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THE FUTURE OF UNITED STATES SECURITIES REGULATION: AN ESSAY ON REGULATION IN AN AGE OF TECHNOLOGICAL UNCERTAINTY

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I have accepted an invitation to predict the regulatory future of securities markets in the United States. My acceptance is foolish for so many different reasons that I despair of counting them all. I therefore draw attention to two of the predictions I am about to offer and trust that the reader will overlook all the others. My first prediction is that my predictions will be proven wrong. My second is that having this essay appear in print is a big mistake. A printed essay creates an irrefutable record that will memorialize the stunning accuracy of my first prediction. On the brighter side, the record will then reflect that I knew that I had no chance of getting it right.

So why even embark on a mission doomed to failure? The reason is simple. There is no other responsible choice. The quality of the securities regulation regime in the United States over the coming decade hinges more critically on the ability of the Securities and Exchange Commission (SEC) to understand dramatic technological change than on any other single factor. The securities industry is, in many essential respects, an information processing industry.¹ In today's world, no competitive enterprise or regulatory agency involved in the information processing industry can develop a coherent strategy for addressing rapid technological change absent a sophisticated

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¹ See Third Report on the Readiness of the United States Securities Industry and Public Companies to Meet the Information Processing Challenges of the Year 2000 (July 1999) (explaining that the securities industry “relies heavily on computerized information processing technology”), at <http://www.sec.gov/news/studies/yr2000-3.htm>.

appreciation of the current state of the technology.² That appreciation must be supplemented by a nuanced view of how technology is likely to evolve in the future. A coherent and policy-relevant set of predictions as to the future course of technological development is essential to such a nuanced view.

Indeed, absent a carefully crafted set of predictions, the agency is bereft of any articulated expectations as to how technology is likely to impact the agency's business. Predictions of the future technological evolution of U.S. securities markets—combined with a sense of humility about the accuracy of those predictions—are therefore essential for prudent regulatory planning and action. We should be under no delusion that these predictions will be precisely accurate, but we should also be under no delusion about the need to engage in the effort to make these predictions.

Put another way, the SEC needs a technology strategy. It cannot develop a technology strategy without having an opinion (that is, a set of predictions or expectations) about the future evolution of technology and its implications for securities markets. A technology strategy need not, and should not, take the form of a fixed plan. Instead, a technology strategy is far better articulated through a flexible and evolutionary set of policies that recognize the difficulties of predicting future technological developments. Ideally, the strategy would respect natural technological and market forces, and recognize that the private sector is far better at innovation than the federal government.³ Respect for the private sector's leadership role in

² For discussions regarding the growing influence of corporate officers with technological expertise (chief technology officers (CTOs) and chief information officers (CIOs)), see Ed Scannell, *CTO's Steer Ebusiness Course*, INFOWORLD, November 15, 1999, at 44 (“[T]he balance of power for spearheading technical development is gently, but steadily, shifting to Chief Technology Officers.”), available at <http://archive.infoworld.com/cgi-bin/displayArchive.pl?/99/46/t01-46.44.44.htm>; *CIO's See a Future in the Chief Exec's Job*, COMPUTERWORLD, August 3, 2000 (predicting that many future CEO's will come from the ranks of CIO's because of increasing business importance of technological knowledge); Susan E. Fisher, *Web Redefines Role of CTO*, INFOWORLD, Nov. 29, 1999, at 100 (describing the growing demand for “individuals who can guide their companies' technology strategy with an eye on business goals”), available at <http://www2.infoworld.com/articles/ca/xml/99/11/29/991129cacto.xml>.

³ See Jim Fisher-Thompson, *Information Technology is Best Spurred by Private Sector*, U.S. Official Says, U. S. Dep't of State International Information Programs (Oct. 2, 2000) (quoting Under Secretary of State for Economic, Business and Agricultural Affairs Alan Larson that development of information technology “is

technology does not, however, mean that the agency should forego carefully selected opportunities to stimulate technological progress through the adoption of suitably tailored “technology-forcing” strategies.

This call for a technology strategy should not be misinterpreted as a criticism of the SEC’s approach to technology to date. The SEC has done a far better job of adapting to the Internet age than the vast majority of government agencies,⁴ and deserves credit for its accomplishments. Nonetheless, the pace of technological change over the coming years is likely to gain speed and technology’s implications for the future of the nation’s securities markets will only become more fundamental.⁵

In furtherance of this call for an articulated, flexible, and evolutionary technology strategy for the SEC, this essay proceeds through four distinct sections. Section I expands on my prediction that a deeper appreciation of technology is perhaps the single most important factor that will drive the agency’s success or failure in the coming decade. Section II describes four distinct regulatory approaches to technology: agencies can be technology forcing, proactive, reactive, or obstructionist. In Section III, I contend that the SEC has done a far better job than most other agencies in responding to technological change, but

being driven by the private sector), at <http://www.usinfo.state.gov/topical/global/econ/00100203.htm>.

⁴ For a general discussion of federal agencies’ adaptation to the Internet, see GENERAL ACCOUNTING OFFICE REPORT NO. AIMD/GGD-00-179, ELECTRONIC GOVERNMENT: FEDERAL INITIATIVES ARE EVOLVING RAPIDLY BUT THEY FACE SIGNIFICANT CHALLENGES, May 22, 2000; David L. McClure, GENERAL ACCOUNTING OFFICE, REPORT NO. AIMD-00-282 B-286007, ELECTRONIC GOVERNMENT: GOVERNMENT PAPERWORK ELIMINATION ACT PRESENTS CHALLENGES FOR AGENCIES. For a discussion of recent efforts to harmonize federal agencies’ internet strategies through a central government portal, see *Electronic Government: Opportunities and Challenges Facing the FirstGov Web Gateway: Testimony Before the House Subcommittee on Government Management, Information, and Technology, Committee on Government Reform* (Oct. 2, 2000) (statement of David L. McClure, Director, Information Technology Management Issues, General Accounting Office).

⁵ See *Restructuring is a Must to Survive the Global IT Boom*, WALL STREET & TECHNOLOGY, Apr. 1, 2000, at 8 (explaining that “[t]he securities industry will have to undergo significant restructuring to survive current and future waves of global information technology changes”); Ivy Schmerken, *The Big Board Pushes Wireless to End the Paper Trail*, WALL STREET & TECHNOLOGY, Dec. 15, 2000; Edward J. Nicoll, *Online Technology Changes the Game*, SECURITIES INDUSTRY ONLINE (June 28, 1999), available at <http://www.securitiesindustry.com>.

that it has been far from perfect. EDGAR⁶ serves as an example of a bold innovation that, today, stands as a legacy system that impedes technological progress. EDGAR is thus an example of how, at different times and with respect to a single initiative, the SEC has morphed from using a technology-forcing strategy to relying on a reactive or obstructionist strategy. In Section IV, I climb way out on several limbs by describing five distinct technological developments, and by predicting how those developments might evolve in a manner that implicates the regulatory regime. Unchastened by the audacity of this enterprise, I also propose a range of regulatory strategies to address each technological challenge or opportunity. Section V collects some concluding observations.

To summarize those five developments, and to whet the reader's appetite (or to save the reader the trouble of proceeding any further—take your pick), the topics I explore and suggestions I make are as follows:

EDGAR is a legacy system. It can be replaced with an open architecture model that allows for internet-based, competitive, instantaneous, and equitable disclosure of filed materials. This policy change could save taxpayers millions of dollars, and significantly improve the quality of the review and disclosure process.

The SEC should take a strong leadership role in the development of financial and accounting XML.⁷ That technology

⁶ According to the SEC:

EDGAR, the Electronics Data Gathering, Analysis, and Retrieval system, performs automated collection, validation, indexing, acceptance, and forwarding of submissions by companies and others who are required by law to file forms with the U.S. Securities and Exchange Commission Its primary purpose is to increase the efficiency and fairness of the securities market for the benefit of investors, corporations, and the economy by accelerating the receipt, acceptance, dissemination, and analysis of time-sensitive corporate information filed with the agency.

