The "New Economy" and Information Technology Policy

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1 Introduction

The growth of the information technology sector (IT) in the 1980s was an important development for the economy, but it spurred relatively little policy or media interest. True, IT was recognized as a driver of comparative advantage for the US and there were a few initiatives involving industrial policy and military preparedness, IT was of interest primarily to specialists. In the 1990's, however, things changed dramatically when the Internet became a topic of intense public discussion. Suddenly computers were not only a way to manipulate information, but also a way to *communicate* information. This led to a dramatic rise in the public and political awareness of the importance of information policy issues such as intellectual property, privacy, and security

The rapid adoption of the Internet stimulated Wall Street's interest as well. Previously arcane topics like venture capital and IPOs became part of the common vernacular. The stock market boom that followed had a dramatic effect on individual wealth, leading to robust consumption demand.[1] Meanwhile, the triple stimulus from telecommunications deregulation in 1996, the "year 2K" problem in 1998-99, and the Internet stock market bubble in 1999-2000 led firms to dramatically increase their investment in information technology.[2] The significant increase in both consumption and investment demand led to the robust economic growth documented elsewhere in this volume.[3] It also appears that at least some of the productivity growth in the 1990s can be attributed to the deployment of information technology, though this point is still somewhat controversial, as we explain later in this chapter.

Some have asserted that the 1990's witnessed the emergence of a "New Economy." That term dates back to the 1980's when it referred to an economy driven by services rather than manufacturing. The fear then was that the services economy would result in slow growth, rising prices, and low-wage jobs. In 1996 Michael Mandel published an article in *Business Week* called "The Triumph of the New Economy" which emphasized the development of a technology-driven, fast-growing, low-inflation economy, which he referred to as "the New Economy".[4] The latter connotation came to dominate popular discussion, although economists as a whole remain somewhat skeptical of the concept.

A unique confluence of forces certainly came together in the 1990s: rapid technological advances in the information technology sector; widespread recognition that computers could be used to communicate information as well as process it; the rapid spread of a simple, inexpensive, and powerful wide-area computer network based on non-proprietary standards; and financial institutions ready to fund investment in advanced technology. These forces led to very rapid growth of the Internet. As firms and consumers flocked to the

Internet in large numbers, it became evident that information policy issues, including importantly, intellectual property, security, and privacy, required serious attention.

In this chapter we will describe the technological and economic developments that faced the Clinton administration in the mid-1990s and examine how the administration responded to the challenges raised by these developments.

2 The National Information Infrastructure Initiative

The Clinton Administration "got the Net" very early. In 1993 it issued an "Agenda for Action" to articulate and implement a vision for a National Information Infrastructure (NII).[5] This initiative was widely praised at the time as a forward-looking technology policy initiative that would simultaneously promote economic growth, improve the lives of citizens, and allow governments to provide better services and information to the public—all without significant new expenditures by the government. The Agenda embraced information technologies as an enabling, and indeed as transformative, means for achieving a broad range of economic, social, and political goals. The Agenda characterized the U.S. as having become primarily an information-based economy and asserted a bright future for communications and information industries. The Agenda sought to marshal attention to the emerging NII so that "business, labor, academia, the public, and government" could work together to build the NII for the benefit of all.

A notable feature of the Agenda was its endorsement of private sector leadership for development of the NII. The Agenda sought to ensure there would be adequate incentives for private sector investment to build, extend, and develop applications for the NII, for example, by adoption of appropriate tax and regulatory policies. Government action should "complement" private sector leadership, not compete with it. The role of the government, in its view, was mainly to forge partnerships, coordinate activities, and promote technological innovation and new applications for the NII. The government could also improve allocation of radio frequencies, protection of intellectual property rights, and access to government information as well as government procurement of goods and services from the private sector—all of which, in turn, would promote private investment in the NII or applications for it.[6]

It is noteworthy that the initial documents describing the NII[7] make little mention of the Internet. The term "information superhighway" was used, but it was meant in a broader sense than the Internet, including cable TV, dialup computer bulletin boards, and many other components of infrastructure to store and communicate information. The Internet was referred to only in its traditional role, as a communications network for educational and scientific purposes.[8]

Tom Kalil describes the Administration's vision of the NII as "a seamless web of communications networks, computers, databases, and consumer electronics that will put vast amounts of information at users' fingertips."[9] This vision was realized, albeit through a rather different route than had been envisioned in the Agenda for Action. It was the Internet (a "bit player", in the Agenda's view) and the World Wide Web (not even mentioned in the Agenda), more than any other technologies, that defined the NII of the 1990's.[10]

3 The Internet as Enabling Technology

The Internet was the enabling technology for the 1990's. Most of the policy issues discussed later in the chapter revolve around the Internet, so it is worthwhile describing briefly where it came from and why it

surfaced in the 1990's to become a mass-market medium.

3.1 Origins and Evolution of the Internet

The term "Internet" made its first appearance in a research paper written by Vinton Cerf and Robert Kahn in 1974. It described a "network of networks" that would link together computers across the country, and eventually the world.[11] Recognizing the strategic importance of this concept, the Department of Defense, via its research projects agency, ARPA, funded networking research for many years. The evolution of the Internet was overseen by the Internet Engineering Task Force (IETF), an organization of volunteers that codified various standards for technological interoperability. By 1986, when the National Science Foundation wanted to provide access to five new supercomputer centers, the Internet technology was sufficiently mature technology to deploy for this purpose. The NSF called its new network program the NSFNET, and it quickly became the principal infrastructure of the Internet.[12]

As the Internet grew, it became clear that the NSF could no longer play a central role in its management and it searched for a way to spin off responsibility for backbone maintenance. These discussions were particularly intense during 1990-92 and finally concluded that privatization of the Internet was the right path to follow. On April 30, 1995, the National Science Foundation stopped funding the NSFNET backbone. Though dire predictions had been made about the Internet grinding to a halt, this privatization went off without a hitch, which is a tribute to the careful planning and coordination by all involved.

The Internet grew from 313,000 hosts in 1990 to 43,230,000 in 2000, and currently stands at over 110 million hosts. The remarkable growth testifies to the huge success of the technology. All in all, the development and subsequent privatization of the Internet is a textbook case of technology transfer. The Internet, with its open protocols and highly extensible nature, would have likely never been developed, much less deployed, by the private sector. Open standards of the sort that made the Internet possible may well require some sort of industry-wide, or publicly sponsored, research and development. But once the Internet reached critical mass, the government wisely decided to facilitate privatization of the infrastructure. Though, in retrospect, there were a few things that could have been done differently, overall the process was hugely successful.

3.2 The World Wide Web

The Internet was a creation of computer engineers. As such, it had an elegant design, but a terrible user interface. File transmission, remote login, email, and other applications all were based on command-line interactions, which involved a steep learning curve.

In the summer of 1991 Tim Berners-Lee, a computer systems analyst at CERN, released the first World Wide Web software to the high-energy physics community. Shortly thereafter an NSF-funded team at the National Center for Supercomputing Applications (NCSA) at the University of Illinois incorporated the WWW architecture into Mosaic, a user-friendly Internet browser. Marc Andreesson, a 23-year old research assistant at the NCSA who worked on the Mosaic development team, subsequently became one of the founders of Netscape Communications Corporation.

The Web put a friendly face on the Internet, providing an interface that a 10-year old, or even a 50-year old, could easily understand. Perhaps more importantly, the back-end protocols for authoring and distributing Web pages (HTML and HTTP) were easy to understand and use as well, facilitating the rapid deployment of Web servers. The first Web sites were in universities and research centers, but other organizations soon

followed.

The next step in the development of the Web was to bring in the for-profit sector. In March 1994, Jim Clark, founder of Silicon Graphics, initiated talks with Marc Andreeson about forming a company. The company, initially named Electric Media, was formed in April 1994 with the goal of developing browser-like technology for interactive TV.

Within a few weeks, the founders realized that interactive TV was less attractive a market than the Internet itself, and they decided to try to develop a commercial version of the NCSA browser. Accordingly they changed the company's name to Mosaic Communications and started programming. After a dispute with the University of Illinois, the name was changed once more in November 1994 to Netscape Communications.[13]

By 1995 everything was in place to create fertile ground for widespread Internet deployment. The critical components were:

Personal computers.
Universities, major corporations, many small businesses, and a significant number of home users had access to personal computers.

Local area networks.
Most businesses had networked personal computers together to make them easier to manage. Standardized technologies like ethernet had become commoditized, and were widely available at low prices.

Wide area networks.
The basic standards underlying the Internet protocols developed by network researchers for connecting together disparate networks were mature. These standards described basic services for address assignment, email, file transfers and the like that were non-proprietary, robust and well-documented. Universities and research organizations had embraced the Internet as the primary network for wide area communications, the technology for home access through dialup modems was widely available, and there was a thriving culture of dialup access to computer bulletin boards.

The Web.
Mosaic had provided a standardized interface for both users and information providers that allowed for easy deployment of, and access to, online information.

4 Growth of private investment in Internet companies

Recall that the Clinton Administration's vision for the National Information Infrastructure was that the private sector would play a major role in investing in its development. This hope was to succeed beyond the Administration's wildest dreams, through the vehicle of the Silicon Valley venture capital industry.

Soon after partnering with Andreeson, Clark turned to venture capitalist John Doerr of the venture capital firm Kleiner, Perkins, Kaufield and Byers. This VC firm had financed some of Clark's other undertakings, such as the Silicon Graphics workstation, and was well positioned to fund the development of Netscape.[14]

Venture capital has been used for financing technology development in the United States for decades, but

Netscape decided to adopt an unusual model. Normally, VCs financed companies for 3-5 years, allowing them to establish a track record and achieve profitability before they went public. But in Netscape's case, public interest in the Web was so high that they founders decided to proceed with an initial public offering when the company was barely a year old.

The August 1995 offering was originally intended to be 3.5 million shares at $12 a share, but this was raised to 5 million shares at $28 each shortly before the IPO. The stock closed at $52 on opening day, after reaching levels as high as $71. Jim Clark, the founder, had a net worth of $565 million after the first day of trading.

The Netscape IPO set off a wave of interest in venture capital funding of Internet companies. As Figure 1 shows, the amount of investment funded by venture capital grew extremely rapidly during the Clinton years. The bulk of the VC capital was invested in information technology, particularly in the latter part of the decade, as shown in Figure 2. Of this IT investment, most went to Internet-related businesses: in the fourth quarter of 1999 and the first quarter of 2000, roughly 75% of all VC funding went to "dot coms."

During the second Clinton term the rates of return on venture capital investments were very high, as shown in Figure 3. These high rates of return were due, in large part, to the run-up in the stock market as a whole, but in part due to “Internet mania.” The media hoopla surrounding the 1995 Netscape IPO led to other “dot coms” adopting the Netscape model of taking the company public as quickly as possible. This led to a dramatic increase in the number of VC-backed IPOs, as shown in Figure 4.

4.1 The Internet bubble

The market developed an insatiable appetite for all things Internet during 1998-99. In March 2000 NASDAQ hit a high of 5132 just before reality set in. By December of 2000, NASDAQ had fallen to more than fifty percent to 2288, with many Internet companies losing 90 percent of their value.

Figure 5 depicts the total return on the NASDAQ and S&P 500 from January 1993 to January 2001. Note how closely the two indices tracked each other up until January 1999, at which time the NASDAQ began its roller coaster ride. In December, 1990 the technology component of the value-weighted S&P 500 was 6.5 percent. By March, 2000 it was over 34 percent. The number of technology companies in the S&P 500 doubled in essentially the same period.[15] The stock market boom of the late 1990s was primarily a technology boom, which was fueled by the public interest in the Internet and IT in general.

We think that the behavior depicted in Figure 3 has to be classified as a speculative bubble. Although the exact definition of a financial bubble is a matter of dispute, there is ample evidence that the rates of growth necessary to warrant the valuations at the peak of the bubble were simply not credible.

In 1996 Federal Reserve Board Chairman Alan Greenspan warned that the stock market was perhaps exhibiting “irrational exuberance.” But this pronouncement was significantly before the Internet boom; most of the irrationality was yet to come. Even during the height of Internet mania, many sober observers pointed out that the valuations for "dot coms" were simply not sustainable. Here is but one example, published in July 1999.

