi Parikka, eds., *Media Archeology: Approaches, Applications, Implications*. Berkeley: University of California Press, 2011. pp. 239-255.

**Grossman 2010** Grossman, Lev. "Jonathan Franzen: Great American Novelist". *Time* (August 12 2010).

- Hall 2011** Hall, Chris. "JG Ballard: Relics of a Red-Hot Mind". *The Guardian* (August 3 2011).
- Howard 2011a** Howard, Jennifer. "In Electric Discovery, Scholar Finds Trove of Walt Whitman Documents in National Archives". *Chronicle of Higher Education* (April 12 2011).
- Howard 2011b** Howard, Jennifer. "U. of Texas Snags Archive of Cyberpunk Literary Pioneer Bruce Sterling". *Chronicle of Higher Education* (March 8 2011).
- Keathley 2010** Keathley, Elizabeth. *Blog comment. The Archive or the Trace: Cultural Permanence and the Fugitive Text. SampleReality*. January 19 2010. <http://www.samplerereality.com/2010/01/18/the-archive-or-the-trace-cultural-permanence-and-the-fugitive-text/>.
- Larsen 2009** Larsen, Deena. *Artist's Statement. The Deena Larsen Collection*. College Park: MITH, 2009. <http://mith.umd.edu/larsen/items/show/165>.
- Lavoie 2004** Lavoie, Brian F. *The Open Archival Information System Reference Model: Introductory Guide*. Dublin: OCLC, 2004.
- MLA 1995** Modern Language Association. *Statement on the Significance of Primary Records*. New York: MLA, 1995. [www.mla.org/primary\\_records1](http://www.mla.org/primary_records1).
- McDonough 2010** McDonough, Jerome, et al. *Preserving Virtual Worlds Final Report*. Champaign: IDEALS, 2010.
- McGann 2006** McGann, Jerome. *The Scholar's Art: Literary Studies in a Managed World*. Chicago: Chicago University Press, 2006.
- Morris 1998** Morris, R.J. "Electronic Documents and the History of the Late Twentieth Century: Black Holes or Warehouses?". In Edward Higgs, ed., *History and Electronic Artefacts*. Oxford: Oxford University Press, 1998. pp. 31-48.
- Parikka 2011** Parikka, Jussi. "Operative Media Archeology: Wolfgang Ernst's Materialist Media Diagrammatics". *Theory, Culture, & Society* 28: 5 (September 2011), pp. 52-74.
- Ridener 2009** Ridener, John. *From Polders to Postmodernism: A Concise History of Archival Theory*. Duluth: Litwin, 2009.
- Ross 1999** Ross, Seamus, and Ann Gow. *Digital Archaeology: Rescuing Neglected and Damaged Data Resources*. Glasgow: Humanities Advanced Technology and Information Institute, 1999. <http://www.ukoln.ac.uk/services/elib/papers/supporting/pdf/p2con.pdf>.
- Smith 1998** Smith, Abby. "Preservation in the Future Tense". *CLIR Issues* (1998).
- Stauffer 2011** Stauffer, Andrew M. "The Troubled Future of the 19th-Century Book". *Chronicle of Higher Education* (December 11 2011).
- Theimer 2012** Theimer, Kate. *Weblog comment. Two Meanings of Archival Silences and Their Implications. ArchivesNext*. March 28 2012. <http://www.archivesnext.com/?p=2653>.
- Thibodeau 2002** Thibodeau, Kenneth T. "Overview of Technological Approaches to Digital Preservation and Challenges in Coming Years". In *The State of Digital Preservation: An International Perspective*. Washington DC: Council on Library and Information Resources, 2002. <http://www.clir.org/pubs/reports/pub107/thibodeau.html>.



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.