

The Noise in the Archive: Oblivion in the Age of Total Recall*

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Bio

Jean-François Blanchette is an Assistant Professor in Department of Information Studies, University of California, Los Angeles. He received a B.Sc. and a M.Sc. in Computer Science from the Université de Montréal in 1995 and 1997, and a Ph.D. in Social Studies of Science from Rensselaer Polytechnic Institute in 2002.

Between 1999 and 2001, he was an invited researcher at the CNRS in Paris, where he investigated the definition of a new legal framework for recognizing the evidential value of electronic documents, including those produced by notaries, bailiffs and judges. Between 2002 and 2004, he was a Post-Doctoral Fellow with the InterPARES project at the University of British Columbia. Professor Blanchette teaches in the area of electronic records management, digital preservation, social dimensions of computing, and systems design. His current research focuses on developing a theoretical framework for analysing the materiality of computing, and its implications for long-term preservation of digital objects.

Abstract

The convergence of pervasive forms of data collection, widespread deployment of cheap digital sensors, and economics of infinite storage is apparently leading us into an age of perfect remembering where “everyone is on the record all the time.” This paper investigates the figure of a future bereft of oblivion by confronting two widely discussed statements on the changing condition of memory, Gordon Bell’s *Total Recall*, and Viktor Mayer-Schönberger’s *Delete*. I argue that in spite of their antagonistic conclusions, both authors share an intellectual commitment to the unique historical status of digital information as immaterial, and thus, impervious to the noise, decay, and distortion that analog carriers have previously brought to the task of preserving memory. I conclude that whatever the future of the past may be, digital information cannot, in fact, escape its material foundations, and will inevitably bring to the table its own particular sets of possibilities and constraints to the business of remembering and oblivion.

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1. Introduction

As the first electronic computers were deployed in the late 40s to tackle business, scientific, and military problems, the scope of their intellectual capabilities generated intense debate. Was computation the same as thinking? How long before their computational prowess exceed that of the human brain? It is perhaps fitting that 60 years or so into the computing age, the conversation is shifting to concerns over the status of computers' memories. How well do they remember? Can they be made to forget? What is the relation between human, institutional, and machine memory?

These questions arise in the context of what has been described as the coming "data deluge": in addition to the highly granular data collection that is an intrinsic feature of online environments, the marketplace is soon to be flooded with inexpensive sensors (smart phones already integrate cameras, microphones, GPS, and accelerometers) that can collect a wide variety of data in digital form — e.g., continuous video and sound of one's daily activities, sport performance, body weight, or sleep patterns. The data may then be automatically geolocated and uploaded to websites providing statistical and visualization tools for sharing, comparing, and forecasting.¹ Furthermore, for the first time in history, these different types of records — images, quantitative data, audio recordings, written documents, etc. — are available for transmission, storage, indexation, analysis, retrieval, and visualization in a single media.

This convergence of pervasive forms of data collection, widespread digitization of analog records, economics of infinite storage, and subsumption of all media into the digital format is, according to the majority of commentators, inexorably leading us into an age of "perfect remembering," enabling individuals to "google their past," recalling at will individual events in full multimedia richness, identifying trends in personal health, work activities, and lifestyle. Indeed, if one factors in the gradual elimination of paper in favor of digital forms for commercial transactions, communication, documentation, etc., and the continually plummeting costs of digital storage, the picture of a world where "everyone is on the record all the time" does not seem far-fetched.

This paper critically examines the trope of "perfect remembering" by confronting two of its most widely circulated articulations, Gordon Bell's *Total Recall*, and Viktor Mayer-Schönberger's *Delete*.² According to both authors, forgetting will soon become a thing of the past, a quirky feature of a bygone technological age, like cars that need cranking and very large cell phones. But while *Total Recall* rejoices in the innumerable benefits — from increased productivity to

¹ See for example Nike's *Nike+ Sportband*, Withing's *WiFi Body Scale*, and Zeo's *Personal Sleep Coach*.

² Gordon Bell and Jim Gemmel. *Total Recall: How the E-Memory Revolution will Change Everything* (New York: Dutton, 2009); Viktor Mayer-Schönberger. *DELETE: The Virtue of Forgetting in the Digital Age* (Princeton, NJ: Princeton University Press, 2009).

immortality – the “e-memory revolution” will bring, *Delete* is concerned that “perfect remembering” will cast a chilling shadow on individuals’ ability to think and act in the present. Published within weeks of each other in the fall of 2009, the two books usefully encapsulate antagonistic positions on the changing state of memory.