> Yahoo's revenue per page view consistently has been 4/10 of one cent ...If it takes Yahoo 250 page views to get $1 in revenues, then to reach $35 billion in revenues [a level which would justify its stock price] will require 8.75 trillion page views per year, or about 24 billion page

views per day. If the world population is 6 billion, then on average everyone in the world, regardless of age, language, or access to the Internet, will have to view 4 pages on Yahoo per day.[16]

Even proponents of Internet technology recognized the problem. Anthony Perkins and Michael Perkins, founding editors of *The Red Herring*, a magazine devoted to the New Economy, published a book in November 1999 called *The Internet Bubble : Inside the Overvalued World of High-Tech Stocks.* Traditional value investors like Warren Buffet warned that a crash was coming, but few investors listened.

Should the Federal Reserve Board have done something to dampen the swings of the stock market? Was this, in fact, the motivation behind the interest rate increases of 2000? The Fed was worried about the stock market bubble, but ultimately decided not to respond in any dramatic way. In part, this was due to Greenspan's belief that the real economy was fundamentally sound and to the recognition that the bubble was located primarily in one category: "New Economy" stocks. (See Figure 5 again.) There was little the Fed could do to deflate one group of stocks without having adverse effects on others. The Fed continued to maintain a low interest rate policy during the late 1990s, apparently believing that there was little danger of inflation. Chairman Greenspan argued in several speeches that the widespread adoption of information technology had shifted the aggregate supply function outward, so that the economy could produce more output without experiencing upward pressure on prices. It was widely believed that IT had made the economy more competitive, more responsive, and more productive.

5 Impact of Information Technology on Productivity

Since the Federal Reserve Board's interest rate policy was premised on the belief that the economy had become more productivity, it is important to examine the evidence for this view.

The historical facts are not in dispute. From 1959-1973 labor productivity growth averaged a healthy 3 percent per year. Then in 1973 it abruptly slowed down: from 1973-1992, it was about 1.4 percent. During the Clinton years labor productivity growth seems to have picked up to about 2.7 percent, almost returning to its previous rate of growth. (See Figure 7.)

This acceleration was greeted with great acclaim, but there is considerable debate about what fraction of this increased productivity growth was cyclical and what fraction was sustainable.

Consider first the hypothesis that the productivity increase of the late 1990s was simply cyclical. During economic slowdowns, firms tend to hoard labor; and during booms, they encourage employees to exert extra effort. This means that measured labor hours tend to underestimate the hours worked during booms and overestimate them during busts. Hence measured labor productivity appears to rise when economic activity is high and fall when it is low.

The U.S. emerged from a small recession during the 1990-91, so it is not surprising that productivity grew in the early 1990s. According to Alan Blinder, “[s]imilar surges in productivity can also be found in 1990-1992, 1983-1986, and 1977-1978. But they all followed recessions. And they were all subsequently reversed.”[17] Indeed, recent evidence of declining productivity in 2001 suggests that there was a strong cyclical component in the productivity growth in the mid- and late-1990s.

On the other hand, many observers think that a significant part of the productivity growth in the 1990s was due to increased investment in computerization and networking, and thus reflects a sustainable increase in productive capabilities One difficulty with this hypothesis is that the growth in labor productivity from 1959-1973 apparently had nothing to do with computers. Since we don't have a good explanation of why productivity fell in 1973, we aren't in a very good position to explain why it has resumed rapid growth in the last few years.

If the productivity growth in the 1990s was due to computerization, why did it take so long to show up? After all, mainframe computers became widespread in the 1960s and 1970s, and personal computers were widely deployed in the mid-1980s. Paul David has offered one explanation for this lag.[18] David points out that it took nearly 20 years for the US productivity figures to reflect the benefits due to electrification, so presumably the benefits from computerization would similarly take several years to emerge. Perhaps the acceleration in productivity in the 1990s is simply the delayed impact of earlier computerization in the 1980s. If so, this would be very good news since it means that we have yet to experience the productivity increases from the even larger investment during the late 1990s.

Brynjolfsson and Hitt extend David's argument by asserting that investment in computers only achieves its full impact on productivity when work processes and practices change as well.[19] Changing organization structures is quite time consuming and prone to failure. Hence, the delayed response of measured productivity to computerization is due to the slow pace of organizational change.

A second explanation for the slow response of productivity to computerization is measurement error. Many of the benefits from computers show up on the services side of the economy, and it is notoriously difficult to measure improvement in the quality of services. As Brynjolfsson and Hitt put it: "According to official government statistics, a bank today is only about 80 percent as productive as a bank in 1977; a health care facility is only 70 percent as productive, and a lawyer only 65 percent as productive as they were in 1977. These statistics seem out of touch with reality." Services currently comprise over 75 percent of GDP, so the measurement problem is clearly significant.

However, there are skeptics. Robert Gordon analyzed macroeconomic data and found that most of the productivity increase in the 1990s due to computerization was in durable goods manufacture, and the bulk of that was in industries that produce computers.[20] See Figure 8 from the Bureau of Labor Statistics, which shows that over half of the productivity growth in the 1990s occurred in computers and electronic components.[21]

In part, these findings reflect another sort of measurement problem. The official statistics on the output of the computer industry attempt to adjust for quality improvement using hedonic regression techniques. Since the performance of chips has grown extremely rapidly (as described by Moore's Law), the quality-adjusted output of the computer industry has also grown extremely rapidly. Since the computer manufacturing industry also uses computers intensively, the result is a large increase in productivity in that industry.

Some might argue that Moore's Law is essentially exogenous technological progress and that the dramatic output of the computer industry is not really due to computerization per se. However, experts in the industry are quite clear that Computer Aided Design and Computer Aided Manufacture (CAD/CAM) have made very significant contributions to the productivity of the chip industry. Today's chips simply couldn't be built without today's computers. So perhaps the chip industry is just far ahead of other manufacturing industries, and other manufacturers will eventually catch up to the computer industry in terms of productivity growth.

Kevin Stiroh[22] recently examined aggregate data for 61 industries. Consistent with the Gordon results, he found that high-tech producing industries and electronics industries exhibited dramatic growth in labor productivity. However, he also found more modest , but still significant, acceleration in productivity for 38

out of the 61 industries examined. In general, he found that IT-producing and IT-using industries accounted for almost all of the productivity growth effects in the 1990s. It is difficult to determine whether this is because IT is not useful in the industries that didn't adopt it, or whether these industries just haven't yet caught on to the benefits of IT.

Dedrick, Gurbaxani and Kraemer[23] recently summarized some of their ongoing research on the IT investment patterns of 400 Fortune-1000 manufacturing firms during 1986-1993. During this period the IT capital per worker of an average firm increased from $4,000 per worker to $27,000 per worker. This capital deepening would be expected to increase output by about 0.4 percent a year. However, the estimated return was about 1.3 percent per year for consumer durables manufacture. Curiously, the researchers find that there is almost no productivity impact of IT in non-durables. Even if one omits computer manufacturing itself from the sample, the productivity effect on durables is very strong.

The differential impact of computers on durables and nondurables remains a puzzle. The durable goods sector is both more labor intensive and more computer intensive than the non-durable goods sector. Gilchrist et. al. note that investment in PCs, especially networked PCs, is highly correlated with productivity growth in this sector. Perhaps the role of computers as communication and coordination devices is particularly important for durable goods.

The Fall 2000 *Journal of Economic Perspectives* symposium describes several different ways to tackle the productivity impact of computers.[24] Suffice it to say that there are many unanswered questions.

6 Government Policy Initiatives

As pleased as the Administration must have been about the high level of investment and growth in IT and the NII, it knew it could not rely solely on the private sector. The rest of this paper describes four areas of policy initiatives that were, in various ways, response to the success of the Internet.

First, we describe how the administration responded with respect to federal funding for research and development. Given the bountiful yield from previous research, it made sense to plant some seed corn for future development.

Second, the boom in financial markets and IPOs stimulated a number of reforms by the Securities and Exchange Commission (SEC) and the Financial Accounting Standards Board (FASB). In retrospect, it is clear that there were some abuses of financial accounting during this period, and, to its credit, the SEC attempted to stem the most egregious of these abuses.

Third, there was a need for new institutions govern the global information infrastructure . The most immediate need was for a new institutions to administer the Domain Name System (DNS). Although the Internet was remarkably scalable in most respects, the DNS, which matched site names to numeric addresses, was not. As we describe in more detail below, dissatisfactions with DNS administration led to the Clinton Administration's decision to contract with a nonprofit corporation to administer the DNS, known as the Internet Corporation for Assigned Names and Numbers (ICANN). This story highlights two of the difficult issues that Internet governance faced and will continue to face in the future: its international nature, and its impact on intellectual property concerns.

Finally, we turn to the fundamental information policy issues mentioned in the introduction: security, privacy, content regulation, and intellectual property. These issues form the core of what we have called

information policy. The Internet's emergence as a medium for mass communication had undeniable benefits. But it also made it easier to infringe copyrights, transmit child pornography, and commit various types of consumer fraud. Thus "information policy", which has always been with us, gained a new and broader significance in both the public eye and the halls of Congress.

Due to space limitations, we will not discuss numerous other initiatives of the Clinton-Gore administration in this area. Among the omitted topics are: the allocation of spectrum for new licensed and unlicensed services; liberalization of export controls on computers and telecommunications; efforts to bridge the "digital divide" both domestically and internationally; and policies to promote applications of the Internet and other information technologies in areas such as electronic government, K-12 education, life-long learning, e-health, digital libraries, and improving the quality of life for people with disabilities.

7 R&D Funding

The boom surrounding the Internet can be traced back to university research sponsored by ARPA in the 1970s and 1980s. To its credit, the Clinton Administration recognized the source of its good fortune and attempted to rebuild and expand federal research funding.

Between 1994 and 2000, total R&D grew from $176 billion in 1994 to $249 billion (1996 dollars), an annual real growth rate of 6.0 percent.[25] This is the largest six-year growth rate period in the history of the R&D data series. However, most of this increase was for industry funded R&D, which grew at a rate of 8.5 percent during this period. See Figures 6 for the growth and composition of R&D expenditures during this decade.

Federal funding of R&D actually declined by 1.1 percent a year between 1994 and 1998, but it picked up in the latter part of the 1990s, leading to an overall 1 percent real increase per year since 1994, much of this increase going to the National Institute of Health. Since privately funded R&D grew much more rapidly the Federal share of R&D funding in 2000 was 26.9 per cent, the lowest it has been since the start of the time series in 1953.

In summary, the federal R&D budget expanded modestly during the Clinton years, especially during the second term, but the private R&D budget grew by substantially more. Since industry funding tends to focus on more applied research, overall research drifted more towards applied, rather than basic, research. The NSF and ARPA recognized this trend and, at least in their rhetoric, attempted to return to their original mission of high risk/high reward initiatives.

There were several notable but relatively small IT-related initiatives during this period, including the Digital Library initiatives, the continuance of the High Performance Computing and Communications Program, and the Information Technology Research Program. The National Science Foundation became more sensitive to issues surrounding the economic and social impact of information technology and encouraged technology proposals to addresses some of these issues, as well as funding some programs focused on these issues.[26]

There were also a number of initiatives in biotechnology, such as the Human Genome Project. The same debates between role of the private sector and public sector emerged in his area. Computers, of course, played a key role in gene sequences. Bioinformatics gained new prominence in the 1990s, along with the related fields of medical and health informatics. These topics are outside the scope of this chapter, but it is

noteworthy that information technology played such a key role in understanding these fundamental biological processes. Indeed, computers have become integral tools for every type of scientific research, and will no doubt continue to play this role in the future.

8 Financial market regulation

Given the importance of stock market boom of the nineties, it is important to examine some of the financial accounting issues that came before the regulatory authorities during this period. We examine four issues: options compensation, merger accounting, safe harbor provisions, and fair disclosure rules. All four of these issues have to do with financial reporting requirements: the accounting treatment of compensation and acquisition strategies, the liability associated with forecasts by corporate officials, and the requirements for equitable disclosure of material information. Though these topics are of interest to all publicly-held companies, they were particularly important to Silicon Valley firms.

These four issues were addressed by the Security and Exchange Commission (SEC) and the Federal Accounting Standards Board (FASB). The SEC is an independent regulatory agency which tends to be resolutely non-political, but it is, of course, subjected to political pressures of various sorts. FASB is a private standards setting body. So far as we can tell, the White House did not intervene explicitly in these issues, preferring to leave the policy choices up to the agencies themselves.

