

Confronting the Information Age: Strategy, copyright, and digital intellectual goods

Brent D. Beal

Assistant Professor of Management, Louisiana State University, Baton Rouge, Louisiana (bbeal@lsu.edu)

Daniel B. Marin

Instructor of Management, Louisiana State University, Baton Rouge, Louisiana (bamari@lsu.edu)

The proliferation of computer networks, the popularization of the World Wide Web, and the increasing availability of digital intellectual goods present producers and distributors of those goods with a unique set of opportunities and threats. Three different conceptual models, proposed and explicated here, focus on the experiential, legal, and organizational aspects of digital intellectual goods. They highlight salient features of the digital revolution and facilitate strategic assessment and response. Different strategic responses suggested by these models are discussed.

A national information infrastructure, or NII, is emerging that is defined by three trends: the proliferation of computer networks, the popularization of the World Wide Web, and the growing availability of intellectual goods in digital form. For some businesses, particularly those that produce and distribute intellectual goods, this infrastructure has the potential to reduce costs, expand marketing and distribution reach, open up new product markets, and increase control over how consumers use their products. On the other hand, it also facilitates the unauthorized reproduction and distribution of those goods. Not only does the NII present such producers and distributors with a complex set of opportunities and threats, but response is further complicated by rapid social, technological, political, and legal change.

The NII will have a greater impact on some industries than on others. For simplicity, businesses can be grouped into two broad categories: (1) those that use information and IT to facilitate the production or delivery of tangible products or services; and (2) those that produce, process or distribute information or cultural products—products that derive most of their value from their intangible content, not the physical medium in which the content is distributed (cassettes, videotapes, CDs). The NII will affect firms in the second category to a greater extent than those in the first. These firms—what we refer to as *information businesses*—face a particularly urgent set of external opportunities and threats clustered around two critical issues: rent appropriation and the ability to innovate.

Intellectual goods—information and cultural products—often require considerable up-front costs to develop and produce. Once produced, however, they can often be easily replicated and disseminated by others. Such duplication and distribution would rapidly dissipate any abnormal rent (revenue above marginal cost) the original producer might have realized, which would render it impossible to recoup the initial costs of development. Copyright law and other forms of intellectual property law, including patent, trademark, and trade secret law, provide for certain ownership rights in such goods. This facilitates the realization of

abnormal returns for a time, thereby ensuring that the firms have adequate economic incentive to continue to produce the goods. The NII threatens to weaken the ability to appropriate economic rent from the goods by facilitating their widespread replication and distribution. Thus, the firms' ability to remain profitable in the short run—and economically viable in the long run—may be imperiled.

If ownership rights in intellectual goods are too expansive, the ability of information businesses to innovate and develop new goods may be impaired, given that existing goods often serve as the raw materials from which new ones are fashioned. Thus, we have a paradox: Although ownership rights may promote the creation of intellectual goods by providing the proper monetary incentive, they may also complicate the creation process. Ironically, too much control over the goods may have the same dampening effect as too little, although the effect would be due to the challenges of navigating an increasingly complex web of property rights on the supply side rather than a lack of monetary incentives resulting from an inability to appropriate economic rents on the demand side.

The strategic assessment of—and strategic response to—the NII requires a conceptual framework. Our primary contribution here is the provision of such a framework, presented in three different models: (1) an experiential model that focuses on differences in how individuals

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experience traditional and digital intellectual goods; (2) a legal model that examines the purpose and characteristics of traditional copyright law and the challenges associated with adapting the same legal framework to the NII; and (3) an economic organization model that addresses some of the implications of the NII for value creation and the nature and form of coordination and control mechanisms employed in economic activity. Each of the three models we discuss here approaches the digital dilemma from a distinct perspective. In developing the models and discussing their strategic implications, we also highlight the broad strategic options suggested by each.

Experiential model

In a seminal essay on the challenge of dealing with intellectual goods in digital form, Barlow (1994) makes the following assertion:

This vessel, the accumulated canon of copyright and patent law, was developed to convey forms and methods of expression entirely different from the vaporous cargo it is now being asked to carry.... Most of the people who actually create soft property—the programmers, hackers, and Net surfers—already know this. Unfortunately, neither the companies they work for nor the lawyers these companies hire *have enough direct experience with nonmaterial goods* to understand why they are so problematic. (emphasis added)

For Barlow, it is direct experience with nonmaterial goods (intellectual goods in digital form) that determines whether or not an individual really understands the differences between them and the intellectual goods embedded in physical artifacts (books, maps, cassette tapes, and so on), hereafter referred to as traditional intellectual goods. Even modest experience should be sufficient to demonstrate Barlow's point: Individuals interact with digital intellectual goods in different ways than with traditional ones.

Most experiential differences can be attributed to one of four broad categories: (1) ease of replication; (2) resistance to degradation; (3) intangibility; and (4) ease of alteration (see **Figure 1**). In addition to specifying the differences in the underlying characteristics of traditional versus digital intellectual goods, we also identify important differences in the character and form of exchange (the mutually beneficial transactions that create social surplus in a traditional economic sense).

