

# The Tower, the Cloud, and Posterity

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The essays in this volume have dealt in a variety of ways with the possible impacts of ubiquitous networks, virtualization, open educational resources, open source software, social networks, and the evolving cloud of network-mediated services on the tower—the mission, programs, and services of the college and university. This essay focuses on the impact of the cloud on one critical aspect of the college or university mission—the identification and preservation of the spoken or written record of human activity.

Among other things, colleges and universities are storehouses. Gates and towers—in architecture and in metaphor—have served not only to isolate the life of the mind from the hubbub of the marketplace, but to preserve and protect scarce and sacred knowledge artifacts.<sup>1</sup> This is among our oldest and most precious charges. Like the monasteries and scriptoria that preceded Western universities, the modern college and university is an arbiter, transmitter, and guardian of culture and of the recorded record that comprises a great deal of humankind's shared memory. The question that arises, therefore, in the context of this volume is, Whither posterity? That is, how does the emergence of the cloud affect both the identification and preservation of society's "shared memories" and the role of the college and university in identifying and preserving this material?

This question, to a great extent, has defined the roles of college and university archivists, librarians, curators, and others for centuries. The authors believe that not only is this question of great import to the future of these noble professions, but the identification and preservation of shared memory is in fact the glue that holds culture together. Harvard University professor Chris Dede makes the case that the tacit epistemologies that underlie the technologies and behaviors characterized collectively as Web 2.0 "differ dramatically from [what Dede calls] the 'classical' perspective—the historic views of knowledge, expertise, and learning on which formal education is based." At stake, according to Dede, is a likely rethinking of the classical view of knowledge as consisting "of accurate interrelationships among facts, based on unbiased research that produces

compelling evidence about systemic causes.”<sup>2</sup> In our view, humankind’s assumptions about the nature of collections—what to collect and what to preserve—are rooted in what Dede calls classical epistemology.

## Record Keeping and Human Memory Sharing

To parse and address the issues of identifying and preserving shared memory that are raised by the cloud, it may be helpful to think of record keeping and human memory sharing in broad sweeps or epochs. Each epoch is defined to a very great extent by a new and disruptive technology or family of technologies.<sup>3</sup>

### Archivy 1.0

The selection and preservation of knowledge for the purpose of creating shared memories is not only a precondition for the development of culture but a survival skill. Pre-literate humans survived by documenting, on rocks and in caves, the existence and location of watering holes, dangers, religious places and objects, and hunts.

As well, many early human groups engaged in a specialized and purposeful form of storytelling. Oral speech was in many pre-literate cultures the dominant instrument for preserving and sharing human memory. This memorized form “was not the vernacular of casual conversation but an artificially managed language with special rules for memorization, one of which was rhythm.”<sup>4</sup> In the oral tradition, selecting knowledge for preservation was frequently a responsibility of a tribe or clan’s religious or secular leadership. The preservation of this knowledge involved an amazing, complex, and evolving web of social relationships and responsibilities ranging from inheritance of responsibility for storytelling from father to son, to the emergence of the epic tradition in poetry in ancient Greece and elsewhere. Even after the introduction of writing, vestiges of this oral tradition persist. Official transmitters included the ancient Greek heralds, Roman stentorians, and medieval *jongleurs* and town criers who traveled the European countryside and cities. Even contemporary religious sermonizers or present-day political campaigners might be included.<sup>5</sup> Officially sanctioned speakers have long been employed to entertain, transmit news, or generate sanctions for contemporary and historical events.

As a process for creating shared knowledge or wisdom and of preserving this wisdom, the oral tradition was highly effective and represents an important layer of the foundation on which much prehistoric civilization was built. The “recorded” oral knowledge was remarkably durable. Individuals who were

charged with transmitting socially constructed knowledge were taught things verbatim, and it was typically a responsibility that was only passed on to genetic heirs or to people who merited trust. Deviating from a script or improvisation was prohibited. Unless carriers of this knowledge died unexpectedly, the knowledge was reasonably secure and credible. Moreover, the source (provenance) of the information was also very clear. The village voice was always a designated person who was trained by his father, who had in turn been trained by his father, who had been trained by his father, and so on. The community could be really sure “where this information came from.”