I begin by summarizing Bell & Gemmel’s arguments for why the coming “e-memory revolution” will reap untold riches for mankind, and, in any case, can hardly be averted, as the book’s dust jacket loudly proclaims; I then move to Mayer-Schönberger’s concerns for the potentially oppressive nature of a world drained of its capacity for oblivion, and conclude with my own critical evaluation of the assumptions shared by proponents and foes alike.

2. Total Recall

Gordon Bell is a computer engineer with a long and distinguished career in industry, notably with DEC.³ After joining Microsoft Research in 1995, Bell embarked on a quest to become history’s first “paperless man.” The experiment, dubbed “MyLifeBits,” was profiled in the *New Yorker*,⁴ *Scientific American*,⁵ and *Fast Company*⁶ (where Bell was photographed with an external hard drive plugged into his forehead) and its insights broadly inform *Total Recall*’s vision. With endorsements from names like Gates, Negroponte, Myrsvold, Shirky, and Drexler generously sprinkled on the book jacket, *Total Recall* is Bell’s bid to accede to the elite group of visionaries that have defined much of the information technology public imaginary and the terms under which it is debated.

The prose is light, long on examples and anecdotes from Bell’s personal life; the tone, decisive, with few if any concessions made to contrary arguments – either ignored altogether, or quickly expedited with swift rhetorical blows.⁷ Bell resorts liberally to the “e-” prefix as well as to short lyrical scenarios of what our future lives *will* look like: “Imagine Dan, a blueberry farmer. ... He loves to sit down with his e-memories and a cup of tea to contemplate how he might make his farm better.” (p. 133) The argument is organized in roughly three parts: first, an overall description of the Total Recall vision and its origin (Vannevar Bush’s *Memex* makes a mandatory appearance); second, more detailed excursions into the potential benefits and consequences of Total Recall in the spheres of work, health, learning, and everyday/afterlife, and finally, material on how to adapt to, and get started with Total Recall, including an annotated guide to relevant

³ I abide by the authors’ own convention of using Bell’s as the sole voice for their text.

⁴ Alec Wilkinson, “Remember This?,” *The New Yorker*, May 28, 2007, 38-44.

⁵ Gordon Bell and Jim Gemmel, “A Digital Life,” *Scientific American*, March 2007, 58-65.

⁶ Clive Thompson, “A Head for Detail,” *Fast Company*, November 2006, 73-79, 110-112.

⁷ For example, “They ask: Do we really want to know all this stuff? Liam Bannon, writing in favor of forgetting, offers up the inarguable: “More data does not imply better-quality decisions.” Of course, that’s true – but flawed human resources do not imply quality decisions either.” (p. 165)

research and literature.

In the workplace, Total Recall will be simultaneous with emancipation from paper and the mental fatigue that too often accompany it. The paperless office will be “pleasant”, “calming”, and provide everyone with “an incredible sense of freedom.” (p. 73) Job training will also radically improve, as new hires tap into their predecessor’s data holdings to access the tacit knowledge that is the first casualty of employee turnover. If concerns for liability have in the past shaped institutional record keeping policies, Bell confides that, in the digital age, “I don’t see how corporate e-memory destruction policies can continue.” (p. 90)

With regard to both health and learning, similar patterns will obtain. Instead of relying on patients’ vague account of their ailments, doctors will finally have access to “minutely detailed chronicles of vital signs, behavior, diet, and exercise, along with physician’ diagnoses, prescriptions, advice, and test results.” (p. 94) Similarly, usage data, collected as students peruse, annotate, and share their electronic textbooks, recorded lectures, and online resources, will eliminate the fuzziness of current (paper-based) evaluation methods, while increasing self-knowledge for both students and teachers. Better information gathering will also foster self-motivation for learning and health, aided by algorithmic assistants that will mine our data stores to identify correlations and trends and issue recommendations that may prolong our lives and supercharge our learning.