Ease of replication. It is relatively difficult to replicate traditional intellectual goods, such as books, maps, pictures, or paintings. Digital goods, in contrast, can be replicated with ease. In some cases, replication is not only easier or less costly, it is a functional imperative and is inextricably linked to access. For example, software programs are *copied* into RAM when executed and Web pages are *copied* from server to client when viewed. The ability to copy digital objects is ingrained in individual experience to such a degree that users are often surprised (and dismayed) when they are prevented from doing so by digital rights management (DRM) constraints or other restrictions.

Resistance to degradation. With traditional intellectual goods, it is taken for granted that a copy is inferior to the original object—a xerox of a book, a copy of a videotape, or a recording of a song from the radio will not be as good as the original. Digital intellectual goods, in contrast, do not degrade with replication. Because they are

“perfect,” there is little emphasis on their generational distance from the “original.”

Intangibility. Digital intellectual products have no bulk or mass—they cannot be hefted or examined in any physical sense. The underlying physics of their storage is incomprehensible to the average user and their

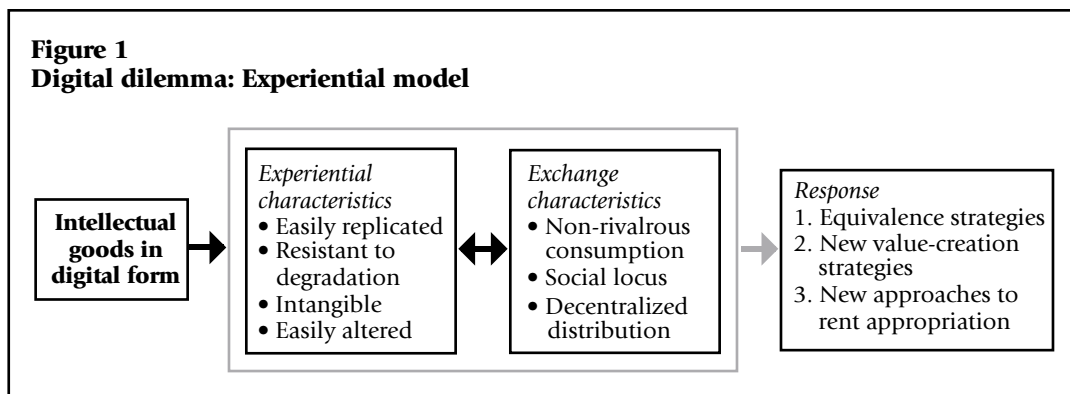
existence is viewed as more tenuous and ephemeral than traditional intellectual goods. Their movement through physical space is not constrained by geographical distance. Digitization also vastly increases the storage density of intellectual property—large numbers of items can easily be stored in and retrieved from a small physical area.

Ease of alteration. Digital intellectual goods are often malleable: a photograph can be altered, a text can be edited, audio files can be combined and archived in personalized collections. Although differences in the ease of alteration often contribute to more subtle differences in the way such goods are experienced, they remain important. The open-source software movement, for example, could not function without the ability to distribute code in digital form that geographically dispersed members of a programming community could then manipulate and improve. Many open-source projects depend entirely on the exchange of code in digital form among individuals who never meet face-to-face.

Exchange characteristics

The characteristics of digital intellectual goods interact and reinforce each other to create an exchange environment that is different in a number of respects from markets for traditional intellectual goods. Figure 1 lists three important ones: (1) non-rivalrous consumption; (2) social exchange; and (3) decentralized distribution.

In a speech at Real Conference 2000, Edgar Bronfman, head of Universal Studios, said, “You own a home. You own a car. They’re yours—they belong to you. Well, your ideas belong to you, too. And ‘intellectual property’ is property, period” (Griffin 2000). However, this statement ignores important differences between rivalrous and non-rivalrous goods. Rivalrous goods such as houses or cars demand an ownership arrangement that allows for excludability (the ability to exclude or prevent others from using them), given that they are depleted or worn out through use. Non-rivalrous goods, on the other hand, cannot be used up—one individual does not deplete or wear out a song or a film, for example, and therefore does



not prevent its use or enjoyment by someone else. Because digital intellectual goods can be easily replicated and are not susceptible to degradation, they are not subject to familiar scarcity constraints. This affects how individuals perceive ownership claims.

Because digital goods can be replicated so easily and cheaply, their exchange often occurs in the social domain and is driven by *quid pro quo* considerations and other behavioral norms rather than by explicit monetary exchange. In peer-to-peer computer networks, for example, norms of good citizenship behavior demand that individuals who download files also share files. A college student experienced in downloading MP3 files from the Internet stated, “I don’t know of anybody who ever sold a CD they burned... You have the music for personal use and you don’t make any type of profit on it” (Alexander 2001).

Because there is no need for explicit economic exchange, there is no need for centralized distribution, in which authorized distributors function as part of a hierarchical distribution channel. Instead, exchange occurs within informal and private networks of individuals, where products are passed from one person to another and little distinction is made between producer and consumer.

