DIGITAL DIAGNOSIS: COPYRIGHT INTELLECTUAL PROPERTY AND THE INTERNET

by

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Abstract

Copyright intellectual property goods, when digitized and made available through computer networks such as the Internet, lose certain fundamental economic traits required for normal competitive market dynamics. Digitized recorded sound creations, written works, visual creations, and computer programs all lack the inherent excludability, rivalry, transparency, reproduction costs and delivery costs required for typical pricing and market behavior. Rights holders of these digital goods must rely on copyright laws, technical modifications, moral suasion, and other means to extract rents from their property. Firms, entrepreneurs and academics are actively seeking strategies to exploit the low cost and powerful distribution capabilities of the Internet to profit from trade in digital goods. This paper analyses some of the economic, legal and technical aspects of the digital goods problem, reviews specific cases, and puts forward a segmentation matrix for optimal online pricing and delivery strategies.

Dedication

This paper is dedicated to my loving family. My wife Lorraine and three sons Joel, Jordan and Kristian have endured long and frequent absences of a Husband and Father who could not have completed this project without their constant support and encouragement. My wife Lorraine has been a particular inspiration and source of strength throughout an ambitious journey filled with unrelenting challenges. I also dedicate this paper to the Faculty, staff and students of NEMBA - 98, who made my MBA educational experience a rich and fulfilling time in my life.

Acknowledgments

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Chapter 1

Introduction

The rise of the Internet and the World Wide Web has created both an opportunity and a problem in markets for copyright intellectual property, those intangible possessions whose replication must be authorized by the owner, but often is not. Harnessing the power of digitization, creators and consumers of the written word, computer programs, music, films, voice recordings and graphical images can now use common and inexpensive technologies to access, replicate and globally distribute these works instantaneously at near zero cost. The reduction in costs of distribution should be a windfall for producers and the ease and speed of access should greatly increase enjoyment of the goods to consumers. However, the near elimination of duplication and distribution costs creates a disruption of normal economic forces that threaten the viability of sustained commerce in digitized copyright intellectual property. The absence of cost based pricing alternatives, the difficulty in excluding other the enjoyment of such goods, the resulting lack of consumer rivalry, and the need to experience these goods in advance of payment all tend to obviate consumer motivation to pay significant prices. Under these circumstances, where competitive market forces may tend to drive prices down toward zero, producers will lose

motivation to create new products, as they may be unable to recover the frequently high sunk costs of creation.

Recent online developments such as the Napster music community has lead some commentators suggest that a fundamental alteration of the entire publishing industry is inevitable (Shirky, 2001). Others are challenging the very right of digital goods creators to extract rents from their products (Barlow, 1993). In spite of this environment, firms are exploring new technologies and online business models in a race to solve the legal, ethical and economic puzzle presented for digital goods by the new Internet communications medium.

The purpose of this paper is to explore the economic implications of digital goods - defined herein as digitized copyright intellectual property delivered through the Internet - and to suggest a possible landscape for future online markets for such products. A review of relevant literature is undertaken, technological factors are examined, and specific cases involving online distribution of copyright materials are analyzed.

Markets for digital products are treated herein to be distinguished from non-digital information goods. Digital goods are viewed as a distinct subset within a broad range of valuable digital products and services now available in the online world. Also, an argument is made that digital goods are not all the same, and that different types of digital goods behave differently in the digital marketplace.

The importance of intellectual property as an economic good has been reflected in laws in the western world. Advances in replication abilities, together with the enduring commercial value of explicit symbols, have led to the institution of special laws designed to protect unauthorized reproduction of mental creations as a way to encourage creators to continue in their creations to the benefit of society as a whole. Digital goods, however, should be distinguished from other Intellectual Property in that they approximate thought more readily. Digitized mental creations become like ideas, by their nature eluding exclusive ownership more than ever. Networked computers have mimicked the mind even further, linking one mind to another across space and time like external synapses. Protecting creations of the mind has become more difficult, as the mind has become one with the medium.

A problem in the literature relating to economic issues facing digital goods is the use of conflicting terms describing these goods. Shapiro and Varian, for example, use the term *Information Goods* when referring to digitized material, writing "…anything that can be digitized – encoded as a steam of bits – is information. For our purposes, baseball scores, books, databases, magazines, movies, music, stock quotes, and Web pages are all *information goods*" (Shapiro & Varian, 1999). The problem with this definition is that it remains unclear as to whether the information itself is a good, or it is the "packaging" of the information that makes it a good. Is the binary code that tells a computer to display hockey score information in the same way that the baseball score is

information? In an attempt to better define terms, Davenport and Prusak (1999) suggest a distinction between Data, Information, and Knowledge. Data is raw code, such as a stream of digits, letters or other symbols that is not intelligible to the human mind. If a series of symbols is arranged in a comprehensible manner, as with the numbers and letters that make up a stock quote, then this becomes information. Knowledge, by contrast, would be the analysis of the stock quote as indicative of a trend, for example. As we can see, the terms information, data and knowledge, whether digital or otherwise, are often used interchangeably. For the purpose of this paper, digital goods are defined as anything digital that is deemed to be protected by copyright laws. Anything digital is considered to be potentially distributable through the Internet.

Chapter 2

2.0 Digital Goods

According to the Biblical account of events at the Tower of Babel, perfect communication between humans unleashed so much economic power that people started to think of themselves as supernatural. Given this linking of economic power to communication, humans throughout have history had as a constant goal the perfect transference of thought using external symbolic constructs. Inventions such as standardized alphabets, stone tablets, parchment, paper, scribes, ink, dies, brushes, pens, the printing press, recording devices,

radio, television, computers, computer languages and binary code have progressively advanced human ability to create and replicate symbols with increasing speed and faithfulness. Binary code, in particular, the language of computers, where all information is converted into a series of digits, being either the digit 1 or the digit 0, has now emerged as a truly global language. If symbols are tools of the mind used to communicate thought with maximum efficiency, then advancements in communications technology such as binary code have as their aim the ability to translate thought into symbols in a way that mimics the mind as much as possible. Symbols replicated by digital technologies are very close in character to thought, being generated by electronic impulses, mutable and without mass, and hence very nearly as intangible as ideas themselves. Digital communication therefore represents a quantum leap toward the perfection of human communication, just as symbols transcend physical objects, as in the mind.

Fundamentally, symbols in the mind can be understood as potential but not actual economic goods. As Thomas Jefferson wrote "If nature has made any one thing less susceptible than all others of exclusive property, it is the action of the thinking power called an idea..." However, the activity of representing ideas through symbols in drawings, paintings, alphabetic characters, musical notations and other explicit abstractions has the effect of transferring mental images into physical matter. Once made explicit, symbols carry with them the potential to

communicate ideas from one person to the next without the creator being physically present.

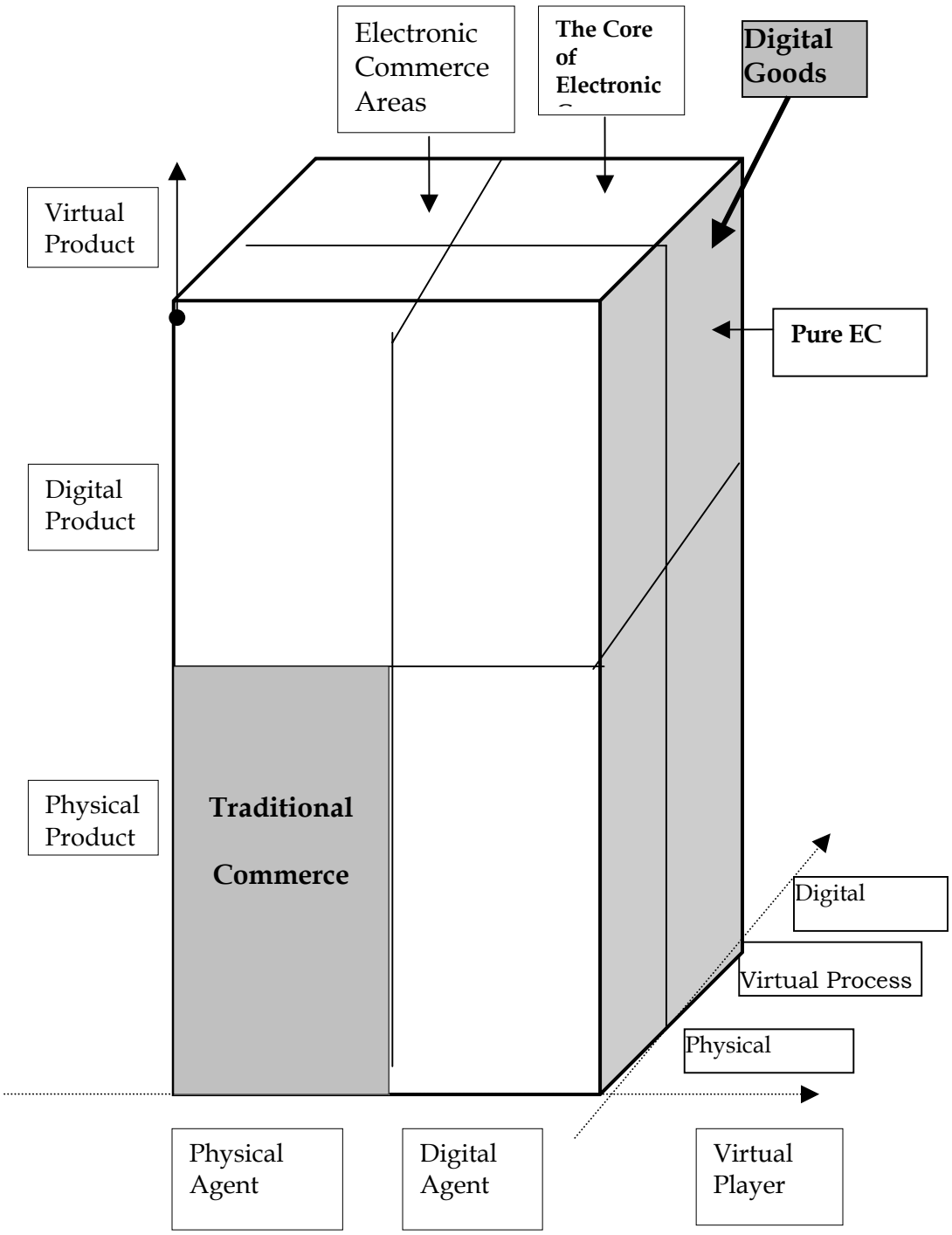
For a variety of reasons, such physical manifestations of ideas can become attractive to agents as possessions. Intangibles become tangible (generally referred to in law as Intellectual Property) and can be subject to ownership and possible trade. Maps, recipes, contracts, art, laws, stories, instructions, melodies and other abstractions are all artifacts that can be owned, collected, purchased, or sold. Whether it is the information itself that caries value or it is the emotional impact of artifacts, explicit symbols can become economic goods. For example, a map that can be bought and sold on the basis of the information contained or as an historical artifact is equally protected from unauthorized duplication. The ability to create explicit communicative symbols is therefore a valuable skill in society, as the value of ideas can become more productive through replication. With digitally created and manipulated symbols, the relationship between the creator and the created becomes fluid, requiring a segregation of human intermediated digital processes from detached digital creations in order to analyze the associated economic activity, as explored below.

2.1 Digital Goods and Electronic Commerce

It is helpful to understand commerce in digital goods as an increasingly important subset of the overall phenomenon known as electronic commerce. According to Choi et al, "…the future of electronic commerce will be guided by

innovative digital products and services that will emerge in the electronic marketplace." Investments in digital goods technologies and marketing is affected by general activity in "ecommerce," a very common but poorly defined term. In Electronic Commerce: A managerial Perspective, Turban et al (2000) define electronic commerce as "…an emerging concept that describes the process of buying and selling or exchanging of products, services, and information via computer networks including the Internet." This description is defined in terms of four different perspectives, which are i) communications, the transmission aspect of networks, ii) business process, the automation of existing processes, iii) service, and iv) online, addressing the technical ability to do business using web technology. All these perspectives have a bearing on market dynamics for digital goods. These broad perspectives take in almost all types of commercial activity. Choi et al (1997), however, segregate electronic commerce by the degree to which the process is purely or partly electronic, according to the diagram below.

