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# A Cyberpublishing Manifesto

## The distribution of digital information on physical media is just not effective. Information belongs in cyberspace.

Imagine a world without the printed page. What would it look like? How would it function? What would the role of an archive be? How would the greatest scholarly achievements be preserved? We don't know, but we're about to find out.

Let's face it, books are dead. History. Toast. Books are as dead as the compact disc.

Wait a minute. Audio CD sales are soaring. CD-ROMs and sister technologies such as DVD are redefining home entertainment. "Dead? CD-ROMs aren't even sick," I hear you cry.

But appearances are deceiving. CD-ROMs, DVDs, MiniDiscs, and all of their technological siblings are ancient history (at least from the perspective of 2100 A.D. and beyond). They'll be relegated to the scrap heaps of the 21st century—the glitterati of global landfills—virtual, vinyl vegetation.

Reality check: CDs are a multibillion dollar industry and will continue to dominate the home audio market for years. DVDs will not just survive but flourish in the edutainment market for decades to come. But really efficient digital technologies are like giant oaks—they take a long time to die, and they look healthy until the very end. But die they will.

Like hieroglyphs, cave paintings, and the fruits of Gutenberg's labor, CD-ROMs, DVDs, and all sundry variations thereof are nearing the end of their life cycles because they are inherently inconvenient. The distribution of digital information on physical media is just not efficient. People shouldn't have to carry information, stow it, package it, move it, lift it. Information belongs in cyberspace.

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### The Irrelevance of Cyber-Mutations

The best way I can convey the irrelevance of cyber-mutations of publications is through a personal experience. Quite a few years ago, I wrote an article and posted the preprint on my Web site after sending the digital manuscript to the publisher. Howard Rheingold saw my preprint, and wrote a review of it in one of his columns. I incorporated some of Rheingold's ideas, along with others who commented on my digital preprint, into another version. About this same time, the galleys of the original submission came back, better from the editor's touch, but out-of-sync with my latest Gestalt state. The point is that by the time the printed copy

shipped, it was already out-of-date. This phenomenon is the consequence of two fundamental principles of the information age: the digital networks made cyber-mutations of written artifacts inevitable, and any particular cyber-mutation-instance of a written artifact is likely to be irrelevant in the long run.

These fundamental principles have major consequences on the way we will express ourselves in the future. Consider the way copyright law remains saddled with such archaic notions as "definitive versions" and "fixity of copyright." Our two fundamental principles hold that future electronic publishing—or, better, cyberpublishing—is best viewed as an ongoing process or activity. The actual artifacts are but ephemeral by-products of the creative process. Should anything be copyrightable, it should be the process of creation rather than the temporal milestones. In the Internet age, everything worth doing is distributed, done in parallel, spontaneous, and results from a healthy dose of serendipity.

By 2100, our current view of electronic publications as copyrightable artifacts will be viewed primarily as a historical allegiance to a pre-participatory, noninteractive, essentially dull and lifeless era of electronic publishing—an era in which one thought of digital libraries and repositories as a collection of linked "things" rather than articulated processes and procedures. The current digital publication will be a relic, an obscure by-product from the horse-and-buggy age of digital networks. In 2100, cyberpublishing will deal with ongoing processes and interactivities. Processes and interactivities are, by their very nature, not stable, and any attempt to make them so won't succeed. The forward-looking vision of publications will not be as individual, rigid artifacts, but rather as collections and convergences of myriad cyber-mutations of dynamic artifacts. If it's helpful, one might think in Platonic terms: the different cyber-mutations are cyber-tokens of a common cyber-form that exists—only virtually, of course—in cyberspace.

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## Electronic Publications as Ongoing Processes

A useful metaphor for cyberpublishing is multiple layers of moving, orthogonal filmstrips in various stages of completion. Each filmstrip represents an ongoing publishing activity or thought sequence. Say my current work on approximate string matching (ASM) coincides with your current research on plate tectonics at a particular moment in time. At that precise moment, and perhaps never again, the content of our "filmstrips" intersect with respect to content, despite the fact that the corresponding themes of our films are very different, and they have irreconcilably foreign conclusions. Knowledge is exchanged between our intersecting frames, which irrevocably changes subsequent frames for the both of us. Each and every reference for our published work is a "thought frame" in this sense. The procedure by means of which these frames are brought together in time are as important as the content of the frames. Trying to define one frame of any of the overlapping sequences as "definitive" misses the point—each is but a "snapshot" of a much larger and grander work in process. By 2100 it will be obvious that any attempt to label a single frame of a thought stream as definitive is akin to trying to paint falling leaves—it just won't work. The world of ideas and concepts changes too fast, and we've been so successful at labeling intellectual property at this point only because our information delivery mechanisms have evolved at a pace that is slower by orders of magnitude. The Internet and the Web have changed all that.

A new world order in electronic publishing will soon be upon us. It will be dynamic, interactive and participatory. Copyrights as we now know them will be pointless and out of place (the recent litiga-

tion between Napster and the Recording Industry Association of America is an important omen in this regard). The very notion of "intellectual property" will be stretched beyond recognition.

## Cyber-Retrogression

What will this new order look like? Let's begin with what it won't look like. Let's begin from 2001 A.D. and look forward to 2100.

Today, the state of the art in electronic publishing is some variety of "digital ink." The digital ink metaphor is especially appropriate here because the term itself suggests it involves the conversion of the hard copy content into a digital realm without any concomitant transformation of the content. Digital ink is anathema to cyberpublishing. Cyberpublishing is about dynamic, ever-changing content. Cyberpublishing is immersing, engaging, and participatory. By 2100, cyberpublishing will have displaced all of the intermediate "placeholder" technologies based on digital ink. Interest in porting over physically produced information to the digital realm will have vanished. In 100 years it will be clear that digital ink will be no more significant in the long run of human interaction than its liquid ancestor.