8.1 Options compensation

During these period there were at least three different accounting rules governing options-based compensation. The most favorable, APB 25, indicated that a company that granted an option to purchase its stock with a strike price set at the value of the stock when the option was issued did not have to declare this as a labor compensation expense. This rule has been in place, essentially unchanged, for at least 63 years.[27]

As options-based compensation became more and more prevalent, especially in high-growth technology firms, questions were raised about whether the rule made sense. One side argued that options-based compensation simply hid a real expense from the investing public; the other side argued that options were a powerful incentive mechanism.

In 1995 the Financial Accounting Standards Board (FASB) decided that publicly-owned companies should estimate the impact of options on income and earnings per share using an options pricing model such as the Black-Scholes model, and report this as a footnote in its financial statements.[28] The options pricing rule had a significant impact on reported profit: according to some studies, profits had been mismeasured by as much as fifty percent.[29] This was something of a compromise as there were people who wanted to require that options be expensed at some appropriate valuation, while others didn't want to see options compensation reported at all. There was even a demonstration of hundreds of Silicon Valley workers who supported not counting options as an expense when the FASB met there in 1999. Of course, the demonstrators expected their options to end up in the money, so it's not clear how they would view this issue now that the Internet bubble has burst.[30]

Despite the accounting treatment of options for earnings statements, options are deducted from corporate earnings for purposes of tax collection. This double standard of what counts as an expense made options an extremely attractive method of compensation, and they were widely adopted in the 1990s.

But options weren't just used for compensation purposes. During the Internet boom of 1998-2000, many technology companies such as Dell Computer, Microsoft and Intel aggressively issued put options on their stock. They were essentially betting against the market that their stocks would continue to rise. This practice tended to amplify earnings: if the stock did go up, the put options would finish in the money, making earnings even larger. This was fine while the stock was going up, but when the market turned down, this led to serious problems. To cite just one example:

> Dell pocketed $59 million in proceeds from option sales. But if the company's stock remains at its current depressed price of $25.63 until its put options expire by September of this year, the company will have to pay $1.06 billion if the options are exercised at the average price of the range noted in the company's filings. That figure is 64 percent of Dell's net income last year.[31]

There is nothing wrong with options-based compensation and sales of puts per se. Each can be an appropriate financial tool in the right circumstances. However, it can be argued that investors should be fully aware of the use of these tools by firms. The SEC actions were helpful in this respect.

8.2 Merger accounting

When one business acquires another, the acquisition is normally accounted for by the "purchase" method. This treats the purchase price of the acquired firm as similar to the purchase of an asset. The difference between the purchase price and the "fair value" of the acquired company is known as an intangible asset known as "goodwill" and is assumed to be subject to depreciation. This difference is then charged against earnings over the life of the goodwill.

Companies whose stock market value far exceed the value of their physical assets, such as technology firms, prefer to use an alternative accounting method known as "pooling." This can only be used in stock-for-stock mergers and acquisitions. Furthermore, such acquisitions must also satisfy several other financial criteria, making it a relatively rare form of M&A accounting; only 5% of such transactions use pooling. Under pooling, firms simply combine their balance sheets, with no change in financial value for either firm.[32]

Here is an example of the difference in the two methods:

> [I]f a company founded by an initial investment of $100,000 has increased revenues to $1 million per year, and is acquired by a public company for $10 million in stock, pooling accounting allows the purchaser to continue to state $100,000 as the target's assets. Consequently, the purchaser appears to earn $1 million per year on an investment of only $100,000 instead of earning $1 million on the actual $10 million paid for the target.[33]

The report from which this quote was taken goes on to say "[t]he United States is unique in allowing its public companies to apply pooling accounting to report acquisitions through using the target's asset values, ignoring the price actually paid for the target's assets." Pooling was widely used by Silicon Valley companies such as Cisco, which acquired 72 companies between 1993 and 2000.[34] In January 2001, FASBE voted to eliminate the pooling method of accounting, but agreed to allow special treatment of intangible assets in purchases.

8.3 Safe harbor for forward-looking statements

In December 1995, Congress enacted the Private Securities Litigation Reform Act of 1995, overriding President Clinton's veto. On of the more controversial elements of that Act were provisions designed to encourage “forward-looking” statements about a firm's prospects by executive officers of the firm.

In particular, the safe-harbor provisions protect certain employees of the firm from liability for a forward-looking statement if the statement is identified as forward-looking and accompanied by “meaningful cautionary statement identifying important factors that could cause actual results to differ materially” from those in the statement. It eliminates liability for such statements unless the plaintiff can show that it was made with actual knowledge that the statement was false or misleading.

Many firms have availed themselves of the opportunity to make such forward-looking statements under the safe-harbor provision.[35] It is an interesting topic for future research to see if forward-looking safe harbor disclosures have different impact on stock prices than traditional backward looking accounting announcements.

8.4 Fair disclosure of corporate information

Corporate announcements of financial information have traditionally been leaked to industry analysts prior to their official announcement. Sometimes this was explicit, as in conference calls. Sometimes it was behind the scenes via "whisper numbers" or cocktail party conversations. Such information release was generally tolerated as long as it wasn't abused. During the 1990s, the intense public interest in the stock market raised issues of fair treatment of small investors vis a vis information disclosure.

In August 2000 the SEC adopted Regulation FD which governed “Selective Disclosure and Insider Trading”.[36] This rule prohibited public companies from selectively disclosing important information to analysts and institutional investors before individual investors. In particular, the SEC warned that private discussions by a corporate official with an analyst giving direct or implicit guidance on the analyst's earnings estimates will generally violate Regulation FD.

The SEC's rule was motivated by two considerations: first, that analysts appeared to have favored access to information, and second, that advances in technology meant that the general public could be included in any disclosures at negligible cost.

There have been many critics of FD. Some have argued that information released directly with the general public will tend to make stock prices more volatile; in this view the filtering of news by financial analysts presumably has a calming influence on stock prices. Other observers have argued that Regulation FD will discourage companies from releasing information. However, Arthur Levitt, the Chair of the SEC from 1993-2001, felt that FD was one of his most important achievements.

The FD rule could well have a significant influence on financial markets through a circuitous route. The Grossman-Stiglitz model of information dissemination in financial markets recognizes that analysts must be compensated for their efforts by higher returns. Presumably, reducing selective access to information will reduce their incentive to collect it. But, on the other hand, better access to information by the public is worth something too. The impact of regulation FD is a promising topic for both theoretical and empirical research in financial economics.

9 Governance of the Internet

The Internet is, in once sense, simply a set of computer protocols and standards that govern the interchange of data among networks. These standards are overseen by various standards bodies, such as the Internet Engineering Task Force and the World Wide Web consortium.[37] Individuals and groups in these organizations propose, debate, and recommend standards, but have no particular enforcement power. Their membership is comprised of technologists, whose goal has generally been the smooth operation of the Internet and the Web. Although the privatization of the Internet has interjected considerable commercial tension into the IETF and the W3 Consortium, they continue to function reasonably well as technical standards bodies.

However, there is a fine line between "standards" and "policies". Many of the technical decisions involving the Internet also involve other issues of information policy such as intellectual property, content, speech, and the like. The Domain Name System, for better or worse, has been at the center of a number of these issues.

The Domain Name System is basically the telephone book of the Internet: it consists of a large database that relates domain names such as Amazon.com to the actual numeric Internet address (208.216.182.15). In the early days of the Internet, DARPA funded network researchers at the University of Southern California's Information Sciences Institute to manage this database.[38]

As the burden of registering domain names grew, it became attractive to outsource this service to a commercial party, and in 1993 the NSF awarded a 5-year contract for this task to a small, minority-owned business in Virginia named Network Solutions International (NSI). The contract was worth about $6 million a year at that time. It is safe to say that no one anticipated how valuable it would later become: in March 2000 VeriSign paid over $21 billion to acquire NSI.

When the Internet was privatized in 1995, the NSF terminated its funding contract with Network Solutions, extracting agreements about what prices it would subsequently charge for domain name registration. Scientific Applications International Corporation (SAIC), a large government contractor, acquired NSI as a wholly owned subsidiary in May of 1995 and in September 1995, NSI instituted a charge of $50 to register names and maintain the supporting databases for the .com, .net, and .org domains.

There was considerable dissatisfaction in the Internet community with this arrangement: some people felt that such a critical task should not be under the control of the a private firm, others objected to the price and service quality provided by NSI, and yet others wanted to compete with NSI, hoping to profit from the seemingly insatiable demand for domain names. Intellectual property owners were beginning to wake up to the potential conflicts involving their trademarks and domain names. Jon Postel, the USC researcher who had managed the DNS for many years, attempted to design an administrative system that would provide some competition for NSI which eventually grew into an organization known as Internet Corporation for Assigned Names and Numbers (ICANN). Unfortunately, Postel died soon after ICANN was created, removing a highly-respected and knowledgeable player from the scene.

In December of 1996, Ira Magaziner initiated an interagency group to study the domain name problem, as part of his working group on electronic commerce In July 1997, President Clinton issued an Executive Order asking the Department of Commerce to “support efforts to make the governance of the domain name system private and competitive and that deals with the potential conflicts between domain name usage and trademark laws on a global basis.” This relieved the NSF from responsibility for these matters. After two rounds of public comment the Department of Commerce issued a “White Paper” on domain name registration in June

of 1998.[39]

The Department of Commerce entered into an agreement with the Internet Corporation for Assigned Names and Numbers (ICANN) in November 1998 to "coordinate the technical management of the Internet's domain name system, the allocation of IP address space, the assignment of protocol parameters, and the management of the root server system."

ICANN is a unique institution: it is international in scope and yet it is not directly affiliated with any government or government agency. Essentially it is a standards-setting body, similar to, yet different from, internationally charted organizations like the International Telecommunications Union (ITU).

ICANN faced, and continues to face, numerous challenges:

1- From where does it get its authority? The Internet is obviously a global institution, while ICANN has been associated closely with the U.S. Department of Commerce.

2- From where does it get its funding? The Department of Commerce made no provision for this.

3- How does it govern? Who are its constituents and how should members be chosen? Who votes on ICANN issues, and to whom is it accountable?

4- What, exactly, should it do?

ICANN has thus far focused on two significant issues: first, setting up a dispute resolution procedure for resolving conflicts between trademark holders and domain name registrants, and second, finding ways to make domain name registration more competitive.[40] We describe ICANN's Uniform Dispute Resolution Policy in our discussion of trademark policy in Section 12.4. Here we focus on the management of the DNS itself.

The White Paper recognized that the management of the DNS database is probably a natural monopoly.[41] However, the *registration* process itself is not necessarily a monopoly, and there can, potentially be many *registrars* even there is only one *registry*.

Magaziner thought that that NSI should continue to manage the registry, at least for a while, in the interests of Internet stability. However, as the White Paper argued, there was no reason not to allow competition in the registration process, and the Department of Commerce encouraged this policy change. Significantly, NSI would continue to function as both a registry administrator and a registrar, and would be paid a wholesale price for maintaining the database of $9 per name per year (which was subsequently reduced to $6 per name per year).

NSI's five-year contract with the NSF required it to give the government a copy of the database when the contract expired, but was, unfortunately, unclear on whether it could continue to register names on its own after the contract expired. The ownership of the domain name database was also unclear. These ambiguities led to tortured behind-the-scene negotiations, lobbying, and negotiation between a variety of public and private parties. Finally, in September 1999 an acceptable agreement was reached that partially clarified the rights and responsibilities of ICANN and NSI.

In March 2000 NSI was sold to VeriSign, a Web infrastructure service provider. In March of 2001, under intensive pressure from the Federal government, VeriSign/NSI agreed to give up management of the .org

database in December 2002, but will maintain the .com database until 2007. It will continue to collect $6 per name/year for the maintenance of these databases, and will continue to function as a registrar as well as the registry administrator.

As of June 2001, it is still unclear how ICANN will deal with its mission of managing the domain space. Part of the problem is that ICANN itself has a rather narrowly defined mission, but tangential issues relating to Internet governance continue to arise. Since there is no governing body for the Internet as a whole, ICANN has been called upon to deal with a variety of matters. So far, it has generally resisted this temptation. But the problem of Internet governance will continue to be with us for many years.