The durability of knowledge preserved in this fashion, however, was eroded by the emergence of writing. Some of the old stories were recorded and preserved, some morphed into folklore and legend, and some disappeared altogether as oral traditions fell into disuse in the wake of an emergent written tradition.

## Archivy 2.0

If humankind’s first efforts to create and preserve shared memory consisted of chiseling an historical or mythological record in pictures in stone or transmitting spoken words to transmit culture, survival skills, and values, then the invention and adoption of writing—alphabetic knowledge—can be thought of as Archivy 2.0.

The creation of written language can be thought of in this context as the substitution of (1) one set of symbolic representations for another (written words for painted or etched pictures) and (2) one storage medium for another (animal skins, vellum, papyrus for cave walls, memory cells, air). The invention of writing and of storage media outside the human brain was revolutionary. The capacity to store shared memories increased immeasurably.

Archivist Oliver W. Holmes describes this as permitting the “beginning of a passive reservoir of knowledge.”<sup>6</sup> With this expanded capacity came (1) the need to systematize both shared memories *and* the physical artifacts that contained them and (2) the need to create a cadre of people skilled in the creation and interpretation of recorded knowledge. As well, shared memory now had physical mass and thus could not be carried from village to city in the minds of storytellers, elders, or other icons of the oral tradition. The challenge of these new realities gave rise to the emergence of libraries, like that in Alexandria, and of *bibliophylakes*, a special and influential class of officials charged with the creation, collection, care, protection, and interpretation of this precious reservoir. Central to the stature of *bibliophylakes* and their various successors such as librarians, archivists, clerks and others was trust. The oral tradition was rooted in the notion of *verbatim* transmission of information. While there were, no doubt, lapses of

accuracy, the oral tradition depended to a very great extent on the shared belief that knowledge that was officially transmitted was accurate. The emergence of writing and the limited spread of literacy meant that social trust needed to be spread farther than ever and that the risk of inaccuracy would also rise. Those charged with creating, collecting, and preserving the human record occupied high positions of trust, and writing—as a representation of reality—became subject to the corruptions of memory lapse, linguistic nuance, legibility, omission, miscopying, and fraud. The rarity of human written recordings and their vulnerability to a variety of threats makes scarcity the defining characteristic of shared memory in this epoch. Other terms that characterize the period (ending around the invention of movable type) might include *durable* (but vulnerable), *instrumental* (serving largely the power elites), and *tightly controlled*.

### Archivy 3.0

Archivy 2.0 centers on mediating human communications and recording knowledge through writing on portable media. The central features of Archivy 3.0 are our efforts to (1) produce repeatable verisimilitude in the printed word and images through mechanical means, (2) enlarge shared memory by proliferating recorded knowledge, and (3) expand the reach and influence of human activity through the spoken and written record. These shifts were tectonic in magnitude and shook the foundations of both how societies think about shared knowledge and how they determine what knowledge is to be preserved.

The cause of faithfulness in recorded information was aided by the emergence of the craft of printing. And, of course, the politics of information are continually changing in the face of (1) the increasing abundance of printed materials, (2) ever-expanding rates of literacy throughout the world, and (3) the emergence of English as the global language of business. The impact of printing and in particular of Gutenberg's movable type and the commercialization of abundant paper are well documented. These tectonic shifts resulted in a shift in record-keeping priorities and skills from a primary concern over protecting scarce texts to the concerns surrounding knowledge management—finding and evaluating information of value amidst an increasingly abundant documentary record. Two later technologies added to the disruptions that define this third epoch—photography and xerography. And, of course, this epoch witnessed the emergence of television and radio, whose impact on human communications cannot be minimized but which will not be examined in this essay.

In 1872, Leland Stanford hired the photographer Edward Muybridge to settle a bet about whether there was a point in a horse's gallop when all four hooves leave the ground. Four years later, Muybridge succeeded in capturing a horse in motion using a series of 50 cameras. The photographs

were published in a series called *The Horse in Motion* and show quite clearly that, contrary to popular belief, a horse did indeed lift all four hooves off the ground. Muybridge continued to perfect his method of freezing motion into smaller and smaller pieces of time. He produced hundreds of thousands of frozen images of motion of people and animals, including himself.