Important Information About Edgar, U.S. Securities and Exchange Commission, at <http://www.sec.gov/edgar/aboutedgar.htm>; John Penhollow, *EDGAR*, 960 *PLI/CORP.* 33 (1996) (discussing the history of EDGAR).

⁷ Norman Walsh describes XML on XML.com as follows:

XML is a markup language for documents containing structured information. Structured information contains both content (words, pictures, etc.) and some indication of what role that content plays (for example, content in a section heading has a different meaning from content in a footnote, which means something different than content in a figure caption or content in a database table, etc.). Almost all documents have some structure. A markup language is a mechanism to identify

can help resolve a host of serious accounting and disclosure issues that cannot be addressed with today's "one-size-fits-all" accounting regime.

The agency should adopt an open-architecture "peer-to-peer" strategy (also described as an open API-structure) to address the fragmentation and competition concerns that are raised by the Electronic Communications Networks ("ECN") revolution⁸ and other new trading technologies.

A host of technological tools can be readily adapted to resolve emerging concerns regarding suitability in the electronic brokerage space. These solutions need not trigger a battle over whether e-brokers are engaged in making recommendations.

The SEC and the self-regulatory organizations ("SRO's")⁹ can be far more helpful in fostering the use of authentication technologies to help deter counterfeit disclosures over the Internet that rely on the ability to "spoof" an authentic source, such as the disclosures that influenced Emulex, Lucent, and Pairgain stock prices.¹⁰

These five examples hardly cover all the bases when it comes to developing an evolutionary technology strategy. They do, however, illustrate some of the key issues that will have to be

structures in a document. The XML specification defines a standard way to add markup to documents.

Norman Walsh, *A Technical Introduction to XML* (Oct. 3, 1998), at <http://www.xml.com/pub/a/98/10/guide0.html>; see also *infra* note 37.

⁸ The past three years has seen the development of nine major Electronic Communications Networks, which handle an estimated 34% of NASDAQ volume and 3% to 4% of trading on the New York Stock Exchange. See Deborah Radcliff, *Trading Nets Give Exchanges A Run for Their Money*, *COMPUTERWORLD*, Dec. 18, 2000, at 20.

⁹ See Elizabeth I. Sanchez, *SEC Rejects Bid to Fully Relinquish Authority Over Pre-need Firms*, *BUSINESSWORLD*, Nov. 20, 2000, at 15 (quoting SEC chairperson Lilia Bautista that self-regulatory organization status "is a privilege granted to institutions to be able to formulate their own policies and monitor the activities of their members").

¹⁰ Shares of Emulex fell 60% in August 2000 after dissemination of a counterfeit online company press release containing damaging information about the company. See Terzah Ewing et al., *Bogus Report Sends Emulex On a Wild Ride*, *WALL ST. J.*, Aug. 28, 2000, at C1. Stock of Lucent Technologies fell 5% after a dozen false postings were made to an Internet discussion board. See David Leinweber, *The Internet and Financial Markets: Democracy or Anarchy?*, *SECURITIES WK.*, Nov. 6, 2000, at 8. A former employee of Pairgain Technologies directed bulletin board visitors to a false Bloomberg report that sent the stock price up 31%. See Kevin A. O'Brien, *The Fight Against Cyber-crime*, *JANE'S INTELLIGENCE REV.*, Dec. 1, 2000, available at 2000 WL 11960958.

addressed by the SEC in the coming years as technology evolves to create new opportunities and challenges.

I. TECHNOLOGY AND THE FUTURE OF SECURITIES REGULATION

Financial markets are more susceptible to technological change than virtually any other major market in the world. The logic in support of this proposition is straightforward, and recent experience amply supports this prognostication.¹¹

The pace of technological change is fastest in the information technology sector. Whether we are talking about broadband, MIPS¹², or cost of storage, the trajectory is in a single direction: better, faster, cheaper, sooner. At root, the financial securities industry is nothing more than a vertical application of the information technology industry. As applied to the financial services industry, the trends toward better, faster, cheaper, sooner are so powerful that they have revolutionized the industry in a relatively short period of time, and there is every reason to believe that this pace of change will, if anything, increase.¹³

The observation that the financial services industry is merely a vertical application of a much larger information technology sector is essential to an appreciation of the vulnerability of securities to technological change. Consider, for example, the process of clearance and settlement.¹⁴ It was once an intensely physical process employing small armies of

¹¹ As SEC Director of Enforcement Richard H. Walker explained, "[w]hat used to require a network of professional promoters and brokers, banks of telephones and months to accomplish can now be done in minutes by a single person using the Internet and a home computer." *SEC Continues Nationwide Crackdown Against Internet Fraud, Charging 33 Companies and Individuals With Fraud For Manipulating Microcap Stocks*, Exchange Act Release No. 2000-124 (Sept. 6, 2000), available at <http://www.sec.gov/news/press/2000-124.txt>.

¹² MIPS, short for million instructions per second, is a measure of the computing power needed to compress a voice signal for compression over a high-speed broadband network. See Nathan Stratton, *Integrated Voice and Broadband Network*, Nathan Stratton's Homepage, at http://www.robotics.net/papers/integrated_voice.html (Dec. 6, 2000).

¹³ See, e.g., *Virtual Rivals*, THE ECONOMIST, May 20, 2000, at 1 (U.S. ed.) (describing how the revolution in information technology is transforming the financial services industry).

¹⁴ Clearance and settlement is the process by which securities trades are finalized. Under the SEC's current clearance and settlement rule, trades are given a three-day grace period to clear. See *SEC Raises Stakes on Trade Turnaround*, INVESTOR REL. BUS., Dec. 4, 2000, available at 2000 WL 8692751.

messengers and runners, with clerks locked in cages in the basements of tall, ominous-looking buildings, and armies of messengers routing certificates from building to building. Today, however, the vast majority of securities ownership positions are documented in electronic book-entry form.¹⁵ When a purchase or sale of a security takes place, the only physical thing that happens is the transfer of bits and bytes of data among databases. There are no messengers scurrying about with certificates to be delivered. Hard disks whirl and the transfer is done. It's all information technology.

This purely electronic form of transaction strongly differentiates the financial services sector from other forms of commerce that, at the end of the day, require the movement of physical things in order to achieve clearance and settlement. For example, when you use the Internet to buy a book, to select groceries, or to lease an automobile, an irreducible percentage of the cost of the transaction arises from the need to move a physical thing that does not exist in purely electronic form. The book (unless it's an e-book) has to be mailed. The car has to be shipped (there are no e-cars). The groceries have to be delivered (got e-milk?). That need for physical movement places a very important limit on the efficiencies that modern technology can deliver to markets that engage in physical transactions. In financial markets, however, those physical limits do not exist because there is no physical thing to be delivered. The security is, in and of itself, pure information just waiting to be processed.

Indeed, the cost savings potentially attributable to modern technology make it perfectly reasonable to think of a world in which brokers charge no commissions and transactions costs are driven to their economic marginal cost—zero. In that world, intermediaries will be paid for providing a host of ancillary record keeping, advisory, and management services. It is a world in which the economics of the brokerage business will look much more like the money management and principal investing business than a traditional wirehouse commission-based business. This is not a very bold prediction because commission-

¹⁵ Book entry refers to a system of direct securities registration, allowing investors to hold their shares in book form through transfer agents instead of certificates. *See id.* (explaining that “[a]lthough many registered investors have consented to ‘book entry’ records of their holdings, others still prefer to hold actual share certificates”).

less trading already exists, and many major financial institutions understand that they have to retool their strategies in this direction.¹⁶

The securities markets are highly sensitive to the evolution of technology for a second fundamental reason. The efficiency of securities markets depends on the rapid incorporation of information into securities prices, as well as on the evolution of new mathematical techniques for calculating and implementing inter-market arbitrage relationships.¹⁷ Because rapid information incorporation and mathematical advances are both driven by technological progress, the means by which the markets will estimate the value of individual securities will change dramatically as technology evolves.