10 A Framework for Global Electronic Commerce

As commercial interest in the Internet started to accelerate in 1996, it became clear that that the Administration should provide some guidance to the private sector concerning its thoughts about an appropriate "information policy". The President appointed Ira Magaziner to develop policy guidelines for electronic commerce on the Internet. Magaziner was chiefly responsible for the policy report entitled “A Framework for Global Electronic Commerce” (but widely known as the “Magaziner Report”) issued on July 1, 1997.[42]

This report was notable for its hands-off approach to regulation, as reflected in the report’s five principles the for e-commerce policy:

1. The private sector should lead.
2. Governments should avoid undue restrictions on electronic commerce.
3. Where governmental involvement is needed, its aim should be to support and enforce a predictable, minimalist, consistent and simple legal environment for commerce.
4. Governments should recognize the unique qualities of the Internet.
5. Electronic commerce over the Internet should be facilitated on a global basis.[43]

The report examined nine policy issues in light of these principles.

1.Customs and Taxation
2.Electronic Payment Systems
3.'Uniform Commercial Code' for Electronic Commerce
4.Intellectual Property Protection
5.Privacy
6.Security
7.Telecommunications Infrastructure and Information Technology
8.Content
9.Technical Standards [44]

Almost nothing happened during the 1990s at a policy level with respect to electronic payments, so we will have nothing further to say about that issue.

Telecommunications policy issues were particularly prominent during the 1990s, but are somewhat outside

the scope of this chapter. Chapter XX describes some of the antitrust issues relating to telecommunications, and we provide a very brief overview of developments in this area below.

11 Taxation

The Magaziner Report recommended that governments refrain from imposing special taxes or customs duties on Internet transactions that would inhibit the growth of e-commerce.[45] The Clinton Administration supported a Congressional moratorium on *new* e-commerce taxes and lobbied with some success in international forums for similar moratoria by other governments.[46]

The moratorium on new Internet taxes was effective. However, the growth of e-commerce in 1998-99 resurrected an old problem: what to do about sales tax treatment of remote purchases.

There is no question that residents of a state are supposed to pay a sales tax (or, more properly, a "use tax") on the items they purchase from out-of-state vendors. Individual consumers, however, are rarely audited by state tax authorities and therefore generally escape payment of these taxes

States have long wanted to require out of state vendors to collect use taxes when sales are made. But in 1992, the U.S. Supreme Court ruled that one state could not demand that vendors in other states be required to collect taxes for it, as this would be inconsistent with the Commerce Clause of the U.S. Constitution.[47] However, this same clause gives Congress the power to regulate interstate commerce, and the Supreme Court suggested that Congress could allow states the power to compel vendors in other states to collect taxes on mail order purchases if it chose to do so by passing enabling legislation.

Some bills were introduced in Congress to establish conditions under which out-of-state commerce could be taxed, but they were never enacted. Taxation of out-of-state purchases was subsequently relegated to the back burner until the rapid growth of Internet commerce again brought this issue to the fore.

In 1998 Congress passed the Internet Tax Freedom Act that created the moratorium alluded to above.[48] In addition, this Act created an Advisory Commission on Electronic Commerce, which was supposed to re-visit the issues surrounding sales tax. The Commission held several public meetings around the country and issued a report in April 2000, but the Commission was unable to reach any consensus on what to do about the sales tax collection problem.

The subsequent demise of the "dot coms" reassured Main Street merchants and state governments that they were not about to be "Amazoned" out of existence, and the sales tax issue has again been relegated to the back burner. Political forces are likely to keep it there. Congress is understandably reluctant to be blamed for enabling a "new" tax, especially if they don't get to spend any of the revenues from it. States are reluctant to simplify and unify their sales tax codes unless there is a clear and present danger to revenues. For these reasons, we expect progress in extending sales and use taxes to remote purchases will be slow.

12 Intellectual Property

Several factors contributed to a heightened significance of intellectual property issues in the 1990s, both at the policy level and in broader popular discourse. One was the growing importance of information and information technology products to the gross national product and to U.S. export markets. By 2000, for example, exports of information technology products constituted 29 per cent of all U.S. exports.[49] Billions of additional exports were attributable to motion pictures, sound recordings and other products of traditional

copyright industries.[50] A second factor was the seemingly greater vulnerability of intellectual property works to infringement because of the increasing distribution of such works in digital form. Third, many copyright, software, and Internet industry groups were supporters of President Clinton, as well as significant contributors to the Clinton-Gore campaigns, and the Administration was understandably receptive to the industry's concerns. Fourth, the expansion of intellectual property rights in the 1990's meant that these rights affected the wider public and captured public attention as never before.[51]

Hence it is not surprising that intellectual property was an especially active policy area during the 1990's. There were major pieces of legislation in the copyright, patent and trademark fields. Even trade secrecy, long protected only by state law, was federalized with the enactment of the Economic Espionage Act of 1996.[52] Also significant were several appellate court decisions that changed the intellectual property landscape, such as *Feist Publications, Inc. v. Rural Telephone Service Co*. (no copyright in uncreative compilations such white pages listings of telephone directories),[53] *State Street Bank & Trust v. Signature Financial Services* (business methods are patentable),[54] and *Computer Associates Inc. v. Altai* (no copyright for computer program interface specifications).[55] Even more significant were two international treaties, one setting minimum standards for intellectual property protection for all member states of the World Trade Organization (WTO) and another establishing an international consensus on the application of copyright in the digital environment. These treaties provided new assurances to technology firms and other content providers that they could count on intellectual property law to protect their investments in information products and services.[56]

12.1 Copyright Law: The Digital Millennium Copyright Act

In 1993, the Clinton Administration's Task Force on the National Information Infrastructure (IITF) formed a Working Group on Intellectual Property (IPWG) to study how intellectual property should be applied in the emerging NII. Unless such property could be adequately protected, there was concern that rightsholders would not make their works available via the NII, and the great promise of the NII would not be fulfilled. Bruce Lehman, a former copyright industry lawyer-lobbyist who became head of the Patent & Trademark Office and Assistant Secretary of Commerce, chaired this Working Group. The IPWG finalized its conclusions and recommendations and issued a "White Paper" on "Intellectual Property and the National Information Infrastructure," published in September 1995.[57]

The White Paper's main substantive conclusions and recommendations were: 1) Copyright owners have the legal right to control temporary as well as permanent copies of their works in digital form (which arguably renders every access to or use of a work via the NII as a copyright-significant activity). 2) Fair use and other copyright exceptions (e.g., archival copying by libraries) will no longer be necessary because it will be possible to license uses needed via the NII. 3) Internet service providers and other intermediaries were and should be strictly liable for any infringing copies made by users because ISPs were in the best position to monitor user behavior. 4) New legislation should be enacted make it illegal to make or distribute technologies, the primary purpose or effect of which was to circumvent a technical protection measure used by copyright owners to protect their works. 5) New legislation should also prohibit the alteration or removal of copyright management information (CMI) that copyright owners might attach or associate with copies of their works to identify the rights holder and the set of rights licensed to a particular user.

The White Paper was received with considerable praise among traditional copyright industry groups, such as the Motion Picture Association of America and the Association of American Publishers. However, it was heavily criticized by other groups, including telephone companies, ISPs, computer companies, universities, libraries, and scientific organizations, as to its interpretation of existing law and as to its legislative proposals.[58]

Not until October 1998 did Congress enact the legislation to deal with the challenges of digital technology.[59] The most contentious and heavily lobbied issue in this legislative struggle concerned ISP liability that pitted the lobbying strengths of the major copyright industries against those of telephone companies and Internet service providers. Congress was eventually able to broker a compromise by establishing "safe harbors" for ISPs (e.g., no liability for user infringement if service takes down infringing material after having been notified about it).[60] This cleared the way for enactment of the Digital Millennium Copyright Act (DMCA). This law included provisions to regulate anti-circumvention technologies and to protect the integrity of CMI similar to the White Paper proposals.[61] The anti-circumvention regulations have been criticized as ambiguous, overbroad, confusingly complex, and harmful to innovation.[62]

Looking back with the benefit of 20-20 hindsight at the "Agenda for Action" and the IPWG's "White Paper," several things are noteworthy. First, the model of the NII in these documents more closely resemble a 500 channel cable TV system than the Internet and World Wide Web that became the predominant new economy phenomenon of the waning years of the twentieth century. Second, even before Congress granted the copyright industries stronger intellectual property rules, millions of individual creators and even many established copyright firms put substantial amounts of content on the Internet and Web despite the absence of technical protection systems to stop the copying of this content. Third, although many content providers have tried to fund electronic publishing activities through advertising, few have successfully transitioned to paying sites, either by subscription or pay-per-use systems. Fourth, the ease with which digital copies can be made and shared has made it easier than ever to infringe copyrights; while personal use copying and noncommercial sharing of music and other copyrighted works has long been regarded as acceptable behavior, the Internet has so changed the scope and scale of such activities (e.g., Napster, Gnutella, and Freenet) that copyright industries have good reason to be afraid that they will lose control of their works. Fifth, it remains uncertain whether the technically protected content will meet with commercial success in the marketplace. Sixth, intellectual property policy is hampered by the lack of serious analysis of the economic impact of changes in both the law and operating practices. It would be worth considering ways to create an organizational framework under which economic considerations could be brought to bear on IP issues, given their increasing importance for the economy at large.

12.3 Patent Law: Software and Business Method Patents

Before computer software and the Internet, inventive ways to organize, process, or present information were considered unpatentable, as were business methods.[63] Since the mid-1960's, inventors of software and business method concepts sought to chip away at these old patent rules, arguing that emerging information industries needed and deserved patents as much as any other industry. Yet, until the early 1990's, software was generally patented, if at all, as part of an automated industrial process (for example, as a step in an improved method for curing rubber) or as a virtual device for performing some function. By the early 1990's, however, patents were issuing for algorithms, data structures, and user interface devices (e.g., icons) as well. Although there continues to be controversy within the computing field about whether software patents promote innovation, an increasing number of software firms have sought patents for their innovations. Toward the end of the 1990's, business methods were finally ruled to be patentable subject matter in the U.S., even without some computer-related implementation.[64] This has considerable significance for Internet commerce.

Opponents of software, business method, and other information innovation patents typically make three kinds of arguments against them.[65] First, they assert that these innovations are not really technological in character and hence are not patentable. This theory draws upon the Supreme Court's 1972 *Gottschalk v. Benson* decision in which the Court ruled that a method for converting binary decimals to pure binary form was a

mathematical idea, not a technological process.[66] Second, they argue that the patent system cannot do a good job with such applications because of the lack of sufficiently knowledgeable examiners, the lack of a sufficiently well-developed classification system for such innovations, and most importantly, the lack of access to databases of prior art from which to judge whether a claimed invention is novel and nonobvious. Third, opponents sometimes argue that the affected industries are unsuitable for patenting. In the software industry context, critics note that the industry rose to prominence without patents because copyright, trade secret, and licensing protected their creations, that innovation in this industry is overwhelmingly incremental in nature, and that there is such a rapid pace of innovation in the industry that a patent is likely to be irrelevant by the time it issues. In the context of business methods, opponents argue that major investments are rarely necessary to bring about innovation in business methods, making patents unnecessary. Fourth, software, no matter how complex its design, is typically constructed from scratch, there being no market for software components by which inventors can be compensated in an efficient way as there is for other manufactured items, the purchase of which allows them to be assembled into larger devices (e.g., airplanes). The dangers of inadvertent infringement of software inventions, by means of independent development of the same or a similar are omnipresent, and costs of searching the tens of thousands of software patents to determine what has been patented is prohibitively high.

The principal response of the Patent & Trademark Office (PTO) to complaints about software and business method patents has been to announce steps to improve the administration of patents in these areas. This has included such steps as hiring new examiners, providing additional training for examiners, issuing new guidelines or stricter processes for judging the patentability of these innovations, and licensing access to new sources of prior art information. In the case of obvious mistakes (for example, Compton New Media's claim to have a patent covering all multimedia products), the Commissioner announced his willingness to reexamine such patents (and in the case of the Compton's patent, the PTO upon reexamination invalidated it). Notwithstanding the PTO's efforts to improve its processes, many continue to believe that the quality of decisions about software and business method patents is unacceptably low.[67] The perception that patenting is easy in these fields may contribute to the flood of applications that only increases the problem. For all the complaints about software and business method patents, there has been very little litigation to enforce such patents, so it is unclear whether they are as much of a drag on innovation and competition as some critics have asserted.