Figure 1. The Dimensions of Electronic Commerce, from Choi et al, <u>The Economics of Electronic Commerce</u> (1997, pg. 18).



Market transactions involving digital goods are considered for the purpose of this paper to be Pure Electronic Commerce, where all aspects of exchange are digital, including product seeking, product selection, product delivery and product consumption, such as online stores to buy downloadable software, electronic books, downloadable music, and other digital goods. An example of Pure Electronic Commerce is Mightywords.com, a subsidiary of on and offline bookseller Barnes and Noble. Mightywords sells digital copies of articles and books from known and unknown authors. Customers can search and browse the content, read reviews, make selections and complete purchased online using credit cards or other electronic payment systems. The purchased items are delivered to the customer via the Internet and the consumer can enjoy the goods by viewing them on their computer. No physical manifestation of the good or of the "store" is required at any point.

By contrast, bookseller Amazon.com is considered to be only partially digital, as physical products must be delivered to consumers to complete transactions. The "store" is virtual, i.e. having no physical location or substance, but the books themselves and the supply chain required to fulfill customer orders is physical. Choi et al suggest that purely digital ecommerce will make up the bulk of future electronic commerce.

2.2 Types of Digital Goods

Digital goods herein will be divided into four categories: recorded sound creations, written works, visual creations, and computer programs. The later category will receive only light coverage here, as the particular and complex characteristics present are sufficient to warrant a separate paper. Network effects and "lock-in" possibilities peculiar to software create potential monopoly conditions that are not present with the former three categories. For example, in order to read a digital document on a computer, one must have software installed that is capable of displaying the document. For this reason, there is a natural tendency to select for installation any document software that is the most commonly used for creating documents. As Varian and Shapiro write "When the value of a product to one user depends on how many users there are, economists say that this product exhibits *network* externalities, or *network effects*" (Shapiro & Varian, 1999, pg. 13). Lock-in can occur when technologies adopted in part due to network externalities become costly to replace. High *switching costs* coupled with strong network effects can give rise to significant barriers to entry for new products, dampening competitive activity.

The scope of what constitutes a digital good is not necessarily constrained the above four categories, however. According to Choi et al (1997) and Turban et al (2000), digital goods, also called digital products, can be expanded to cover

tokens and various services, as outlined in the following list from Turban et al (2000, pg. 429):

1. **Digitized information and entertainment product such as**:
- Books, newspapers, magazine journals, store coupons, marketing brochures, newsletters, research papers, and training materials
- *Product information*: product specifications, catalogs, user manuals, sales training manuals
- *Graphics*: photographs, postcards, calendars, maps, posters, x-rays
- *Audio*: music recordings, speeches, lectures, industrial voice
- *Video*: movies, television programs, video clips
- *Software*: programs, games, development tools

2. **Symbols, tokens, and concepts**:
- *Tickets and reservations*: airlines, hotels, concerts, sports events, transportation
- *Financial instruments*: checks, electronic currencies, credit cards, securities, letters of credit

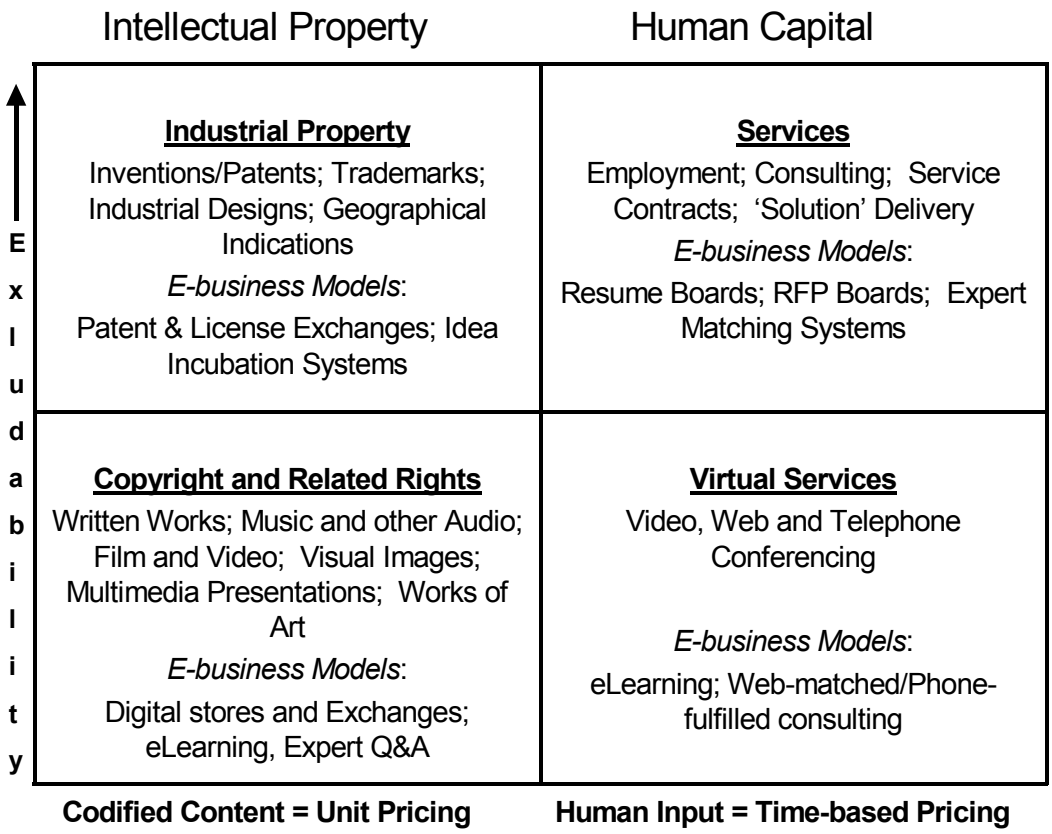
3. **Processes and services**:
- *Government services*: forms, benefits, welfare payments, licenses
- *Electronic messaging*: letters, faxes, telephone calls
- *Business-value-creation processes*: ordering, bookkeeping, inventorying, contracting
- *Auctions, bidding, bartering*
- *Remote education*: telemedicine and other interactive services
- *Cyber cafés, interactive entertainment, virtual communities*

Some of the above examples can be described as human services delivered by digital means, such as 'telemedicine.' These digital products, which combine human actions with digital communication, can de segregated from pure digital goods in that the time involved in a person delivering a service cannot be digitized. A legal consultation, for example, would typically be billed to the client on an hourly basis. The same consultation could be performed via Web teleconferencing, but the hourly method of billing would still applied, even

though the service received by the client would be a digital reproduction of the Lawyer's image and voice. However, if the consultation was recorded in a digital file and replayed later to a large audience, the payment for the service could be on a unit basis.

Digital goods as defined herein are a subset of digital products under the definition of Choi et al. To illustrate how digital goods are related to digital products, the author has devised a schema whereby digital goods categorized according to the relative excludability and unitization methodologies for different types of digital products. The schema can also be described as a matrix for categorizing online business models that deal with digitized intellectual capital.

Figure 2. A Framework for Categorizing Digital Services and Goods.



The ***y*** axis above represents the degree to which a particular good can be excluded from simultaneous enjoyment by more than one agent. The ***x*** axis measures the degree to which a good can be codified and unitized. In other words, the lower left quadrant would represent unitized digital products that could be defined as public goods, such as a recorded song. The upper left quadrant identifies property that is entirely made up of information that can be digitized and unitized, as in a patent, but enjoy relatively high excludability, as

the transference of the benefits of the goods must be carried out through significant contractual arrangements and frequently high prices. The upper right quadrant involves direct human interaction in the delivery of services charged for by some measure of time, as with an hourly wage or annual salary. Excludability is high, a people cannot be in more than one place at one time. The lower right signifies digitized services that enable broader dissemination of the service. Excludability is lower as digitization enables conceivably unlimited consumption of the same service, depending on the degree of interactivity required.

The significance of this diagram is that digital goods (lower left quadrant entitled "Copyright and Related Rights") correspond with Choi et al's "Pure EC" quadrant, meaning that digital goods simultaneously enjoy the most benefits of digitization and Internet communication and the least benefits of excludability. This paradox may explain high but failed investments in ecommerce applications related to tangible goods such as Pets.com and eToys.

Chapter 3

Digital Goods as Intellectual Property

According to the World Intellectual Property Organization ("WIPO"), "Intellectual property refers to creations of the mind: inventions, literary and artistic works, and symbols, names, images, and designs used in commerce."

WIPO divides IP into two categories: "Industrial property, which includes inventions (patents), trademarks, industrial designs, and geographic indications of source; and Copyright, which includes literary and artistic works such as novels, poems and plays, films, musical works, artistic works such as drawings, paintings, photographs and sculptures, and architectural designs. Rights related to copyright include those of performing artists in their performances, producers of phonograms in their recordings, and those of broadcasters in their radio and television programs" (WIPO, 2001). Broadly speaking, digital goods can be considered to fall within the range of the above definitions. Unlike non-digital goods, however, creations in digital form could be considered subject Industrial Property and Copyright constraints simultaneously, as with software and business processes embodied in Web pages. A set of instructions directing a computer to behave in a certain manner is both the blueprint for an invention and the invention itself. Digital goods have the quality of being at all times explicit, in that they can be displayed symbolically as a series of printed digits, symbols or written instructions, and therefore are in some measure constantly subject to Copyright.

Although digital goods have the potential for overlapping protection from Intellectual Property laws, the impact of the Internet and digital technologies on Industrial Property is less significant that the broad implications for Copyright. The right to exploit Industrial Property must be conveyed by specific contracts between specific parties, whereas Copyright imputes a general contract on

market participants. The communications capability of the Internet does little expedite the granting of Patents or the negotiation and contract process involved in conveying ownership in a Patent. The duplication and distribution capabilities of the Internet also have little bearing on specific contractual obligations of identified parties. For these reasons, Copyright Intellectual Property is highly affected by the Internet and will be the primary form of IP addressed by this paper. New Copyright laws are now being brought before the US Congress that attempts to address new concerns, such as the vulnerability of databases to be copied without penalty.

Chapter 4

4.0 Relevant Technological Factors

Certain hardware and software elements in the Internet infrastructure are particularly germane to the way market participants use digital goods. Technology that enables faster transmission and better manipulation of increased amounts of data has a direct impact on both producer capability and user enjoyment of types digital goods requiring larger amounts of information. For example, high-speed data transmission services, combined with increased processing power and display software have greatly increased the ability of participants to transmit and enjoy music, film, photographs, and longer and graphic-rich literary works. Browsing software such as Netscape and Internet

Explorer enable rapid and convenient display of words, images and imbedded links to other web pages, allowing easy navigation through digital goods sourced from numerous locations. However, speed and faithfulness of the reproduction of digital goods by the user is highly variable, depending on the individual's hardware, software, and communications equipment and services.

Four key computer technology factors are particularly relevant to market dynamics for digital goods: 1) Bandwidth; 2) Input/Output Technology; 3) Storage; and 4) Microprocessor performance. Each of these factors introduces constraints on the ability of market participants to distribute and enjoy digital goods. In order to be transmitted and manipulated by computers, digital goods must be transformed from analog representations to digital code. According to the online computer technology encyclopedia Webopedia "In general, humans experience the world analogically. Vision, for example, is an analog experience because we perceive infinitely smooth gradations of shapes and colors. Most analog events, however, can be simulated digitally." However, faithful conversion of analogue experiences for use by computers requires variable amounts of digital code to be processed and transmitted. The written word, represented by various forms and qualities of text, require comparatively little digital code for conversion, whereas sound and film requires very large amounts code. Constant advances in technologies affecting the speed of processing and transmission of digital data and the ability of users to enjoy increasingly realistic

analogue experiences area ensure that markets for digital goods are in a state of flux.

4.1 Bandwidth

According to the online computer technology encyclopedia Webopedia, Bandwidth is defined as "…The amount of data that can be transmitted in a fixed amount of time. For digital devices, the bandwidth is usually expressed in bits per second (bps) or bytes per second. For analog devices, the bandwidth is expressed in cycles per second, or Hertz (Hz)." Bandwidth is limited by the capacity of communications networks and the processing capability of computers connected to the network. Limited bandwidth introduces a constraint on the ability of producers and consumers to distribute and access digital goods. The delivery of high-speed Internet access via television cables and the rapid penetration of high output fiber optic telephone lines had had a significant impact on the rapid penetration of services such a Napster, which requires considerable bandwidth for the transference of music files between users.