It is in the realm of the personal that Bell takes his most extreme stand, when he recommends discarding commemorative artifacts in favor of digital surrogates (mostly photographs). While he recognizes the evocative power of material objects, he contends that “most people’s physical mementos gather dust in an attic – if they even have them.” (p. 118) With regard to leisure, the e-memory revolution will not only result in fantastically detailed travelogues “that might even exceed the actual trip experience” (p. 142), but also eventually leave our descendants with much more than slide shows to remember us by: Bell suggests that we may in the future endow digital avatars with our lifetime store of data, achieving in the process a certain kind of immortality.⁸

Bell is well aware that in spite of its transformative potential, changes as profound as those implied by Total Recall will require individual adaptation, collective choices, as well as technical innovation. He foresees some difficulties with regard to data loss and decay (will your data be readable fifty years from now?), data entanglement (how can we separate work data from personal data?),

⁸ There is more than a passing acquaintance here with the “singularity” movement, something Bell believes will eventually occur, although not in the form of machine consciousness – see Alfred Nordmann, “Singular Simplicity,” *IEEE Spectrum* 45 (June 2008): 60-63. On the ambiguous promise of memorials for effecting remembrance, see also David Bindman, “Bribing The Vote Of Fame: Eighteenth-Century Monuments And The Futility Of Commemoration,” in *The Art of Forgetting*, ed. Adrian Forty and Suzanne Küchler (Oxford: Berg, 1999), 93: “What could be more forlorn than a grand and costly tomb, put up to prolong a reputation beyond the grave, but now long neglected and falling into ruin, with the name of the deceased completely forgotten.”

adapting to more self-knowledge (how much truth about ourselves can we handle?), adapting to being recorded (how will consent be negotiated?), adapting in court (could your memories be used against you in court?). For those concerned with the Big Brotherian potential of *Total Recall*, Bell points out that a society in which “the recording equipment is not controlled by a single central authority, but by millions of individuals and private entities” (p. 14) is a *democratic* surveillance society.

What forces will propel this adaptation forward? Quite simply, technology itself: “I am a technologist, not a Luddite, so I’ll leave abstract discussions about whether we should turn back the clock to others. Total Recall is inevitable regardless of such discussions.” (p. 159) Bell is understanding that some might consider curtailing their participation in such a movement, but reminds them that “Total Recall, like the automobile, is rejected only at the price of giving up great advantages.” (p. 174) How long before the tidal wave washes upon us? When it comes to prediction, Bell cannot quite resist the decisive statements that signal the supremely confident visionary: “It is absolutely clear that by 2020 these streams of technology will have matured to give the complete Total Recall experience” (p. 24) or the instant classic: “It’s impossible to know exactly how long it will take for lifelogging to become common practice, but it’s almost a sure bet that it will do so within a decade.” (p. 21)

3. Delete

Viktor Mayer-Schönberger, formerly of the Kennedy School of Government at Harvard, and now a professor at the National University of Singapore, provides a somewhat more nuanced analysis of the consequences of the “e-memory revolution.” At less than 200 pages, with relatively few notes and a short bibliography, *Delete* is directed at a broader public than mere academics, with the goal of stimulating policy debates in information governance. Like Bell, Mayer-Schönberger’s premise is that mass digitization, cheap storage, improved retrieval techniques and the global reach of computer networks are making it easier today to remember than to forget, “because it no longer requires a conscientious act, a tiny bit of time, energy or money that we need to expend to commit information to digital memory.” (p. 169) Unlike Bell however, Mayer-Schönberger sees this shift as deeply problematic, as the individual and collective unlearning of “one of the most fundamental behavioral mechanisms of humankind.” (p. 92)

Mayer-Schönberger’s analysis of the issue proceeds along two main dimensions, power and time. In the first case, he sees the demise of forgetting as leading to enormous asymmetries between individuals and the institutions that collect their personal information. The accessibility, durability, and comprehensiveness of digital information will provide an almost overwhelming incentive for individuals to censor themselves, as they contemplate the potential damage that

even the mildest forms of deviant or oppositional behavior may inflict on their reputation long into the future — Mayer-Schönberger can in fact already point to such frightening cases. In the second case, he points to how the continuous availability of an instantly available and detailed representation of past events will have deleterious effects on our ability to act in the present. The selective processes of forgetting, he argues, are not so much flaws as they are the necessary foundations of our ability to generalize, and thus, to rise above the particular. By gradually undermining cognitive processes rooted in millennia of human evolution, we may in effect leave ourselves vulnerable to impaired individual and collective decision-making.