Notwithstanding the paucity of litigation on software and business method patents, these patents do have significance in the marketplace. The principal strategy of many software developers is to engage in "defensive patenting" and acquire a portfolio of patents so that the firm will have something to trade if another firm threatens to sue it for patent infringement. IBM is one of the few firms with a substantial patent portfolio from which it derives significant revenues. Business method patents, particularly for electronic commerce concepts, seem to be particularly important to startup firms seeking venture capital.

More general developments with implications for new economy firms included progress in the 1990's toward harmonization of U.S. patent law with world norms. For example, U.S. law finally requires publication of most patent applications eighteen months after filing.[68] Congress also made some improvements to the patent reexamination process.[69] Overall, patent rights got stronger in the 1990's, as is evident from the higher rate of appellate court affirmances of patent infringement decisions and reversals of rulings of noninfringement after establishment of the Court of Appeals for the Federal Circuit.[70]

12.4 Trademark: Cybersquatting

One new economy business model that was consigned to the dustbin of history in 1999 was speculation in domain names, widely known as "cybersquatting." A journalist may have gotten this speculative frenzy

started when he wrote a story in the mid 1990's about his registration of various famous trademarks as domain names (mcdonalds.com, coke.com, and the like) and the cluelessness of these major business enterprises about the desirability of registering their marks as domain names.[71] Although the journalist registered these famous names in pursuit of his story, others began speculating in trademark domain names, offering to sell the names to the owners of trademarks in a registered word or phrase for hefty sums. Many trademark owners were outraged by this behavior, bringing lawsuits charging domain name registrants with trademark infringement or dilution. Some of these lawsuits were successful because the domain name registrant was using the domain name in a manner likely to cause consumer confusion or dilute the distinctiveness of the name.[72] However, courts sometimes stretched trademark law beyond traditional bounds to reach "cybersquatters."[73]

This was an important problem because old economy firms began to realize in the late 1990s the potential revenues they might derive from electronic commerce and they wanted to be sure that their trademark rights would not be nullified by domain name registrations by cybersquatters. The U.S. Congress passed the Anticybersquatting Consumer Protection Act of 1999 to make it illegal to register a trademark as a domain name in bad faith.[74]

The Clinton Administration sought to address the global problem of cybersquatting by encouraging ICANN to formulate a uniform dispute resolution process (UDRP) for trademark-domain name disputes. ICANN has now put a UDRP in place, requiring all registers and registrars of domain names to require applicants to agree to use of UDRP for resolving these kinds of disputes.[75] Hundreds of disputes have been resolved, most of which have resulted in the transfer of domain names to the trademark owner. The UDRP addresses the most pressing of the international trademark-domain name problems in a remarkably cost-efficient way.

12.5 Database Legislation

Commercial databases are an important new economy industry. The call for legal protection for the data in databases arises from the obvious fact that data, especially when in digital form, are cheap and easy to copy, seemingly making them vulnerable to market-destructive appropriations. Given this, it is unsurprising that legal protection for databases became an important policy issue in the 1990's. Up until 1991, U.S. courts had generally protected data compilations, such as white pages of telephone directories, on a "sweat of the brow" rationale, that is, on the theory that the expenditure of substantial time, money and energy in compiling and updating information allowed the compiler to assert copyright protection to prevent appropriation of all or a substantial part of the contents of the compilation.[76]

All this changed in 1991 when the Supreme Court ruled in *Feist Publications Co. v. Rural Telephone Service, Inc*. that copyright law could not protect the white pages listings of telephone directories or other uncreative compilations.[77] Copyright protection required some creativity in the selection or arrangement of the data such that the compilation as a whole satisfied the statutory requirement that a compilation be "an original work of authorship."[78] In *Feist*, the Supreme Court repudiated the utilitarian rationale for protecting unoriginal compilations by copyright law, saying that Congress lacked constitutional power to do this under the copyright clause, even if it wanted to.

Although some commentators worried that *Feist* was a threat to the stability of the U.S. database industry,[79] no legislation to protect the contents of databases from *Feist*-like appropriations was introduced in the U.S. Congress until 1996. Even then, the bill was mainly an accommodation to certain Clinton Administration officials who wanted to assert that such a law was being considered in the U.S. in order to strengthen the U.S. negotiating position on a draft international treaty on the legal protection of databases scheduled to be considered at a diplomatic conference in December 1996. In each session of Congress since then, database

protection bills have been proposed, but so far none has been enacted.[80]

The principal impetus for U.S. database legislation since 1996 has been a set of rules that the European Union created to protect the contents of databases.[81] The expenditure of substantial resources in developing a database gives the maker fifteen years of protection against the extraction and reuse of all or a substantial part of the contents of that database. To induce other countries to adopt equivalent laws and to ensure that European databases would not suffer from inadequate protection on foreign shores, the Europeans decided that databases of non-EU nationals would not be eligible for the benefits of the new legal regime unless their nations had adopted an equivalent law.[82] Because U.S. firms were the leading providers in the European database market, they had some reason to fear losses unless the U.S. Congress adopted an equivalent law.

Even though the 1997 Framework for Global Electronic Commerce identified database protection as a priority,[83] the Administration later opposed EU-like database legislation as overbroad.[84] It drew upon concerns expressed by the science community and new economy companies such as Yahoo! Yahoo! recognized that an overbroad database law would make it illegal for them to extract information on the World Wide Web to make directories for their search engine.

Even without a new form of intellectual property protection for the contents of databases, the U.S. database industry has continued to grow.[85] Copyright still provides significant protection to data compilers. In addition, database firms rely on their reputations for high quality, up-to-date information, as well as on licensing contracts and technical controls.

12.6 International Developments: TRIPS and the WIPO Copyright Treaty

Among the most significant information policy achievements of the Clinton Administration was its leadership in the successful conclusion of an Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) as an annex to the agreements establishing the World Trade Organization in 1994.[86] The TRIPS initiative had begun during the Regan-Bush years as U.S. officials came to believe that the U.S. global comparative advantage in innovative technology was being eroded because many nations turned a blind eye to local infringements of intellectual property rights of foreign nationals.[87] Use of unilateral sanctions against nations with inadequate IPRs produced only limited success in changing the policies of other governments, so the U.S. and its allies in the developed world sought international recognition that inadequate IPRs distorted international trade. It was no small feat to convince developing and least developed countries to agree to abide by TRIPS norms.

TRIPS not only requires member states of the WTO to conform their national laws to certain minimum standards of protection as to seven categories of intellectual property rights, but it also requires them to enforce those rights. Nations aggrieved by the deficiencies of another nation's intellectual property laws or enforcement of rights can now submit their grievances to the WTO. If the dispute cannot be resolved through mediation, a dispute resolution panel will be appointed to consider the merits of the complaint and to issue a ruling. In the last few years, WTO dispute panels have resolved several significant IP disputes.[88]

The overwhelming majority of the TRIPS norms derive from longstanding international intellectual property treaty provisions. However, TRIPS also addresses some new economy technology policy concerns as well. Because of some uncertainty about whether computer programs and databases were protectable under the leading international copyright treaty known as the Berne Convention for the Protection of Artistic and Literary Works, Clinton Administration officials insisted that the TRIPS Agreement should require WTO member states to provide copyright protection for programs and databases.[89] They also used TRIPS to strengthen international norms on the legal protection for the topography of integrated circuits.[90] By insisting

that patents must issue to protect inventions "in all fields of technology,"[91] U.S. officials set the stage for possible challenges to the patent laws of some nations that do not as yet protect computer software or genetically engineered inventions.

Also ongoing during the early 1990's were negotiations hosted by the World Intellectual Property Organization (WIPO) to consider a possible treaty to update application of copyright law to the Internet and the World Wide Web. In 1996, largely at the instigation of U.S. officials, WIPO convened a diplomatic conference of representatives of 170 nations that resulted in the adoption of the WIPO Copyright Treaty.[92]

The WIPO Copyright Treaty establishes several norms with important implications for the new economy.[93] Like TRIPS, the WIPO treaty requires signatory nations to protect computer programs and databases as literary works under the Berne Convention. It affirms that copyright owners have the right to control reproductions of their works in digital form. Owners also have the right to control communications of their works to the public via the Internet or other communications medium, although clarifying that merely providing a communications facility should not give rise to liability, thereby allowing nations to limit the responsibility of Internet service providers for user infringement. Exceptions and limitations to copyright continue to apply, as appropriate, in the digital networked environment, and new exceptions and limitations may also be adopted as appropriate for the digital networked environment.

The WIPO treaty established two new wholly international norms. One deals with the removal or alteration of copyright management information that may be attached to or associated with digital copies of protected works to identify the copyright owner and licensed rights in the copy.[94] The other requires nations to provide "adequate protection" and "effective remedies" against circumvention of technical protection measures copyright owners use to protect their works against infringing uses.[95] As indicated above, the U.S. implemented these new international norms in 1998.[96] The WIPO Copyright Treaty was a significant achievement of the Clinton era's technology policy for it paved the way for the emergence of the global market in digital information envisioned in the Information Infrastructure Task Force's Agenda for Action and in the 1997 Framework for E-Commerce.

13 Commercial Law

The 1995 NII IP White Paper and the 1997 Framework for Global Electronic Commerce report emphasized the need for harmonization of contract law to promote global electronic commerce.[97] These documents imagined a global market for digital information in which anyone anywhere on the globe could search electronically for information of interest and make a contract via the GII for delivery of the information directly to them. To bring this vision to fruition, there needed to be some international consensus about contract formation rules in cyberspace and default terms of such contracts (e.g., which jurisdiction's law will apply to the transaction and in which forum(s) disputes should be resolved).

Although the Clinton Administration initiated legislation on other NII and e-commerce policy matters, it did not initially propose new cyberspace contract rules in part because contract and commercial law rules have traditionally been matters for state rather than federal law. The Clinton Administration was also aware that the National Conference of Commissioners of Uniform State Laws (NCCUSL) had been at work for some years to develop two model laws for electronic commerce: the Uniform Electronic Transactions Act (UETA) and that now known as the Uniform Computer Information Transactions Act (UCITA).[98]

UETA was needed because the laws of many states require that contracts be memorialized in "writings" and bear the "signatures" of persons authorized to enter into the contract. Prior to UETA, it was unclear whether

electronic signatures and electronic records would satisfy such state law requirements. UETA updates contract law so that signature requirements can be satisfied by electronic signatures and writing requirements by electronic records. NCCUSL promulgated UETA in the summer of 1999, and about half of the country's state legislatures have now enacted it. To spur additional uniform adoptions, the U.S. Congress enacted the "E-Sign" legislation that essentially makes UETA a national standard.[99] Proponents of UETA hope that it will eventually be an international standard as well.

UCITA is NCCUSL's model law for commercial transactions in computer information.[100] Among other things, UCITA would validate shrinkwrap, click-through and other mass market licenses for software, databases, websites, and the like, as long as the user of the information has had an opportunity to review the terms of the license.[101] UCITA has been highly controversial because it is complex, poorly drafted, overbroad, hostile to consumer interests, and imbalanced in other ways.[102] Some key provisions of the law are likely to be preempted by federal intellectual property law and policy (e.g., anti-reverse engineering clauses of software licenses).[103] Despite a strong push by leading new economy firms, such as Microsoft and AOL, only two states have adopted UCITA so far, one of which made significant changes to enhance consumer protection and the other of which deferred its enforcement for two years out of concern about imbalance in the law. Although a number of state legislatures are still considering UCITA, there is reason to doubt that this law will provide the clarity and uniformity in rules that proponents had hoped for. Thus, an important part of the legal infrastructure for the new economy remains uncertain.

14 Security Policy

The proliferation of computers and networks as critical infrastructure for government and private sector activities meant that computer security and encryption policy took on a new importance in the 1990s.[104] This meant that computer security was in part a national security issue, and encryption was one of the key technologies for strengthening computer security. The market for encryption technologies grew rapidly during these years for a wide range of uses, for instance, to enable businesses to transfer sensitive data, to enable individuals to engage in secure communications, and to enable the transfer of credit card numbers to complete commercial transactions over the Internet.