Experiential model: Strategic response

The important characteristics of digital intellectual goods (highlighted in Figure 1) alter the value proposition for consumers, thereby raising fundamental questions about the value creation process. This is not a trivial issue. As Porter (2001) reminds us, once the faddish elements of the new economy are set aside, “the creation of true economic value once again becomes the final arbiter of business success.” If the digitals are perceived to be sufficiently different from the traditionals, then consumers may attach a different value to them. If this value is significantly less than that attached to the same goods in traditional form, business processes that created economic value in the past may no longer be viable.

Based on this experiential model, at least three different generic strategies are possible:

1. Make the digital experience equivalent to the traditional one—that is, give digital intellectual goods characteristics (and limitations) similar to their traditional counterparts.
2. Redesign economic value-creation processes to take advantage of the different characteristics of digital intellectual goods.
3. Employ different rent appropriation strategies that do not depend on managing or constraining how consumers interact with digital intellectual goods.

The first strategy is defensive in nature; the last two are more proactive.

A number of information businesses are currently pursuing an equivalence strategy. Record companies are exploring several technologies aimed at complicating the process of “ripping” or making MP3 files from music CDs. EMI Group and Roxio, an Adaptec subsidiary and publisher of the popular *Easy CD Creator* software, are jointly developing protection measures that will prevent the “burning” of copyrighted songs onto homemade CDs. If these efforts are successful, then extracting audio content from CDs and converting it to a more fungible digital format will be more difficult. Many of the e-books available from Amazon.com expire or become inaccessible after 60 days, thus in effect degrading. The adoption of digital audio technology (DAT) was adversely affected by the legal requirement that all DAT systems include a chip that would automatically reduce the quality of digital copies, which otherwise would have been perfect. Another technological solution to the widespread replication and dissemination of MP3 music files is a scheme that permits “original” music files to be copied, but prevents the copying of copies of the original. Other software has been proposed that would automatically delete from a user’s hard drive a copyrighted file saved to a floppy disk or e-mailed to a friend.

If the same limitations can be imposed on digital intellectual goods that naturally occur in traditional ones, economic exchange can be structured in the same way and the same rent appropriation strategies can be employed. However, these limitations must be artificially applied and maintained in the digital context, whereas in the traditional case they represent inherent attributes of the physical artifacts in which intellectual content is embedded.

Redesigned economic value-creation processes and different rent appropriation strategies represent relatively untested strategies. Small software firms like Zone Labs, publisher of the popular Zone Alarm firewall software, have experimented with business models that attempt to use the NII to establish reputation and product ubiquity, then leverage these assets to market other products and services. Similar business models could be employed in the recording industry, requiring a focus on establishing name recognition and notoriety and then leveraging such assets to

realize revenue from commercial licensing and public appearances. Likewise, game companies might leverage game popularity to market online gaming forums or channel players into other products and services. Different rent appropriation strategies include selling or licensing intellectual goods to identifiable groups of individuals through large commercial entities or public institutions who can then use their position to charge members without imposing constraints on access to or use of the goods. A college, for example, might pay for unlimited access for its students to a productivity software suite, then impose a minimal software fee on all students. This same logic suggests that different types of taxes on different types of hardware or other physical artifacts used in the NII might represent a viable rent appropriation avenue for content providers that would obviate the need to change the character or nature of digital goods or the NII.

Legal model

There are three main branches of intellectual property law: patent, trademark, and copyright. Because the emergence of the NII has the most implications for the third, we focus primarily on copyright law in developing a legal model of the digital dilemma. Copyright law is designed to protect artistic and expressive work, which includes maps, charts, books, photographs, sound recordings, motion pictures, software, and other information goods.

Copyrighting is a compromise between two opposing imperatives. Absent the grant of enforceable property rights, it would be impossible for producers to recoup initial production costs. As Goldstein (1999) observes, “The critical point is that, unable to appropriate the value of his information, the producer will, from the start, be disinclined to invest in producing information.” The first imperative, therefore, is that ownership rights must be granted to the producers of intellectual goods in order to provide economic incentive for continuing to produce them.

On the other hand, information goods are non-rivalrous—once produced, their use by another individual does not diminish them or decrease their availability. If producers demand a given price for these goods, there will be consumers who are unable or unwilling to pay it, but who would nevertheless derive some benefit from use of the goods. Granting free access to these consumers would result in a clear benefit to them, while doing no harm to any other group, and would therefore, from a societal perspective, represent a more advantageous outcome. Put another way, the marginal cost of information goods is often zero. Given that social surplus is maximized when price is equal to marginal cost, the price of information products should, over time, approach zero. “Put suc-

cinctly,” note Cooter and Ulen (1988), “the dilemma is that without a legal monopoly not enough information will be produced, but with the legal monopoly too little of the information will be used.”

Given these conflicting demands, US copyright law reflects a careful balance between control and access (see Figure 2).