Mayer-Schönberger then proceeds to the analysis of three pairs of possible responses to the power/time dimensions of the forgetting crisis, operating respectively on the level of individual behavior, law, and technology. Individuals may redress the power imbalance by simply refraining from sharing personal information, the practice of “digital abstinence.” (p. 128) It is also possible they may cope with the continuous intrusion of the past by disregarding it and focusing on an individual’s most recent actions, forms of “cognitive adjustment.” (p. 154) Laws may also address the power imbalance by further defining information privacy rights that grant individuals the power to restrict access to their information, and may also expand existing mechanisms that mandate sealing or deletion of certain types of information (e.g., juvenile crime records, bankruptcy in credit reports). And technology may also join in the fight, either through “digital privacy rights infrastructure” that could enforce policies for the retention and disposal of personal information, or through providing the “perfect contextualization” that would situate each piece of information within its full historical context. (p. 163)

While each of these approaches does contribute something to restoring a certain balance, each has also significant drawbacks. Practitioners of digital abstinence must systematically forego the various benefits service providers offer in exchange of release of personal information; privacy rights have historically enjoyed limited successes in the US, and policies for automatic negotiation of privacy settings between information sharing devices are notoriously complicated for dedicated experts, let alone for casual users.

Mayer-Schönberger’s own proposal aims to “flip the default back” to forgetting by attaching a new type of metadata — an expiration date — to each piece of information. When saving a file, for example, users would be forced to specify a retention period, in the same manner they specify the file’s name and location. A search query could similarly include an additional parameter specifying its retention period. Mayer-Schönberger’s proposal draws its inspiration from the warnings triggered by Web sites attempting to install cookies:

“the core goal of expiration dates for information is precisely not to push the

problem of digital memory off our consciousness by delegating it to technology, but rather the opposite: to make humans aware of the value and importance of forgetting.” (p. 185)

While well-aware that a combination of measures will likely prove necessary to restore the ecology of remembrance and forgetting, Mayer-Schönberger believes that confronting users with choices of suitable retention periods performs an important function, by reminding them that “the value of information is not timeless.” (p. 173)

4. Noisy bits

The confrontation of these two antagonistic theses immediately leads to two questions. First, are Bell and Mayer-Schönberger right? Is it indeed the case that we have switched from default forgetting to wholesale remembering? Second, if they are right, which conclusion is the correct one? Will *Total Recall* usher in a golden age of enhanced self-learning and objective historical truth for humanity, or on the contrary, a perpetual dark age of domination by an omnipresent past?

4.1 Digital decay

Bell-Gammel’s and Mayer-Schönberger’s analysis posits a historical progression of technologies for remembering, along an axis where the unreliabilities of “biological memories” are gradually supplemented by stronger and stronger grades of “external memories” inscribed on various media – from writing, paintings, books, and movies, to information’s supreme incarnation in the digital. For Mayer-Schönberger, digital information is superior to all previous analog forms of remembering “because it lacks the noise problem” (p. 57), that is, it does not decay with use, reproduction, or time. For Bell, in contrast to its biological counterpart, “digital memory is objective, dispassionate, prosaic, and unforgivingly accurate.” (p. 56)

This characterization is dependent on the pervasive Western analogy that identifies human memory with recording technologies that function through imprinting (and erasing) of traces on substrates of variable malleability, from wax to stone.⁹ In such a framework, material decay is akin to forgetting and, conversely, “perfect remembering” a direct consequence of the noiselessness of digital media, of its imperviousness to decay.

The ascription of such improbable qualities to any system for recording

⁹ Adrian Forty, “Introduction,” in *The Art of Forgetting*, ed. Adrian Forty and Suzanne Küchler (Oxford: Berg, 1999), 2; James Burton, “Bergson’s Non-Archival Theory of Memory,” *Memory Studies* 1 (2008): 322; Mary J. Carruthers, *The Book of Memory: A Study of Memory in Medieval Culture* (Cambridge: Cambridge University Press, 1992), 16. The Roman punishment of *damnatio memoriae* involved erasing all traces of a person, including those written in stone – see Charles W. Hedrick Jr., *History and Silence: Purge and Rehabilitation of Memory in Late Antiquity* (Austin: University of Texas Press, 2000).

information is best understood as another manifestation of the historical association of electric communication with transcendence of the material properties of physical media,¹⁰ of the sublimity of overcoming the ordinary limitations of space, time, and energy through technology,¹¹ and of the pervasive metaphors within computer science that “minimizes our sense of representations as material things.”¹²