A significant barrier to growth of the market for software using encryption was a set of U.S. export control regulations that forbade the export of encryption technologies beyond a certain strength (typically measured by the length of keys).[105] American firms faced the dilemma of making two products—one with strong encryption for the American market and another with weaker encryption for foreign markets—or making one product with weak encryption for both markets. Their concern was not only the higher costs of developing two products, but also that foreign developers of encryption technologies often operated under looser or no export control constraints. U.S. firms complained they were losing market share both domestically (because foreign competitors could import strong encryption products into the U.S.) and abroad because of the export control regulations. They lobbied vigorously for changes to these controls. Over the course of the 1990's, encryption rules were loosened considerably to the evident relief of the American software and related high technology industries.[106]

The principal reason that the FBI and other intelligence agencies opposed loosening encryption controls was because advances in information technologies making it more difficult for them to get access to information affecting national and international security. These agencies sought to encourage the adoption of technologies that would facilitate the access they regarded as essential to their mission, such as fostering "voluntary" industry adoption of the so-called "Clipper chip" in information technology devices.[107] Clipper was a superior security technology in some respects as compared with previously endorsed government

encryption standards, but it provided the government with a “back door” through which to access encrypted communications if this became necessary. Civil libertarians and the high technology industry strongly objected to installation of the Clipper Chip on both practical and philosophical grounds. The discovery of technical flaws in the Clipper Chip reinforced industry objections to this technology. Following this, the Administration proposed a “key escrow” system as an alternative way to ensure their access to encrypted communications.[108] Proposals varied somewhat, but the core idea was that users of strong encryption would deposit keys to their encrypted information with the government or a third party so that the government could get access to the information in appropriate cases. The technology industry and civil liberties groups received these proposals with little enthusiasm. The decade ended without resolution of this important encryption and computer security issue.

In the latter 1990’s it became increasingly evident that use of strong encryption was essential to the growth of e-commerce. This may have been a crucial factor in the Clinton Administration’s decisions in the late 1990’s to relax export controls considerably and to cease promotion of the Clipper Chip and key escrow initiatives.[109]

15 Telecommunications

Describing the details of telecommunications policy during the 1990s could easily require a whole book, so we can provide only the most cursory overview of major developments in this section.[110]

The biggest single topic is, of course, the Telecommunications Act of 1996, and we will use it to organize our discussion. This Act, coming 12 years after the historic breakup of AT&T in 1984, was a valiant attempt to clean up the detritus left from half a century of regulation.[111]

The main provisions of the Act were:

1) To encourage competition for Incumbent Local Exchange Carriers (ILECs) by allowing entrants (Competitive Local Exchange Carriers, or CLECs) to interconnect with with ILECs, lease lines and other ``unbundled network elements'' from the ILECs at wholesale prices, allowing for physical collocation of equipment, and several related measures such as mandating number portability. Some of this was already underway in various states, but the Act made this a nationwide policy.

2) To allow RBOCs to enter the long-distance market, once their local markets were sufficiently competitive, as determined by the FCC. This superceded the provisions of the Modified Final Judgment in the AT&T breakup.

3) To set forth explicit principles of universal service as a matter of Federal communications policy, and to require the FCC to advance this goal. In particular, the Act created the so-called ``E-rate'' which provided subsidized access to the Internet by schools and libraries.

4) To encourage the FCC to relax various restrictions of over-the-air on radio and TV broadcast, and to grant additional spectrum rights to TV in order to allow for a transition to High Definition Digital TV.

5) To deregulate cable TV by repealing many provisions of the 1992 Cable Act.

6) To deal with content-related issues, such as pornography and violence via measures such as the V-chip. The Communications Decency Act, described in Section 17 of this chapter, was attached to the 1996 Telecommunications Act.

7) Deal with a large number of other miscellaneous measures to further the deployment of advanced services.

The Telecommunications Act of 1996 was widely hailed by officials in the Clinton Administration, Congress, and the communications industry as a whole. Congress passed the Act by 414 to 16 in the House and 91 to 5 in the Senate.

Significantly, the Act mentions the Internet only in two places, one of which had to do with school and library access to the Internet, the other being the various provisions of the Communications Decency Act

How has the Act been successful? We think that it is safe to say that progress has made, but not as much as had been hoped for. In particular, it is widely believed that requiring ILECs to provide access to their ``unbundled network elements'' has not worked particularly well. There is considerable debate as to whether this lack of success was due to foot-dragging by the ILECs or a poor business model by the CLECs, but the fact of the matter is that the local market continues, for all practical purposes, to be monopolized. The major beneficiaries of competition at the local exchange level have been businesses who have purchased discounted telephone services from CLECs.

The Act appears to have stimulated a number of telecommunications mergers, which are described in by Robert Litan and Carl Shapiro in Chapter XX. These include SBC-Pacific Bell-Ameritech, Bell Atlantic-Nynex-GTE, Quest-US West, and Worldcom-MCI. There were also a few divestiture, most notably AT&T's spin off of Lucent in 1997.

With respect to item (2), progress has also been slow. In 2000 Bell Atlantic becomes the first "Baby Bell" to be approved to offer inter-LATA long distance services to customers in New York.

The most notable aspect of the universal service provision was the E-rate, which subsidized access by schools and libraries via a tax on telecommunications carriers. The Act has definitely been successful in connecting up schools: in 1994 only 30 percent of public elementary schools had Internet access, but by 1998 over 80 percent had Internet access and by now virtually all public schools have at least some degree of Internet access.[112]

On the other hand, the E-rate has cost between 1 and 2 billion dollars a year, a cost covered by a ``hidden'' tax on telecommunications service providers. Though the E-rate program enjoys wide popular support, there are still many critics of the telecommunications tax used to fund it.

Item (5), the deregulation of cable TV, has not had much of an impact at the consumer level as its critics had feared. It may have contributed to consolidation of the industry, as represented by the AT&T acquisition of TCI in 1998 and the AOL-Time Warner merger in 2001. However, such consolidation was well underway prior to the Act.

Finally, item (6), having to do with content regulation, is discussed in Section 17 of this chapter.

Consistent with the vision of the NII, there was been considerable deployment of Internet access in the United States during the 1990s. In August 2000, roughly 40 percent of US households had access to the Internet, with 4.4 percent of US households having broadband access, either via cable modems (50

percent) or DSL (34 percent).[113]. Nearly half of Internet users report that they have access to broadband, but only 12 percent have actually adopted it as of the end of 2000.[114]

In summary, significant progress was made during the 1990s in terms of attempting to deregulation telecommunications and deploy new services. Many states were already moving in this direction; the Act's primary contribution was to set a nationwide policy. Deployment of new services did not occur as rapidly as their proponents had hoped, but the fact that they occurred at all stands as a stark contrast to previous decades.

16 Information Privacy

Advances in information technology, especially those adapted for use on the Internet and World Wide Web, made it easier than ever before to collect data about individuals (what they looked at, how long they looked at it, what they did next, etc.), often in ways of which the individuals were unaware. The economic value of personal data motivated firms to collect and process these data, for example, by generating profiles of user behavior for internal marketing purposes or for sale to other firms wanting customers of that type. Polls consistently show that an overwhelming majority of people in the United States are concerned about their lack of control over personal data, especially on the Internet and Web. Among other things, this makes them less willing than they might otherwise be to purchase goods and services over the Internet and World Wide Web. Privacy thus became a key issue for e-commerce policy in the 1990's.[115]

One pressure point for U.S. information privacy initiatives was the decision of the European Union in the mid-1990's to require member states of the EU to adopt a comprehensive legal regime to protect personal data.[116] The regime protected individuals against unauthorized collection or processing of personal data. IT also granted individuals rights to access data about themselves in the hands of private sector firms, to demand correction or deletion of the data, and to sue for violations of data privacy rules. EU member states are also obliged to establish data privacy bureaucracies to ensure compliance with the data protection rules. The European data protection rules authorize blockage of transnational data flows if the nations through which the data would pass do not have satisfactory privacy rules. During much of the 1990's European officials expressed serious doubts that U.S. rules met this standard.[117] This led to considerable tension between the US and the EU about data privacy issues. To overcome this potential barrier to trade, US and EU officials engaged in lengthy negotiations aimed at establishing "safe harbor" rules so that American firms willing to abide by such rules could transfer and process data in or through the EU without fear of blockages.[118] Although safe harbor rules were eventually adopted, the European Parliament and EU data privacy officials have expressed some reservations about them. For now, the safe harbor rules, if followed, provide some assurance for businesses operating in the global market that information flows will not be interrupted.

Another pressure point for U.S. information privacy initiatives came from domestic concerns about information privacy. For the most part, the Clinton Administration relied on the private sector to develop self-regulatory measures to protect information privacy.[119] The Federal Trade Commission (FTC) took action against some firms that failed to abide by posted information privacy policies, thereby committing an unfair or deceptive trade practice under section 5 of the FTC Act.[120] The FTC also began issuing annual reports to Congress on privacy on the Internet, reporting, for example, on the proportion of websites that informed consumers about uses they intended to make of data collected about them.[121] The FTC articulated a set of principles for judging the meaningfulness of self-regulatory measures. During the mid- to late 1990's Clinton Administration officials frequently stated that if the private sector did not engage in meaningful self-regulation, the Administration would support information privacy legislation. Yet it bristled when the FTC announced in 2000 that self-regulation had been a failure and endorsed enactment of legislation in addition to

that adopted in the late 1990's to protect against online gathering of information from children.

Notwithstanding the lack of comprehensive privacy legislation in the U.S., electronic commerce did grow during the 1990's. However, e-commerce may grow more rapidly if the American public has more confidence that their personal data will not be abused. If state legislatures become more active in adopting Internet privacy rules, industry groups may press for national legislation as a way of achieving uniformity in rules. In addition, many other nations are adopting EU-style privacy rules. American firms engaged in international business transactions already have to comply with EU rules and increasingly with other similar national privacy rules. To promote business certainty, one harmonized set of privacy rules may be desirable.

17 Content Regulation As E-commerce Policy

Just as advances in IT have made it easier to infringe copyrights and invade privacy, they have also made it easier than ever before to disseminate harmful content, such as hate speech, child pornography, and defamation. The global nature of the Internet makes it difficult to know what content regulations will apply to Internet communications. The Framework for Global Electronic Commerce announced the Clinton Administration's general opposition to content regulations.[122] Commerce in content obviously flows more freely when there are few or no content regulations with which to deal. In addition, free speech values of American law disfavor content regulations. One source of tension between the US and other nations during the 90's arose because some nations sought to regulate Internet availability of hate speech and the sale of Nazi memorabilia which are legal in the U.S.[123] Another source of tension concerned national rules limiting the amount of "foreign" content. Although other nations defend such rules as necessary to preserve cultural heritage, American firms tend to regard them as discriminatory protectionism against foreign competition and market access. Clinton Administration officials argued that such rules should not apply to the emerging GII.[124]

Yet content regulation was viewed differently by the Administration when the question was whether the law should protect children against "indecent" or "harmful" materials on the Internet. The Administration joined a majority in Congress in support of legislation to outlaw such material and to require schools and libraries to use filtering software to block access to such material. One such law was the Communications Decency Act (CDA), enacted as part of the 1996 telecommunications deregulation package. It outlawed, among other things, the use of an interactive computer service to display patently offensive materials on a site accessible by persons under the age of 18.[125] Although Internet service providers persuaded Congress to exempt them from indirect liability for harmful speech on their sites, anyone who uttered patently offensive words via an interactive computer service could have gone to jail for up to two years—at least until the U.S. Supreme Court ruled that the CDA's strictures violated the First Amendment.[126] The term "patently offensive" gave inadequate notice about what would and would not violate the law and was therefore likely to chill expression of protected speech. As important as it was to protect children from harmful materials on the Internet, the Supreme Court concluded that Congress could not reduce the level of discourse on the Internet to be that suitable for five year olds. An important aspect of this ruling was its designation of the Internet as a robust forum for democratic discourse that is entitled to the highest level of protection under the First Amendment. Thus, content regulations aimed at the Internet will likely be carefully scrutinized in the future.

The economic significance of content regulations aimed at protecting children is considerable. This is in part because of the breadth of their application, the strictures they impose on sites, and the burdens they impose on online services. The Child Online Protection Act (COPA), for example, encourages sites to adopt identification systems, such as credit card systems.[127] Operators of pornographic sites will find it easy to comply with COPA because they do not object to imposing credit card obligations on those wanting to have

access to their content. Other firms or individuals with open web sites are at risk, if their content includes questionable words (such as references to breast cancer or beavers). Schools and libraries that receive federal funding are now required to purchase, install and maintain filtering technologies, even though most reports on filtering technologies suggest that they both under- and overblock content.[128] This regulation too is being challenged as unconstitutional under the First Amendment.[129] In the meantime, this law will be a boon to new economy firms in the filtering software industry.