Distinction between commercial and private activity

An understanding of the commercial/private distinction is essential to understanding our legal system in general and intellectual property law in particular. As Goldstein (1994) states, “Every American copyright act since 1790 has clung to the idea that copyright is a law of public places and commercial interests.” In Figure 2, this distinction is represented by a gray horizontal line that transects the copyright rectangle, which we have labeled the *commercial/private divide*. Copyright law is designed to be applied to explicit economic exchange, which occurs in the relatively public sphere of commercial activity (the commercial domain) and is driven by the expectation of profit. Historically, the private domain has been of little interest to copyright holders because the noncommercial activities of individuals have had little impact on the functioning or viability of commercial markets.

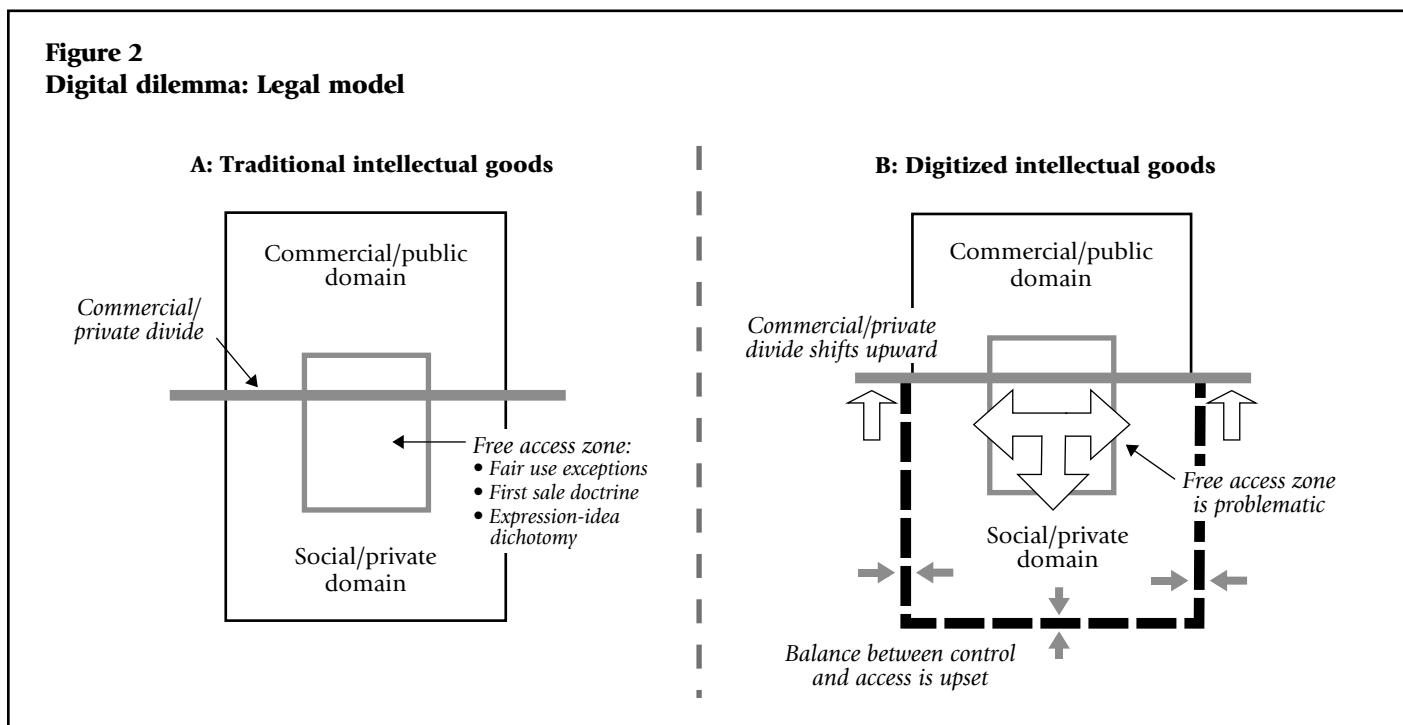
Free access zone

The maintenance of a free access zone is a critical component of existing copyright law. Article I, Section 8 of the US Constitution, in which all such law is grounded, provides

a utilitarian justification for copyrighting: “The Congress shall have power...[t]o promote the progress of science and the useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.” The challenge, according to the National Research Council (2000), is in “striking and maintaining the balance, offering enough control to motivate authors, inventors, and publishers, but not so much control as to threaten important public policy goals (e.g., preservation of the cultural heritage of the nation, broad access to information, promotion of education and scholarship).” This zone ensures that authors, artists, and others have access to the collective body of intellectual goods that often serve as the raw materials from which new intellectual goods are fashioned. As Litman (1990) explains:

[T]he very act of authorship in *any* medium is more akin to translation and recombination than it is to creating Aphrodite from the foam of the sea. Composers recombine sounds they have heard before; playwrights base their characters on bits and pieces drawn from real human beings and other playwrights’ characters...cinematographers, actors, choreographers, architects, sculptors all engage in the process of adapting, transforming, and recombining what is already “out there” in some other form. This is not parasitism: it is the essence of authorship. And in the absence of a vigorous public domain, much of it would be illegal.