4.2 Input/Output Technologies ("I/O")

Input/Output aspects of computer technology affect the way consumers interact with digital goods. According to Webopedia "I/O…refers to any operation, program, or device whose purpose is to enter data into a computer or to extract data from a computer." Printers, video monitors, sound cards,

modems, and speakers are all I/O technologies that play a part in converting digital code into usable information. The capability of I/O technologies is directly related to the ability of consumers to enjoy digital goods or not. The increasing I/O capability of personal computers places competitive pressure on the suppliers of traditional hardware such as televisions, radios, and stereos. The phenomenon of merging computer use with traditional entertainment is described in media circles as "convergence," where it is predicted that eventually all media services such as news, journalism, film, music and television programming will all be delivered though digital means.

4.3 Microprocessor Performance

The clock speed of a computer's microprocessor is "…the speed at which a microprocessor executes instructions" (Webopedia) and plays an important part in the ability of microprocessors to convert digital code into realistic analogue representations. Relatively robust processing power is necessary for realistic delivery and manipulation of digital films, whereas comparatively modest computing power is required for text transmissions. Manufacturers of the computer's primary microprocessor, the Central Processing Unit or "CPU," have historically proven an ability to simultaneously deliver dramatic increases in processing power and significantly lower prices. This trend is expected to continue which means that typical home and business computer users will have

increasing capability to convert digital multimedia content into satisfying visual images, contributing to the phenomenon of convergence.

4.4 Storage

Webopedia defines storage as "The capacity of a device to hold and retain data." The storage capability of personal computers is continually advancing, but the amount of data available for storage keeps pace with these increases. Although digital goods can be transmitted and duplicated at near zero cost, storing the data introduces a cost on the consumer. This cost is decreasing, allowing consumers to store more and larger files for long periods. This decreasing storage cost is particularly important for visual and sound goods. The supply and demand for storage is curiously linked, as inexpensive a plentiful storage encourages producers to produce applications and products that require significant amounts of storage, such a computer games and video content. The increasing availability of high-resolution graphics and, music and video content in turn drives demand for storage.

4.5 Impact of Technology Factors on Different Types of Digital Goods

Capturing, digitizing, transmitting, converting and reproducing realistic sounds via the Internet requires considerable Bandwidth, sophisticated I/O and considerable microprocessor performance. Consumers require a number of

technological capabilities in order for to access and enjoy complex sounds such as music via the Internet, such as: 1) "High-speed" Internet Access such as cable or ADSL services; 2) Hardware and software components for converting digital music into analogue messages; and 3) High fidelity speakers. In order to enjoy sound and music away from the computer that received the Internet transmitted content, a means of copying the information to a portable storage device is required. Most digitized music requires more memory that a single floppy disk, so users must also use alternate high memory storage systems, such a Compact Disks. Special hardware and software is required to copy files from a computers hard drive to a compact disk. At time of writing, the software, hardware and connectivity required to enjoy Internet delivered complex sound such as music requires significant additional cost over basic computing systems.

Text characters that convey language are the most basic visual representations that computers display. Minimal connectivity, I/O and processing capabilities are required to transmit and consume written information. Constraints on enjoyment are similar to those of offline dynamics, i.e., one must be able to see, read and understand the language of the transmitter.

However, the activity of reading is poorly suited to the computer at present. Unlike paper, which reflects light, computer monitors project light, making prolonged computer based reading hard on the eyes. Studies show that users will rarely read more than 20 pages of text from a computer monitor

(Farmanfarmaian, 2000). Also, unlike a book or other printed material, computer displayed text is not easily portable.

Software and hardware companies have developed new products to overcome the limitations of normal computer display of text. High-resolution fonts and portable reading devices are now readily available. However, the cost and quality of these alternatives is highly variable, and market acceptance is as yet low (Libbin, 2001). In spite of low early adopter rates, analysts project that in 10 years a much as 50% of all books published will be available only in digital form.

Written works presented by computer devices involve a significantly different experience than printed works. Newspapers, magazines and books have visual, tactile, and mobility traits than may never be replicable. Beyond the utility of the information they contain, books may also possess certain externalities that are difficult to replicate, such as the potential quality of being rare and collectible. Large and impressive libraries of books and subscriptions to certain newspapers and magazines can also provide the possessor a level of status and other social rewards.

Like digitized sound, visual images such as photographs and films require considerable bandwidth and processing power to transmit and enjoy. I/O capability is moderate, however, as basic color computer monitors are capable of reproducing photos and films reasonably. Full motion video presentation requires the most bandwidth and processing power of all forms of digital goods

and presents the greatest technological challenge to market participants. Whereas recorded music can be transmitted, converted and replayed with fidelity matching offline technologies such as CD players, the current quality of Internet delivered film content is significantly lower than that offered by VCRs and DVD players.

Moving visual images such as film and video content have until the time of this writing enjoyed protection from the perils of digital distribution due to the above technical constraints on quality. It is unclear whether or not personal computers are capable of dislodging traditional Television and Video viewing, as numerous behavioral factors are inherent in use of these alternatives. For example, Television sets and computers are typically located in separate areas of the home, i.e., work related areas such as an office and leisure related areas such as the living room. Creators and publishers of film, television and video content may be able to utilize existing methods of delivery for some time, i.e., cable subscriptions, video cassettes and DVDs. Integrating advanced computer technologies with television sets, stereos and radios may be economically difficult for some time as the consumer would be facing significantly high switching costs, unless low cost "adapters" can be deployed. For example, digital films accessed via the Internet could be downloaded to a digital player attached to a television and a stereo.

Chapter 5

5.0 The Economics of Digital Information Goods

John Perry Barlow, a widely read commentator on electronic publishing issues and former Grateful Dead lyricist, expressed the economic issues facing digitized copyright intellectual property as follows:

> "Throughout the time I've been groping around Cyberspace, there has remained unsolved an immense conundrum which seems to be 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 riddle 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?" (Barlow, 1993).

Various economists have echoed Barlow's concerns and have written extensively on how traditional economic theory struggles with markets for digital goods, particularly with respect to cost-based pricing models. "…digital products fall into a gray area where such economic reasoning fails to give an insightful answer to business professionals looking to know how to price their products" (Choi, Stahl, Whinston, 1997). However, various writers recommend a variety of strategies as a means of turning an apparent morass into an advantage.

According to the doctrines fundamental to most modern economic discourse, goods and services in a society are most efficiently distributed when unimpeded market forces are allowed to drive the prices and rates of production for such good and services. Revered seventeenth century economist Adam Smith's laissez-faire philosophy held that if all individuals in a society were allowed to freely compete for scarce resources, an "invisible hand" would operate to ensure that society's welfare as a whole would be maximized. Centuries later, it is hard to dispute that the world's wealthiest nations are those that promote free market policies. As Smith wrote in his classic treatise The Wealth of Nations:

> "…every individual…endeavors as much as he can…to direct…industry so that its produce may be of the greatest value…neither intending to promote the public interest, nor knowing how much he is promoting it…He intends only his own gain, and he is in this, as in many other cases, led by an *invisible hand* to promote an end that was no part of his intention…By pursuing his own interest, he frequently promotes that of society more effectually than when he really intends to promote it…"

In order for the invisible hand to work, however, markets must display certain fundamental characteristics (De Long and Froomkin, 1997). First of all, goods in the market must be *excludable*, in that market participants may exclude others from the use and enjoyment of a good. The value of air to a person's life is perhaps greater than all other resources, but to date, no one has found a way to exclude others from enjoying it, and hence it is not a source of rents in an

economy. Pure oxygen, on the other hand, can be extracted from air, bottled and sold as a good, as two cannot equally enjoy a single breath of oxygen. Secondly, market theory assumes that the scarcity of excludable goods invokes *rivalry* between buyers of the good. The price of oxygen may rise if a production plant fails, as buyers compete for a smaller supply. Finally, for market forces to operate efficiently, goods must have as much as possible the quality of *transparency*, in that buyers can ascertain the nature and quality of a good before it is consumed. Most shoppers know what they are getting when they buy an apple and a fair judgment of its quality can be made in advance. On the other hand, although the benefits of oxygen for human consumption are obvious to most people, the purity of any oxygen supply cannot be easily determined by casual observation. Oxygen buyers ultimately may never be able to easily determine the purity of the good. In this case, information asymmetry leads to a *market failure*, necessitating governments to regulate the production of oxygen.

Unlike most products and services in the economy, digital goods display only minimal levels of excludability, rivalry and transparency. Thousands can enjoy a book displayed on a web page equally and simultaneously. Once released into a digital network, information and knowledge could become like air, floating freely with no ability to exclude anyone's use of it. Such conditions tend to dampen consumer rivalry, as the element of scarcity is removed. Information is also very opaque, where it is almost impossible to determine the quality of the good until after the information is consumed. These factors all

mitigate consumer willingness to pay for digital goods. The response of most Internet publishers to date is to simply provide digital goods for free, hoping, usually in vain, to recoup their heavy production costs.

Making matters worse for digital goods is the problem of price. Traditional pricing schemes take into consideration the cost of production. Social welfare is maximized when the price of a good is equal to the cost of producing one more unit (a good's "marginal cost"), as any price higher than this would mean that willing consumers would experience an unnecessary loss of utility due to not having the desired good. For this reason, freely competitive markets favor the consumer, as any producer selling above marginal cost will find other producers willingly meeting the unmet demand at price equals marginal cost. With digital goods delivered through the Internet, however, the cost of producing and delivering one more copy is essentially zero. If the price equals marginal cost is applied to digital goods, all digital goods should be priced at zero.

In their book Information Rules: A Strategic Guide to the Networked Economy, Hal Varian and Carl Shapiro point out how information goods typically have high costs of production and very low costs of reproduction. Given the tendency of markets to favor zero prices for digital goods, it follows that because producers cannot cover their costs, production will cease. As Bradford de Long and A. Michael Froomkin observe in their article "The Next Economy?" "…charging price equal to marginal cost almost surely leaves the

producer bankrupt, with little incentive to maintain the product except the hope of maintenance fees, and no incentive whatsoever to make another one except for that warm fuzzy feeling one gets from impoverishing oneself for the general good" (De Long and Froomkin, 1999, pg. 3). Under these economic conditions, we can see that the production of digitally distributable knowledge is only possible on a sustained basis if the cost of production of the knowledge is covered through subsidization by governments or complementary income streams. As expected, much of the knowledge content available on the Internet for free has been indirectly funded through educational budgets or is written off as a marketing expense by knowledge providers seeking to entice new buyers of their services. A good example of this is the legal profession, where lawyers will provide legal insights in magazine and journal articles for free in exchange for the exposure they receive for themselves and/or their firm.

Chapter 6

6.0 Review of Economic Discourse on Key Issues

Given the serious implications of a potential failure of publishing businesses due to the removal of excludability through potential digitization, numerous authors, industry groups, academic institutions and government agencies have turned their attention to the problem of digital goods. Generally, commentary is focused on the main economic issues facing digital goods, i.e.,

excludability, transparency, and price. Discussion surrounding the problem of excludability involved the issue of technical and legal copy protection. The matter of transparency incorporates the possible efficacy of versioning and branding strategies. Pricing discussions relate to the problem of cost based pricing, bundling and other revenue maximization strategies.

6.1 Excludability

As discussed above, digital goods lack the inherent excludability of tangible goods. As Oz Shy, a teacher of economics at the University of Haifa and author of an article entitled "The Economics of Copy Protection in Software and Other Media", writes "Information and know-how are perfect examples of what economists call public goods. A public good is a commodity or service whose "consumption" by one agent does not preclude its use by other agents" (Shy 2000, pg. 97). The debate amongst economists is how legal and technical protections to digital products effect markets for these goods.