The transcendental properties of information technology, its seemingly mysterious ability to both exist within the physical plane and yet escape its most fundamental law (decay) have been recently questioned by scholars trained in methods of bibliographic analysis, focusing on the material context of production, expression, and interpretation.¹³ For our purposes, such analysis have yielded two observations of particular importance: first, and despite how pervasive the distinction in ordinary discourse, “form is constitutive of information, not its transparent representation”;¹⁴ second, the specific material instantiations of informational artifacts are “always undergoing changes, aging, crumbling, acquiring or resisting wear.” (p. 142) How then do Bell and Mayer-Schönberger account for the wear and tear of digital media, given its purported noiselessness and unforgiving accuracy?

Driven by the pragmatic constraints of the “My LifeBits” experiment, much of *Total Recall* can in fact be read as a list of contradictory footnotes to Bell’s vision of seamless and perfect remembering, each highlighting a different dimension of the materiality of digital information. A first category relates to the reformatting, degradation, or unavailability of data arising from the various incompatibilities exhibited by file formats, hardware platforms, and software applications, as they ceaselessly morph into their next market-driven incarnations. Despite our limited collective experience with digital preservation, it already appears

¹⁰ Shawn J. Rosenheim, *The Cryptographic Imagination: Secret Writing From Edgar Poe to the Internet* (Baltimore: The Johns Hopkins University Press, 1997).

¹¹ David Nye, *American Technological Sublime* (Cambridge, Mass.: The MIT Press, 1994).

¹² Phil Agre, “Beyond The Mirror World: Privacy and The Representational Practices of Computing,” in *Technology and Privacy: The New Landscape*, ed. Phil Agre and Marc Rotenberg (Cambridge, Mass.: The MIT Press, 1997), 29-61. It should be noted that Bell’s *Total Recall* vision essentially reiterates one articulated almost 20 years ago by David Gelernter, who argued that ubiquitous sensors will inevitably lead to a distributed computer running a real-time simulation of the physical world, faithfully mirroring reality, yet augmenting it with software capabilities. Gelernter’s *Mirror World* is real-time and concerned exclusively with public spaces, while *Total Recall* is about stored data and confined to the personal sphere, but in every other respect, they share the same basic assumptions about computers’ ability to substitute for reality. See David Gelernter, *Mirror worlds: Or the day software puts the universe in a shoebox ... How it will happen and what it will mean* (New York: Oxford University Press, 1991).

¹³ Matthew G. Kirschenbaum, *Mechanisms: New Media and the Forensic Imagination* (Cambridge, Mass: The MIT Press, 2008); Lisa Gitelman, *Always Already New: Media, History, and the Data of Culture* (Cambridge, Mass.: The MIT Press, 2006).

¹⁴ Johanna Drucker, *SpecLab: Digital Aesthetics and Projects in Speculative Computing* (Chicago: University of Chicago Press, 2009), 139.

inevitable that in order to stave off obsolescence, data will require some kind of continuous process of re-instantiation into (newer) formats, each one dictating in effect new formal conditions of production, expression, and interpretation. Despite the relative ease with which a string of characters may migrate from one format to another, plain text is not XML is not Word is not PDF is not TIFF, and no single format will ever transcend the entirely different conceptions of what a text is each embodies. The problem is already well upon us with Web-based documents (Bell recommends printing them to PDF) and gets only worse when one considers Flash-based sites or social media – Bell suggests such sites should “wise up ... and release our data from captivity.” (p. 201)

More radical forms of loss also loom large, from hard drive crash to improper backups and licensing of content that constrain the availability of documents. All in all, as Bell admits, “thousand-year preservation is a matter shrouded in uncertainty” (p. 224), but much more worrisome, so is that of hundred-year preservation. Despite this, Bell suggest that in general, one may confidently destroy original artefacts, unless their qualities as material objects justify keeping them, as in the case perhaps of a photo album, which you may keep and enjoy “until it falls apart and fades – in any case, you should rest assured that you have the digital version forever.” (p. 187)

A second type of material impingement on the transparent manifestation of digital information falls under the heading of “representation”: resolution, classification, and description bring specific kinds of constraints to the digital archive: pictures and video offer more or less detail, and only ever from specific viewpoints, and for recall to occur at all, they must be properly described, whether through authoritative descriptors, social tagging, or automatic analysis. As Bell remarks, “all this takes work” (p. 197), involving considerations of intellectual and physical labor, time, space, energy, and value, considerations which induce in turn a certain stratification of the total archive, in terms of its discoverability by search algorithms.