It is the creation and preservation of what we refer to as a *free access zone* that works to preserve the “vigorous public domain” to which Litman attributes such importance. The



free access zone represented in Figure 2A is sustained by at least three features of current copyright law: (1) fair use exceptions, (2) the first sale doctrine, and (3) the expression-idea dichotomy.

The NII represents a challenge to the legal intellectual property framework depicted in Figure 2A. In the digital context, four things happen, as shown in Figure 2B: (1) the commercial/private divide shifts upward; (2) the private domain becomes significantly more important to (and problematic for) information businesses; (3) maintaining a free access zone becomes increasingly problematic; and (4) the balance between control and access becomes unstable.

The upward shift in the commercial/private divide represents the growing relevance of “private” copying to commercial markets. For example, the popularity of digital audio files and the proliferation of data processing and storage technology (rewriteable CDs and DVDs) have made the “sharing” of music files in the private domain a significant impediment to the rent appropriation strategies of the major recording studios. The free access zone becomes problematic because it is difficult to differentiate between private use and fair use. In the digital context, one way to prevent widespread replication is to restrict the user’s ability to manipulate, copy, and/or disseminate digital content. These kinds of restrictions, however, also serve to restrict fair use. If fair use can be used to justify greater access, then it has the potential to become a kind of gateway to private use, given that once users have the ability to manipulate and disseminate an intellectual good it is almost impossible to prevent widespread dissemination outside the scope of fair use.

The stability of prevailing copyright law can be attributed, at least in part, to its consistency with the constraints inherent in the physical artifacts in which intellectual property has traditionally been embedded. The prohibition against reproducing and selling copyrighted books, for example, is enforceable (and hence effective) because publishing is a difficult, costly, and inherently public act. Copyright law in this instance is bolstered by the constraints inherent in the books—constraints that are immutable in that no invention will remove them, thereby enabling the cheap and effortless creation of physical artifacts (the books) out of thin air. This is not the case with digital intellectual goods.

Legal model: Strategic response

The legal model of the digital dilemma shown in Figure 2 draws attention to a number of important issues that demand strategic assessment and response. Whereas the experiential model focuses on consumer experience, the legal model draws attention to the sociopolitical mechanisms through which control over intellectual goods is sanctioned and exercised. It suggests that the private

domain is rapidly becoming an important concern of information businesses. The free access zone is securely institutionalized, making it impractical for firms to try to curtail access in this zone. At the other extreme, despite the freewheeling nature of the NII, there remains tacit consensus that only the creators or owners of intellectual goods should be able to commercially exploit them. This leaves three broad strategies for responding to the digital dilemma: (1) contest the private domain; (2) use proxies to contest the private domain; and (3) regroup behind the commercial/private divide.

Contest the private domain. Information businesses may attempt to educate consumers on the differences between fair and private use and then try to enforce the distinction. This requires informing consumers that sharing intellectual goods—even if no explicit economic exchange takes place—is prohibited. Passage of the No Electronic Theft (NET) Act (Public Law 105–147) in December 1997 represents an important attempt to criminalize such sharing within the private domain. The Act added the following sentence to Section 101 of Title 17 (Copyrights) of the US Code: “The term ‘financial gain’ includes receipt, or expectation of receipt, of anything of value, including the receipt of other copyrighted works.” This change was explicitly intended to broaden the definition of “financial gain” so that prevailing copyright law could be applied to infringement motivated by the expectation of reciprocity rather than explicit monetary exchange. Thus, it criminalizes the swapping of MP3 files or other copyrighted material even though participants in such activity neither received nor expected to receive any direct financial compensation.

Use proxies to contest the private domain. Information businesses may persuade or otherwise obligate other businesses or institutions to police consumer behavior within the private domain. This strategy assumes that in some instances other firms or institutions may be in a better position to constrain the casual copying of intellectual goods and that information businesses can legitimately obligate them to constrain such behavior. According to the National Research Council, some scholars have suggested that “the notion of copy may not be an appropriate foundation for copyright law in the digital age.” If intellectual goods are to be protected through other means, the probability is high that other firms may be in a better enforcement position. Other “pressure points” besides copying that might be effective in the NII include hardware, software, and access providers. The Digital Millennium Copyright Act (DMCA), signed into law in October 1998, stipulates, for example, that all analog VCRs must be designed to conform to a set of security technologies, known as Macrovision. The DMCA also includes a controversial anti-circumvention clause that makes it illegal to produce and sell a product that is primarily used to circumvent electronic rights management systems used to protect intellectual goods.

Regroup behind the commercial/private divide. Information businesses may elect to cede the private domain by allowing noncommercial replication and distribution of their intellectual goods. Pursuit of this strategy does not imply that they need also forgo commercial exploitation of those goods. If ubiquitous personal use of a good leads to commercial demand, then its rapid, convenient, and widespread proliferation within the NII may represent an attractive marketing option. Pursuit of this strategy, however, implies that the restrictions on commercial use of intellectual products be enforced. Information businesses may also leverage ubiquity in the private domain to outmaneuver rivals in product positioning or to build demand for complementary products or services.

