

MARK STEFIK

FOREWORD BY

VINTON CERF

ARCHETYPES, MYTHS, AND METAPHORS



INTERNET DREAMS

Internet Dreams
Archetypes, Myths, and Metaphors

Mark Stefik

The MIT Press
Cambridge, Massachusetts
London, England

Third printing, 2001

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This book was set in Sabon by Asco Trade Typesetting Ltd., Hong Kong and was printed and bound in the United States of America.

Images of the metaphors are by Eric P. Stefik.

Library of Congress Cataloging-in-Publication Data

Internet dreams : archetypes, myths, and metaphors / Mark Stefik.

p. cm.

Includes bibliographical references (p.) and index.

ISBN 0-262-19373-6 (HB), 0-262-69202-3 (PB)

1. Information superhighway—United States. 2. Internet (Computer network)—United States. I. Stefik, Mark.

ZA3250.U6I58 1996

303.48'33—dc20

96-28249

CIP

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Letting Loose the Light: Igniting Commerce in Electronic Publication

Mark Stefik

Connections

In "The Digital Library Project: The World of Knowbots" in Part 1, Robert Kahn and Vinton Cerf ask, "If a thousand books are combined on a single CD-ROM and the acquirer of the CD-ROM only intends to read one of them, what sort of royalty arrangement is appropriate to compensate the copyright owners? How would compensation be extended for cases in which electronic copies are provided to users?" Their questions show how, in 1988, issues about copyright protection and payment for using information arose in the context of early CD-ROM distribution.

By 1994 copyright issues not only had not been settled, they were coming to a boil. Laura Fillmore's effort to build a successful publishing business on the Internet reveals the limitations of what was practical in May of 1994. Although digital works were being sold on the Internet, provisions for commerce were primitive. Furthermore, the ease of copying digital works had led many people to believe that digital information should be free. Fast access to the network had made trading programs or other data as easy as mixing songs on audio tape. In short, it had become much simpler for network users to infringe copyright than to uphold it.

This is the context for the oft-quoted statement by John Perry Barlow of the Electronic Freedom Foundation, "Copyright is dead." Advocates of free information argue that because you don't lose the original when you make a copy of a digital work, there should be no charge for copying information. The conventional wisdom among publishers in late-1994, when this article was written, was that digital containers for software

were inherently leaky vessels and that no viable solution would ever be found. The article suggests, however, a way to sustain commerce for those who want to sell information on the network.

Throughout the time I've been groping around cyberspace, an immense, unsolved conundrum has remained at the root of nearly every legal, ethical, governmental, and social vexation to be found in the Virtual World. I refer to the problem of digitized property. The enigma is this: If our property can be infinitely reproduced and instantaneously distributed all over the planet without cost, without our knowledge, without its even leaving our possession, how can we protect it? How are we going to get paid for the work we do with our minds? And, if we can't get paid, what will assure the continued creation and distribution of such work?

John Perry Barlow, "The Economy of Ideas"

No problemo.

T-101 (Arnold Schwarzenegger) in *Terminator 2*

It all depends on whether you really understand the idea of trusted systems. If you don't understand them, then this whole approach to commerce and digital publishing is utterly unthinkable. If you do understand them, then it all follows easily.

Ralph Merkle

Across many cultures, knowledge and inner knowing are described as light. *Letting loose the light* refers to spreading knowledge in the world, typically in written form. Consistent with this metaphor, the period in the eighteenth century characterized by a burst of writings in philosophy and science is called the *Enlightenment*. In the present century the metaphor of knowledge as light is both poetic and physically realized. Books, pictures, movies, musical performances, and other works can be conveniently represented digitally. With fiber optics, digital works are actually transmitted by the shining and pulsing of light.

The digital representation of works and their nearly instantaneous transmission has profound consequences for commercial publishing. Three of the fundamental economic factors affecting the publishing industry—printing costs, inventory costs, and transportation costs—can be drastically reduced. Digital works can be copied at minuscule costs, stored in almost no space, and transported instantly anywhere in the world.

This portability opens up visions of a greater information age. For libraries, universal access to the world's written knowledge is a centuries-old vision. Today many libraries have electronic catalogs accessible to anyone with a computer. Articles can be delivered to anyone with a fax machine. In the technophile's idealized vision, books and magazines need never be printed on paper at all; any digital work could be made available to anyone, anytime, anywhere in the world.

However, the dream of universal digital access to high-quality works dangles just beyond reach. Such works are not usually available, because of publishers' concerns that uncompensated copying will infringe and erode their ability to make a living. History suggests that this problem will not go away. Publishing thrives only when it is profitable, and profitability depends on limiting uncompensated copying.