6.1.1 Copyright Legislation.

A comprehensive examination of copyright law is beyond the scope of this paper, but a summary of key trends is possible. As noted above, the importance and intent of copyright is entrenched in the United States Constitution and other seminal national and international legal statutes. As articulated by Delong and

Froomkin, the economic effect of many laws is to impose excludability where it is inherently lacking. "…Enforcement of excludability…is one of the few tasks that the theory of *laissez-faire* allows the government" (Delong and Froomkin, 2000, pg. 11). Unlike laws pertaining to permanent private ownership of land, however, laws imputing exclusive ownership of Intellectual Property stipulate monopolies that expire over time. Under the Berne Convention for the Protection of Literary and Artistic Works, adopted on September 9, 1886, the oldest international standard in existence, copyright extends for the life of the author plus 50 years after the death of the author. The duration and enforceability of these limited monopolies are important means of balancing public and private welfare. For copyright, widely diverging interpretations of what constitutes illegal copying has caused controversy. Twentieth Century Technologies such as the photocopier and the computer have had an impact on what constitutes illegal copying.

The advent of the photocopier made copying of various copyright works easily and cheaply available to the developed world. The result was that many protected works were being copied on a significant scale. To address the problem, according to WIPO, laws were clarified in many countries to ensure that this type of reproduction was prohibited. "Article 9 of the Berne Convention (Paris Act l971) stipulates that "authors of literary and artistic works protected by this Convention shall have the exclusive right of authorizing the reproduction of these works, in any manner or form", and all contemporary copyright laws

contain provisions implementing this principle" (WIPO, 2001). As the prevalence of photocopiers in libraries increased, special arrangements were made to incorporate blanket licenses that incorporated the revenues represented by the copying activity. The advantage of photocopiers to libraries is that allowing a user to copy a single article from a journal, for example, means that the journal can remain available in the library for the benefit of others. In some countries, such as Sweden and Germany, licensing arrangements for copying for educational institutions were recognized by specific statues, even incorporating copyright fees onto the prices of photocopiers (WIPO, 2001).

The nature of computer technology has also given rise to further regulatory clarification of what constitutes illicit copying. According to The Digital Dilemma: Intellectual Property in the Information Age ("Digital Dilemma")[1], authored by a team of scholars, executives and industry

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[1]This publication is of significant influence in deciding public policy in the US. The Computer Science and Telecommunications Board (CSTB) stimulated the work after a history of examining problems associated with digital goods dating back to 1991. In 1997, under a grant from the National Research Council, the CSTB formed the Committee on Intellectual Property Rights and the Emerging Information Infrastructure (CIPREII). This committee spearheaded the writing of Digital Dilemma, which is available online for free on the National Academy Press' web site (www.nap.edu) at http://bob.nap.edu/html/digital_dilemma/ and in print form as a book. Later in 2000, CIPREII committee members Pamela Samuelson of the University of California at Berkley and MIT Professor Randall Davis summarized Digital Dilemma into a 31-page document of the same name for presentation at a conference. Digital Dilemma is written in a somewhat informal style and is clearly intended to educate a broad spectrum of readers. Considerable time is spent explaining the technological underpinnings of the problem of digital goods, and frequent reference is made to the legislative backdrop of the United States Congress. Digital Dilemma could be interpreted as an effort to educate US lawmakers and other stakeholders facing possible changes to law protecting Intellectual Property.

practitioners and published in 2000 by the United States National Academy of Sciences, legal clarification is required to deal with the fact that it is impossible for computers to operate without making copies. "Running a computer program, for example, occurs by copying the program from disk to memory. This action seems inconsequential to most computer scientists. Yet, courts have ruled that merely turning on a computer loaded with programs by a repair service not licensed to use the programs constituted copyright infringement because unauthorized copies of programs were made in the random access memory of the computer" (Digital Dilemma, 2000). Under such circumstances, copying is not part of an action designed to replicate a work, it is part of a process that enables viewing of a work. The intimate relationship between copying and viewing inherent in computer generated symbols necessitated clarifying regulations, as outline below. In particular, with respect to the use of the Internet for viewing copyrighted works, the authors suggest that the word "access" may be more appropriate for content viewed through a web browser. Viewing documents or images through a web browser or listening to music involved copying intellectual property from one medium of memory to another, or between databases. In other words, no copyright material can be "accessed" or "viewed" where the computer has not first made a copy of the good. Consumption of digital goods cannot occur without reproduction (Digital Dilemma, 2000).

To address the replication required by computers, and to deal with 1997's estimated $13.2 billion in revenue losses due to software piracy (Turban, et al, 2000, pg. 354), the US Congress enacted the Electronic Theft (NET) Act in 1997, which clarified what constitutes copying and stipulated criminal liability to those who infringe copyright electronically. A significant aspect of the NET Act was extending protection to works originally distributed for free. The NET act stipulates that creators of digital goods such as software and news articles, although possibly distributed without charge via the Internet, can suffer economic loss if the works are presented or distributed by other that the creator or an authorized agent.

For example, "freeware," that is, software distributed at no charge, may if of good quality, can build significant reputational capital for the producer, which would constitute and important aspect of that creator's ability to extract rents for services in the future. In other words, the provision without charge of copyright material does not constitute a forfeiture of copyright. An example of a practice prohibited under the NET act would be the compilation of "free" journal article into a compendium to be distributed someone not authorized to do so, even if the compendium is distributed freely.

In 1998, partly to address shortfalls of the 1997 NET, and to ensure reasonable access to electronic information for educational purposes, the US Congress enacted the Digital Copyright Clarification and Technology Education Act ("DCCTEA"). According to Turban, et al (2000), DCCTEA "…limits the

scope of digital copyright infringement by allowing distance learning exemptions." This act also sets out the principal of fair use, which generally allows limited coping so long as such copying "does not conflict with exploitation of the work, and does not prejudice the legitimate interests of the author." Under the DCCTEA, teachers, for example, are entitled to make singular copies of digital goods for classroom use.

Another issue exacerbated by the Internet is the problem of liability for digital publishers. For example, publishers may pay authors for journal articles and make them available on web pages. Is the publisher responsible for subsequent piracy of the goods? Also, the technique of using hyperlinks enables web publishers to provide extremely quick access to content paid for by other publishers. This conflict is covered in the Online Copyright Liability Limitation Act, which the US congress enacted to protect publishers from liability in cases where they have no control over or no knowledge of infringing activities by third parties.

A further act of the US Congress designed to clarify the application copyright laws to the Internet is the Digital Millennium Copyright Act ("DMCA"), passed in 1998. The DMCA reasserts the efficacy of copyright law on the Internet, makes attempts to circumvent anti-copying technologies illegal, allows for such circumvention when the intent is to conduct encryption research or to achieve hardware/software compatibility, and forbids excessive copying of databases, which were formerly exempt from copyright protection (Turban et al,

2000). Lists of phone numbers, as in a phone book, for example, were formerly not protected. Prior to the Internet, copying a phone book for commercial gain would involve large data entry and printing costs, giving directory creators a measure of protection. Digital directories published via the Internet, on the other hand, can be copied and redistributed unlimited times at near zero cost.

In addition to actions taken by the US Congress, international treaties governing copyright have been modified to recognize the special character of digital copyright intellectual property. To reflect general technological change, The Berne Convention received major revisions in Berlin in 1908, in Rome in 1928, in Brussels in 1948, in Stockholm in1967 and in Paris in 1971. More recently, under the auspices of the General Agreement on Tariffs and Trade ("GATT"), the World Intellectual Property Association ("WIPO") convened diplomatic meetings in Geneva in 1996 which lead to the adoption at the meeting of the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty.

The WIPO Copyright Treaty was expressly designed to extend, not curtail, the scope of protection under the Bern Convention, but permits specific agreements between countries for special circumstances. However, the main thrust of the new treaty was to deal with digital goods. According to WIPO "…it became clear that the most important and most urgent task of the WIPO committees and the eventual diplomatic conference was to clarify existing norms and, where necessary, create new norms to respond to the problems raised by

digital technology, and particularly by the Internet. The issues addressed in this context were referred to as the 'digital agenda' " (WIPO, 2000, pg. 36).

As early as 1982, WIPO had clarified the application of clauses under the Berne convention to stipulate, "…that storage of works in an electronic medium is reproduction" (WIPO, 2000, pg. 37). According to WIPO, the notion of distributing works via the Internet created considerable disagreement amongst the drafting committee, as specific technologies where interpreted to be effecting different actions under the traditional definitions of reproduction of works. The solution adopted by WIPO was a so called "umbrella solution" that avoided specific reference to given technologies, but rather address the fundamental rights of authors. Accordingly, Article 8 of the WIPO Copyright Treaty reads "…authors of literary and artistic works shall enjoy the exclusive right of authorizing any communication to the public of their works, by wire or wireless means, including the making available to the public of their works in such a way that members of the public may access these works from a place and at a time individually chosen by them." Given the broad implications of the phrase "communication to the public," the WIPO Copyright Treaty also incorporates clauses limiting limitability of participants under various circumstances, as also clarified in the Online Copyright Liability Limitation Act in the United States. Also, the WIPO Copyright Treaty forbids the removal or tampering with rights information electronically encoded in digital goods.

Given the considerable legislative activity outlined above, it is clear that regulators are prepared to act quickly to ensure that historic protections under copyright laws are extended to cover digital goods, reinforcing excludability. A collective resolve appears to be present in governments worldwide to ensure that the Internet does not become "…a giant copying machine…," as many fear (Shapiro and Varian, pg. 56). However, effective enforcement of enhanced copyright laws through the courts will also be required in providing comfort for producers. In the meantime, producers will likely continue to seek technical measures to achieve excludability as well.

6.1.2 Digital Rights Management

Digital rights management ("DRM") technology, also known as technical protection systems ("TPS"), has arisen recently as an important sector within the software industry (Digital Dilemma, 2000). DRM seeks through a variety of means to indicate ownership in digital goods, by disabling copying of the goods, or both. Commentators have diverging views on the importance of DRM in the economics of digital goods.

Examples of copy protection in digital products are watermarking, encryption, digital keys, specialized viewers and function blocking. Digital watermarking is similar to its analog equivalent, introducing indelible visible or invisible marks in software, documents or images that signify authorship,

branding, authenticity, version or other ownership evidence. This practice does not prevent copying, but is designed to be a deterrent to plagiarism, a possible motivator for illicit copying. Encryption techniques scramble software code in such a way that files containing data can only be unscrambled under certain circumstances. Encrypted files can force would be viewers to operate specialized software on their computers, or obtain special pass codes called digital keys. Digital keys are pass codes that "un-lock" files for restricted or unlimited viewing. Specialized viewers are required to read some documents and other images. A free program called Adobe Reader, for example, is required to read documents created by Adobe Corporation's document software. Adobe's "PDF" file format is becoming a standard for many digital documents as the software prevents easy manipulation of text and images by would be plagiarists or pirates. Adobe's also enables document creators to limit functionality such as printing, editing, or saving under different file names. Although all of these methodologies for making copying more difficult are now readily available, adoption by producers and consumers is not guaranteed as diminished utility for consumers may lead to lowered demand for producers.

According to Digital Dilemma, the committee members concluded, "…technical protection services need not be perfect to be useful. Most people are not technically knowledgeable enough to defeat even moderately sophisticated systems and, in any case, are law-abiding citizens rather than determined adversaries…[Technical measures] can deter the average user from engaging in

illegal behavior…." (Digital Dilemma, pg. 27). In light of these conclusions, the authors recommend use of DRM systems, in spite of some clearly acknowledged shortfalls. For example, DRM systems can introduces additional cost and frustration on users and militate against the public's right of access to knowledge. The committee also acknowledged the role of economics, ethics and business models in shaping the way agents address the lack of excludability of digital goods.

Another concept explored in Digital Dilemma that supports the use of DRM is the inherent "plasticity" of digital information. "Although a paper book is difficult to alter and hard to search even with a good index, online text can be changed easily, for instance, by adding and rearranging paragraphs" (pg. 67). This increased plasticity lowers barriers to plagiarism, forgery, and other technical manipulations that can obscure or obliterate author credit, and create "derivative" forms of works that defy traditional referencing, such a list of hyperlinks rearranging other works. Technological techniques such as function blocking, for example disabling the "copy and paste" functionality in a given document, can make digital goods less plastic, correspondingly increasing excludability.

According to Shy (2000), the economic impact of illicit copying for digital goods is significantly different from historical examples of physical copying activity. Shy posits three models of copy diffusion; vertical, horizontal and mixed. Under vertical reproduction, one copy is made from the original work,

and each successive copy is made from the copy ahead of it in its succession. In non-digital circumstances, vertical reproduction leads to rapid deterioration in product quality, discouraging the activity. Under horizontal reproduction, one original is used to make multiple copies, which are then distributed. Under mixed duplication, multiple copies are made from an original and subsequent vertical duplication takes place.