The speed with which markets learn new information is highly sensitive to technological developments. The ability to discover and implement ever more complex inter-market arbitrage relationships also depends critically on technological progress. Advances in mathematical techniques and the ability to implement these techniques are also apparent in several new financial strategies and products that can dramatically change the investment process. For example, exchange traded funds are possible only because information technology makes it sufficiently cheap to implement arbitrage relationships that allow these funds to track their target indexes very efficiently.¹⁸ The emergence of these funds on a retail basis may provide U.S. investors with entirely new strategies for building and maintaining investment portfolios.

Combining these observations leads to a straightforward

¹⁶ See Cassell Bryan-Low, *Web Brokers Begin to Offer No-Commission Stock Trades*, WALL ST. J., June 19, 2000, at C1.

¹⁷ See John D. Ayer, *The Role of Finance Theory in Shaping Bankruptcy Policy*, 3 AM. BANKR. INST. L. REV. 53, 55-56 (1995) (discussing the role of arbitrage in efficient markets).

¹⁸ For general discussions of exchange traded funds, see Julie Allecta, *Exchange Traded Funds: WEBS, SPDRS, Diamonds, NASDAQ 100, Opals and Others*, SE91 A.L.I.-A.B.A. 283 (2000) (explaining that exchange traded funds, or ETF's, "are derivatives or baskets of securities that generally track a well-known index or industry sector and at the same time, trade like a share of common stock"); Robert S. Salomon Jr., *The Virtues of ETF's*, FORBES, October 2, 2000, at 206 (explaining several advantages and disadvantages inherent in dealing with exchange traded funds); Burton G. Malkiel, *Investors Shouldn't Fear "Spiders,"* WALL ST. J., May 30, 2000, at A26 (describing the "enormous growth" and "unique advantages" offered by ETF's).

conclusion. Securities regulation is all about information regulation. The information may represent news that moves securities prices, ownership records, announcements of bids and offers, new forms of instruments, or evidence of transactions. It doesn't make a difference. At bottom, it's all about information and the movement of bits and bytes. It follows that the SEC is in the information regulation business whether it wants to be or not.

Participants in the information technology business understand that they cannot succeed unless they have an informed view about where information technology stands today and where it might evolve in the future. The SEC must have such a view as well or it will become a passive reactor to technological change and run an unnecessary risk of failure. In order to develop an effective technology strategy, however, a market participant must have a set of predictions about the probable evolution of technology and develop a plan for adapting to those anticipated changes.

In developing a technology strategy, it is important to recognize that "doing nothing" can be an intelligent and optimal regulatory approach. But an agency can find itself "doing nothing" either out of: (a) ignorance, (b) indecision, or (c) as a consequence of a rational plan. If an agency succeeds because it has "done nothing" as a consequence of its own ignorance or indecision, then it has been lucky. There is nothing wrong with good luck, and I would certainly rather be lucky than smart. Unfortunately, it's dangerous to build a strategy around good luck.

Finally, when developing a technology strategy, it is important to recognize that today's reasonable judgment can be tomorrow's horrible blunder. Technology evolves rapidly. One of the biggest mistakes a competitor or regulator can make is to commit to a policy that is expensive to reverse or that allows for little further growth or adaptation. Regulators have to learn to keep technology options open. Consider the growth of the Internet over the past five years. Very few people would have come close in 1995 to predicting the growth of Internet technology by 2000. Predicting the path of the Internet from the year 2000 until the year 2005 is at least as difficult. Accordingly, it would be very dangerous to build a regulatory strategy that was overly sensitive to any set of predictions about

technological progress, and it follows that flexibility and reversibility are central values when it comes to designing a technology strategy. Given a choice between a strategy that maps out a relatively inflexible path for the future and one that allows for the evolution of new options, the choice is easy—flexibility should prevail.

II. FOUR REGULATORY APPROACHES TO TECHNOLOGICAL CHANGE

Regulatory agencies and legislators tend to adopt one of four approaches when confronted with the prospect of technological change. These approaches can be labeled as technology forcing, proactive, reactive, or obstructionist.

Regulators and legislators are most obviously “technology-forcing” when they adopt standards based upon technology that does not exist at the time of their action. Technology-forcing standards are designed to induce an industry to develop and implement technology that would otherwise not be forthcoming, or that would be implemented at a far slower pace. Automobile efficiency standards are perhaps the best example of a technology-forcing regulatory strategy. Effective adoption of such strategies, however, requires a fairly good grasp of realistic technological possibilities and of the realistic costs of achieving the necessary technological breakthroughs on the timetable mapped out by regulation.¹⁹

¹⁹ For example, the 1970 Clean Air Act required automobile emissions to be reduced by 90% in five years, despite the fact that Congress understood that “the technology . . . did not yet exist, might not be available by the deadline, and had an unknown cost.” Eric Biber, *Exploring Regulatory Options for Controlling the Introduction of Non-Indigenous Species to the United States*, 18 VA. ENVTL. L.J. 375, 400 n.152 (1999) (quoting ROBERT V. PERCIVAL, ET. AL., ENVIRONMENTAL REGULATION 842 (2d ed. 1996)). The requirements were finally met in 1981. *See id.* Another example of technology forcing is the automobile airbag. The Department of Transportation began to develop and implement standards for “passive occupant restraint systems” in 1966, even though the technology was not yet available. *See* Alan Heinrich, Karl Manheim & David J. Steele, *At the Crossroads of Law and Technology*, 33 LOY. L.A. L. REV. 1035, 1036 n.1. The National Highway Traffic Safety Administration (“NHTSA”) historically engaged in very active technology-forcing rulemaking, requiring improvements in auto safety that were in the vanguard of current technology. The NHTSA has more recently moved toward a reactive strategy of issuing recalls for safety defects. Frank B. Cross, *Pragmatic Pathologies of Judicial Review of Administrative Rulemaking*, 78 N.C. L. REV. 1013, 1025 (2000) (“Because of difficulties with judicial review . . . NHTSA had problems promulgating rules requiring safety improvements in cars and therefore shifted to a

Proactive regulatory responses describe situations where regulators do not force the market to develop technology more quickly or in a different direction. Rather, proactive regulatory responses rapidly adopt new technologies, promote the evolution of technology in whatever direction the market determines, or quickly adjust their regulatory regimes to recognize the evolution of new technology. Government agencies that have promptly and effectively built websites designed to take advantage of Internet technology can be described as proactive.²⁰ Research and development tax credits and other technology incentives are also often described as proactive strategies.²¹

Reactive technology responses describe situations in which the marketplace has *de facto* adopted new technological standards ahead of the regulatory regime, and the agency is lagging the market it regulates. In this situation, the regulators may find themselves applying regulatory standards that are outmoded, or using technology that has been surpassed in the private sector. The well-publicized technology problems experienced by the IRS are an example of the difficulties of a reactive approach. Indeed, the entire problem that the IRS encounters when seeking to enforce the tax code against sophisticated market participants who aggressively seek to use financial technology to structure tax-avoidance transactions can also be viewed as characteristic of a reactive stance to technology.²²

program of recalls for automobile defects.”); see generally JERRY L. MASHAW & DAVID L. HARFST, *THE STRUGGLE FOR AUTO SAFETY* 69–105 (1990) (documenting the NHTSA’s evolution from technology-forcing to passivity in its regulation of automobile manufacturers).

²⁰ The Treasury Department’s Treasury Direct program, which allows any individual to buy and hold treasury securities through the Internet without the intermediation of a broker, is perhaps a good example of proactive government use of technology. The Treasury Department has received a few good reviews for its efforts to make its securities available to all investors over the Internet. See, e.g., Albert B. Crenshaw, *U.S. Savings Bonds Go High-Tec; Securities Available On-Line, Via Credit Card, 24 Hours a Day*, WASH. POST, November 7, 1999, at H2.