Yet another set of constraints to perfect remembering include those related to selection and appraisal, that is, what gets included or excluded in the archive. Exclusion may occur, among other things, through technical processes (e.g., the possible resolution of a given measurement), appraisal policy (e.g., “my goal is to record everything I actually read, not what others send me. It’s my choice, not their, that counts.” [p. 32]), cultural and legal norms (e.g., requiring consent before recording), intellectual property agreements (Bell recounts how, after Jim Gray’s disappearance at sea, Microsoft returned his laptop to his wife, meticulously expunged of documents susceptible of leaking trade secrets), not to mention individuals’ desire to bequeath posterity a favorable image of themselves.

Mayer-Schönberger’s investigation also forces him to eventually work through the dichotomy of a transcendent yet materially instantiated media. After an analysis of media history that concludes with the inherent superiority of digital

media over all previous analog technologies, he points to our collective faith in this superiority – the dazzling speed and comprehensiveness of our digital stores – as the very danger that threatens our appreciation for forgetting. But as he points out, the digital archive is necessarily “biased against information that is not captured in digital form and not fed into digital memory.” (p. 123)

Furthermore, this collective faith is even more dangerous because, contra to analog media, we simply lack experience with evaluating this systematic bias (one we already experience insofar as if it can’t be found with Google, it doesn’t exist), or the kind of forgeries digital media will fall prey to.

At the same time he unveils these shortcomings, Mayer-Schönberger cannot shake off his intellectual commitment to technologies of representation that may one day provide for objective, unmediated, comprehensive remembering. When he recommends against unconditionally trusting the digital archive, it is on the basis that it “can be modified after the fact, and thus does not necessarily represent an accurate rendition of a past event.” (p. 120) And when he critiques the “perfect contextualization” approach, it is on the basis that it would require an investment in “the technical means for true digital remembering.” (p. 165) Digital information thus retains its superior status as transparent representation, an ontological circle that is fully closed when he concludes that until “our internal thoughts are remembered, digital memory will remain fundamentally incomplete.” (p. 166)

4.2 Can you handle the truth?

What if, in addition to media’s intrinsic ambiguity as representation, suffused with noise, decay, degrees of resolution, etc., records themselves figured in an ambiguous relationship to our psychological need for remembering and forgetting? What if humans create commemorative artifacts not only because, as Mayer-Schönberger puts it, they “yearn to remember” (p. 93), but because they yearn just as much to deny, repress, forget?

Bell’s vision for *Total Recall* has little room to entertain such academic sophistry: if digital memory stands as objective and accurate capture of reality, the only question remaining is whether we are ready to confront it: “successful people don’t shy away from the honest record. ... In court, we ask for the truth, the *whole* truth, and nothing but the truth. It might be painful, but I believe better memory is really better.” (pp. 166-167) Freud would have understood Bell’s Total Recall as not merely painful, but in fact, profoundly alien to the dynamics of the psyche, dynamics in which forgetting plays an active and fundamental role in the constitution of the self. Bell’s characterization is also inaccurate: court proceedings are ruled by elaborate rules governing the admissibility and evaluation of evidence, and the most cursory examination of these rules cannot fail to point to the fact that courts have, thanks to the adversarial process, a sophisticated understanding of the technological mediation of evidence.

Instead of mere prosthesis to aid our failing biological mechanisms, one might

thus understand commemorative artifacts as mediating the conflicting demands of self-building, whether individual or collective. At the most basic level, this mediation operates simply by causing “only certain things to be remembered, and by exclusion, cause others to be forgotten.”¹⁵ An archive is necessarily a condensation of a larger whole, and is thus founded on a fundamental process of exclusion that defines the boundary between its inside and outside. On another level, commemorative artifacts, by serving as focal points for remembering, may enable more pervasive forms of forgetting to take place. This ambiguity has been explored in particular by the artists and architects who have created memorials to humanity’s most systematic attempt at consignment of a people to oblivion, the Holocaust. Several of them have explicitly attempted to eschew the traditional figure of the memorial as a durable imprint of an historical event — for example, Rachel Whiteread’s “Memorial to the Victims of the Holocaust” in Vienna, seeks to actively provoke the audience, by presenting them with an hermetically-sealed library of nameless books “causing us to try to remember what remains permanently out of reach, and inaccessible to us.”¹⁶