The conventional wisdom—based on the way computers are used for word processing, electronic mail, and computer networking—is that copying digital works is easy and, therefore, inevitable. There appears to be a clear, inherent conflict between representing works digitally and honoring the commercial and intellectual property interests of creators and publishers. Fortunately, computers need not be blind instruments of copyright infringement. Properly designed digital systems can be more powerful and flexible instruments of trade in publications than any other medium. The seeming conflict between digital publishing and commerce is merely a consequence of the way computer systems have been designed to date.

The technological means for commerce in digital works are now at hand. New and unconventional when compared with today's uses of computers, these means will enable us to buy, sell, and lend digital works much as we now buy, sell, and lend printed books and other publications. They will change the way digital works are purchased and delivered and will give consumers access to all sorts of works at any time of the day—though not necessarily for free. Consumers will be able to sample works, borrow them, rent them for nominal fees, and make copies for friends. Creative people will be able to circulate their works to networks of friends while earning a reliable living from people who make copies of them. This technological system will affect everything from digital books to digital television, from digital music to digital video

games. It will radically change our concepts of digital libraries, digital bookstores, digital music stores, digital newspapers, and digital television stations. Moreover, any competent technological company will be able to implement the required systems.

Here is a road map to this new land. First, we discuss the history of copyright law and the reasons for the widespread, but incorrect, belief that works represented digitally will be copied without permission. We then describe the technological innovations that can enable and support commerce in digital publishing. Finally, we introduce the institutional and business challenges that lie ahead. What we require to overcome them is the wit, will, and means to create institutions that provide the necessary security, convenience, vision, and longevity.

The Origin and Rationale of Copyright

It is harder to be honest than to cheat when copying digital works on general-purpose computers. The license printed on the package of most purchased computer software authorizes a buyer to load the software into one computer and use it there. Getting another legal copy for a friend involves driving to the computer store and buying it. It is much easier, faster, and cheaper to simply load the same software into another computer. Such copying is so private and easy to do that most people do it without thinking, and without guilt.

Unauthorized copying on computers is not, of course, limited to purchased software. With a few keystrokes, it is often possible to copy a paragraph, an article, a book, or a life's work without compensating its creators or publishers. Nor are unauthorized copying and use new phenomena. Anyone who ignores the FBI warning message on video tapes to make copies for friends infringes a copyright, as do people who copy compact discs onto cassettes. As a practical matter, it has not been feasible to enforce the copyright law in these cases. There are simply too many people with recording devices to make rigorous enforcement practical or cost-effective.

It is widely believed that there is no viable technical solution to this problem for digital information. John Perry Barlow, a prominent spokesperson in the computer industry, says that the idea of patents and copy-

rights needs to be rethought in the digital age. Information, he argues, cannot be contained or owned. It wants to be free. Cyberspace is the new frontier, and its leaders and pioneers are today's radical thinkers about freedom of information. Barlow suggests, in fact, that we abandon all notions of intellectual property and market regulation. This solution was tried at least once, and it didn't work. Apparently, for high-quality works to spread in the world people need to be able to make a living from creating and distributing them.

Barlow's arguments are reminiscent of the intense debates about intellectual property that took place in France during the French Revolution. Like Barlow, revolutionaries argued that ideas cannot be owned and should not be regulated. During the revolution, many writers and underground publishers emerged as civic heroes of public enlightenment by arguing against tyranny and for freedom of the press. The revolution of the mind, they said, required the dismantling of the laws and institutions governing authorship, printing, publishing, and bookselling. Absolutely free communication was one of the most precious rights of man. All citizens should be able to speak, to write, and crucially, to print freely. According to this philosophical ideal, people had a will to know and should be allowed to read and learn from anything they liked. The wide availability of books and the right to publish were seen as keys to this spread of knowledge.

In 1789, the revolutionary government wholly deregulated the press, believing that the works of the great writers of the Enlightenment would thus be made universally and cheaply available. The writers and publishers certainly never expected what actually happened. Instead of works of enlightenment, the presses turned out mostly seditious pamphlets and pornography. Printers also competed with each other to bring out cheap editions of books others had spent money developing. So little money could be made producing the good books that quality declined; most editions were abridged and contained many errors. Publisher after publisher went into bankruptcy and then out of business. The disastrous nature of an unregulated press, largely unanticipated in the heat of the revolution, became blatantly obvious as the publishing industry fell into shambles. The same leaders who had clamored for the freeing of the presses came belatedly to understand the folly of their action. In the

chaos of the unregulated press, some prominent and popular writers even stopped publishing; because they could not control the printing of their works, they could not make a living by writing.