²¹ Another example of a proactive regulatory approach to technology is recent proposed legislation designed to support and encourage the use of digital signature technology in electronic commerce. See generally Kalama M. Lui-Kwan, *Recent Developments in Digital Signature Legislation and Electronic Commerce*, 14 BERKELEY TECH. L.J. 463 (1999).

²² IRS Commissioner Rossotti has himself acknowledged that the IRS is “really an agency out of date.” Heather B. Conoboy, *A Wrong Step in the Right Direction: The National Taxpayer Advocate and the 1998 IRS Restructuring and Reform Act*, 41 WM. & MARY L. REV. 1401, 1421 n.126 (1999–2000). For discussions of IRS

Obstructionist responses result when regulators are either overtly opposed to certain technological developments or are so non-responsive that their inaction impedes the evolution of a technology. The fact that an agency is obstructionist does not, however, mean that the agency is wrong. New technological developments are not always beneficial. If an agency forms the view that a new technology presents a sufficient hazard then it should actively seek to shut that technology down. For example, if a new pharmaceutical or medical procedure has side effects that are sufficiently serious when weighed against the technology's benefits, then the Food and Drug Administration would be correct to take regulatory action to block the use of that new technology. On the other hand, obstructionist approaches to technology can be self-defeating. The French approach to regulating the Internet is a charming example of a fundamentally obstructionist strategy doomed to the fate of an electronic Maginot Line.²³

While it may be possible to draw some crisp distinctions between technology-forcing strategies and other strategies, there are no bright lines that distinguish proactive strategies from reactive strategies. There are also no bright lines that distinguish between reactive and obstructionist strategies. These are matters of degree. Moreover, because individual agencies can confront a broad range of technological challenges at the same time, an agency can simultaneously find itself implementing technology-forcing strategies in some areas while seeking to obstruct technology in others.

technological problems, see John Connor, *Report Says IRS Modernization Plan Suffers From Lack of Technical Skill*, WALL ST. J., January 22, 1996, at B5 (summarizing National Research Council report which paints gloomy picture of state of IRS efforts to modernize itself); Tom Herman, *Tax Report: A Big Contract Will Soon Be Awarded by the IRS*, WALL ST. J., Dec. 2, 1998, at A1; James J. Hall, *Critics Blast IRS' Tax System Modernization Program*, WEST LEGAL NEWS (APRIL 12, 1996), 1996 WL 259761.

²³ See Patrick Bishop, *Jospin Calls for Internet Regulations*, THE DAILY TELEGRAPH (London), May 16, 2000, at 17 (explaining French Prime Minister Lionel Jospin's position that self-regulation of the Internet cannot combat child pornography and racism). One well-known instance of aggressive French regulation of Internet content is a recent French court decision that prohibited Yahoo! from allowing online sales of Nazi memorabilia through its U.S. auction site. The court held that Yahoo! had offended the "collective memory" of France by permitting such sales. See *French Court Says Yahoo Broke Racial Law*, N.Y. TIMES, May 23, 2000, at C27.

III. THE SEC'S HISTORIC APPROACH TO TECHNOLOGY

The SEC's track record in responding to technological change may well be among the best of any federal agency to date. That record is, however, far from perfect, and much can be learned from the agency's shortcomings in dealing with technology. Those shortcomings are attributable, I believe, to two dominant factors.

First, the agency has never had a coherent technology strategy. Although it is possible to point to situations when the agency has been technology-forcing (EDGAR and decimalization are two good examples),²⁴ it is easier to find situations where the agency has been reactive or obstructionist because of an inability to respond to new technological developments or because of a fear of change, and not necessarily because of a conscious and reasoned policy decision to defer a response.²⁵

Second, the agency's staff has lacked sufficient technological expertise. Given the pace of technological progress and the tremendous value that can be added by a neutral third-party standard setter, there will likely be increased opportunities for the agency to act in a beneficial technology-forcing role. Unless, however, the agency adds a new set of technology skills to its repertoire, it is unclear that it will be able to capitalize on this opportunity. An agency dominated by lawyers and an occasional economist may not have the necessary skill mix, and the time may be ripe to add a core group of technologists to the agency's staff.²⁶

These two shortcomings are closely related and they create a natural bias in favor of reactive and obstructionist strategies. If there are few people in the agency who pay detailed attention to the evolution of new technology and to its implications for the markets, then it is all but inevitable that the agency will be reactive or obstructionist because it does not know how to be technology-forcing or proactive. This natural tendency will

²⁴ See Wayne Upton, *Financial Statements: Capitalizing on the Web's Power for Financial Reporting*, 1999 AM. BANKR. INST. J. 5 (1999), available at 1999 ABI JNL LEXIS 5, *3; Henriquir de Azevedo Ferreira Franca, *Legal Aspects of Internet Securities Transactions*, 5 B.U. J. SCI. & TECH. L. 4, 7 (1999).

²⁵ See Upton, *supra* note 24, at *3.

²⁶ For an example of the agency's lack of staff expertise, see Roberta S. Karmel, *Internet Prospectus Issues and Recent SEC Resolutions*, N.Y. L.J., June 15, 2000, at 3 (suggesting that "the SEC may be forced to rethink its basic approach" to Internet prospectuses).

prevail even if the agency occasionally acts in a bold and imaginative manner. Given that observation, it is interesting to consider one of the most technology-forcing events in the SEC's history and its fate since its inception. The tale is worth telling because it is a timely example of how a technology-forcing strategy can, due to forces that may well have been beyond anyone's control, morph into a reactive or even obstructive strategy.

EDGAR is the biggest technology bet ever made directly by the SEC.²⁷ When first conceptualized by SEC Chairman John Shad in the mid-1980's, EDGAR was clearly a technology-forcing strategy. The underlying vision was to replace the mountains of paper that flowed through the SEC with an electronic filing and dissemination system that would facilitate the registrant's filing obligations. The same system would also ease the staff's review process and facilitate the public's prompt access to information. To achieve this objective, the agency mandated that certain filings would have to be submitted electronically or not at all.²⁸

Given the technology available at the time, and in light of serious budgetary constraints, the agency developed a strategy that relied on a centralized database with preferential information access provided to the contractors who built the database.²⁹ The contractors received preferential access to help them recoup their development and operational costs. The result today is a legacy system that seriously lags available technology. While the system is quite functional, it is but a pale shadow of the system that could be designed and built from scratch today.³⁰

To be fair, no one in the mid-1980's could have predicted the rapid advance of Internet technology in the 1990's. It would therefore be wrong to criticize the agency for having failed to predict a future that no one else was able to predict with any confidence at that time. Further, there is probably little doubt

²⁷ See generally John Penhollow, *EDGAR*, 960 PLI/CORP. 33 (1996) (outlining detailed history, compliance procedures, and analysis of EDGAR system).

²⁸ See *id.*

²⁹ See *id.*

³⁰ For general discussions of the SEC's ongoing efforts to modernize EDGAR, see *Rulemaking for EDGAR System*, 2000 SEC LEXIS 799, SEC Release Nos. 33-7855, 33-42712, 35-27172, 39-2384, IC-24400 (April 24, 2000); *Rule Changes Adopted in EDGAR Modernization Effort*, 32 Sec. Reg. & L. Rep. (BNA) 569 (May 1, 2000); *EDGAR News: Upcoming SEC Plans for EDGAR*, at <http://www.sec.gov/edaux/news/edplan2.htm> (last modified Oct. 18, 2000).

that the agency is better off today with the EDGAR system—flaws and all—than without it.³¹ Nonetheless, the agency has failed to update the system as quickly as it might in order to help the system adapt and respond to changed technology.³² The EDGAR experience thus stands as a testament to both the potential value of intelligently applied technology-forcing regimes and to the dangers of regimes that are insufficiently flexible and adaptive. Given the rapid pace of future technological developments and the potential benefits of technology-forcing approaches, the EDGAR experience may well have lessons that reach far beyond the registration system's narrow domain.