18 Standards

The Clinton Administration recognized that standards were critical to the development of an open information infrastructure. However, they also realized that standards development was something typically best left to the private sector. For example, the National Institute of Standards and Technology funded an Advanced Technology Program that award grants to private companies that developed standards for information interchange, among other things.

The Internet Engineering Task Force (IETF), which had evolved as a volunteer effort to standardize various aspects of the Internet, suddenly found itself at the center of numerous political and commercial interests. It is still the center of much debate, and there are some that question how well it will be able to deal with the stresses and strains associated with its much-enlarged role. However, since there is no alternative organization that can command the loyalty of the engineers that make the Internet run, it will likely continue to play its critical role in developing Internet standards.

The World Wide Web Consortium (W3C) was created in 1994 by Tim Berners-Lee "to lead the World WideWeb to its full potential by developing common protocols that promote its evolution and ensure its interoperability."[130] It has also played a very significant role in making the Web work more effectively. Currently it has over 500 member organizations that contribute to its standards development.

The 1990s saw a plethora of ad hoc standards bodies arise, often focused on a single technology or even a single standard. Given the deliberative and slow-moving nature of the more established standards bodies, it was natural that the fast-moving IT industry would want decisions made more quickly. However, sometimes the rapid development of standards led to poor decisions, and some of the traditional standards bodies have attempted to respond to industry needs more expeditiously. Competition is effective, even in the domain of standards setting.

19 Conclusion

The Clinton Administration presciently conceived of a National Information Infrastructure that, if properly nurtured, would promote economic growth, better government services, broad public access to information, and cultural enrichment. From the beginning, the Administration was committed to the idea that the private sector should lead in developing and deploying NII technologies. And invest the private sector did in a wide variety of innovative Internet infrastructure and applications technologies. This, in turn, produced an unparalleled stock market boom, especially notable in the late 1990's. The market was, as Alan Greenspan observed, irrationally exuberant and the stock market correction of 2000 was to be expected. Among the many hopes for the NII was that it and concomitant investments in IT would enhance productivity more generally. There are some signs that productivity did improve during the 1990's as a result of investments in IT, although economists continue to debate important questions about the impacts of IT on productivity. Consistent with the Administration's policy of promoting private sector initiatives was its encouragement of

private sector self-regulatory measures, such as, for example, nudging firms to post information privacy policies on websites so that privacy legislation would be unnecessary. Also encouraged were industry consortium initiatives to address policy issues, such as the Platform for Privacy Preferences initiative of the W3C so that users could program their browser software so that they would not visit websites whose privacy policies did not conform to their preferences. In addition, the Administration supported turning over a significant Internet policymaking function, namely, administration of the domain name system, to a newly created nonprofit corporation ICANN.

While relying principally on the private sector for NII development, the Clinton Administration introduced new policies when necessary either to correct abuses or create incentives for certain desired activities. The FASB, for example, formulated new accounting rules for valuing stock market options that are widely used in the IT sector and the SEC issued a rule requiring disclosure of nonpublic information to the market at one time so that industry analysts and institutional investors did not enjoy undue advantages from, for example, pre-IPO IT road shows. More proactively, the Administration sought to promote NII development by supporting deregulation of the telecommunications industry, opposing new Internet taxes or customs that might inhibit the growth of electronic commerce, proposing new intellectual property rules, and articulating the need for new commercial law rules for the Internet. Non-economic considerations (e.g., protecting children and national security) were significant driving forces behind some controversial information policy proposals the Administration supported such as the Communications Decency Act rules forbidding indecent communications via the Internet and export control regulations that limited the use of strong encryption in software or Internet applications. Critics of both policies relied on both economic (e.g., the rules unduly inhibited commerce) and countervailing non-economic arguments (e.g., the rules also violated civil liberties). The Administration's record on intellectual property policy would be more praiseworthy had it been more consistently guided by economic analysis. The Administration deserves praise, for example, in expressing doubts on economic grounds about a European-style database law that would have outlawed many uses of information on the Internet. However, the Administration can fairly be criticized on economic grounds for its support of an extension of copyright terms for an additional twenty years and of overbroad anti-circumvention rules that the content industry has been using to challenge innovative IT applications. In the international arena, the Clinton Administration achieved notable successes on key electronic commerce policies, such as the successful conclusion of the TRIPS Agreement and of the WIPO Copyright Treaty, safe harbor information privacy rules, and moratoria on electronic taxation.

Undoubtedly it will take years, and perhaps decades, to reach satisfactory resolutions of the all of the policy issues examined in this paper. We can only hope that future administrations will be as appropriately supportive of private sector initiatives and as successful in its proactive policies to promote beneficial development of the information infrastructure as this Administration was.

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[1] See Chapter xx of this volume.

[2] See Chapter yy of this volume.

[3] See Chapters zz and aa of this volume.

[4] Mandel, Michael, *The Coming Internet Depression*, Basic Books, 2000, p 153.

[5] Information Infrastructure Task Force, The National Information Infrastructure Initiative: Agenda for Action (Sept 15, 1993).

[6] On the reinvention of government using information technology, see the National Partnership for Reinventing Government, Access America: Reengineering Through Information Technology (February 1997), available at http://govinfo.library.unt.edu/npr/library/announc/access/acessrpt.html.

[7] The historical documents are available at http://www.iitf.nist.gov/index-old.html.
[8] Note in particular the discussion in the chapter of the Agenda for Action titled "Benefits and Applications of the National Information Infrastructure", available at http://www.ibiblio.org/nii/NII-Benefits-and-Applications.html. There were, however, voices within the Administration that recognized the value of an "open platform" for the NII. See, for example, Al Gore's address to the National Press Club in 1993 where he says: " We need to ensure the NII, just like the PC, is open and accessible to everyone with a good idea who has a product they want to sell." (http://iitf.doc.gov/documents/speeches/gore_speech122193.html)
[9] Thomas Kalil, "Public Policy and the National Information Infrastructure", *Business Economics*, October 1995 30(4): 15--20.
[10] For more on this period, see Brian Kahin, ("The Market, the Web, and the Virtual Project") in Kahin and Ernest Wilson, eds, National Information Infrastructure Initiatives: Vision and Policy Design, MIT Press 1996.

[11] The next goal for the Internet is the Solar System; planning is now in progress for an Internet host on Mars.
[12] See, e.g., Barry M. Leiner et al., A Brief History of the Internet, http://www.isoc.org/internet/history/brief.html.
[13] http://www.wired.com/news/business/0,1367,16440,00.html
[14] For an entertaining history of Clarke, see Lewis, Michael, *The New New Thing*, W. W. Norton, 1999.
[15]See David Henry, "Behind the S&P 500", *Business Week Online*, March 23, 2001, http://www.businessweek.com/bw50/content/mar2001/bf20010323_409.htm
[16] Arnold Kling, http://arnoldkling.com/~arnoldsk/aimst2/aimst209.html.
[17] http://www.cisp.org/imp/april_2001/04_01blinder.htm
[18] "The Dynamo and the Computer: An Historical Perspective on the Modern Productivity Paradox", American Economic Review, May 1990, pp. 355-361.
[19] Erik Brynjolfsson and Lorin M. Hitt, "The Resurgence of Growth in the Late 1990s: Is Information Technology the Story?", *Journal of Economic Perspectives*, 24(4), Fall 2000, 23-28.
[20] "Has the 'New Economy' Rendered the Productivity Slowdown Obsolete?", *Journal of Economic Perspectives*, 14(4), Fall 2000.
[21] For other contributions to "the productivity debate" see Charles Steindel and Kevin J. Stiroh, "Productivity: What is it and why do we care?", April 12, 2001. Available at http://www.ny.frb.org/rmaghome/staff_rp/2001/sr122.pdf,
Kevin Stiroh, "Information Technology and the U.S. Productivity Revival: What Do the Industry Data Say?", Federal Reserve Bank of New York, January 24, 2001; the Council of Economic Advisors, Economic Report of the President 2000 and 2001; Stephen Oliner and Daniel Sichel, "The Resurgence of Growth in the Late 1990s: Is Information Technology the Story?", Federal Reserve Board of Governors, Finance and Economics Discussion Series 2000-20, March 2000; and Dale W. Jorgenson, "Information Technology and the U.S. Economy, American Economic Review, 91:1 (March 2001), 1-32.
[22] Kevin Stiroh, "Information Technology and the U.S. Productivity Revival: What Do the Industry Data Say?", Federal Reserve Bank of New York Staff Report Number 115, January, 2001. Available at:
http://www.ny.frb.org/rmaghome/economist/stiroh/papers.html
[23] Jason Dedrick, Vijay Gurbaxani and Kenneth L. Kraemer, "Information Technology and Economic Performance: Firm and Country Evidence", Working Paper, Center for Research on Information Technology and Organizations, UC Irvine, 2001.
[24] See Vol. 14, No. 4, Fall 2000, http://www.e-jep.org/archive/Fall2000.html.
[25] See Payson, Steve and John Jankowski, "Sixth Year of Unprecedented R&D Growth Expected in 2000", *NSF Data Brief*, http://www.nsf.gov/sbe/srs/databrf/nsf01310/sdb01310.htm
[26] See *Fostering Research in the Economic and Social Impact of Information Technology*, National Academy of Sciences Press, 1998, http://www.nap.edu/readingroom/books/esi/
[27] http://www.manitouinvestment.com/content/longviewoct.html. There two types of options: qualified and non-qualified which have different tax consequences for individuals when exercised. Though this treatment is also economically questionable, our primary concern in this section is with firm accounting, not individual tax liabilities.
[28] http://www.fed.org/onlinemag/july00/trends1.htm
[29] http://www.manitouinvestment.com/content/longviewoct.html
[30] http://www.americanbusinessconf.com/pooling.html
[31] Gretchen Morgenson, "If Earnings Depend On Investing, Watch Out", *New York Times*, January 21, 2001
[32] http://www.americanbusinessconf.com/pooling.html
[33] http://www.mmmlaw.com/articles/pooling.html
[34] http://www.cisco.com/warp/public/750/acquisition/summarylist.html
[35] Type safe harbor" into any Web search engine to see some examples.
[36] http://www.sec.gov/rules/final/33-7881.htm
[37] See http://www.ietf.org and http://www.w3.org.
[38] The following historical account is drawn from Milton Mueller, "ICANN and Internet Governance", *info*, volume 1, number 6, pp.497--520, available at http://www.icannwatch.org/archive/from_the_archives.htm
and A. Michael Froomkin, "Wrong Turn in Cyberspace: Using ICANN to Route Around the APA and the Constitution", 50 *Duke Law Journal* 17 (2000), available at http://www.icannwatch.org/icann4beginners.php