Publishers of printed matter can therefore, according to Shy, take economic advantage of what amounts to "built-in copy protection" (Shy 2000, pg. 100). Because of the diminishing buyer utility of vertically reproduced copies, producers can extract the available rents by increasing prices. In other words, Shy assumes that a consumer is willing to pay less for copy than for an original because the copy is of inferior quality. Shy presents an example where the value to consumers drops by 50% with each vertical copy progression, where the producer charging $1.93 for the original could extract all surplus rents of a $1.00 document, assuming five generations of vertical copying. If the original is worth $1.00, then the first generation copy is worth $0.50, the second generation copy $0.25, and so on. This phenomenon has given rise to what Shy calls the "library model" (Shy 2000, pg. 100), where libraries are willing to pay higher prices for printed materials as the copying activity increases the value of their service to the community, attracting correspondingly higher donations from the public. Libraries, Shy argues, would be willing to pay the publisher's demanded

$1.93 because the included permission to make copies will attract more patrons which in turn will generate more donations from the public.

By contrast, digitally copied works display no such diminution of utility in vertical copying. Under Shy's $1.00 document example, "…if the information is digital, the entire surplus sums to five times the valuation of each consumer, so it is unlikely that any consumer would be willing to pay this price. Thus, my point here is that printed information providers are better protected, in the sense that they tend to capture a higher percentage of total surplus than digital information providers" (Shy 2000, pg. 101). In other words, if the consumers willingness to pay is based on the quality of an original copy, as assumed with paper originals above, then consumers would theoretically be willing to pay full price for every digital copy, as there is no reduction in quality. On the other hand, Shy notes, the implication is that copy protection in digital goods should be much more profitable, as copying results in no reduction of quality, and theoretically full rents should be extractable from each consumer. Paradoxically, however, Shy notes that although perfect copy protection is possible with software, "…the software industry has removed copy protection from most of its products."

The abandonment of copy protection practices in the software industry underscores the ongoing debate over the significance of illicit copying in the economics of digital goods. Shy (2000), Varian and Shapiro (1999), and other economists point out the strategic advantage to firms that can be gained through

rapid and widespread adoption of software products, even if product diffusion is achieved through unauthorized copying. The presence in software markets of network effects, potential for lock-in, and the impact of positive feedback have been discussed above. In addition to these factors, Shy also points out that producers of software can also benefit from price discrimination, particularly with business customers, where rents can be extracted from illicit copying. If employees make illicit copies of software for use at home, businesses may be willing to pay higher prices, as such employees are able to do company work at home, increasing productivity.

However, for various reasons, DRM practices in software are different that in non-software digital goods. Incongruously, reduced excludability in printed media and the film industry has lead to increased profitability for firms, the exact opposite effect than had been expected. As Shapiro and Varian argue, the absence of excludability inherent in Internet delivered digital content presents a unique and valuable marketing capability. "The very technologies that make rights management more difficult - the dramatic reduction in costs of copying and distribution – also offer a fantastic opportunity for owners of intellectual content" (Shapiro and Varian, 1999, pg. 83). Shapiro and Varian recommend a number of strategies to harness the marketing power of the Internet, such as product give-away schemes to generate demand, versioning strategies extract more rents from the demand curve (discussed further below under Transparency), and profiting through lower transaction costs.

Ultimately, Shapiro and Varian suggest that illicit copying, dubbed by them as "bitlegging" (pg. 92), has only minor implications for digital goods as would be pirates are curtailed from employing the marketing power of the Internet. Agents in possession of illegal copies of goods are in the same position of legitimate holders in that simple possession fails to extract any economic benefits when buyers are unaware of where they can acquire the good. If illegal holders "…advertise their location to potential customers, they also advertise their location to law enforcement authorities" (pg. 92). Thus the authors suggest reliance of legal measures are of prime importance, whereas DRM is less value. "Trusted systems, cryptographic envelopes, and other copy protection schemes have their place but are unlikely to play a significant role in mass-market information goods because of standardization problems and competitive pressures."

DRM systems hold some promise of replacing a measure of the "built-in" copy protection enjoyed by printed or otherwise physically produced works. However, these technical excludability systems may reduce buyer utility to such a degree that lowered demand eliminates the potential rents sought by producers. Books printed with blue ink are very hard to copy, but most people dislike reading blue ink. DRM systems like digital keys may be hard to defeat, but many consumers dislike the aggravation of using them. DRM systems are therefore unlikely to be useful tools in curing the lack of excludability inherent in digital goods.

6.1.2 Moral and Ethical Arguments

In addition to debate surrounding legal and technical remedies for infusing the quality of excludability into digital goods, some commentators argue that the key to maintaining economic equilibrium in the digital world is dependent mainly on prevalent social mores pertaining to voluntary ascription of rights and benefits to creators. Assuming that extraction of rents from digital goods is ultimately dependent on the buyer's sense of duty to give credit where it is due, the social psychology pervading a culture is of the highest importance. In this light, the interpretation and application of moral and ethical standards become key in anticipating market behavior towards digital goods.

One position taken in this debate is that it is inherently unethical to attempt to exclude, by technical or legal means, any agent from the enjoyment of digital goods available through the Internet, and that all digital goods should therefore remain free of charge. One well-known proponent of this view is John Perry Barlow. Barlow's above cited article "The Economy of Ideas: Selling Wine Without Bottles: The Economy of Mind on the Global Net" is characteristic of the medium he is commenting on, in that it exists in various versions, with various titles and with various publication dates. At the bottom of the web page displaying the version above, which is accessible from the web site of the Electronic Frontier Foundation (www.eff.com), an organization co-founded by Barlow, the author writes "This expression has lived and grown to this point

over the time period and in the places detailed above. Despite its print publication here, I expect it will continue to evolve in liquid form, possibly for years." Above this sentence are dates ranging from 1992 to 1993, with an allusion to the present version having been published in Wired Magazine.

In spite of its non-traditional publication, this essay, also called "The Idea Economy," is widely quoted and represents a foundational treatise bolstering the view that copyright laws have limited jurisdiction over the Internet. According to the article "Intellectual property law cannot be patched, retrofitted, or expanded to contain digitized expression." At the heart of Barlow's moral argument in respect of digital goods is the suggestion that rent seeking in intellectual property is inferior to the public good that arises out of the "free exchange of ideas." Barlow takes aim at firms as standing in the way of the publics right to access information. "The greatest constraint on your future liberties may come not from government but from corporate legal departments laboring to protect by force what can no longer be protected by practical efficiency or general social consent." Barlow argues against attempts to impose the rule of law in the "…perhaps permanently lawless seas of Cyberspace" in favor of a reassessment of the economic basis of trade in digital goods, suggesting an economic system based purely on ideas.

In contrast to the view that inhibiting free access to all digital content is immoral, other commentators argue that most in society are governed by a deep-rooted moral code that causes them not to engage in illicit copying, and that this

moral grounding is what will ensure that rents are extracted from digital goods. A proponent of this view is copyright lawyer William S. Strong as summarized in a frequently quoted article entitled "Copyright in the New World of Electronic Publishing." Strong's article presents a view of digital goods as being entirely dependent on the moral and ethical behavior of average citizens, which he suggests supports continued compliance with the spirit of copyright principals. Strong argues that fears of rampant piracy and the demise of the publishing industry are not well founded. Strong states in the article, "I have heard people say in the tones once reserved for statements that God is dead, that copyright is somehow defunct. I have heard people say copyright will have to be drastically overhauled in order to avoid becoming obsolete. With all due respect, I submit that all of these statements are wrong." Strong points to research by the Boston Globe by a poll of its readers that the overwhelming majority of readers believed that theft of copyright materials is wrong. From this and other evidence of strong public support for copyright, Strong concludes that "…copyright is based in human terms on something more than mere utility' and that "…there is a moral element present in most people's view of these things that can be built upon and reinforced as a way of reinforcing copyright."

6.2 Transparency

As noted above, digital goods are experience goods, requiring prior consumption of the good for proper assessment of product quality. Without the ability to pre judge the quality of a good, a consumer must rely on a variety of cues that signal quality, such as reputation and brand awareness. Economic commentary on this problem focuses primarily on the role of branding and versioning strategies in the dissemination of digital goods. The role of the publisher and the problem of "information overload" are central to the debate.

6.2.1 The Role of the Publisher

The character of and the Internet has simultaneously threatened and strengthened the role of publishers in the extraction of rents in digital goods markets. On one hand, the reduction in publishing costs enables authors to provide their creations directly to the market, circumventing the typical intermediation of a publishing firm. On the other hand, reduced costs have lowered barriers to entry for authors, resulting in high supply of goods that lack significant differentiation. Publishers bring critical differentiation, marketing and branding to digital goods.

In an article entitled "Economics and Electronic Access to Scholarly Information," Jeffrey K. MacKie-Mason and Juan F. Riveros (2000) argue that the role of the publisher is very significant. "Utopians have suggested that if

technology is put in the hands of authors, for-profit publishers can and inevitably will be bypassed." The authors argue that publishers' performance of editing and production services is a significant addition of value. Even in digital publishing and web delivery, significant expertise in interface design and maintenance is required, something that may be beyond the purview of many authors. Most important of all, publishers typically perform the marketing function. "Good scholars are good at research, not at finding readers" (MacKie-Mason & Riveros, 2000, pg. 205). This outlook is echoed by Eberhard (1999), "An author comes to a particular publisher because that publisher has a reputation with readers and a marketing and sales force that will sell as many copies as possible of the author's book. This is the publisher's core value, and it remains so with the emergence of the e-book."

Strong (1994) also argues for an important ongoing role for publishers, as they add valuable quality and reputation signals to digital products that helps overcome low transparency. "There are many people who think that the role of publishers is going to wither away, just as Marxists thought the state would wither away. I respectfully suggest that the opposite may occur" Strong writes." Strong argues for the increasing importance of publishers by providing a filtering mechanism that points readers to relevant and higher quality products. Pointing to the growing supply of information in the environment, Strong suggests that "…good publishers, by screening this information for quality, and validating it during the publishing process, perform an enormous service."

Hence Strong argues that publishers provide a proxy for transparency, becoming trusted sources for quality as well as relevancy.

However, MacKie-Mason & Riveros point out that the Internet and digital technologies will have an adverse impact on publishers. Traditional barriers to entry such as expensive production infrastructures not will be absolutely necessary, leading to increased competition. As a result, publishers will achieve only "…normal (not monopolistic) profits over time." (pg. 205). Other barriers to entry, such as the proprietary rights to publish the works of certain author, will therefore become more important to publishers.

6.2.2 Branding and Reputation

As with markets for tangible goods, prior experience with the output of a given producer of a product helps consumers decide as to the merits of the producers' goods in general. BMW brand cars, for example, are indicative of a certain level of quality of automobile. Quality may vary from model to model, but it is unlikely that significant variance will occur, where a one model is excellent, while the next is very poor. With intellectual output, on the other hand, significant variance is possible. Also, subjective valuations from one consumer to the next can vary drastically with artistic works, for example. A filmmaker, may achieve high ratings from a mass audience for a given film, and

extremely low ratings for a following production, but with very high ratings from a small market segment for both.

On the whole, consumers of digital goods are forced to rely very heavily on branding and reputation in selecting purchases, however unpredictable such cues are in indicating desirability. One consequence of this high reliance of familiarity with a given producer is the "winner take all" character of markets for authors, artists, filmmakers, musicians and other generators of reputation-based goods. With high sunk costs of production for such products as feature films and major book printings, producers can increase market acceptance of their product by associating actors or authors will widely known and reasonably consistent positive reputations. In a 1994 article entitled "Talent and the Winner-Take-All Society" (Frank, 1994), Robert H. Frank argues that openly competitive bidding for talent creates significant inefficiency. "Winner-take-all markets give rise to two important forms of inefficiency. One is that they tend to attract too many resources away from markets with more conventional payoff structures," Frank writes. Extremely high salaries attract additional entrants into the market, which should generate healthy competition. However, Frank points out that since a handful of individuals make extremely high rates of return, this will attract talent to a market in which there is very low chance of success. Competitors in these talent markets would likely generate more efficient returns in other fields of endeavor. The second inefficiency Frank discusses is the tendency for participants to be at the top at all costs and the destructive measures

that can be taken, such as with performance enhancing drugs. Gold medal winners can attain million dollars endorsement contracts, while bronze medallists may not be able to pay for basic living needs. The significance of the winner-take-all phenomenon for digital goods markets is that low transparency increases the importance of brand name and recognition to gain buyer acceptance. This means that "unknown" authors and musicians, for example, will have a difficult time generating markets, as publishers will be motivated to back known authors only.