IV. PREDICTIONS OF TECHNOLOGICAL ADVANCES AND POTENTIAL AGENCY RESPONSES

To this point, my observations about the SEC's approach to technology have been abstract and exhortative. I have suggested that technology poses the greatest challenge to the agency's success, that the agency needs a technology strategy together with a staff that contains more technologically inclined personnel, and that the future will present increased opportunities for technology-forcing strategies. That is all well and good; however, the rubber doesn't hit the road until someone presents specific examples of how a technology strategy might influence the agency's actions and the markets it regulates.

Toward that objective, I present five distinct areas of securities regulation related to technology and present specific recommendations and predictions with respect to each.

A. *EDGAR Should be Redesigned as an Open Architecture System*

As previously discussed, EDGAR is today a legacy system based on outdated technology.³³ The Commission should re-

³¹ See Upton, *supra* note 24, at *3.

³² For an example of criticism of even the most recent and most "web-friendly" version of EDGAR, see Cary Griffith, *The Modernized Edgarlink Proves to Be Anything But*, CORP. LEGAL TIMES, Nov. 2000, at 22.

³³ EDGAR has been criticized for being years behind schedule, millions of dollars over budget, and devoid of effective top management to oversee the system. See *SEC System Shows Need for Upgrades*, USA TODAY, March 4, 1996, at 2B (reporting a congressional study that "the EDGAR system needs more flexible computer 'architecture' to keep pace with technology and market developments");

invent EDGAR and replace it with an open architecture system³⁴ that provides improved service to users, filers, and to the staff. This open architecture system could also save the government millions of dollars that are currently spent operating the EDGAR system as currently configured.

One possible implementation of an open-architecture "new-EDGAR" system would be as follows. The SEC begins by defining Designated EDGAR Filing Sites ("DEFS"). DEFS would be operated by private entities and would have to satisfy physical and electronic security and performance standards established by the SEC. DEFS would be subject to third party audit compliance procedures implemented by the SEC staff or others to ensure that they comply with the SEC's security, authentication, time-stamping, and other standards. DEFS could also be required to post bond or provide other assurances of responsibility and viability. There would be no limit on the number of DEFS that could be established and any entity that satisfies the SEC's standards could be qualified as a DEFS.

Filers would transmit their filings to any DEFS that the filer selects. The DEFS site receiving the filing would be able to charge a fee. The fee would be determined by competitive market forces and would reflect the quality of the service offered by the DEFS over and above the minimum standards set by the SEC. The filing could be made immediately available to the public upon receipt by a DEFS, and a copy could be transmitted to the SEC for storage in the SEC's master database of filed materials. Alternatively, the filing could be "embargoed" until a copy was received at the SEC's database and the DEFS received electronic notification of the agency's receipt, as well as SEC authorization to release the filing to the public. As a technical matter, it would not be necessary for the SEC to maintain such a database, but the agency might insist on having the electronic equivalent of its own "physical copy." To prevent fragmentation of the public filing database, every DEFS would have the right to sweep all other DEFS in order to copy filings made at other

GAO and Dingell Find SEC's Answers for Delay in Completion of EDGAR Unacceptable, SEC. WK., Feb. 8, 1993, at 4.

³⁴ Open architecture systems are assembled with industry-standard equipment supplied by several vendors; whereas proprietary systems are not based on industry standards and are supplied by a single vendor. See Deborah Novachick, *Strategies for Automation Management and Staffing*, CONN. L. TRIB., Aug. 12, 1991, at 19.

DEFS, and every DEFS would have an obligation to notify all other DEFS of filings made on its system. Such sweeps and real-time notifications would allow competitors to build multiple complete and competing filing databases. These filings could use the latest technological advances, including video, audio, and the most recent forms of XML tagging,³⁵ if they complied with the agency's minimum performance standards and did not generate incompatibilities among DEFS.

The DEFS would neither require nor receive financial support from the SEC for providing their services. The agency's expenditures on new-EDGAR could then be reduced to: (1) the cost of defining the performance standards that govern DEFS operations (which would be minimal and comparable to a rulemaking process); (2) the cost of inspecting DEFS to ensure compliance (a function that could be outsourced, if so desired); and (3) the cost of operating a database that simply mirrors the filings posted to DEFS, and that could be ready to operate as the "DEFS of last resort" in the event that the competitive marketplace failed to develop. Costs could be lowered further by relying on the filings made at DEFS without replicating the highly authenticated information that would reside in DEFS' sites. That would, however, eliminate the agency's ability to act as "DEFS of last resort," and might be viewed as an overly extensive reliance on outside contractors.

A similar structure currently exists in the Northern District of California, where Local Rule 23-2 requires that certain filings in class action securities fraud cases be posted on the Internet at "Designated Internet Sites;" these sites are self-certified and satisfy court-established performance criteria.³⁶

³⁵ For an explanation of XML tagging, see *infra* note 37.

³⁶ Rule 23-2, entitled "Electronic Posting of Certain Documents Filed in Private Securities Actions" states:

(a) Electronic Posting. All postable documents, as defined in subsection (b) of this rule, required to be filed pursuant to Civil L.R. 5-1 in any private civil action containing a claim governed by the Private Securities Litigation Reform Act of 1995, Pub. L. No. 104-67, 109 Stat. 737 (1995), must be timely posted at a Designated Internet Site. The party or other person filing such document is responsible for timely posting.

(b) Postable Documents. For purposes of this Rule, "postable documents" means:

(1) Any pleading specified in FRCivP 7(a);

(2) Any briefs, declarations or affidavits filed pursuant to FRCivP 12, 41 or 56;

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- (3) Any briefs, declarations or affidavits relating to certification of a class pursuant to FRCP 23;
 - (4) Any briefs, declarations or affidavits relating to designation of a lead plaintiff pursuant to 15 U.S.C. §§ 77z-1(a)(3) or 78u-4(a)(3);
 - (5) Any report, statement, declaration or affidavit of an expert witness designated to testify, whether filed pursuant to FRCP 26(a)(2)(B), or otherwise;
 - (6) Any pretrial conference statement pursuant to Civil L.R. 16-10, pretrial briefs or motions in limine;
 - (7) Any filing concerning approval of a settlement of the action; and
 - (8) Any filing concerning any request for attorney fees or costs.
 - (9) Provided however, that no person shall be required by this Rule to post any:
 - (A) Document which is filed under seal with the written consent of the Court, whether pursuant to a pre-existing written confidentiality order, or otherwise; or
 - (B) Exhibits, appendixes or other attachments to documents otherwise required to be posted; or
 - (C) Briefs, declarations or affidavits which are not available in electronic form in the possession, custody or control of the person filing the document, or such person's counsel, agents, consultants or employees.
 - (c) Timely Posting. A postable document shall be deemed timely posted at a Designated Internet Site in accordance with subsection (a) of this rule if, on the day the document is filed with this Court:
 - (1) An electronic form of the filing, prepared in any commonly used word processing format, is forwarded to a Designated Internet Site by electronic transmission, e-mail, physical delivery of a diskette, or any other means acceptable to that Designated Internet Site, provided that such electronic delivery occurs by means reasonably calculated to result in delivery by the third day following the filing; and
 - (2) The certificate of service required by Civil L.R. 5-6 states that service in compliance with this rule has been accomplished to a Designated Internet Site that is identified by its physical and electronic addresses.
 - (d) Designated Internet Site. "Designated Internet Site" for purposes of this rule means an Internet site that:
 - (1) Is accessible at no cost to all members of the public who are otherwise able to access the Internet through commonly used web browsers;
 - (2) Charges no fee to any party, intervenor, amicus or other person subject to the provisions of this rule;
 - (3) Places no restrictions on any person's ability to copy or to download, free of charge, any materials posted on the site pursuant to the requirements of this rule;
 - (4) Maintains and responsibly operates a notification feature whereby any member of the public can request to receive e-mail notification, at no charge, of any posting of materials to the Designated Internet Site;
 - (5) Undertakes to post on its site within two days of receipt of the electronic copy all filings forwarded to it;
 - (6) Undertakes to provide e-mail notification within one day of receipt of the electronic copy to all other Designated Internet Sites informing them of the posting of any materials related to securities class action litigation;
 - (7) Maintains and publicizes a physical address to which the United States Postal Service or other commonly used delivery services can make physical