Photography revolutionized the way we thought about the world and our notions about what we could capture and keep. Photographs rendered their subjects more faithfully than words and drawings and could be reproduced faithfully. Photographers traveled the globe capturing, and thus preserving, monuments and artifacts from faraway lands for people who would never be able to witness these scenes firsthand. And for those who did venture far from home, photography made it possible to take family and home with you in the form of the family picture album. Moreover, as Muybridge first demonstrated, photography made it possible to capture that which was seemingly invisible, such as an instant in a horse's gallop, the microscopic world, and distant galaxies. Photography unleashed a revolution and passion for capturing the world around us. It was, perhaps, an innovation that was perfectly suited to Western society that had embraced empiricism, positivism, and scientific method.

The picture, it seemed, was worth a thousand words.

Sixty-five years after Muybridge captured the collective imagination with his photographs of horses in motion (1937), American law student Chester Carlson invented "a copying process based on electrostatic energy."<sup>7</sup> Carlson's electrostatic process faithfully reproduced words on a page in minutes. The importance of this innovation cannot be understated. This invention simultaneously gave scaling and verisimilitude huge shots in the arm and changed fundamentally the very nature of the "posterity problem." As David Owen put it, "It gave people an extraordinary means of preserving and sharing information, and it placed the rapid exchange of complicated ideas within the reach of everyone, becoming the biggest breakthrough in written communications since Gutenberg."<sup>8</sup>

Photography and xerography made it possible for an enormous number of people to share *identical* knowledge in different places at roughly the same time. For those charged with preserving a meaningful record of shared memory and human experience, these innovations represented a shift from an era of scarcity to one of abundance. This shift demanded fundamental shifts in the philosophy and craft of the archivist. With the proliferation of records came attendant needs to focus on the arrangement of records and on their provenance. As well, this proliferation fostered a growing need for people and for methods that could be trusted to facilitate the appraisal of newly abundant resources and selection of those few records that would faithfully serve the need for shared memory and historical documentation.

## Is the Past, Prologue?

The essence of the history of record keeping over the millennia to this point can be reduced to a series of broad concerns:

- Can esteemed and valuable information be *collected*?
- Can we *select* from among records collected those that will create meaningful and unbiased documentary record?
  - ◇ Who selects what becomes “shared memory”?
- Can this information be *protected and preserved*?
- Once collected and appraised for value, can information *be found*?
- *Who has access* to the information?
  - ◇ Under what conditions?
  - ◇ Who controls this access?
  - ◇ How easy or affordable is it to gain access?
- Can the information *be trusted*?
  - ◇ Is it credible?
  - ◇ Is it authentic?
  - ◇ Can we certify its authenticity?
  - ◇ Can we ascertain its provenance?

The shifts that we have described are truly tectonic in magnitude. They can be summarized in part as seen in Table 1.

The shifts from Archivy 1.0 to Archivy 2.0 set humankind on a fundamentally new path, and in many ways humanity’s past did not in fact prepare us well for the future. The shift from information scarcity to information abundance cannot be understated in either importance or extent. And study of the history of ideas tells us that the democratization of information must be viewed as a change of enormous magnitude whose far-reaching impacts would have been hard to predict.

**Table 1. From Archivy 1.0 to Archivy 2.0**

| FROM  | TO  |
|---|---|
| Human record is oral.   | Human record is written.  |
| Knowledge is scarce.  | Records are abundant.   |
| Archivists are scarce.  | Archivists are scarce.  |
| Recorded knowledge is durable.                                    | Recorded knowledge is durable.                                    |
| Recording of knowledge is representational (reasonably credible). | Recording of knowledge is literal or facsimile (highly credible). |
| Preoccupation with preservation.                                  | Preoccupation with selection and appraisal.                       |
| Information is accessible by elites.                              | Information is accessible by many.                                |
| Information is easy to find (if extant).                          | Information is difficult to find.                                 |
| Information is tightly controlled.                                | Control of information is distributed.                            |
| Provenance is clear.  | Provenance is often traceable.                                    |

## Archivy 4.0: The Digital Revolution

The shift from Archivy 3.0 to Archivy 4.0 is likely to be similarly potent. This is the shift to digital record keeping. While it has been only 60 years since the first electronic computers appeared in the 1940s, today virtually all information is created on computers and stored on optical, magnetic, or flash memory, tape, or other media. Digitization changes things profoundly.