6.3 Pricing Digital Goods

Pricing Internet delivered digital goods at price equal to marginal cost results in a market failure, as no recouping of substantial "first copy" costs is possible. Also, pricing at some percentage above marginal costs extracts no rents, as marginal cost is zero. However, as Shapiro and Varian point out, "…people are willing to pay for information" (1999, pg. 3). In light of strong consumer demand for digital goods, sellers seek to maximize profits by pricing their offerings in an optimal manner. Traditional applications of revenue maximization formulas to Internet delivered digital goods is difficult to apply. As Sebastian M. Maurer and Bernardo A. Huberman of the Xerox Palo Alto Research Center write "…the standard formulation of the competitive equilibrium theory is inapplicable to the Internet economy. This is because the theory of competitive equilibrium focuses on the dynamics of price adjustments

in situations where both the aggregate supply and demand are a function of the current prices of the commodities" (Maurer and Huberman, 2000, pg. 1). Given that marginal cost is essentially zero for an additional viewing of a web page, supply will always meet demand, Maurer and Huberman argue, suggesting that factors other than price are driving traffic to web sites.

Choi et al argue that "digital product" pricing will be determined by payments required by copyright holders. "Although some argue that the variable reproduction cost will be zero, the authors believe that it will be a substantial, albeit constant, amount due to the per-copy copyright payment" (Choi et al, 1997, Pg. 350). Furthermore, the authors suggest that the most efficient way to deliver digital goods may be through a strategy of "mixed bundling," incorporating "micro-payments" for individual articles, instead of traditional bundled pricing methods typical of News Papers, Magazines, Journals, and Music CDs. Under bundled strategies, consumers must pay for content they don't want in order to get the content they want, which may improve margins for the content. However, there is evidence that unbundled pricing may be profit maximizing for sellers and utility maximizing for buyers.

Economic discourse related to the pricing of digital goods examines the efficacy of bundled, fixed, mixed, and other schemes such as donations, or the "National Public Radio Model" as described by DeLong and Froomkin (2000). As Maurer and Huberman note, work by Smith, Bailey and Brynjolfsson (1999) reveals that "…when the marginal reproduction cost approaches zero, new

strategies and behaviors appear, in particular with respect to bundling, price dispersion, value pricing versus cost pricing, versioning, and complicated price schedules" (Huberman & Maurer, pg.3). Opinions on what scheme is optimal differ significantly from author to author.

Although digitization creates problems for pricing, the Internet offers possible new benefits to producers by using personalized price discrimination. The level and type of interaction that occurs between customers and vendors can allow businesses to collect and process information about the preferences of buyers in a very efficient manner. Buyer preference information, once captured and stored, could be used to deliver a price for a good targeted closely at each customer's willingness to pay. If possible, this practice would enable sellers to extract more surplus than through fixed pricing. Such information gathering could benefit third-degree price discrimination, as in markets for journal subscriptions, where an attempt is made by sellers to deliver a good to various groups and different prices according to their willingness to pay, as with group discounts for students. More efficient second-degree price discrimination is also possible, where an attempt is made to segregate markets according to quantities of a good desired, such as group discounts for travel or events. First-degree price discrimination is perhaps the most significant potential practice enhanced by the Internet, well sellers attempt to extract the highest price for a good for each buyer, as with haggling at a public market (McAuley & Young, 1994). As Shapiro & Varian write "…if you sell goods to people using a 'point-to-point'

technology, as is possible on the Internet, you can sometimes arrange for multiple, even personalized prices" (1999, pg. 39)[2]. The point here is that a logical pricing strategy can be applied to digital goods in absence of excludability by manipulating the quality and character of the product mix.

6.3.1 Bundling

Selling information goods in bundles via subscriptions is the most common manner of pricing these good. Fishburn, Odlyzco and Siders (2000) argue that bundling schemes are the only viable pricing alternative for digital goods. "Arguments in favor of bundling are strong, and suggests that *a la carte* or unit pricing will not be the dominant mode of commerce in information goods" (Fishburn, Odlyzco and Siders, 2000, pg 168). As proof, the authors point to the many historical failures of per unit schemes, such as pay-per-view TV, and suggest that consumer behavior is predisposed to bundled information goods, and that this strategy is advisable in spite of the fact that it is possible for monopolists to earn higher revenues from fixed pricing. However, the authors find that mixed bundling strategies are almost always preferable to pure bundling strategies.

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[2] Shapiro and Varian create new terms for the above pricing tactics categorized by A.C. Pigou in 1920, call first degree "personalized pricing," second degree "versioning," and third degree "group pricing" (1999. pg 39).

Bundling strategies can be divided into two categories, mixed bundling and pure bundling. With pure bundling, two or more goods are contained inside the same packaging and are not sold separately, such as with certain automotive optional equipment, where air-conditioning and power seats are not sold separately, for example. With mixed bundling, goods can be bundled at one price and sold separately under different prices, as with "value meals" at fast food chains. Studies have shown that that bundling serves to segregate customers by willingness to pay, allowing firms to extract additional consumer surplus.

In arguing that bundling with digital goods is highly complex, MacKie-Mason and Riveros (2000) note that most of the prior economic literature dealing with bundling has dealt with cases where just two goods are involved, such as popcorn with movie tickets. "The bundling problem becomes increasingly complex as we depart from the two-good formulation" (MacKie-Mason and Riveros 2000, pg. 215). According to research by Hanson and Martin (1990), optimal bundles can be found that include up to 21 items. However, academic journal typically bundle about 100 articles in a subscription payment. Under these circumstances, it is hard to conclusively prove improved surpluses under pure bundling.

In spite of considerable research by the authors during the PEAK (Pricing of Electronic Access to Knowledge) experiment, described below, MacKie-Mason and Riveros conclude that additional research and experimentation is needed to

determine optimal pricing structures for digital goods, as current theories do not fit actual circumstances very well. "The space for electronic-access product bundling and pricing structures is immense…" (Pg. 227).

6.3.2 Unbundled Pricing

Recently, the University of Michigan spearheaded a three and one half year experiment designed to help discover optimal pricing strategies for electronically delivered academic journals (MacKie-Mason, Riveros and Gazzale, 1999). The PEAK (Pricing Electronic Access to Knowledge) project, conducted in cooperation with Elsevier Science, provided electronic access to 1200 scientific journals to a number of academic institutions under three of pricing schemes. "Traditional Subscription" pricing provided "unlimited access" to a given journal. "Generalized Subscriptions" provided unlimited access to any 120 journals of the 1200 available. "Per Article" pricing provided unlimited access to specific articles by one individual. Among many interesting findings, the PEAK experiment indicated that as the users became familiar with the system, per article revenues increased dramatically. "…revenues for per article purchasing are more than fifteen times higher in 1999 than in 1998…" (MacKie-Mason, Riveros and Gazzale, 1999, Pg. 9). The writers observe, "…we see evidence that as they gained experience with PEAK, librarians favored the more flexible access options…that allow users to select the articles they want to read…" (MacKie-

Mason, Riveros and Gazzale, 1999, Pg. 9). These findings would suggest that for academic writings, buyer utility and seller revenues are maximized through unbundled selection and delivery.

With respect to journal articles, John Chung-I Chuang and Marvin A. Sirbu also argue that per unit pricing is preferable for publishers. "…it appears to be in the publishers' interest to unbundled their journals" (pg. 139). In support of their assertion, the authors describe the behavior of scholars who will "…expend a great deal of energy..." (pg. 139) locating individual articles that are relevant to them. Another factor is the proliferation of titles available, making it impossible to obtain by subscription access to all desired articles. Given the search and retrieval capabilities of information technology integrated into most web interfaces, finding relevant articles over thousands of different journals is possible. Under these circumstances, the authors argue, forcing buyers to subscribe, frequently at significant prices, for unwanted articles, is counterintuitive and inefficient.

Another factor in support of pay-per-view pricing is the increasing cost to libraries for subscriptions when the costs of interlibrary loans ("ILL") are taken into consideration. Under print version subscriptions, many publishers allow for duplication when articles are being distributed to other branches, which is costly. "Empirical studies have found that libraries are incurring costs of up to $20 per ILL item obtained. This suggests that a potential market does exist for

unbundled articles at both the individual and institutional level" (Chung-I Chuang and Sirbu, 2000, Pg. 139).

According to Chung-I Chuang and Sirbu, mixed bundling is always preferable to pure bundling. Producers should make content available by subscription and per article whereby the producer can extract more consumer surplus "…via consumer self-selection" (Pg. 163).

6.3.3 The Donation Model

According to DeLong and Froomkin (2000), the absence of excludability necessitates commerce on the basis of "gift-exchange" rather than purchase and sale. "When commodities are not excludable, people simply help themselves" (2000, pg. 11). Accordingly, they suggest that a model akin to the Public Broadcasting Corporation is well suited to markets for digital goods, where "…if the user feels like it, he or she may make a 'pledge' to support the producer." The authors point to the substantial practice of tipping and the success of the NPR and other user funded programming as evidence that the donation model works.

An experiment in applying the donation model in Internet publishing is the "Amazon Honor System," a service of online retailer Amazon.com. Using the slogan "It's time to get paid for your website," Amazon provides web site owners a "paybox" on their site which if clicked takes them to a page on

Amazon's site dedicated to the referring site. The payment system is linked to Amazon's database of customers, of whom many have provided Amazon with their credit card or other charging data. Appreciative visitors can contribute sums as low as one dollar. Amazon retains a fee of 15% plus $0.15 per transaction. Amazon has provided no usage or revenue data related to its honor system, but early review of the service have been mixed.

Amazon's donation based payment model is in essence a pay-per-view system where the payments are optional. However, the system also captures bundled services, as donation is based on appreciation of an entire web site, which is typically a bundle of digital goods and services.

Given the forgoing, pricing strategies for digital goods must take into account that the relationship of buyers to sellers differs from conditions in non-digital goods, in that excludability is lacking and marginal costs are extremely low. In order to determine optimal pricing schemes, sellers need to manipulate their product offerings in order to deliver differentiated products according to willingness to pay. Sellers can adopt mixed bundling strategies while acknowledging that they can and should appeal to the sense of obligation that many feel to pay for any good.

Chapter 7

7.0 Online Business Models Dealing with Digital Goods

Cheap and faithful reproduction technologies are also not new to business. The photocopier and the videocassette-recording device were originally viewed as potentially ruinous to the publishing, film and television industries. But in a happy paradox, it appears that far from harming the producers of written and visual goods, low cost duplication and distribution has produced an opposite effect. As Shapiro and Varian observe with respect to printed works, " Printing presses, xerography, and the Internet have made text reproduction progressively cheaper, and express mail and fax machines have reduced distribution costs immensely. With each reduction in cost, the *amount* of information being distributed has increased dramatically. There is more being published today, and more money being made in publishing, than ever before" (Shapiro and Varian, 1999, Pg 94). The same unexpected outcome has occurred with the feature film industry. Far from losing revenue to theft of their copyright intellectual property, more money is often made from sales of videotapes than theatrical releases.

In spite of the economic challenges inherent in digital goods, many commentators predict that Internet delivered products represent the true business promise of the new medium.

7.1 The Recorded Music Industry

The recorded music industry affords a current and active case of digital goods problem. For a variety of reasons, the distribution of recorded music has demonstrated significant susceptibility to the market failure potential of digital goods. In particular, the case of the "Napster Music Community" has given rise to one of the most publicized copyright lawsuits in history. At issue are the legal, technical, and moral constraints, or lack thereof, in enforcing measures of excludability in recorded musical creations. In Digital Dilemma, a specific section entitled "Music: Intellectual Property's Canary in the Digital Coal Mine" is dedicated to examining the phenomenal rise of Internet accessed music and possible solutions to rampant illicit copying.