B. The SEC Should Adopt a Technology-Forcing Approach to XML

"XML" is shorthand for extensible mark-up language. It describes a technique for the consistent tagging of information so as to allow the construction of larger databases that provide for "apples-to-apples" comparisons.³⁷ For example, if "reserves for doubtful accounts"³⁸ were consistently tagged in all financial

delivery of documents, and/or diskettes, an Internet address in the form of an operational Uniform Resource Location ("URL"), and an e-mail address to which persons subject to paragraph (a) of this rule can transmit electronic copies of documents subject to the posting requirement of this rule;

(8) Undertakes to disclose prominently the URLs, physical addresses, and facsimile numbers of all other Designated Internet Sites known to it; and

(9) Submits to the Secretary of the Securities and Exchange Commission (the "Secretary") a statement signed by a member of the bar that: identifies the Designated Internet Site through its URL; provides the name, address, telephone number, facsimile number and e-mail address of one or more persons responsible for operation of the site; and attests that the site satisfies the requirements of the rule and that it will promptly notify the Secretary should it cease to be a Designated Internet Site.

(e) Suspension of Posting Requirements. Compliance with this rule is not required for any document filed at any time during which no Designated Internet Site is operational

CIV. L.R. 23-2 (N.D.Cal.), available at <http://www.securities.stanford.edu/pslra/ndcal/locrules.html>; see also Sylvia L. Sironi, *Securities Regulation: Information Initiative on the Internet*, 50 ADMIN. L. REV. 255, 256-57 (1998) (arguing that the Northern District's Local Rule 23-2 "effectively advances the goals of the Reform Act" and provides "collateral benefits as an excellent informational tool for practitioners, legislators, and investors").

³⁷ XML is perhaps most easily understood as an improved and more powerful relative of HTML ("Hypertext Markup Language"), the language used to create Web pages. Because XML, unlike HTML, is extensible, it is possible to define different versions of XML for use with different kinds of documents. A specialized version of XML for SEC filings would allow given pieces of text in the filing to be unambiguously specified. For example, XML could specify that the words "Morgan Stanley" at the bottom of the prospectus cover page refer to the name of the lead underwriter. Users would then be able to search a database of SEC filings for documents where Morgan Stanley is the lead underwriter, and the search will not turn up any documents where the text "Morgan Stanley" appears in other contexts. An XML-based filing standard would result in a more customizable and adaptable search capability for a database of SEC filings. For discussions of the advantages of XML-based electronic filing standards in both legal and administrative agency contexts, see Robert Plotkin, *Electronic Court Filing: Past, Present, and Future*, 44 JUN B.B.J. 4 (2000); Claire Barliant, *XML Revolution: Worth the Trouble*, LEGAL TIMES, Oct. 2, 2000, at 30; *Patent Office Turns to XML*, INFO. WK., Oct. 9, 2000, at 40.

³⁸ For a general discussion on reserves for doubtful accounts, see GEORGE S. HILLS, *THE LAW OF ACCOUNTING AND FINANCIAL STATEMENTS* § 2.6, at 70 (1957).

statements filed with the SEC, then it would be easier to construct larger databases that could be used to search for companies with unusually high or low reserves, or that have displayed unusual growth or decline in the size of their reserves.

The problem with XML is that it requires a central authority (or an acceptable consensus mechanism) to establish a "dictionary" or "grammar" that ensures that the same tag has the same meaning in all applications. It is also important that the tagging process remain dynamic so as to allow the creation of new tags as novel circumstances arise, much as languages must allow for the definition of new words.

Insofar as XML can be used in accounting statements and SEC filings, the agency is the natural arbiter of a neutral XML standard. There are several reasons why the SEC should step to the plate to perform this role as quickly as possible.

The benefits of an SEC-standardized version of financial account and reporting XML are significant. Users of financial statements often strip those statements down and reconstruct them in order to provide a representation of the registrant's financial position that they believe is more meaningful than the GAAP-consistent statements mandated by the SEC.³⁹ XML would facilitate that process dramatically. XML could also allow users to incorporate more readily into their view of the financial statements—information that is now buried in the footnotes. For example, if a user wanted to deduct information regarding the estimated cost of option compensation for an issuer's estimated earnings per share, XML would allow the user to do so quite easily by simply extracting the tagged footnote data.

This last observation is fundamental. XML, if properly deployed, would allow the market to divide the financial reporting process into two distinct functions: (1) the accurate measurement of data that are XML tagged, and (2) the rules for aggregating those data into financial statements. Because the process of aggregating the data into alternate versions of income statements, cash flow statements, and balance sheets would become far cheaper and easier than it is today, the market would likely evolve its own set of aggregation protocols.⁴⁰ These

³⁹ See Bill Alpert, *The Numbers Game: Reporting of Pro Forma Earnings is Rising, and so is the Debate About It*, BARRON'S, Sept. 11, 2000, at 22.

⁴⁰ Other industries have attempted to use XML as well. See Lynda Radosevich, *Health Care Uses XML for Records*, INFOWORLD, Aug. 25, 1997, available at

protocols could co-exist with SEC and Financial Accounting Standards Board ("FASB") requirements,⁴¹ thereby enhancing the analysis process without requiring any material changes to current forms of GAAP or GAAS.⁴² Moreover, XML would dramatically reduce the cost of allowing management to present its own preferred view of its own financials, along with an explanation of its views and, simultaneously, enhance the market's ability to criticize management's self-assessment as unrealistic. The evolution of XML tagging would therefore greatly facilitate public understanding of managements' views of issuers' financials and simultaneously promote the dissemination of the views held by managements' critics.

If XML tagging is properly implemented, it could become a significant boon to the agency's strategy of open and full disclosure. XML would dramatically reduce the cost of building alternative perspectives of any issuer's financial statements, and promote a vigorous and robust market-based debate over the proper approach to market valuation. Indeed, because XML tagging is easily expanded to cover items that are not currently captured in financial statements—such as measures of intellectual capital, including the number of: patents issued, engineers on staff, and eyeball views per month—an XML approach would also be responsive to calls for expanding the traditional approach to accounting and could be implemented without abandoning the traditional approach.⁴³ XML may thus constitute the best "growth path" available to the agency when dealing with the serious accounting issues it faces today.

<http://www.infoworld.com/cgi-bin/displayStory.pl?features/970825xml.htm>. For a detailed explanation of how XML can be utilized, including its advantages and disadvantages, see Winchell "Todd" Vincent, III, *XML and the Legal Foundations for Electronic Commerce: Legal XML and Standards for the Legal Industry*, 53 SMU L. REV. 1395 (2000).

⁴¹ For general background on the relationship between SEC and FACB requirements, see Reid Anthony Muoio, *An Independent Auditor's Suit for Wrongful Discharge*, 58 ALB. L. REV. 413, 419 (1994).

⁴² See Note, *The Opinion Shopping Phenomenon: Corporate America's Search for the Perfect Auditor*, 53 BROOK. L. REV. 1077, 1078 (1986) (discussing how GAAP principles can be manipulated in order to please upper management).

⁴³ A FASB-sponsored committee recently completed a two-year project studying how investors and other users of financial information could get a broader, deeper view of a company's operations by including nontraditional information in companies' financial statements. See Steve Burkholder, *FASB Panel Gives Tentative Nod to Report Regarding Nontraditional Business Disclosure*, 32 Sec. Reg. & L. Rep. (BNA) 1312 (Sept. 25, 2000).

C. *The Challenges Presented by ECN Technology Can be Addressed Through an Open API/Peer-to-Peer Strategy.*

The fragmentation challenge posed by the emergence of ECN's is one of the more contentious issues to face the agency in recent memory. Technology created the ECN opportunity and the fragmentation challenge. Technology can also help solve it.