In 1793 legislation to restore order to publishing was passed. It recognized the rights of authors and grounded the publishing industry in the principles of the marketplace, establishing the author as creator, the book as property, and the reader as an elective consumer. This law reflected a fundamental shift in the Enlightenment perspective, which now saw that the widespread creation and publication of creative works was better served when the authors could own the products of their minds. This history of the treatment of intellectual property in France is discussed by Carla Hesse in her book *Publishing and Cultural Politics in Revolutionary Paris, 1789–1810*.

Today, most people see the infringement of copyright on digital systems as unavoidable. In the remainder of this section, we describe the assumptions about computer design behind this belief and argue that we need to go beyond conventional ways of thinking to solve the problem.

Three main factors currently inhibit the development of digital publishing: (1) the absence of high-contrast, low-power, cheap flat-panel displays; (2) lack of an inexpensive and reliable way of handling money digitally; and (3) the need for a widely accepted means of accounting for the use and copying of digital works. Improvements in technology will almost certainly solve the display problem in the next five to ten years. Most people see such displays as crucial to making electronic books and newspapers portable. They matter less, however, in applications for which desktop displays are satisfactory or where displays are not necessary—such as in transmitting musical works. The second factor—methods of handling money digitally, in the form of checks, credit cards, or anonymous cash—has recently become the subject of much field experimentation. Our focus is on the third problem, techniques for commerce in what we call *digital property rights* or *usage rights*, a generalization of the idea of copyright that delineates several kinds of rights besides copying.

Some publishers see illicit copying as too big a business risk and do not publish in digital form at all. Digital newspapers often leave out impor-

tant and high-value content such as the pictures or graphics, and consumers of these lower-quality papers are unwilling to pay much for them. The perception of low quality leads to a chicken-and-egg problem in which the publishers make little money and consumers have few choices. Ironically, publishers of works that need periodic upgrading, such as computer software, have found that some leakage increases their customer base, even though it is often reported that there are more unauthorized copies of a program in use than authorized ones. Software publishers have decided that the revenue losses of illegal copying are affordable, although they lead to unfair billing. Software publishers charge all users the same price, regardless of the use to which they put the program, arguably overbilling people who use the work infrequently.

As computers and computer networks have proliferated, the need for a better approach to protecting digital works has become more widely appreciated. Moreover, as new kinds of works—such as music, video, and multimedia works that mix these forms—are now available digitally, people from different industries are searching for solutions. Given this wide acknowledgment of the need, why have solutions seemed so elusive? Apparently, we are stuck in a rut, assuming that things must be done the way they have always been done with electronic mail, word processing, and other current applications.

Conventionally, we use general-purpose computers with general-purpose operating systems and general-purpose programs. The computer industry, grounded on the premise that computers can do anything that can be programmed in software, produces a wide range of programs—word processors, spreadsheets, databases, calendars, graphics programs, and computer games. Manufacturers accept no liability when someone uses a computer to copy a copyrighted file. After all, one company builds the computer, another writes the software that does the copying, and both hardware and software are intended for general purposes—that is, any purpose the user wants to put them to. The manufacturer wants no responsibility for someone who uses the computer in a way that just happens to infringe a copyright, nor does the software publisher. The perpetrator is the consumer, who finds it easier to make an unauthorized copy than to be strictly honest.

Stuck within this framework the community of computer users protests against any attempt to regulate the copying of digital property. If we continue to accept this framework, with all of its assumptions, no party will be motivated or empowered to break the cycle and no effective way to protect digital property will be developed. At present, without enforceable property rights, the writers of words, interactive games, and songs often are not compensated for their work. And without their works the world is a darker, poorer place. Honoring their creative work in the digital systems of tomorrow requires us to challenge the design assumptions of the systems we use today.

A New Design for Digital Publishing

The technical core of the approach we propose is based on two ideas: (1) that digital works can be bought and sold among trusted systems, and (2) that works have attached usage rights that specify what can be done with them and what it costs to exercise those rights.

Trusted Systems

The term *trusted system* refers to computers that can be relied on to do certain things. For example, suppose that a creator or publisher forbids all copying of a particular digital work. A trusted system in this context would reliably and infallibly carry out that stipulation; no amount of shouting or coaxing would coerce it to copy the work. The trusted system might be very polite, but ultimately it would always refuse to make an unauthorized copy. Similarly, suppose that a trusted system *could* copy a work but only if it reliably records a set fee to be paid when it has done so. A trusted system would always record the fee whenever the work was copied. If the copying process is interrupted part way through, the trusted system would follow a standard policy; for example, it might delete the partial copy, record no fee, and note that a copying attempt was begun but not completed. Again, no amount of coaxing would change its behavior. It could always be counted on to follow the rules of the trust.

A common but false analogy claiming to show why digital works cannot be protected in computers is that of genies and bottles. In this