### New Economics

The economics of digital record keeping derive not from the ever-increasing costs associated with labor, harvesting trees and refining paper, developing dyes for ink, labor, recycling expended materials, transporting logs, pulp and paper, and so forth but from the economics of innovation we call Moore's law. The cost of computing, storing, and transmitting digital information has declined by about 50 percent each passing 18-month period since the invention of the semiconductor. Using this rule of thumb it is likely that in less than 10 years it will be possible to store the complete collection of the Library of Congress on one's personal storage device. Within 18 years, we will be able to store the Library of Congress holdings on a key fob-sized memory device.<sup>9</sup>

### Information Is Superabundant

In 2007 computer industry analyst IDC reported that the world produced 281 exabytes of data that year.<sup>10</sup> This amounts to nearly 30,000 times the holdings of the Library of Congress. The amount of information published each year continues to grow. Nearly 300,000 books were published in 2006 alone, an increase of 0.5 percent from 2005 figures.<sup>11</sup> On July 31, 2006, *Technorati* tracked its 50 millionth blog and about 175,000 new blogs are created each day.<sup>12</sup> Podcasts, videos, blogs, wikis, and digital archives further expand our information sources, and 2.7 billion Google searches are performed each month. Despite the changing economics, the cost of storing all information created was estimated by one writer to approach \$7 trillion annually.<sup>13</sup>

### Everything Is Connected

Information stored digitally can be viewed or otherwise shared *simultaneously* by anyone with a computer, compatible software, a web browser, a digital display, and a network connection. The cost of transporting infor-

mation has dropped to nearly nothing. Digital information can be copied infinitely, stored inexpensively, viewed at virtually no cost, and disseminated for pennies. The interconnection of everyone to everything at photonic speeds shortens the latency time needed to create shared memory and changes the behavior of those using information. These changes, of course, make other changes likely, but unpredictable.

Scientific research has already been profoundly changed by the interconnection of resources of all kinds on the network. The scale of scientific research has grown thanks to these interconnections. It is now possible to leverage the cost of enormous scientific instruments such as telescopes and particle accelerators over global scientific communities and to provide simultaneous access to primary research data anywhere on earth.

The role of place in the interconnection of people and information stores is changing and, in fact, diminishing in importance. Notwithstanding the changing role of place, the global network is overall increasing the capacity of repositories to make their collections and data available and to provide great remote support for researchers, seamless access controls, libraries of software tools, and sophisticated data management (storage, metadata, and ontology). The capacity to deliver world class remote services virtually will likely determine the fate of the modern repository in the future.

## **Everything Can Be Found**

In the era of Archivy 2.0, recorded information was scarce and collections were precious and professionally managed. In the era of Archivy 3.0, paper-based information became abundant and the tools that were developed to produce a coherent collection and to extract value for posterity included records disposition, archival appraisal, arrangement of collections, and the production of finding aids. The outputs of these activities include magnificent collections, acres of distilled knowledge, epic backlogs of unprocessed collections acquired for preservation's sake, and finding aids that often provided detail only at the collection or record series level.

In Archivy 4.0, digitization, the emergence of the Internet and web, social tagging, and the unimaginable investment in search technology are making it possible to search at the document level or finer level of detail. These capabilities are a source of enormous private capital, lifting all boats, including that of the historical researcher. These capabilities call into question the meaning of document arrangement (for example, contextualization) in a digital context and the value of the archival appraisal function. They also raise profound questions of public policy as the dependence for discovering archival materials shifts from largely public to largely private (Google, Microsoft, and so forth) providers.

## **Digital Media Are Ephemeral**

Until the 20th century, paper was a remarkably durable storage medium for critical information. As the records of government and business exploded in quantity, durable high-quality paper was replaced by acidic, inexpensive paper. Notwithstanding the special and very real challenges posed by the introduction and widespread use of nondurable paper stock, it is important to understand the profoundly ephemeral nature of digital media in the effort to preserve shared memory and the historical record. Digital collections can be destroyed with a keystroke and can be altered easily without a trace. The ephemerality of digital media reverses the trend toward verisimilitude enabled by photography and xerography, and efforts to lock down digital content via electronic date stamps, watermarks, and other measures are meeting only partial success. At risk is the evidentiary value in records inherent in photographs, photocopies, and other fixed, faithful-and-hard-to-tamper-with media. The ephemeral nature of digital media is also enabling changes in the very nature of the record, the nature of authorship, and the nature of provenance.