The SEC should require that every exchange, marketplace, ECN, and even every broker that crosses its own in-house trades, be required to post its bid and ask information (to a depth defined by the agency) at an electronically accessible address structured to minimize system latency and designed to offer prompt and executable information. These addresses would be publicly posted in a readily accessible format. With such information in hand, the market could develop a competitive family of software-based search agents that would automatically search for "best-execution"; however, that concept might be defined by the search agent. Such software would resolve the fragmentation issue by effectively reconstructing the fragmented market into a single structured database so that investors can compare prices among various markets to identify the best location at which to attempt execution.⁴⁴

For example, suppose GM shares trade on the NYSE, NASDAQ, three regional exchanges, and four ECN's. If the bid and offer information, together with size available at all those markets, were available on a real-time basis, then traders would automatically be able to route their orders to the market that they calculated would give them the best execution.

If the objective is to write a search agent that simply finds the best bid or offer to execute a relatively small market order, then the software task is simple. When trades involve larger

⁴⁴ For a general discussion of the fragmentation controversy, see Ian Springsteel & Michelle Celarier, *The ECN Dilemma: Blasting Fragmentation, Wall Street Calls For a Centralized Market Structure that Threatens the Upstarts*, INVESTMENT DEALERS DIGEST, March 6, 2000. For discussions of NASDAQ's Super Montage proposal, see *Super Messy*, THE ECONOMIST, Sept. 3, 2000 (U.S. ed.) (describing the battle between NASDAQ and ECN's and other Super Montage opponents over SEC approval of Super Montage); Rachel Whitmer, *Official Affirms Decimal Readiness of NASDAQ Market 'When the SEC Wants It'*, 32 Sec. Reg. & L. Rep. (BNA) 731 (June 5, 2000); *NASDAQ Unveils New Order Display Window Aimed at Centralization, Price Transparency*, 31 Sec. Reg. & L. Rep. (BNA) 1327 (Oct. 8, 1999); Bruce Kelly, *Buy-siders Boo NASD: Fund Firms Question Super Montage Plan*, INVESTMENT NEWS, Sept. 11, 2000, at 1.

blocks, seek to promote price improvement, or require more demanding executions, then that task of writing a search agent becomes more challenging and subject to interpretation—but still possible.

D. Suitability Concerns Can Be Ameliorated Through Electronic Warning Technology

The emergence of on-line electronic brokers poses a challenge to traditional notions of suitability.⁴⁵ Historically, customers dealt with human brokers who often made recommendations regarding specific instruments and strategies. Because these brokers made recommendations, the SEC and the SRO's were able to impose suitability obligations on the brokers. Brokers thus stood as gatekeepers with potential liability for "inappropriate" trading in a customer's account.⁴⁶

In a world of electronic on-line brokerages, there are no humans making recommendations, and electronic brokers themselves avoid making the electronic equivalent of recommendations. Instead, the brokers provide access to a wide array of databases, news feeds, and search tools without directing investors to any specific investment alternative.⁴⁷ In this environment, electronic brokers are able to claim that they make no recommendations, and thus have no suitability obligations.

The SEC is nervous about this state of affairs. It is concerned over the disappearance of an important "gatekeeper" in the investment process: the professional regulated broker with an affirmative obligation to "know the customer" and to recommend only investments and strategies that are suitable to the customer.⁴⁸

⁴⁵ See *Online Brokerage Regulation Roundtable Set for November 1 in Washington, D.C.*, PR NEWSWIRE, Oct. 7, 1999 ("The suitability rule requires brokers to recommend only those investments that are appropriate for a client . . .").

⁴⁶ See *Unger Report Suggests Possible Rules on Best Execution, Systems Capacity*, 31 Sec. Reg. & L. Rep. (BNA) 1563 (Dec. 3, 1999); *Online Brokerage: Keeping Apace of Cyberspace*, at <http://www.sec.gov/news/studies/cybexsum.htm> (Nov. 22, 1999).

⁴⁷ See Tracey Longo, *Keeping Online In Line: Online Brokerages Say They're Not Subject to Suitability Requirements, But Regulators May Argue Otherwise*, FIN. PLANNING, July 1, 1999, available at 1999 WL 7351388.

⁴⁸ See *id.* (reporting Charles Schwab's position that "suitability obligations do not apply to . . . information typically available on Web sites").

The difficulty with the traditional suitability doctrine in the age of the Internet is that it is based on a critical assumption that is simply untrue in the age of Internet trading. For many investors, there is no one making a recommendation because their orders are unsolicited and self-directed, and as to these investors no one owes a suitability obligation.⁴⁹

If the SEC desires, it could address this situation not by imposing suitability obligations on electronic brokers, but by establishing appropriate "duty to warn" standards that could be satisfied cheaply and efficiently through software tools that analyze the investor's portfolio and trading history to offer estimates (or "warnings") of the riskiness of the investor's conduct. It would also be possible to calculate the marginal effect of a proposed trade on a portfolio's risk level. The warning generated by such software could also include estimates of the probability that a portfolio would lose, say, 25, 50, or 75 percent of its value over 6, 12, or 24 months. It could also compare the riskiness of an individual trader's portfolio to broad market measures of risk or to measures of risk inherent in other accounts held at the same broker. No doubt, the agency would want to assure that the warnings or estimates provided are responsibly generated and neither understate nor overstate the probable risk inherent in the investors' decision. A standard rulemaking procedure should suffice in this regard.

Disclosure of such information, without the imposition of liability for a trader's unsolicited transactions (especially after a reasonably calculated warning), probably constitutes a prudent accommodation of agency and industry concerns. The agency and industry would be pleased that investors are being cautioned about the consequences of their actions and that they are receiving objective warnings that are not provided today. The industry would be comforted that it would not have liability for their customer's unsolicited – but warned – trading activity.

⁴⁹ See Prepared Statement of Prof. Howard M. Friedman University of Toledo College of Law Before the Senate Governmental Affairs Committee Permanent Investigations Subcommittee, FED. NEWS SERVICE, March 22, 1999 (discussing suitability obligations and online trading).

E. The SEC Can Foster The Use Of Authentication Technologies To Deter False Announcements That "Spoof" Legitimate News Releases

The shares of Emulex, Lucent, and Pairgain have all been subject to material stock price moves because imposters posted false press releases to the Internet.⁵⁰ These imposters typically use techniques designed to mimic legitimate issuer releases.⁵¹ Similar frauds also occurred prior to the advent of the Internet, but the general impression is that the Internet makes such frauds more probable and more significant once they occur.⁵²

The most recent such event involves Emulex, and the facts of that transaction serve as a reasonable benchmark for discussion. The perpetrator was a former employee of *Internet Wire*.⁵³ He used his knowledge of internal corporate procedures to fool *Internet Wire* into believing that a bogus press release was authentic.⁵⁴ The press release falsely claimed that Emulex's CEO had resigned, that the company was under investigation by the SEC, that it would restate its 1998 and 1999 earnings, and that it would revise its fourth quarter gain to show a loss.⁵⁵ Dow Jones News Service, Bloomberg, CNBC, and other financial news outlets redistributed the false press release.⁵⁶ Emulex's stock price "plunged from \$103 to \$45 in 15 minutes," stripping more than \$2 billion from the company's market valuation before the NASDAQ halted trading.⁵⁷ The company then issued a release asserting that its business was stronger than ever.⁵⁸ The stock closed at \$105.75 down \$7.31 on the day.⁵⁹

⁵⁰ See *supra* note 10.

⁵¹ See, e.g., Tezra Ewing et al., *E-Mail Trail Leads to Emulex Hoax Suspect*, WALL ST. J., Sept. 1, 2000, at C1; Alex Berenson, *On Hair-Trigger Wall Street, A Stock Plunges on Fake News*, N.Y. TIMES, Aug. 26, 2000, at A1.

⁵² See Corey Grice & Scott Ard, *Hoax Briefly Shaves \$2.5 Billion Off Emulex's Market Cap*, CNET (Aug. 25, 2000) (reporting the Internet has made it easier for fraud to occur), at <http://news.cnet.com/news/0-1004-200-2611957.html>.