Economic organization model

How the digital dilemma is resolved has important implications for the economic organization of information businesses. The software industry serves to illustrate the implications, at both company and industry levels, of “thin” versus “thick” protection of intellectual goods.

The process of software production varies radically, depending on whether it occurs in a proprietary or open-source context. Each of these contexts has its own justificatory accounts, ideology, behavioral norms, business models, and social and economic institutions. *Proprietary* software development is associated with justificatory accounts infused with ownership rhetoric and incentive-

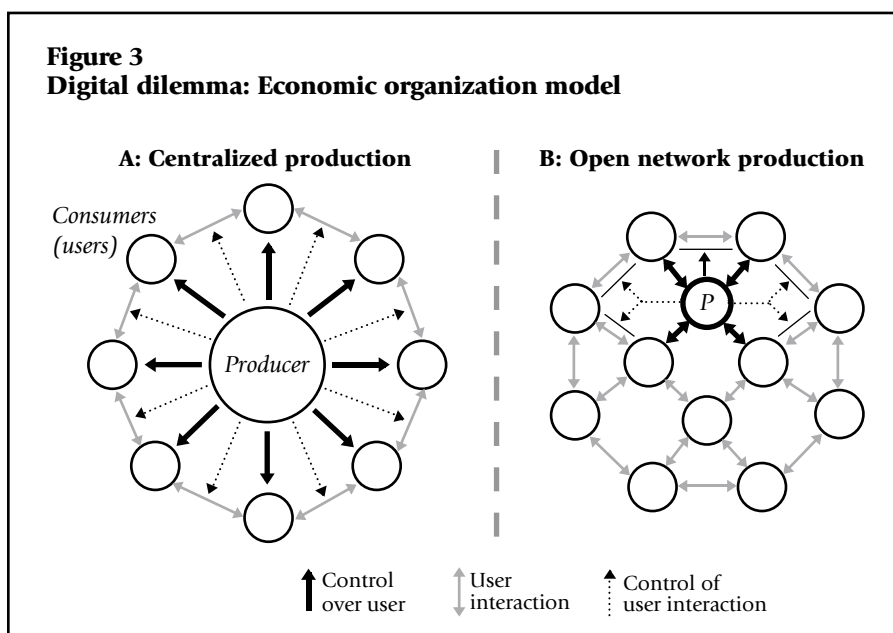
based economic arguments. Source code is considered a trade secret, a potential source of competitive advantage, and a valuable asset to be protected and actively leveraged in the marketplace with the objective of maximizing shareholder returns. Software production resembles industrial manufacturing in a number of key respects: it occurs largely within company boundaries; it is performed by workers tied to the firm by traditional employee-employer contracts; and the product is delivered to the consumer through controlled distribution channels.

Software production in an *open-source* context looks and feels very different. Open-source development is often driven by an anti-commercial zeal that focuses on the potential benefit to society of maintaining a software commons. This commons, or societal “bathtub of code,” is supported by a gift culture that, notes Raymond (2001), relies on individual reputation and the intrinsic rewards of designing and writing aesthetically pleasing code to motivate individual contributors. Products are developed within loose networks of programmers, often connected only through electronic means, in a decentralized and often somewhat chaotic fashion. There is very little hierarchical organization and no attempt to control distribution. Dialogue between programmers and users is invaluable and the evolution of software projects is generally incremental, cumulative, and community-based.

When intellectual goods are thinly protected—just enough to provide sufficient incentive for producing them—production is more likely to occur within open networks similar to those characteristic of open-source software production. We refer to this as *open network production*. In the case of thick protection, which effectively converts intellectual goods into rivalrous goods, production is more likely to occur in traditional firms. Three principle dimensions distinguish open network production from traditional production: (1) centralization; (2) degree of control over the user or consumer; and (3) degree of control over user or consumer interaction (see **Figure 3**).

Centralization

Since the Industrial Revolution, a large percentage of economic activity has been concentrated in large economic institutions, with which individual consumers have become accustomed to interacting. In many contexts, these economic entities are recognized as the “authorized” source of particular products or services. A number of the rationales put forward for their emergence and persistence focus on such concepts



as division of labor, capital requirements, task complexity or difficulty, transaction costs, and risk pooling. As shown in Figure 3A, large economic institutions (the circle labeled “Producer”) are the norm in many contexts—a situation consumers often take for granted.

When production involves tasks that are intrinsically rewarding and can be inexpensively performed by individuals or small groups of loosely affiliated individuals, less concentrated production is possible. The production processes associated with most types of intellectual goods satisfy these basic criteria. Figures 3a and 3b contrast traditional proprietary production models dominated by large economic institutions with open network production in which the institutions serve as additional peer nodes rather than dominant players.