## **The Social Life of Information Is Undergoing Significant Change<sup>14</sup>**

If Web 1.0 was chiefly about the posting of a great deal of the world's current information on the web, Web 2.0 refers to changes in how web developers and users use the web. Increasingly the web is shifting from a place of document discovery or a place for self-expression to a place for social interaction, including collaboration. New collaborative tools such as blogs and wikis are making it possible for people to convene around common interests and purposes. Importantly, these tools, along with open source software and open educational resources, are leveling the playing field. From an educational perspective, the web is emerging as perhaps our most open university: a virtual place where people can gather around common interests, review supporting textual resources, and engage in common cause—social, learning, commercial, or otherwise.

The unique qualities of digital media, though, are making it possible for informal groups—often characterized as “crowds”—to engage in work that had been previously individual or institutional in nature. Wikipedia is perhaps the most noteworthy example. Content cocreation is perhaps one of the most important concepts and social behaviors to emerge in Web 2.0 and a development that has the potential to rock the very foundation of archival thinking about authorship and provenance. Similarly, Web 2.0

social behaviors, such as social tagging, will also challenge longstanding professional ideas about the roles and nature of authority control in facilitating access to information.

Finally, we will need to grapple with the concept of Internet time. The rise of the collective makes it possible to witness the rapid emergence of more and more versions of information on the web. Establishing provenance is a quixotic task. Even more important will be developing and socializing methods of asserting or otherwise establishing the credibility, validity, standing, and reliability of information produced often by anonymous crowds in the “fullness” of Internet time. As Farhad Manjoo put it, “The limitless choice we now enjoy over the information we get about our world has loosened our grip on what is—and isn’t—true.”<sup>15</sup>

## **Establishing *Identity* Is Hard**

Just as it is becoming increasingly difficult to establish the credibility, validity, standing, and reliability of information, it is increasingly difficult to establish the identity and *bona fides* of those seeking to use digital ideas and documents. Colleges, universities, and their archives have long traditions of standing apart from the bazaar, in part to place scholarly coaching and personal reflection in the service of truth seeking. The Internet and the web, however, inherently erode boundaries. The institution’s ability to provide its community members with broad access rights—while at the same time mediating others’ access to institutional information resources and collaborative spaces—will demand greater care and investment over time. The new media and the ease of movement across Internet territories is necessitating a rethinking of what constitutes community membership and of the rights and authorities of those who are members of a community, those who are interested stakeholders in the community, and those who are not.

## **Everyone Is an Archivist**

As mentioned, information is now superabundant and the capacity to store it and connect to it is now widespread and inexpensive. Social forms are emerging that engage interested amateurs and professionals in tagging information to facilitate its eventual retrieval. Everyone can be a journalist, commentator, expert, and even video star on the Internet. Mundane aspects of life appear every day on sites like YouTube and Facebook, taking so-called “reality TV” to a whole new level. And take the case of George Bell, a research scientist for Microsoft, who has taken Muybridge’s notion

of easily recording the moment one step further—he is recording his entire life. Bell carries miniature cameras and recorders at all times to record everything he sees and hears. The sensors he carries even record changes in light and temperature. Bell, now 71, began storing his life digitally as an experiment to push the boundaries of information technology. He began by scanning books and important papers he wanted to keep. The project then mushroomed into his recording of all the details of his life, from conversations with plumbers to the scholarly papers he writes. Bell's digital database is known as "MyLifeBits" and presents an interesting challenge in determining how to manage information over a human lifetime. Perhaps even more amazing than Bell recording almost every moment of a lifetime is the fact that he is also personally storing the 1,300 videos, 5,067 sound files, 42,000 digital pictures, 100,000 e-mail messages, and 67,000 web pages that make up "MyLifeBits." The creation of such personal digital repositories is now technologically possible and Microsoft researchers believe that anticipated advances will enable most individuals to store the complete digital record of their lives.

## **Will the Cloud Block the Sun?**

The introduction of the digital record, and the emergence of richly interconnected data communication networks, low-cost digital storage devices, search engines, and a common user interface (web), are changing how people create, retain, dispose of, value, and use information. These technical changes and these shifts in the patterns of information use may disrupt the longstanding archival community with possible serious consequences to human shared memory and to scholarship. These changes can be partly summarized as shown in Table 2. The implications of these shifts are potent and really must challenge us to ask whether knowing the past truly prepares us for the future.