⁵³ See Ewing et al., *supra* note 51.

⁵⁴ See Corey Grice, *23-year-old Arrested in Emulex Hoax*, CNET (Aug. 31, 2000), at <http://news.cnet.com/news/0-1004-200-2660540.html>.

⁵⁵ See Ewing et al., *supra* note 10.

⁵⁶ See Berenson, *supra* note 51.

⁵⁷ See *id.*

⁵⁸ See *Emulex Rebuts Fictitious Press Release* (Aug. 25, 2000) (company press release) ("Emulex shareholders should be assured that our business is at record levels and the fundamental of our business . . . have never been stronger."), at <http://www.emulex.com/press/2000/hoax.html>.

⁵⁹ See Berenson, *supra* note 51.

The perpetrator held a losing short position in Emulex shares and the fraud was designed to help the perpetrator cover his short at a profit.⁶⁰ The perpetrator apparently did so, and sought to make additional profits by purchasing Emulex shares while the stock was temporarily depressed.⁶¹

Recriminations flew even as the story developed. Competing Internet services attacked *Internet Wire* for failing to check with the company in order to confirm the accuracy of the press release.⁶² *Internet Wire* defended itself by explaining that it had been victimized by a sophisticated fraud and that its competitors had also suffered similar problems.⁶³ The press vacillated between defending its own automatic redistribution of the story, recognizing that it could have done a better job, and calling for greater diligence before redistributing such materials.⁶⁴ The NASDAQ market was criticized for failing to halt trading sooner than it did.⁶⁵

Finger pointing will accomplish little good here. It does not take a high degree of sophistication to fool the current distribution mechanism in the financial news cycle. It also does not take a high degree of sophistication to conduct this sort of fraud through techniques that make it very difficult, if not impossible, for the authorities to identify the wrongdoer.

In the case of Emulex, the FBI was able to identify the perpetrator easily and quickly because he used a computer located close to the addressee and he did not invoke certain measures available to mask his identity on the Internet.⁶⁶ More

⁶⁰ See Grice, *supra* note 54.

⁶¹ See *id.*

⁶² See Seth Sutel, *Internet Wire Increasing Security Following Hoax*, ASSOCIATED PRESS (Aug. 28, 2000), available at <http://www.landfield.com/isn/mail-archive/2000/Aug/0159.html>.

⁶³ See *id.*

⁶⁴ See Joseph Strupp, *New Policies on Press Releases After Emulex*, EDITOR & PUBLISHER MARKET GUIDE (Sept. 12, 2000), available at <http://www.mediainfo.com/ephome/news/newshtm/stories/091200n2.htm>.

⁶⁵ See Thomas S. Mulligan, *In Wake of Emulex Hoax, Blame Game Begins*, L.A. TIMES, Sept. 2, 2000, at C1.

⁶⁶ Within hours, federal agents recovered the Internet Protocol number of the computer where the fraudulent email originated, the IP number of the computer used to create a Yahoo! email account to send the email, and the coding on the Microsoft Word template used to design the false press release. All of these numbers corresponded with computers at El Camino Community College, where the alleged perpetrator was a student. The FBI also found records of the perpetrator's execution of online trades in Emulex shares on his computer at his former job, the very wire

talented perpetrators can use more advanced techniques to avoid detection. For example, in my Law School classes at Stanford, I often discover several computer literate law students who know their way around the Internet well enough to be able to conduct such a fraud—while making it far more difficult to identify them. For obvious reasons, I will not explain these techniques in public and simply observe that the entire structure of the news dissemination process is currently quite susceptible to this sort of fraud.

Significantly, however, just as technology is the source of this problem, it also holds the key to the solution. Technology currently exists that would allow issuers to post their news releases to the Internet or to news services with an authenticating mark.⁶⁷ The “mark” would essentially serve as a digital signature.⁶⁸ That mark or signature would allow third parties (the public, the press, and even the SEC) to verify with a high degree of assurance that they are indeed viewing an authentic document. Of course, if someone steals the code-generating mechanism necessary to generate the mark in the first instance, then the same fraud can be perpetrated with the new technology. The odds of doing so successfully, however, would be far lower than with today’s authentication techniques.

We could, of course, wait for the market to determine that this problem is sufficiently serious that news organizations themselves decide to require the use of such authentication technology. There may, however, be a collective action problem with respect to standard-setting processes that impedes the rate

service (*Internet Wire*) to which he sent the fake release. See Christian Berthelsen, *Tracking Tech Crime: Law Enforcement’s Cybersleuths Study Computer ‘Fingerprints’ to Crack Fraud Cases*, S.F. EXAMINER, Sept. 3, 2000, at B1; Andrew Gumbel, *Digital Footprints Lead FBI to Door of Trader Accused of \$50M Fraud*, THE INDEPENDENT (London), Sept. 2, 2000, at 12.

⁶⁷ See Mark Gibbs, *IP Security: Keeping Your Business Private*, NETWORK WORLD, March 15, 1999, at 36.

⁶⁸ Technically, a digital signature is a message encrypted by means of public key encryption and a hash function that allows a recipient who possesses the signer’s public key to determine: (1) whether the encryption was created with the signer’s private key, and (2) whether the initial message has been altered. The additional step of ensuring that any given pair of public and private keys actually corresponds with the designated individual requires a Certification Authority, who acts as a repository of public keys and can issue an electronic certificate confirming the connection between a given public key and a corresponding individual. See W. Everett Lupton, Comment, *The Digital Signature: Your Identity By the Numbers*, 6 RICH. J. L. & TECH. 10 (1999), at <http://www.richmond.edu/jolt/v6i2/note2.html>.

at which organizations adopt this technology, if they adopt it at all. Further, to the extent that the SEC, the NYSE, and NASDAQ independently place a higher-than-free-market value on the ability to authenticate such information in an egalitarian manner, those organizations may have an incentive to adopt a technology-forcing strategy that requires certain press releases be posted to the Internet using an appropriate authentication technology.

CONCLUSION

The future of the securities industry depends more on the evolution of information technology than on any other factor. To date, the Securities and Exchange Commission has done a commendable job in responding to the challenges posed by technology, but significant room for improvement remains.

In particular, the Commission lacks a coherent technology strategy. It has no articulated view as to the likely evolution of information technology or its effects on the United States' securities markets. Nor does it have a stated perspective as to the implications of technological progress for the Commission's regulatory responsibilities. The Commission also has relatively few technologists on its staff.

These observations are all related. Absent a Commission that perceives technology as both a potential challenge to the regulatory process, and as a potential solution to a wide range of regulatory issues, the Commission will be unable to craft an effective and coherent technology strategy for the regulation of the nation's securities markets.

The Commission has, instead, approached technological challenges on a case-by-case basis. The advantages of a case-by-case approach are as clear as its limitations. A case-by-case approach presents the agency with a series of well-defined problems that are susceptible to discrete resolution. It also, however, limits the agency's ability to plan ahead of the curve and sharply curtails its capacity to harness technology as a force that can provide more fundamental solutions to many of the problems that challenge the nation's markets.

This brief Article has, I hope, provided some insight into the potential benefit that can result from a more technologically aware SEC. A more technologically aware approach would, I believe, understand how EDGAR could be restructured to

provide improved service at lower cost. It would appreciate the potential benefits of XML as a solution to some of the most vexatious accounting issues that plague the industry today. It would understand the potential of "peer-to-peer" style networks as a solution to the fragmentation issues that will continue to roil the markets as technology evolves and as new entrants compete for existing order flow. It would seek to harness technology in providing a potential solution to suitability and other risk disclosure concerns in modern, fast paced markets where investors often have portfolios spread over many accounts. And, it would recognize the ability of authentication technology to provide a level of protection against certain forms of fraud that are becoming more common in modern markets.

Absent internal institutional evolution of the form described in this essay, it remains an open question as to whether, when, and how these changes in the nation's securities markets can or will emerge.