Control over user

When economic activity is concentrated in large economic institutions, the latter often exert a great deal of control over not only the production function itself but also distribution and consumption. This control is represented in Figure 3A by the arrows that extend from the producer (economic institution) to the individual consumers. The language generally used to describe market participants—producers (or suppliers) and consumers (or users)—reflects and reinforces the fact that this relationship is hierarchical and unilateral. Although economic institutions are driven by a profit maximization logic dictating that consumer needs and preferences be probed and taken into account in the production function, producers and consumers do not interact as peers. It is the institutions that generally dictate exchange terms. Products and services are generally described as being “pushed” through distribution channels or moved “down” through these channels to the consumer.

In network-based production, illustrated in Figure 3B, the distinction between producer (P) and consumers is blurred. The relationship between economic institutions and individuals or other entities is horizontal, bilateral, and mutually dependent. For example, the production of different products and services may originate anywhere in the network and then be co-opted by economic institutions. The institutions do not have the same control over the consumer, or over how the consumer interacts with their products.

Control over user interaction

In the case of most tangible manufactured products, there is little need for economic institutions to attempt to control what consumers do with their products. In the case of an automobile, for example, it is unnecessary to explicitly state that individuals do not have the right, after purchasing the car, to replicate the vehicle and give a copy to a neighbor. In the case of intellectual goods, however, par-

ticularly digital ones, it is often claimed that this kind of control is essential to the ongoing viability of firms involved in producing such goods. In Figure 3A, control over individual interaction is represented by dotted arrows extending from the producer to the arrows connecting individual consumers. Richard Stallman (1999), the founder of the open-source software movement, found this type of control particularly abhorrent. Allowing economic entities such control, he said,

meant that the first step in using a computer was to promise not to help your neighbor. A cooperating community was forbidden. The rule made by the owners of proprietary software was, “If you share with your neighbor, you are a pirate. If you want any changes, beg us to make them.”

For Stallman, the proprietary software model represents a “stark moral choice”—prohibiting individuals from altering or sharing existing software is antisocial, unethical, and “simply wrong.” In the case of open-source software, such interference in ongoing individual interactions is explicitly forbidden; once software is introduced into the network, people are encouraged to alter and share it. In Figure 3B this is represented by the small black lines clocking producer interference in user interaction.

Economic organization model: Strategic response

The economic organization model focuses attention on the dynamic process of economic value creation. It represents the primary threat to established information businesses, not the lack of protection of intellectual goods. Three generic strategies are possible: (1) disruption, (2) contribution, and (3) avoidance.

Disruption. Open network production is dependent on intrinsic motivation, trust, and shared production standards. Established information businesses may be able to disrupt open networks if they can undermine the commitment of—or sow discord between—the participants. For example, they might attempt to hire or co-opt network participants in order to channel the latter’s creative energies into producing competing proprietary products. The effectiveness of open networks may also be lessened if important resources or access to distribution channels is withheld. Open network products are particularly vulnerable to these tactics because there is little incentive for participants to expend time and effort in actively marketing the products to potential users. Care must be taken that such activities do not run afoul of current antitrust laws or result in damage to the firm’s reputation of accumulated goodwill among important stakeholders.

Contribution. If open networks are viewed as legitimate competitors, then a value-chain analysis may reveal areas of relative advantage. Because the networks are often loosely

organized and dependent on voluntary participant contributions, certain value-added processes may be more suited to the hierarchical structure of formal companies. For example, for-profit firms may be better able to adapt or customize existing open network products or provide ongoing service-related activities. While it may be possible for established information businesses to mimic some of the features of open network production, it must be noted that one of the defining elements of such production is the absence of *ex post facto* rent appropriation. In other words, once an intellectual good has been created, it is freely distributed to (and often improved by) other network participants. For-profit firms cannot easily abandon their rent appropriation strategies, given the often significant development costs associated with product development.

Avoidance. In some cases, for-profit information businesses may not be able to disrupt or contribute to certain open networks. In these instances, the only viable strategic option may be to carefully delineate the scope of activities in which the networks have the advantage and to avoid competing in those areas.

The framework presented here—the experiential, legal, and economic organization models—all function at a moderate degree of abstraction. The models are abstract enough to draw attention to salient features of the digital dilemma, but remain sufficiently grounded in the empirical realities of the digital context to contribute meaningfully to a genuine understanding of the strategic challenges faced by information businesses.

Figure 4 lists the categories of strategic responses we have discussed. Examples of strategies used by existing information businesses that correspond to each category are also listed. At the time this research was completed, the equivalence category was probably the most prevalent response. The equivalence strategies listed as examples represent attempts to change the nature and character of the NII by altering either the characteristics of digital intellectual goods or the hardware that drives the network. These changes are made with the intent of providing convenient “pressure” points or “bottlenecks” to facilitate rent appropriation. In every case, such attempts impose constraints on NII users that limit the versatility and functionality of digital goods and make them more simi-