E-book technology (www.openebook.org/) is an example of digital ink. When one thinks about e-books, one thinks about digital formats, presentation media, rendering environments, just-in-time delivery, tetherless connectivity, and the like. Note that none of this has anything to do with dynamic content. Instead of serving up 19th century content on acid-free paper, we're now serving up 20th century content on LCD screens. But the nature of the content is essentially unchanged (I'm even prepared to extend this argument to modern "multimediocrity," but that calls for another forum). In either paper or e-book form, the content remains static, the rendering is still driven by the information provider rather than the information consumer, nonlinear traversal continues to be prescriptive, and, overall, the venue is no more participatory than today's daily newspaper. The e-book isn't the most important publishing revolution since Gutenberg as some would have us believe. It is a reincarnation of Gutenberg's press with digital ink.

Another form of digital ink is Xerox's Digipaper (www3.cs.cornell.edu/DigiPaper/). Again the emphasis is on rendering media, this time with the added twist of compression, speed of access, and control over the resolution of the presentation.

Despite the outward appearance of progressiveness, digital ink technologies are actually retrogressive from a cyberpublishing perspective. No matter how clever, they are all entrenched in a publisher-centric, author-oriented, prescribed hyperlinked traditional model of publishing where information flow is rectified from creator, through publisher, to reader. To the contrary, cyberpublishing is about bringing the information provider and information consumer together in time as active contributing partners in the publishing experience. Digital ink has nowhere to go beyond mid-century.

## Cyberpublishing Revisited

Now that we've provided an example of what cyberpublishing won't look like, let's see if we can figure out what it will look like by looking backward from 2100. My high-altitude view seems fairly clear, if not the technologies to implement it. Cyberpublishing will have to involve technologies that will contribute toward an interactive and participatory environment, that will encourage dynamic thought swarms and intellectual synergies, and that will facilitate the creation of new knowledge by letting everyone involved in the cyber-creation experience play an active role. Author, reader, and critic will become one in the grandeur of the cyberpublishing experience.

The facilitating technology I foresee will be a cross-platform, networked environment that will encourage the purposeful and productive convergence of ideas. Perhaps cyberpublishing will be a far-out extension of groupware technology—the ultimate dimensionless collaboratory. Perhaps it will be an outgrowth of Ted Nelson's hyperpublishing model (www.sfc.keio.ac.jp/~ted/OSMIC/OSMICpage.html). Or maybe it will be an outgrowth of the new "markets-as-conversations" metaphor (www.ideavirus.com, www.cluetrain.com). In all likeli-

hood, it will involve technologies as foreign to us now as TCP/IP was to Vannevar Bush. Perhaps the paradigm will be something like interactive, nomadic computing flavored with a pinch of Nelson's hypertime, a healthy handful of document microversioning, and some "idea virus" technology augmented with a touch of virtual reality. Beyond that, the technology behind the vision is too futuristic to be reliably predicted beyond the obvious no-brainers: it will be some variety of untethered convergent technology that is seamlessly integrated into all of our other digital appliances.

But, beyond the obvious, the digital substrate of cyberpublishing will be unique to the new millennium. It will necessarily extend beyond hyperpublishing, because of the latter's version-centricity, the fact that it is self-limiting by not focusing on bringing the information producers and consumers together in time, and the prescriptive nature of the nonlinear document traversal it is built upon. Cyberpublishing will necessarily extend beyond "markets-as-conversations" because of the latter's inability to impose structure on the thought swarms. It will go beyond microversioning because cyberpublishing is inherently process-centric rather than version-centric, and since processes are likely to be dynamic, spontaneous and unregulated, their record will be, by definition, irreversible and not well suited to version control environments of any type.

Cyberpublishing will also certainly extend beyond the current wave of conversation-collection environments. I reaffirm my optimistic, though perhaps naive, view that by 2100 society (most especially academic administrators) will realize intellectual value is not the same as intellectual volume. Cyberpublishing is also about adding value to content. The history of the 21st century will confirm the principle that unmoderated collections of banter and ruminations were no more useful to society than a collection of scrambled phone directory listings.

Over the past few decades, several digital technologies have been described as the "most important breakthrough since Gutenberg." Word processing, desktop publishing, a variegated mix of digital-ink technologies, and the Web itself, have all been characterized in this way. I'm confident that Gutenberg would remain nonplussed. We all need another reality check: so far, our collective imagination has produced nothing more than digital manifestations of Gutenberg's "artificial" method of reproducing calligraphy—a 42-line bible here, an 80-column display there, or true-type fonts with kerning and micro-justification—all variations on the theme. A further irony is that just as Gutenberg originally sought to emulate the earlier manual calligraphy rather than take full advantage of the more modern movable-type technology (by using page numbering, including artwork, convenient indexing, and so forth), we have initially built our digital world of writing around ad hoc and arbitrary traditions of the earlier hard copy era. How much sense does it make to develop word processors that orient the text preparation around pages? We were so fixated on reproducing Gutenberg-like pages on laser printers that we completely overlooked the fact that we could have been thinking digitally from the beginning. As a result, we used an inherently paperless, digital technology to drown ourselves in paper. Just consider the logical absurdity of developing all of our sophisticated OCR technology to scan in archival documents that were for the most part digital in the first place. The humor of this will not escape the attention of 22d century cybernauts as they reflect on the intellectual limitations of those in the previous century.

The next millennium will embrace something like the cyberpublishing model described here as the dominant venue for information exchange. All that remains is the technology platform to support it. I'm working on it. Help is appreciated. Solutions are appreciated more. C

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