There is little doubt that the digital revolution on balance is contributing in magnificent ways to world literacy, to research, and to the democratization of knowledge. There is no doubt that technologies will cut their own channels in most of our institutions, including colleges, universities, libraries, museums, archives, and others. It is hard to imagine the implications of a single scientific instrument such as the Large Hadron Collider producing nearly 100 million channels of data streaming from each of the two largest detectors and filling 100,000 CDs every second. These CDs would produce a stack to the moon in six months.<sup>16</sup> Or try to imagine the digital artifacts and ephemera of George Bell and the implications of the remorseless recording and storage of unedited human experience.

**Table 2. From Archivy 3.0 to the Digital Revolution**

| FROM   | TO  |
|--|---|
| Information is abundant.                           | Information is superabundant.                                       |
| Recorded knowledge is durable.                     | Recorded knowledge is ephemeral.                                    |
| Information discovery is a public service.         | Information discovery is a privately financed search engine.        |
| Finding information is hard.                       | Everything can be found.  |
| Repository is a place.                             | Repository is a network address.                                    |
| Collections are disconnected.                      | Everything is connected to the network.                             |
| Archivists are scarce.                             | Everyone is an archivist.   |
| Access to information is mediated by institutions. | Access to information varies widely.                                |
| Document authorship is knowable.                   | Document authorship cannot be easily known or reconstructed.        |
| Archival appraisal is an art.                      | Archival appraisal may be an algorithm based largely on popularity. |

Notwithstanding the daunting nature of the challenge, those of us charged with the collection and preservation of the human record must abide. More than this, we must advocate in the name of shared memory and assert standards for the selection and valuation of the evolving historical record. As University of Manitoba Professor Terry Cook put it, “If there is no such place in society where knowledge and meaning can be discerned, where things can be true or not true, where accountability through transparent evidence of actions and ideas by those in power can be readily achieved through good record keeping, where the records themselves in transient digital formats can be certified and locked as authentic and reliable, not tampered with, created when, where, and by whom so asserted, and trusted, then we will enter a new dark age.”<sup>17</sup> As we all, like George Bell, create our own “presidential libraries,” how many of us will withstand the temptation to “tweak” our autobiographic record so that our shared memory can be a bit rosier or more flattering? Not only do the archival and scholarly communities need to advocate for scholarly rigor and for standards, we must strive to popularize these qualities, imbed them throughout the education system, and instantiate them in search engines and throughout our presence on the Internet.

What may be the emergence of a new and superior epistemology as suggested by Professor Dede could become what Alexis de Tocqueville feared as the tyranny of the majority.<sup>18</sup> Will our capacity to be arbiters of our cultures be enhanced or endangered by subjecting all matters great and small to wiki-ization or to a vote? Will the “American idolization” of facts, trends, taste, and truth crush independence of thought? Will we, as Cook wonders, abandon existing professional standards or fail to construct new ones, leaving a human record possessed of “too much

scrambled, meaningless trivia of information where discerning anything of value or having context-rich value statements at all becomes impossible.” This state of being is guided by what philosopher Alasdair MacIntyre labeled as *emotivism*, a doctrine holding that all evaluative judgments, especially moral judgments, are merely expressions of preference, attitude, or feeling.<sup>19</sup> It is ironic that just as we became awash in information and wealthy in the tools of discovery, mining, and analysis, the term *truthiness* was coined.<sup>20</sup> Is it possible that as information becomes so voluminous, the standards of selection become so pluralistic, and the content of information becomes so nuanced, feeling will replace analysis as the social barometer of truth?

Perhaps, then, the past is prologue. Cook observes that it is possible that the cloud will envelop and overwhelm the tower, returning us to a dark age. Medieval Europe’s scarcity of information and literate souls left many people in the dark. Today’s superabundant but decontextualized, filtered, mashed up, Photoshopped, crowd-sourced, and opaque information environment also contains the potential for leaving people in the dark. The filtering of politically unacceptable search results by Google’s China search engine is only one example of what may be possible.

## What Is to Be Done?

The stakes in the game of how the tower and the cloud interact in the context of the identification and protection of the human historical record are high. Too, the issues regarding the future of those modern day *bibliophylakes* are similarly momentous. How the game will play out is completely unclear.