Recorded music, and in particular popular music "songs," provides ideal Internet content for technical and social reasons. A digitized minute of music takes up on average 10 megabytes of storage space on a standard compact disk. Using a format called MP3 (Motion Picture Expert Group, Layer 3), the same amount of music can be stored in approximately one tenth of the space of regular formats, while maintaining high levels of sound reproduction quality. The reduced file size for digitized music means that the above noted constraints of storage and bandwidth are at acceptable levels. Also, I/O devises required to create high fidelity sound are relatively inexpensive, where good quality

speakers, including a sub-woofer, can be bought for less than one hundred dollars, and are now commonly bundled with home computer packages.

The popularity of recorded music in society results in a high supply of music available, most of it already digitized on music CDs. CD reading devices, now standard on most personal computers, also have the capability to extract digital information from the CDs, while inexpensive and often free software converts the data into usable formats such as MP3. Slightly more expensive CD "burners" allow recording of digital files from the computer to the CD medium, meaning that music can be acquired via the internet, stored on the computers hard drive, and then transferred to the CD, enabling playback in portable devices or transference by hand to third parties.

As noted in Digital Dilemma, the music industry has experience high levels of copyright infringement because "…music is popular with a demographic group (students in particular, young people generally), many of whom have easy access to the required technology, the sophistication to use it, and apparently less than rigorous respect for the protections of copyright law" (pg. 27). In other words, the demand for music via the internet does not enjoy to high degrees the benefit of excludability brought about by moral and ethical convictions.

7.1.1 The Case of Napster.

In the fall of 1999, a nineteen-year-old California student named Shawn Fanning started a web site called Napster.com. In contrast to most digital goods delivery from large, centralized "server" computers, Napster users access music files from millions of other smaller computers owned by individual users. Known as Peer-to-Peer file sharing, users both serve and accept files enabled by Napster's software and database service. The underlying purpose of the web site was to make the ""sharing" of digitized music between consumers easier than before. The popularity of the site is considered extreme, with over 50 million users registered as of January 2001. Napster was recently successfully sued for copyright violation by a consortium of companies that hold copyrights to much of the music transferred through the Napster network. Although Napster did not "serve" the copyright files themselves, their participation in copyright infringement by others was found to make them culpable. Faced with massive pecuniary damage claims, Napster has reacted to various court injunctions curtailing use of the system to expedite the sharing of copyright protected music.

The courts have found that Napster has the burden of ensuring that specifically identified copyright songs of the plaintiffs were not resident in its database. In the March 5, 2001 decision, a higher Court upheld a lower court's

finding that Napster, through its music information database, had "reasonable knowledge of specific infringing files," and should therefore take steps to ensure that such files be removed Following the decision, Napster started to comply with the order by introducing screening technology to remove infringing information from its system. However, on July 11, 2001, the same court, apparently not satisfied with Napster's compliance with the order, altered the March 5 ruling, stipulating a "zero tolerance" policy for infringing files, and order the web site shut down until Napster could satisfy the court that its system was capable of perfect compliance with the law. Napster appealed the ruling and on July 18, 2001 won a stay of the shutdown order, according to an Associated Press report on CNNFN.com. At the time of writing, Napster remains shut down, but may resume at any time. At issue in the appeal was the finding of the court that Napster must ensure that 100% of protected material be removed. Napster maintained in its appeal that it's software was able to block 99% of infringed material, but needed time to improve its screening capability to 100%, the report said.

The case of Napster could be cited as a proof of Varian and Shapiro's contention that "bitlegging" is futile on a large scale, in that Napster's success was its undoing. On the other hand, Napster's ability to remain open for long periods in spite of court actions may suggest that Napster was successful. It remains to be seen if Napster can remain popular with most blockbuster songs and major recording artists unavailable through the site. At present, Napster has

no means to extract rents from its services. Certainly the Napster case is a very compelling argument for the position that Copyright Laws perform well as a means of excluding agents from engaging in illicit copying on a mass scale. However, the impact of Napster on the music industry's ability to extract rents from copyright music is a matter of debate.

During the trial preceding the March 5 ruling, testimony in favor of Napster contended that there were no financial losses for copyright holders resulting from the use of Napster by consumers. In an declaration submitted by Peter S. Fader, Associate Professor of Marketing at the Wharton School of the University of Pennsylvania argued that the exact opposite was true, saying "…every reliable and representative published survey of individual consumers shows Napster use, or downloading of digital music files more generally, to cause more consumers to increase their CD purchases than it causes to decrease those purchases."

Ironically, in a declaration filed on behalf of Napster , John Perry Barlow states clearly that Napster obviates copyright holders such as music publishers to extract rents from their intellectual property. As Barlow testified "…one-to-one sharing through Napster will allow musicians to break the lock grip of the big five recording companies on marketing, promotion and distribution. Napster allows music to be delivered…without the artist signing away rights and becoming indebted to a recording label." However, if Napster diminishes the

ability of corporate rights owners to enjoy excludability, then individual artists would likely suffer the same fate.

The case of Napster also has bearing on the theory of digital goods pricing. In a recent article entitled "Where Napster is Taking the Publishing World" published in the February 2001 edition of Harvard Business Review, Clay Shirky argues that the explosive growth of the Napster music "file sharing" community has dramatic implications for the entire publishing business, not just the music industry. According to Shirky, Napster has assured that unbundled, pay-per-unit pricing schemes will not work. Describing the bias of the music industry, Shirky writes, "…'one unit, one price' would be the norm, they believed, while 'all-you-can-eat' based on subscriptions and advertising would be oddities. Napster's success means that the 'all-you-can-eat' model has won." Shirky further argues that consumers who copy digital files will not accept Digital Rights Management, the application of technology to prevent illicit copying and distribution of electronic files.

Shirky's article, which was published prior to the February 2001 court ruling against Napster, suggested that the vary nature of Copyright law would need to be altered to conform to the consumers appetite for free access to digital content. "The big question isn't whether Napster will win or lose on appeal. It's whether the current legal structure regarding copyright will hold. As anyone who has used Napster is aware, the answer is no. The music industry is not losing the right to enforce copyright but the ability to do so" (Shirky, 2001, Pg 6).

In light of the recent closure of Napster, Shirky's doubt as to the efficacy of copyright laws may have been premature.

The author believes that although the Peer-to-Peer system of file sharing will force music copyright holders to adopt a subscription based revenue model, the Peer-to-Peer model will not be prevalent as other forms of digitized copyright intellectual property distribution. The reason for this is that the very character of music makes it amenable to multi server file sharing, whereas other digital goods do not. Accordingly, differentiated pricing and delivery methods are required to address the variable character and use parameters.

7.2 Electronic Books

Nothing has galvanized the attention on the issue of digital goods more than the prospect of widespread use of electronic books, or so called eBooks. For reasons outlines above, publishing firms fear possible erosion of margins and being sidestepped by authors. Some sources project that within five years over 50% of all published goods will be available in digital form only (Hilts, 2000). Jean Naggar, the current president of the Association of Authors Representatives, described the advent of eBooks as "potentially as big as the invention of the printing press," (Eberhard, 1999). While commentators agree that eBooks are a very significant development, not all agree that the new reading medium will have a large effect on the business of publishing.

In an article entitled "E-book Economics" in Publisher's Weekly, author Martin Eberhard examined some of the underlying economic issues related to electronic books that represents the enthusiastic side of the eBook debate (Eberhard, 2000). Eberhard, who when talking of eBooks speaks of handheld devices points to a host of technical aspects of eBooks that offer increased utility over paper based reading through features such instant delivery of purchased books, a the ability to store dozens of books on a device the size of one book, search capabilities, specialized font selection, and multimedia capability such as audio and video. Eberhard argues also that eBooks will necessitate alteration of standard author/publisher contracts to remove territorial segmentation of markets and clauses dealing with out-of-print issues as copies can be globally distributed easily without ever going out of print.

Eberhard examines the costs structure in the book publishing industry and concludes that only marginal savings are realized with eBooks. Manufacturing and distribution costs for a typical hardback book are about 10-15% of list prices, or $2.50 to 3.75 for a $25 retail price. Large distributors such as Amazon.com typically buy at a 55% discount, or $11.25 under the $25 example. Typical author royalties are 10-15%, or $2.50-3.75. Publishers will retain approximately $6.25 be for marketing, overhead and profit. Given that large book chains offer significant discounts of around 30%, only $4.25 is retained by the bookstore for marketing, overhead and profit. Assuming that publisher and bookstore marketing and profit requirements are maintained for eBooks, as

Eberhard suggests, only the manufacturing cost is saved with eBooks. However, under the $25 example, a list price for an electronic edition should be $20. As a book moves into less expensive paperback printing and initial marketing costs are absorbed, eBooks could also come down in price, such that an eBook could always be cheaper than its paper counterpart. Pricing of eBooks therefore could introduce problems, as market research has shown that consumer perception is that the cost of book printing and distribution is high, and therefore expect to pay significantly less for eBooks. Under these conditions, the success of eBooks will depend on increasing buyer perceived value associated with features that distinguish them as superior to paper books.

7.2.1 The Case of "The Plant" by Stephen King

Horror genre author Stephen King is considered by the publishing industry to be the first major talent in fiction to sell an electronic book directly to the public without going to print. According to Publisher's Weekly writer Shannon Maughan (Maughan, 2001) "…Stephen King's maiden venture into this brave new digital world with The Plant (a self-published, Internet-only story) last summer arguably put the e-book craze on the map, forcing most publishers to take a closer look at this technology and how it might shape their future business plans." Ironically, according to King, The Plant is a parody of the eBook phenomenon, where a magical vine in a publishing house "…offers success,

riches and the always desirable Bigger Market Share" (King, 2000). The King case is important because it tests the popularity of the medium, potential profitability, and the donation model.

The Plant was made available starting in July of 2000 with "…one episode a month, pay as you go, …and by the honor system" (King, 2000). By December of 2000, King reported that gross revenues were $600,000 where on average 50% of readers who downloaded the episodes paid the one-dollar donation for them. King reported that he found the experience to be compelling from an economic standpoint because there were "…no printing costs, publisher's cuts or agents' fees to pull it down. Advertising aside (I did some, not much), costs are low to the point of nonexistence, and the profit potential is unlimited" (King 2000). In spite of his reported satisfaction, King abruptly suspended the episodes in December 2000, in order to fulfill other writing commitments. The case of King shows the potential of know artists to bypass publishers due to the transparency afforded by their name and reputation.

7.3 Advertising Supported News and Information Services

The inability to exclude use of digital goods is not particular to the digital age. Classic examples of the promise and peril of communications technology are radio and television. Broadcast media such as radio and television transmissions can be picked up by anyone with a "receiver." Rather than struggle to find ways to scramble and de-scramble signals, early broadcasters

gave birth to the advertising supported content delivery model. Unlike most newspapers, which had to be purchased, a "purchase" of radio waves was not possible. However, the rapt attention of listeners and viewers proved to be an extremely valuable commodity.

Given the success of the advertising model with broadcast media, it was only natural for Internet publishing concerns to adopt the free content approach. However, the Internet lacks many key features required to make the advertising model successful. First of all, barriers to entry for new publishers are much lower on the Internet. With Television, for example, significant minimum expenditures, various regulatory approvals and critical business relationships are required before a firm can be in a position to charge advertisers for the right to send messages to an audience. On the other hand, the web provides millions of "channel" selections, instead of dozens, which leads to a large dilution of viewers. Competition for viewers in the Internet landscape has driven many to continue delivering their products in spite of mounting losses, leading to eventual closure.

7.4 Knowledge Exchange Strategies

7.4.1 The Internet Marketplace Phenomenon.

The Internet has given rise to a new form of commerce that enables large numbers of remote market participants to interact and conduct commerce with very low costs of communication. Internet marketplaces are distinguished from other forms of ecommerce in that the participants are independent from the organization facilitating the transactions. Examples include public online auctioneer eBay, private online automotive parts exchange Covisnt, Sotheby's Online Auction joint venture with Amazon.com, airline ticket clearinghouse Priceline, and various markets for commodities and durable goods.