The *Total Recall* vision is thus problematic not only on account of the purported imperviousness of digital technologies to decay, but also in its implication of a direct correspondence between records and remembering. It relies on a number of hypotheses about digital media that prove difficult to maintain in any sustained encounter with the practical constraints of digital information capture, storage and curation. Like any other media, digital media brings to the table its own dialectics of objectivity and subjectivity, signal and noise, integrity and decay, authenticity and forgery, transparency and censorship, remembrance and repression. These dialectics are never fully determined by the material characteristics of the technology, as Bell would have us (at least partially) believe. José van Dijck captures the point succinctly:

“Media are not confined to private and public areas, and neither do they store or distort the past in relation to the present or future. Like memories, media’s dynamic nature constitutes constantly evolving relations between self and others, private and public, past and future.”¹⁷

If there *is* something unique about digital media, it is to be found in the powerful association between computers and mathematics that endows digital information with a special cultural authority, that which has historically accrued to mathematics as pure symbolic expression of natural laws. Unlike mathematics however, computers are thoroughly physical devices (for those in doubt, the electrical cord is a dead giveaway). How is it then that otherwise scientifically

¹⁵ Forty, “Introduction,” 9.

¹⁶ Forty, “Introduction,” 13.

¹⁷ Jose van Dijck, *Mediated Memories in the Digital Age* (Stanford: Stanford University Press, 2007), 26.

minded individuals align themselves with conceptions of memory that manage to abstract away the basic laws of decay? One answer is provided by historian of computing Michael Mahoney, who notes:

“The dual nature of the computer is reflected in its dual origins: hardware in the sequence of devices that stretches from the Pascaline to the ENIAC, software in the series of investigations that reaches from Leibniz’s combinatorics to Turing’s abstract machines. Until the two strands come together in the computer, they belong to different histories, the electronic calculator to the history of technology, the logic machine to the history of mathematics, and they can be unfolded separately without significant loss of fullness or texture. Though they come together in the computer, they do not unite. The computer remains an amalgam of technological device and mathematical concept, which retain separate identities despite their influence on one another.”¹⁸

The computer’s split personality problem leads information age pundits to almost unfailingly focus on its *logical* dimension, happily ignoring its *material* dimension, the mechanical components that compute, exchange, and store bits. From John Perry Barlow’s “there is no matter here”¹⁹ to Nicolas Negroponte’s “from atom to bits,”²⁰ the material dimension of computing consistently gets short shrift. Of course, no one explicitly denies that digital information is dependent on physical hardware for its existence, yet, this material dimension is largely understood as merely providing a support system for the processing, transport, and storage of immaterial bits. Yet, as the looming digital preservation crisis signals, the messy materiality of computing will become increasingly harder to ignore.

5. Conclusion

Even if we put aside the easy rhetoric of the coming “e-memory revolution,” there is little question that we are facing something rare and exceptional, nothing less than a “new regime of memory practices,”²¹ a sweeping changing of the guard in the modes of production, expression, and reception of commemorative artifacts. While this essay has argued that characterizing such a shift as a revolution obscures rather than illuminates, the transition to a new dominant

¹⁸ Michael S. Mahoney, “The History of Computing in the History of Technology,” *Annals of the History of Computing* 10(1988), 113-125.

¹⁹ “Governments of the Industrial World, you weary giants of flesh and steel, I come from Cyberspace, the new home of Mind. ... Your legal concepts of property, expression, identity, movement, and context do not apply to us. They are all based on matter, and there is no matter here. ... Our identities have no bodies, so, unlike you, we cannot obtain order by physical coercion. ... In our world, whatever the human mind may create can be reproduced and distributed infinitely at no cost. The global conveyance of thought no longer requires your factories to accomplish.” John Perry Barlow, “A Declaration of the Independence of Cyberspace,” <https://projects.eff.org/~barlow/Declaration-Final.html>.

²⁰ Nicolas Negroponte, *Being Digital* (New York: Vintage, 1996).