What is clear is that the stewards of the historical record in the past must now give voice to this great debate. We must present ourselves neither as uncritical enthusiasts of everything shiny and new nor as change-averse curmudgeons protecting a declining turf.

It seems clear, too, that the turf of the modern day *bibliophylake* is not shrinking but changing. To remain relevant and to continue to serve our great purpose, we must separate those principles that will guide our future actions from the methods and structures that have served these principles in the past. Some of the methods and structures will survive; many will not.

We must conceive of a new professional ecosystem and of our place in such a new tangle of relationships. In Archivy 2.0, the *bibliophylake* was likely a member of the religious order and a spiritual brother or sister of the scholar-scribe. In the xerographic era, records managers and archivists were linked. The new media are rendering old social and professional

relations ineffectual and are opening the doors for new relations. This new ecosystem needs to be described and new professional communities and networks need to be formed.

The ephemeral nature of digital media is a vexing problem from a preservation viewpoint. Digital technologies create masses of information and conflicting goals for selection and preservation. A key question is, who determines value and for what purposes? Is it the crowd in the cloud? Furthermore, most digital media are themselves subject to easy alteration (that is part of their virtue) and are not durable. And if the storage media are durable, digital data must be readable by software to be useable. The issue of preserving digital data in forms that can be retrieved and read over centuries is enormously problematic, particularly in the sciences, where files of petabyte size are being produced and captured at the expense of billions of dollars. This is a problem of epic size that demands the attention not only of the archival community but of foundations and governments.

One of the major issues associated with preserving shared memories is the identity management issue. Substantial progress is being made in constructing a layer of middleware tools and federation practices that will help ensure that record users are who they claim to be and are authorized to do what they assert they are authorized to do. As well, this middleware infrastructure goes far in protecting the traditional privacy of the researcher. Institutions associated with preserving information need to be engaged in this work and must adapt these tools to the archival context.

Archivists will also face especially complex challenges as regards the protection of privacy. Learning management systems, for example, now make it possible to capture and preserve the classroom contributions of tomorrow's Albert Einstein or George W. Bush. Many faculty members and students might be very uncomfortable if their conversations and interactions in an online class were preserved indefinitely by their institutions. Classrooms are traditional bastions of free speech and for the testing of ideas. "Half-baked thoughts" are encouraged as part of the learning process. Knowing your every thought or proposition might be preserved forever would certainly inhibit the free-wheeling conversations associated with university and college classrooms. Similarly, health records are another area of potential conflict between archival preservation and individual privacy. It is clear that the broad standardization and sharing of digital medical records can have some significant benefits. However, this capability also raises some controversial issues about privacy and ownership, especially with regard to who can keep and use medical records of deceased individuals, which could prove to be valuable historical and medical research resources. New community standards, policies, and laws will need to be considered as social

conduct in the digital context changes. The archivist needs to be engaged in this public policy debate. Otherwise, we run the risk of violating public trust or, worse, we begin to censor our history to the point where valuable records are destroyed through self-censorship in the fear that they may be used inappropriately.

And we must move closer to where history is being made. This is a reintegration, for the librarian and archivist have long been associated with those creating the shared memories. In many ways the history of archivy and librarianship is a history of shifting attention from the creators of knowledge to the artifacts themselves and to the great halls we build to house them. In a world of scarcity, those who seek knowledge must travel to the sources of knowledge. In an era of superabundance, those who wish to preserve the knowledge must now return to the wellsprings. The *bibliophylake* cannot likely remain a creature exclusively of the tower. The values we share and the standards that we must promote must be instantiated when and where the future historical record is being created and in the culture of those technology providers whose products are reshaping the landscape of shared human memory. The librarian and archivist must not simply be part of this new “cloud” of digital information artifacts. They must take a leadership role in guiding its policies and practices.

We need nothing less than a new literacy to guide ourselves and our students through the exciting and sometimes frightening new terrain. Perhaps this is the new epistemology referred to by Professor Dede and perhaps it is the scholarly literacy described by Professor Paul Courant in this volume.

Going digital may be the most significant inflection point in the history of human record keeping. Never before has so much information been available to so many people. The implications of having more than a billion people with persistent connections to the Internet and exabytes of information freely and openly available cannot be overstated. With every significant innovation comes unintended consequences and amidst the plentitude that we now enjoy in this arena are found a host of new cautions, threats, and risks. We would never turn back. The cautions, threats, risks, and other unintended consequences of going digital together comprise the challenge for the modern *bibliophylakes*. Our ancestors and we have protected the record of human achievement through wars, revolutions, fire, and flood. Our charge remains the same; the stakes remain monumentally high.