7.4.2 The Case of Knexa.com

Knexa.com, founded by the author of this paper, applies the Internet marketplace paradigm to digital goods such as electronic books, articles, papers, video content or audio files. Knexa, a word derived from a contraction of the words knowledge, exchange and auction, enables users to browse author information and content abstracts and bid on those items. Delivery is by immediate download to an unlimited number of winning bidders. Sellers register and upload files to the Knexa server together with item descriptions,

biographical and pricing information. Knexa.com is akin to a "double auction" where buyers bid and sellers ask, as with the stock market. Sellers set their price to descend or ascend according to the demand for their product. Question and answer functionality is supported, where knowledge seekers can pose questions to the Knexa.com community of experts. Knowledge sellers can respond with answers, at a fixed but negotiable price.

Knexa's pricing system, called the Knexatron, is an attempt to introduce first degree, or personalized pricing for digital goods. By allowing buyers to indicate bids, haggling can occur, where willingness to pay becomes evident. Sellers of digital goods on Knexa set a series of price parameters that include time and percentage calculations. After selecting a starting price, sellers indicates the number of sales within a certain number of days that are required in order to raise a price by a percentage determined by the seller. Also, the seller sets the number of days that must pass with out a certain sales threshold being met whereby the initial asking price drops by a specified percentage. As an example, a seller could set a price for a research report to rise by 10% if more than one copy is sold in one day, or fall by 10% if sales at the ask price are less than two in 7 days. If a buyer places a bid below the ask price, the price could descend to the lower price over time. The Knexatron is flexible enough to allow sellers to engage in a variety of creative pricing strategies that seek to extract more value from aggregate demand for a given digital good.

Another objective of the Knexatron is to introduce consumer rivalry in markets for digital goods by limiting supply at each price point according to time factors. A seller of a new software product could instruct the technology to execute a low initial price strategy that rises gradually or sharply over time, where buyers with higher price points are motivated to purchase early, reaping consumer surplus. This strategy is akin to "door crasher" item sales in retail stores, where a limited number of an item are offered at very low prices, creating a frenzy of early buying activity. With digital goods, an appearance of early brisk trade can be important signals of quality, leading to increased transparency.

In order to deal with low transparency of digital goods, Knexa incorporates the role of the publisher through a system of self-branding, ratings and third party recognition groups called Knowledge Agents. Individual branding and reputational capital can be built up though a system of user reviews and ratings. Knowledge Agents are firms or individuals who are subject matter experts who could be established or start-ups. Knowledge Agents aggregate, review and provide editing, marketing and other services to authors. An example of a Knowledge Agent to Knexa is Biotecheducation.com, a firm representing a group of biotechnology Ph.D. students at Harvard University. Biotecheducation.com maintains its own Internet site designed to promote its positioning as a reliable source of Biotechnology information specifically written for investors.

An ideal use of the Knexa.com system would involve a digital good offered for sale by a Knowledge Agent with significant peer recognition and a prior history of good ratings utilizing a low initial price strategy that generates positive initial ratings and reviews, increasing transparency, stimulating further demand.

Chapter 8

Summary and Conclusions

Commerce involving copyright intellectual property forms a significant segment of the global economy. Historically, a balanced environment of legal protection and prudent business strategy has arisen that fosters both the distribution and creation of new intellectual goods. However, the advent of digitization and Internet distribution threatens to disrupt this balance. Internet distributed digital goods become like public goods, lacking the excludability, rivalry and transparency required for normal markets. Strengthened legal protection and innovative technical copy protection combined with new business strategies should lead to a new balance for digital goods markets. To be most effective, new business strategies should take into account the distinct behavior of various types of digital goods in the marketplace. Optimal strategies for delivering and pricing digital goods must be selected in light of the classification system outlined in the matrix below.

Digital goods are similar to non-digital copyright protected property in many respects. Both are by definition subject to possible authorized and unauthorized copying. Both are experience goods, requiring prior consumption by buyers for full evaluation. Both types of intellectual property require legal, physical and moral constraints on unauthorized exploitation so that sufficient benefits can flow to the creators of the goods. On the other hand, digital goods display characteristics not found in their non-digital counterparts. Unlike physical copyright property, all digital goods can be copied perfectly using the same computerized process. A book can be reprinted identically by a printing press, but a music CD cannot be reproduced with a printing press. A computer can both copy and distribute music, writings and visual images. The economics of reproduction and distribution of digital goods are fundamentally different that non-digital copyright goods.

Different types of digital goods can be copied and distributed with similar technologies, but consumers' interaction with each type of good is far from uniform. Enjoyment of these intangibles is highly dependent on how they are manifested in the physical world. These distinctions in manifestation effect how these goods should be brought to market. For example, consumers behave in a very distinctive way with software, and other types of digital goods exhibit different dynamics that should be considered when devising a business strategy around digital goods. Consumers of recorded music typically expect recurrent enjoyment of a recording, whereas recurrent reading of the written word is less

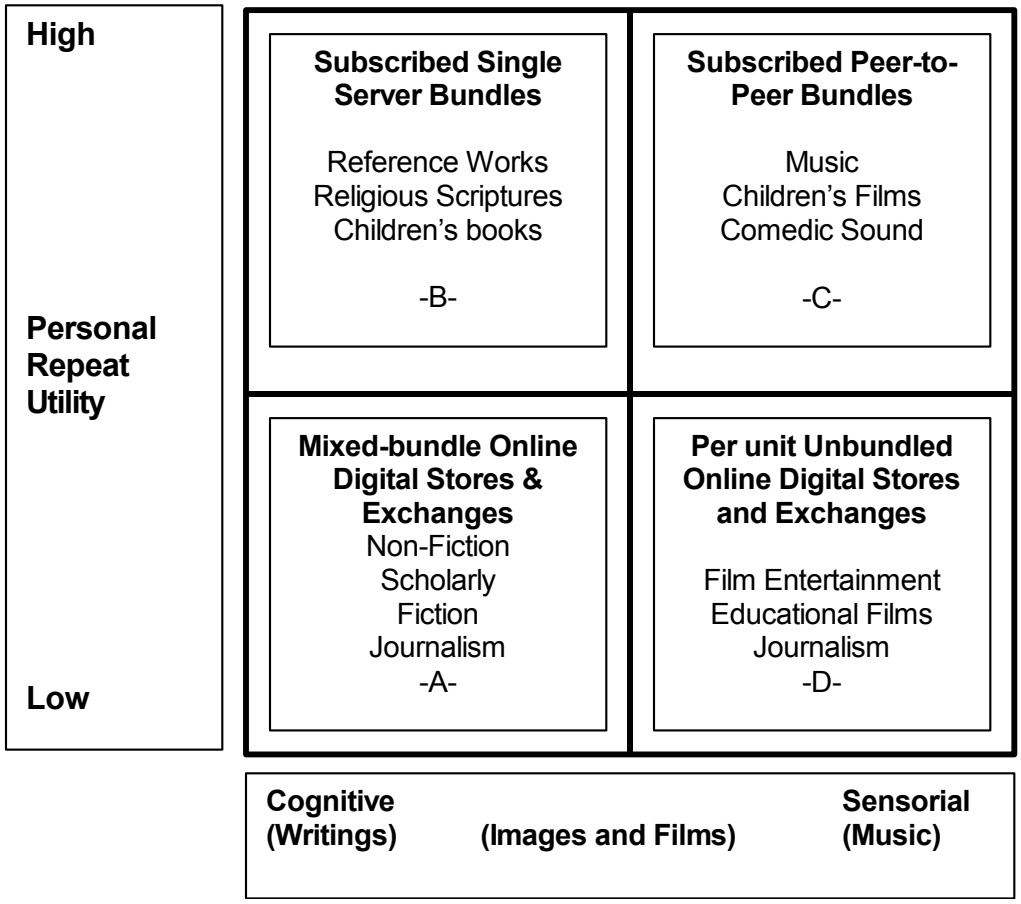
common, except for reference works and religious literature. The sustained enjoyment from repeat plays of recorded music also evokes buyer desire for choice of time and location for such enjoyment. Vinyl record, CDs and tapes provide the listener with increased "option value" (Varian & Shapiro, 1999) when compared to live performance or radio listening. For this reason, perfect copies of recorded music may display significantly different demand characteristics than Internet delivered literature. Also, historical offline consumer behavior toward the various digital goods segments may have a significant impact on how they behave towards Internet digital goods. Recorded music is frequently consumed via radio broadcast at no direct cost to the consumer, providing a free sample of the creations in order to stimulate demand for the repeat enjoyment through purchased copies. Written works, on the other hand (except for news copy, advertising copy and dramatic works), are not highly amenable to radio broadcast, and physical distribution of printed written works will not likely generate demand for repeat consumption. Film and video creations also display distinct use dynamics patterns and historical consumer behavior. Film "trailers" can provide limited sampling, but full screenings would cut demand for paid consumption dramatically. Certain visual goods display rapidly diminishing marginal utility of use, such as news reports, whereas animated films for children can display high utility on repeated use (Varian & Shapiro, 1999).

Recorded sounds may be duplicated perfectly, but sound wave reproduction is not uniform, resulting in variable listener utility. Visual images are dependent on display mechanisms of variable quality to deliver enjoyment. Similarly, the utility of literature is to some degree a function of the medium. A barely legible hand written novel manuscript will not yield the same utility as well produced book. Although all digital goods can be converted into indistinguishable digital data packages, the character of market behavior is differentiated according to the process required to project these goods into the physical world. Accordingly, business practice, technology adoption and government policy will not have uniform affects on all forms of digital goods.

The following diagram (Figure 3) illustrates a differentiation scheme for non-software digital intellectual property with suitable corresponding Internet distribution models. Digital goods can be segmented according to the contrast between experiences that are purely cognitive and those that are purely sensory. Upon cognition, the brain can store the concepts, ideas and evocations of writings permanently, reducing the need to re-read. Music, by contrast, cannot be fully reproduced by the brain, as sound waves are required. Peer-to-Peer platforms such as Napster are dependent on high utility of reuse, as users must maintain files on their computers for sharing in the network. If utility per use reduced rapidly, users would tend to delete more used files, reducing the attractiveness of the network. In the case of written works, motivation to store the data is reduced, as reuse renders little utility. Users would have low

motivation to make their servers and files available to a network in a Peer-to-Peer matrix. The likelihood of a "Napster for Writings" is therefore low, forcing market participants to buy and sell written works through online stores and exchanges. As utility per use increases, so does the relative efficiency of bundled pricing schemes. Reference works, for example, yield long term repeat utility, as users 'refer' back to them again and again. Since writings are not suitable for Peer-to-Peer networks, single server subscription bundles are appropriate.

Figure 3. Ideal Online Business Models for Various Types of Digital Goods.



The purpose of the above matrix is to provide a unified approach to pricing and technology strategy for digital goods. Examples of businesses approaches in Quadrant A are electronic booksellers such Barnes & Noble and scholarly article sellers such as the Harvard Business Review. Barnes & Nobles website features a variety of downloadable books, articles and courses strictly on

a pay-per-view basis, while Harvard Business School provides articles in traditional subscription bundles and at individual prices. An example of an online business in quadrant B is Britanica.com that offers full access to its encyclopedia to subscribers only, with no per-article option. In Quadrant C are Napster and other file sharing communities. To date, Napster has not charged and fees for its service, but monthly subscription fees are part of its business plan required to satisfy litigated payment demands for music rights holders. Quadrant 4 covers a variety of video-on-demand configurations such as Tivo (www.tivo.com), a hardware and software system that digitally stores regular television programming for later viewing. The popularity of Tivo suggests that there is significant consumer demand for mixed bundling in video products, where viewers pay a subscription fee to Tivo for the storage and conversion service so that they can watch programs at their convenience.

The above matrix is robust, but does not take into account other strategic considerations for digital goods vendors such as competition and buyer power, as digital goods markets become more and more attractive for new entrants. Regardless of the technical delivery process and pricing approach, fierce price competition can also be a major factor in determining if a given business strategy is successful. Unfortunately, many online digital good businesses have cut their prices to zero in order to gain increased viewers, only to reintroduce higher prices in the future. Britanica.com slashed the price of their historic encyclopedia to zero in an attempt to gain viewers, presumably to drive advertising revenues,

but after poor returns has now introduced subscription fees. Digitization and instant Internet delivery has destabilized markets for copyright goods, but a sensible balance will undoubtedly emerge from the current state of flux.

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