²¹ Geoffrey C. Bowker, *Memory Practices in the Sciences* (Cambridge, Mass.: The MIT Press, 2005).

media offers special opportunities for analysis and critique:

“There is a moment, before the material means and the conceptual modes of new media have become fixed, when such media are not yet accepted as natural, when their own meanings are in flux. At such a moment, we might say that new media briefly acknowledge and question the mythic character and the ritualized conventions of existing media, while they are themselves defined within a perceptual and semiotic economy that they then help to transform.”²²

In conclusion, I want to offer a brief probe into one such ritualized convention of remembrance and oblivion, with a far-reaching impact on the historical record, and how it might be successfully challenged during our current time of transition.

Mayer-Schönberger argues that “information ecologies” (i.e., regulatory constraints on personal information collection and storage) approaches have held limited purchase so far on the demise of forgetting and stand to erode even further. The legal safeguards built around, for example, credit reports and the sealing of juvenile crime records²³ seem quaint and desperately out of touch with reality at a time where Google seeks to make available “the world’s information” and transparency has become synonymous with effective government.

Yet, few are questioning the effectiveness of such constraints when it comes to one social actor, the corporate person. An extensive regulatory apparatus, including an array of governmental agencies (e.g., SEC, FDA, EPA), trained professionals (counsels, records managers) and comprehensive body of rules operates with single-minded devotion to the precise delimitation of corporate accountability and liability through the creation, preservation, and destruction of records, as defined by the retention periods established in various sectors of corporate activity. In his groundbreaking analysis of the political economy of personal information, Oscar Gandy pondered why similar limits seem unthinkable for individuals:

“Corporations, unlike individuals, can be rather easily dissolved and formed anew on action of their boards of directors. Why should corporations as fictional persons already have rights that natural persons still long to enjoy?”²⁴

Driven by a concern for the vast gap in the historical record such a regulatory framework induces, business historian David Kirsch has begun questioning this

²² Geoffrey B. Pringree, and Lisa Gitelman, “Introduction: What’s new about new media,” *New Media 1740-1915* in ed. Lisa Gitelman and Geoffrey B. Pringree (Cambridge, Mass.: The MIT Press), xii.

²³ Jean-François Blanchette and Deborah Johnson, “Data Retention and the Panoptic Society: The Social Benefits of Forgetfulness,” *The Information Society* 18 (2002): 1-13.

²⁴ Oscar H. Gandy, *The Panoptic Sort: A Political Economy of Personal Information* (Boulder: Westview Press, 1993), 225.

remarkable discrepancy. While every year in the United States, more businesses are created than marriages celebrated, historians will have little to rely on when the time comes to document the extraordinary surge of entrepreneurship that is synonymous with the rise of the Internet. In 2007, the records of a bankrupt Silicon Valley law firm, Brobeck, Phleger, & Harrison, were assigned to a liquidation committee. Comprised of several millions records and one and half terabyte of data, the collection constitutes an extraordinarily rich and unique historical archive of thousands of dot com ventures. Yet, as private business records, issues of legal privilege and confidentiality prevent their use as primary sources for historical research.

With help from the Library of Congress, Kirsch's efforts have led to the creation of the Brobeck Closed Archive, operating under a set of innovative guidelines that seek to reconcile the interest of Brobeck's clients with a public interest in private records. As Kirsch notes,

"even if the bulk of the Brobeck Archive would need to remain off-limits to historians, potentially into perpetuity, the scale and breadth of the collection could support social science research to answer a host of interesting questions without requiring that specific confidential information be disclosed."²⁵

The case of the Brobeck Closed Archive suggests it is indeed possible to develop "information ecology" approaches that negotiate in innovative ways the trade-offs between liability, accountability, and the collective interest in a comprehensive historical record. Rules constraining the use of information relative to personal bankruptcy and juvenile crime records were developed with a similar concern in balancing individual rights with the collective interest in ensuring that individuals eventually participate again in economic and social life. If such regulatory constraints appear today a lost cause, it is not on account of the impossibility of effectively regulating digital information, but of the enormous economic value of the data points that constitute the finely grained fabric of our online personas.

Thus, in evaluating the various claims for both risks and benefits of digital technologies for memory, we should remain mindful that "remembering," whether perfect or fallible, is always the remembering of specific social actors, with varying degrees of access and exposures to these risks and benefits. The ability to be forgotten is a thus privilege likely to remain unevenly distributed among these social actors and, for some of them at least, the best years for oblivion are probably still to come.

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²⁵ David A. Kirsch, "The Record of Business and the Future of Business History: Establishing a Public Interest in Private Business Records," *Library Trends* 57 (2009), 362.

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