## Endnotes

1. Nancy Cantor and Steven Schomberg, "Poised between Two Worlds: The University as Monastery and Marketplace," *EDUCAUSE Review* (March/April 2003), <http://net.educause.edu/ir/library/pdf/ERM0320.pdf>.
2. Chris Dede, "A Seismic Shift in Epistemology," *EDUCAUSE Review* (May/June 2008), 80, <http://connect.educause.edu/Library/EDUCAUSE+Review/ASeismicShiftinEpistemolo/46613>.
3. The authors use the term *disruptive* as used by Clayton Christensen to describe a new, low-cost, often simpler technology that displaces an existing, sustaining technology. See Clayton M. Christensen, *The Innovator's Dilemma* (Cambridge, MA: Harvard University Press, 1997).
4. Eric A. Havelock, "The Alphabetic Mind: A Gift of Ancient Greece to the Modern World," *Oral Tradition* 1, no. 1 (1986): 134.
5. Joseph J. Duggan, "The Social Function of the Medieval Epic in the Romance Literatures," *Oral Tradition* 1, no. 3 (1986): 728.
6. Oliver W. Holmes, "History and Theory of Archival Practice," in *University Archives: Papers Presented at an Institute Conducted by the University of Illinois Graduate School of Library Science, November 1-4, 1964*, ed. Rolland E. Stevens. Champaign, IL: Board of Trustees of the University of Illinois, 1965, [http://www.archive.org/stream/universityarchivalstev/universityarchivalstev\\_djvu.txt](http://www.archive.org/stream/universityarchivalstev/universityarchivalstev_djvu.txt).
7. Mary Bellis, "The History of Xerox: Xerox Photocopiers and Chester Carlson," About.com: Inventors, <http://inventors.about.com/od/xyzstartinventions/a/xerox.htm>.
8. David Owen, *Copies in Seconds* (New York: Simon & Schuster, 2004), 12.
9. Thom Hickey, "Entire Library of Congress," Outgoing: Library Metadata Techniques and Trends by Thom Hickey, [http://outgoing.typepad.com/outgoing/2005/06/entire\\_library\\_.html](http://outgoing.typepad.com/outgoing/2005/06/entire_library_.html).
10. Lucas Mearian, "Study: Digital Universe and Its Impact Bigger Than We Thought," *Computerworld*, March 2008, <http://www.computerworld.com/action/article.do?command=viewArticleBasic&articleId=9067639>.
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12. "How Many Blogs Are There? 50 Million and Counting," CyberJournalist.net, posted August 7, 2006, <http://www.cyberjournalist.net/news/003674.php>.

13. David Rosenthal, "Petabyte for a Century," DSHR's Blog, posted July 17, 2007, <http://blog.dshr.org/2007/07/update-to-petabyte-for-century.html>
14. The term *social life of information* was coined by John Seeley Brown and Paul Duguid in their book, *The Social Life of Information* (Cambridge, MA: Harvard University Press, 2000).
15. Farhad Manjoo, *True Enough: Learning to Live in a Post-Fact Society* (Hoboken, NJ: John Wiley & Sons, 2008), 4.
16. Graham P. Collins, "The Large Hadron Collider: The Discovery Machine," *Scientific American*, January 2008, <http://www.sciam.com/article.cfm?id=the-discovery-machine-hadron-collider&page=2>.
17. Terry Cook, letter to Richard Katz, July 3, 2008.
18. Alexis de Tocqueville, *Democracy in America* (1835), Chapter XV.
19. "Political Philosophy of Alasdair MacIntyre," The Internet Encyclopedia of Philosophy, <http://www.iep.utm.edu/p/p-macint.htm#H5>.
20. Dick Meyer, "The Truth of Truthiness," *CBS News*, December 12, 2006. <http://www.cbsnews.com/stories/2006/12/12/opinion/meyer/main2250923.shtml>. *Truthiness* is the term coined by comedian Steven Colbert in 2006 to describe things "that a person claims to know intuitively or 'from the gut' without regard to evidence, logic, intellectual examination, or facts."

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