[39] http://www.icann.org/general/white-paper-05jun98.htm
[40] ICANN has also wrestled with the issue of expanding the number of top-level domains. Recently it has created seven new domain names such as .biz, .info, .museum, and so on to complement the existing TLDs such as .com and .edu.
[41] There are those that say the technology can be decentralized, and many technologists believe that one can layer directory services on top of the DNS that would provide a better framework for users to locate relevant web sites.
[42] See William J. Clinton & Albert Gore, Jr., A Framework for Global Electronic Commerce (1997) (cited hereinafter as "Framework"), available at http://www.iitf.nist.gov/eleccom/ecomm.htm .
[43] Id. at 2-3.
[44] Id. at 3-4.
[45] Framework, supra note xx, at 4-5.
[46] See U.S. Government's Working Group on Electronic Commerce, First Annual Report (1998), available at http://www.doc.gov/ecommerce/E-comm.pdf) at 7 (discussing Internet Tax Freedom Act), 12 (discussing negotiations about foreign tax initiatives).
[47] Quill Corp. v. North Dakota, 504 U.S. 298 (1992).
[48] Pub. L. No. 105-277, 112 Stat. 2681 (1998). See generally David L. Forst, *Old and New Issues In the Taxation of Electronic Commerce*, 14 Berkeley Tech. L.J. 711 (1999).
[49] See, e.g., Roy Mark, US High Tech Exports Surge, New York Times, March 29, 2001.
[50] See, e.g., NII IP White Paper, supra note xx, at 131 (reporting $45.8 billion in annual exports of copyright products in 1993).
[51] See, e.g., Computer Science & Telecommunications Board, National Research Council, The Digital Dilemma: Intellectual Property in the Information Age (2000) (cited hereinafter as "Digital Dilemma") at 45-47.
[52] 18 U.S.C. secs. 1831-39.
[53] 499 U.S. 340 (1991).
[54] 149 F.3d 1368 (Fed. Cir. 1998).
[55] 982 F.2d 693 (2d Cir. 1992).
[56] See infra Section xx for discussion of these developments.
[57] See NII IP White Paper, supra note xx.
[58] See, e.g., Pamela Samuelson, *The U.S. Digital Agenda at WIPO*, 37 Va. J. Int'l L. 369 (1997) (discussing controversies over NII IP White Paper proposals and their equivalents in the proposed WIPO Copyright Treaty).
[59] Digital Millennium Copyright Act, Pub. L. No. 105-304, 112 Stat. 2860 (1998).
[60] Now codified at 17 U.S.C. sec. 512.
[61] Now codified at 17 U.S.C. secs. 1201-04.
[62] See, e.g., Pamela Samuelson, *Intellectual Property and the Digital Economy: Why the Anti-Circumvention Regulations Need To Be Revised*, 14 Berkeley Tech. L.J. 519 (1999).
[63] See, e.g., Pamela Samuelson, Benson *Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions*, 39 Emory L. J. 1025 (1990) (discussing these limiting doctrines and pre-1990's patent caselaw on software, information, and business method innovations).
[64] State Street Bank & Trust v. Signature Financial Services, 149 F.3d 1368 (Fed. Cir. 1998). Interestingly, the European Union has not embraced a similar expansion of patentable subject matters
[65] See, e.g., Pamela Samuelson, Randall Davis, Mitchell D. Kapor, and J.H. Reichman, A Manifesto on the Legal Protection of Computer Programs, 94 Colum. L. Rev. 2308, 2361-64 (1994); John R. Thomas, The Patenting of the Liberal Profession, 40 B.C. L. Rev. 1139 (1999).
[66] Gottschalk v. Benson, 409 U.S. 63 (1972). For critical commentary on this decision, see, e.g., Donald S. Chisum, *The Patentability of Algorithms*, 47 U. Pitt. L. Rev. 959 (1986). For commentary supportive of the decision, see, e.g., Samuelson, supra note xx.
[67] See, e.g., Digital Dilemma, supra note xx, at 192-98.
[68] 35 U.S.C. sec. 122. See Aimee Boss, Comment: The 21st Century Patent System Improvement Act: Is It Really An Improvement?, 32 J. Marshall L. Rev. 725 (1999)(discussing the U.S. 18 month publication rule).
[69] 35 U.S.C. sec. 304-06. For a discussion of the new procedures, see Mark A. Janis, Inter Partes Patent Reexamination, 10 Fordham I.P., Media, & Ent. L.J. 481 (2000).
[70] See, e.g., Robert P. Merges, Commercial Success and Patent Standards: Economic Perspectives on Innovation, 76 Calif. L. Rev. 803, 820-21 (1988) (reporting higher rate of affirmances of infringement decisions after establishment of the Federal Circuit).
[71] Joshua Quittner, Billions Registered, 2.10 WIRED 50 (1994).
[72] See, e.g, Panavision International v. Toeppen, 141 F.3d 1316 (9th Cir. 1998).
[73] See, e.g., Intermatic, Inc. v. Toeppen, 40 U.S.P.Q.2d 1412 (N.D. Ill. 1996).
[74] 15 U.S.C. sec. 1125(d).
[75] See Rules for Uniform Domain Name Dispute Resolution Policy, http://www.icann.org/udrp/udrp-rules-24oct99.htm. For a helpful essay discussing the UDRP and the circumstances leading up to its adoption as well as controversies concerning ICANN and the UDRP, see, e.g., Jessica Litman, 4 Small & Emerging Bus. L. 149 (2000).

[76] This history is well-recounted in Jane C. Ginsburg, Creation and Commercial Value: Copyright Protection for Works of Information, 90 Colum. L. Rev. 1865 (1990).
[77] 499 U.S. 340 (1991).
[78] 17 U.S.C. sec. 102(a)
[79] See, e.g., Laura D'Andrea Tyson & Edward Sherry, Statutory Protection for Databases, in Hearings on H.R. 2652 Before the Subcomm. On Courts and Intellectual Property of the House Comm. On the Judiciary, 105th Cong. (1997).
[80] See, e.g., J.H. Reichman and Paul Uhlir, Database Protection At the Crossroads, 14 Berkeley Tech. L.J. 793 (1999) (discussing U.S. legislative activity on database protection).
[81] Council Directive 96/9/EC of March 11, 1996 on the Legal Protection of Databases, 1996 O.J. (L77) 20. For a critique of the Directive, see, e.g., J.H. Reichman & Pamela Samuelson, Intellectual Property Rights in Data?, 50 Vand. L. Rev. 51 (1997).
[82] Id., art. 11.
[83] Framework, supra note xx, at 10.
[84] See Reichman & Uhlir, supra note xx, at 822-23 (discussing the Clinton Administration's opposition to an EU-style database law).
[85] See, e.g., Steven M. Maurer, Across Two Worlds: Database Protection in the U.S. and Europe, for Industry Canada Conference on Intellectual Property and Innovation in the Knowledge-Based Economy, May 23-24, 2001 (on file with the authors).
[86] Among the many fine commentaries on the TRIPS Agreement and its implications are: Rochelle Cooper Dreyfuss & Andreas F. Lowenfeld, Two Achievements of the Uruguay Round: Putting TRIPS and Dispute Settlement Together, 37 Va. J. Int'l L. 275 (1997); Paul Edward Geller, Intellectual Property in the Global Marketplace: Impact of TRIPS Dispute Settlement?, 29 Int'l L. 99 (1995); J.H. Reichman, Universal Minimum Standards of Intellectual Property Under the TRIPS Component of the WTO Agreement, 29 Int'l Law. 345 (1995).
[87] See, e.g., Michael P. Ryan, Knowledge Diplomacy: Global Competition and the Politics of Intellectual Property (Brookings 1998).
[88] For instance, the U.S. challenged a Canadian law that allowed manufacturers to stockpile generic versions of drugs whose patent rights were about to expire so that the generic firms could begin selling products as soon as the patent expired. The WTO panel ruled that this violated the TRIPS norm that patent laws of WTO member states must grant patentees exclusive rights to make, use and sell the invention during the life of the patent. See WTO Dispute Panel Decision in United States v. Canada Concerning Pharmaceutical Patents, http://www.wto.org/english/tratop_e/dispu_e/7428d.pdf
[89] TRIPS, Art. 10.
[90] Id., Arts. 35-38.
[91] Id., Art. 27(1).
[92] The history of this and a similar treaty to protect sound recordings is recounted in Samuelson, U.S. Digital Agenda, supra.
[93] WIPO Copyright Treaty, adopted Dec. 20, 1996, WIPO Doc. CRNR/DC/94. Its sister treaty for sound recordings is WIPO Performances and Phonograms Treaty, adopted Dec. 20, 1996, WIPO Doc. CRNR/DC/96. The implications of the treaty for the new economy is discussed at length in Samuelson, U.S. Digital Agenda, supra.
[94] WIPO Copyright Treaty, Art. 12.
[95] Id., Art. 11.
[96] See supra Section xx.
[97] NII IP White Paper, supra note xx, at 49-59 (discussing licensing and the need for contract rules for online transactions); Framework, supra note xx, at 6-8.
[98] See id. at 7.
[99] Pub. L. No. 106-229, 114 Stat. 464, codified at 15 U.S.C. secs. 7001-06. See Jonathan E. Stern, The Electronic Signatures in Global and National Commerce Act, 16 Berkeley Tech. L.J. 391 (2001).
[100] For an overview of the principal features of UCITA and the main arguments supporting it, see, e.g., Raymond T. Nimmer, *Breaking Barriers: The Relation Between Contract and Intellectual Property Law*, 13 Berkeley Tech. L.J. 827 (1998); Robert W. Gomulkiewicz, *The License Is the Product: Comments on the Promise of Article 2B for Software and Information Licensing*, 13 Berkeley Tech. L.J. 891 (1998). Nimmer was the chief drafter of UCITA; Gomulkiewicz is a senior attorney for Microsoft Corp. and head of the Business Software Alliance's Working Group on UCITA.
[101] Uniform Computer Information Transactions Act, sec. 211.
[102] See, e.g., Pamela Samuelson and Kurt Opsahl, *Licensing Information in the Global Information Market: Freedom of Contract Meets Public Policy*, 21 Eur. Intell. Prop. Rev. 386 (Aug. 1999) (reviewing criticisms).
[103] See, e.g., David Nimmer, Elliot Brown, & Gary Frischling, *The Metamophosis of Contract into Expand*, 87 Calif. L. Rev. 17 (1999) (arguing that many UCITA terms would be preempted); Mark A. Lemley, *Beyond Preemption: The Law and Policy of Intellectual Property Licensing*, 87 Calif. L. Rev. 111 (1999) (discussing preemption and other doctrines likely to be employed to limit UCITA licenses).
[104] See generally Kenneth Dam and Herbert Lin, eds., National Research Council, Cryptography's Role In Securing the Information Society (1996).
[105] See 15 C.F.R. sec. 734 et seq.

[106] See, e.g., Stephen Levy, Crypto: How the Code Rebels Beat the Government—Saving Privacy in the Digital Age at 282-312 (2001) (discussing the loosening of export controls affecting cryptography during the 1990's).
[107] For a discussion of the Clipper Chip initiative and its aftermath, see, e.g., A. Michael Froomkin, It Came From Planet Clipper, 1996 U. Chi. L. Forum 15 (1996).
[108] For a discussion of key escrow systems, see, e.g., Levy, supra note xx, at 294-96; Dam & Lin, supra note xx.
[109] See, e.g., Levy, supra note xx, at 311-12 (crediting e-commerce with bringing about change in the crypto policy environment).
[110] For an insider's account, see Reed Hundt, *You Say You Want a Revolution*, Yale University Press, 2000.
[111] For a brief summary of the Act, see The Benton Foundation's review at http://www.benton.org/Policy/96act/.
[112] See http://www.speakout.com/Issues/Briefs/1164/
[113] See the October 2000 NTIA report, "Falling Through the Net", available at http://www.ntia.doc.gov/ntiahome/fttn00/Falling.htm
[114] See Telecommunications: Characteristics and Choices of Internet Users. General Accounting Office AO-01-345. February 16, 2001.
[115] For a discussion of this and other economic reasons why legal protection for personal data is warranted, see, e.g., Peter P. Swire and Robert E. Litan, None of Your Business: World Data Flows, Electronic Commerce, and the European Privacy Directive (1998).
[116] See Council Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the Protection of Individuals with Regard to Processing of Personal Data and the Free Movement of Such Data, 1995 O.J. (L281) 31.
[117] For a discussion of the extent to which U.S. law conforms to European privacy standards (and why it mostly does not), see Paul M. Schwartz & Joel R. Reidenberg, Data Privacy Law (1996).
[118] See U.S. Dept. of Commerce, International Safe Harbor Privacy Principles (2000), available at http://www.ita.doc.gov/ecom/shprin.html.
[119] See, e.g., U.S. Dept. of Commerce, Privacy and Self-Regulation In the Information Age (June 1997).
[120] See, e.g., In re Geocities (consent decree excerpts in Mark A. Lemley et al., Software and Internet Law at 991-1001 (2000)).
[121] See, e.g., Federal Trade Commission, Privacy Online: Fair Information Practices in the Electronic Marketplace, A Report to Congress, http://www.ftc.gov/reports/privacy2000/privacy2000text.pdf
[122] Framework, supra note xx, at 18-20.
[123] Id. at 18-19.
[124] Id. at 19.
[125] 47 U.S.C. sec. 223.
[126] Reno v. ACLU, 117 S.Ct. 2329 (1997).
[127] 47 U.S.C. sec. 231.
[128] Children's Internet Protection Act, codified at 20 U.S.C. sec. 9134 and 47 U.S.C. sec. 254(h).
[129] ACLU has sued to enjoin the mandatory filtering by schools and libraries receiving federal funding. The complaint is available at http://www.aclu.org/court/multnomah.pdf.
[130] Mission statement at http://www.w3.org/Consortium/