Figure 4
Digital dilemma models and strategic responses

<i>Model</i>	<i>Example(s)</i>
EXPERIENTIAL	
● Equivalence	Proposed Security Systems Standards and Certification Act (SSSCA); Sony’s Key2Audio technology; Digital Rights Management Technologies (e.g., solutions marketed by ContentGuard, Digimarc, and InterTrust Technologies); High Definition Multimedia Interface (HDMI); VHS Macrovision
● New value-creation processes	MP3.com; EMusic.com; EZCD; Listen.com’s Rhapsody; Napster
● New appropriation methods	France’s tax on recordable CDs, DVDs, minidisks, and MP3 players; Kazaa and Verizon’s proposed copyright compulsory license for the Internet
LEGAL	
● Contesting directly	No Electronic Theft (NET) Act; Recording Industry Association of America (RIAA) targeting individuals engaged in digital file swapping
● Using proxies to contest	RIAA v. Integrated Information Systems; various lawsuits targeting SonicBlue’s ReplayTV 4000; anti-circumvention provisions of the Digital Millennium Copyright Act (DMCA) of 1998; RIAA’s attempt to obligate ISPs to police peer-to-peer (P2P) networks; Motion Picture Association of America (MPAA) attempting to obligate ISPs to police P2P networks
● Regrouping	Zone Labs’ Zone Alarm
ECONOMIC ORGANIZATION	
● Disruption	Microsoft’s alleged practice of “embrace, extend, extinguish”
● Contribution	Lego’s Mindstorms Robotics Invention Systems; Valve’s Half-Life and the Counter-Strike mod; Lucasfilm and TheForce.net
● Avoidance	Red Hat, SuSE, Mandrake

lar or equivalent to traditional intellectual goods. In the case of digital audio files, these strategies have not been effective. Despite Napster's demise, there is evidence that MP3 trading using Gnutella-based peer-to-peer (P2P) programs now surpasses the level of trading at Napster's peak, when users traded more than 2.7 billion unauthorized music files, all royalty free.

In many respects, music has been intellectual property's canary in the digital coal mine. New firms have pioneered new business models, including MP3.com, eMusic.com, EZCD, and Listen.com. Each of these new models gives users greater access to music before buying and provides information services that facilitate consumer browsing and selection. New appropriation methods, such as France's tax on recordable CDs, DVDs, minidisks, and MP3 players and the joint proposal by Kazaa and Verizon to tax ISPs, have been driven primarily by concern over the growing practice of digital audio file sharing.

As described earlier, the NET Act of 1997 was an explicit attempt to address the private domain, set out in our legal model. The Recording Industry Association of America (RIAA), the Motion Picture Association of America (MPAA), and others have been actively pressuring ISPs to police the online behavior of their customers in addition to pressuring the manufacturers of various electronic and computer hardware to include features to facilitate the management and control of digital content. Zone Labs explicitly states that its product is free for personal and nonprofit use, while for-profit businesses, government entities, and educational institutions must purchase a license. This solution allows it to avoid the costs of attempting to enforce copyright law in the private domain, takes advantage of the dissemination potential of the Internet, and allows it to leverage the software's popularity in the personal market into revenue (and presumably profit) in the commercial domain.

Innovation in economic organization has been most pronounced in the software industry, with the growing importance (and prominence) of the open-source movement. For example, Lego's Mindstorms Robotics Invention System has benefited from open network product extensions by having its software for Mindstorms "hacked" and modified by avid users, thereby increasing the functionality and popularity of the product. Software and service companies like Red Hat, SuSE, and Mandrake have pioneered business models that avoid direct competition with open networks by operating in areas where open network production is inefficient or impossible, such as software packaging, customization, and service.

In addition to providing a launching pad for more abstract and theory-driven analyses, our digital dilemma framework highlights three important "big picture" issues. The experiential model raises the question of whether or not

digital intellectual goods are different products than their traditional counterparts. If they are experienced differently, the processes by which information businesses can effectively add economic value may also be different. The legal model draws attention to the legal framework that has been used to provide economic incentive to creators of traditional intellectual goods. It raises the important question of whether or not firms can or should attempt to apply the same framework to digital goods and the NII. Implicit in this broad question is the more specific issue of whether or not "copying" should be maintained as a fundamental concept of intellectual property protection. If the current legal framework is to function in the NII, then important gray issues associated with private and fair use will have to be resolved. Finally, the economic organization model poses the important question of when open network production represents a viable alternative to the traditional corporate form. Although we have restricted our focus to firm-level strategic analysis, thereby rendering a thorough discussion of these questions outside the scope of this study, these questions represent important issues that should be addressed in future research.

Finally, there is the danger that, by aggressively pursuing greater protection of intellectual goods, firms will fall into an intellectual property trap. Individual firms may have clear economic motives for aggressively protecting their property; but if all companies act in this manner, innovation may be retarded and individual firms may find themselves worse off than if each had been content with "thin" protection. This "trap" represents a form of the classic prisoners' dilemma, in which the interest of individual participants diverges from the collective interest of the group. One way out of this trap may be the emergence of industry associations or other collectives that work to enforce thin protection. Another solution may be a legal structure purposely designed to provide only thin protection. Individual firms should be aware of the possibility of such a trap and allow it to inform their strategic response to the challenges associated with the national information infrastructure. ○

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