Michigan Telecommunications and Technology Law Review

Volume 11 | Issue 1

2004

Better, Faster, Cheaper - Later: What Happens When Technologies Are Suppressed

Kurt M. Saunders
California State University, Northridge

Linda Levine
Carnegie Mellon University

BETTER, FASTER, CHEAPER—LATER: WHAT HAPPENS WHEN TECHNOLOGIES ARE SUPPRESSED

*Kurt M. Saunders**
*Linda Levine***

Cite as: Kurt M. Saunders and Linda Levine, *Better, Faster, Cheaper—Later: What Happens When Technologies Are Suppressed*, 11 MICH. TELECOMM. TECH. L. REV. 23 (2004), *available at* http://www.mttlr.org/voleleven/saunders.pdf

---

* Associate Professor of Business Law, California State University, Northridge.
** Senior Member of the Technical Staff, Software Engineering Institute, Carnegie Mellon University.

The authors express their appreciation to David Fowler, Ben Yu, Lester Saft, and Richard Florida for their useful comments on earlier drafts of this Article.

Some inventions never see the light of day. Others enter the spotlight after long delays and the factors that slowed the arrival of that innovation are ignored. Technology suppression is a real occurrence involving well known and widely used products. In this Article, we examine the topic of technology suppression, seeking to reveal the tactics of suppression and the patterns and conditions under which it occurs. Current examples of U.S technologies are used to highlight the significance of this phenomenon. We consider related factors, including market and innovation forces, and we identify suppressive tactics, using illustrative cases where patent nonuse or abuse has occurred. Once suppression is more fully understood, we assess the legal and policy implications, including potential deterrents to the problem.

> *The right of suppression . . . came into the law over a century after the first patent act was passed . . . [I]t is time to be rid of that rule. It is inconsistent with the Constitution and the patent legislation which Congress has enacted.*[1]

1. *Special Equipment Co. v. Coe*, 324 U.S. 370, 380–381 (1945)(Douglas, J., dissenting). Justice Douglas's position echoes that of Judge Blodgett who, in 1886, wrote that a patentee "is bound either to use the patent himself or allow others to use on reasonable or equitable terms." *Hoe v. Knap*, 27 F. 204, 212 (N.D. Ill. 1886).

> *[W]e answer that such exclusion may be said to have been the very essence of the right conferred by the patent, as it is the privilege of any owner of property to use or not use it, without question of motive.*[2]

I. INTRODUCTION

Technology suppression "is the shelving of an invention[3] which others would like to manufacture or use if they knew about it, and implies that the patented product or process is as good or even better than any other already in use."[4] Thus, suppression involves the nonuse and nondiffusion of a developed technology by those who control that technology.[5] The investigation of technology suppression is particularly challenging because, for the most part, the literatures of management science and strategic research and development make little acknowledgment of its existence,[6] and because the courts have been reluctant to view this conduct as unlawful. These omissions oblige us to reconsider both the legality of suppression and its legitimacy as a competitive tactic. Recent developments and news reports regarding, for example, "safer" cigarettes, alternative vehicles, and pharmaceutical products, all confirm that technology suppression is a real and ongoing phenomenon.

Those who concede that suppression occurs are often tempted to downplay its impact in one of two ways. Some assert that technology suppression is all about technology merit; in other words, patented technologies that are deliberately not used are inherently inferior or unmarketable. Others insist upon reductive explanations, arguing for

---

2. *Continental Paper Bag Co. v. Eastern Paper Bag Co.*, 210 U.S. 405, 429 (1908).

3. Some distinguish between an invention that is formally described in a patent application, *see* 35 U.S.C. §§ 100(a),112 (2000), and an innovation which represents the market introduction of the invention in product form. Our concern is with the latter—the introduction of the invention into the marketplace. Tornatzky & Fleischer define technological innovation as the "situationally new development and introduction of knowledge derived tools, artifacts, and devices by which people extend and interact with their environment." Louis G. Tornatzky & Mitchell Fleischer, THE PROCESSES OF TECHNOLOGICAL INNOVATION 11 (1990). We use the terms "technology" and "innovation" interchangeably.

4. Floyd L. Vaughan, THE UNITED STATES PATENT SYSTEM: LEGAL AND ECONOMIC CONFLICTS IN AMERICAN PATENT HISTORY 227 (1956).

5. *See* Richard Dunford, *The Suppression of Technology as a Strategy for Controlling Resource Dependence*, 32 ADMIN. SCI. Q. 512, 513 (1987); Richard Fellmuth, *Suppression and Other Antitrust Concerns, in* LEGAL ASPECTS OF SOLAR TECHNOLOGY 197–216 (John H. Minon & William H. Lawrence, eds. 1981); S. CHESTERFIELD OPPENHEIM ET AL., FEDERAL ANTITRUST LAWS 873–74 (4th ed. 1981).

6. *See,* Dunford, *supra* note 5, at 513.

instance that only a monopoly would suppress patented technologies.[7] We believe that suppression is a more nuanced problem requiring greater investigation—one that does not seek to draw bright lines, and make black and white distinctions. Our intent is to demonstrate that technology suppression occurs.

We submit that our message is important for innovators and entrepreneurs who want to secure the best chance that their innovations will *not* be suppressed as a result of an acquisition, exclusive licensing arrangement, or an in-house decision to shelve a technology. R&D managers are operating in a domain where their own organization, or a competitor's, may be the victim or perpetrator of suppressive tactics. Ultimately, we will propose strategies for deterring suppression and limiting its effects, thus making it more difficult for those who intend to block innovations.

II. Approach

Our approach to researching technology suppression can be described as exploratory. Initially, we were concerned with the legal aspects of technology maturation and diffusion processes. In reviewing these issues, we became interested in what happened when these processes were disrupted or frustrated through technology suppression.

To better understand this phenomenon, we examined suppression from several perspectives. First, we reviewed the few existing overview articles on technology frustration[8] to identify additional leads and sources, including legal cases. We were already aware of several Twentieth Century examples, including electric lamps, solar energy, and pain control devices. Simultaneously, we reviewed research on how software tools could be used to search patent databases to identify promising innovations and relationships between and within patent families.[9] Of particular interest was whether or not companies deliberately amassed patents in order to remain competitive or to block rivals in their technology areas. To answer this question, we conducted exploratory patent searches with the U.S. Patent & Trademark Official Gazette to determine which compa-

---

7. Gilbert & Newberry, *infra* note 83, at 517–18; Tirole, *infra* note 80, at 393; Scherer, *infra* note 51, at 428; Shepherd, *infra* note 76, at 151–52.

8. *See, e.g.*, Dunford, *supra* note 5; Bernhard J. Stern, *The Frustration of Technology*, Sci. & Soc'y 3 (1937).

9. Mary Ellen Mogee, *Using Patent Data to Identify and Assess Technology Transfer Opportunities at Government Laboratories*, *in* Proceedings of the 18th Annual Meeting of the Technology Transfer Society, Ann Arbor, Michigan (June 26–29, 1993).

nies might be accumulating patents in areas that we had previously identified. Here, our findings were inconclusive.[10]

Second, we conducted library searches to identify legal cases and other instances reporting suppression. In all, we identified forty documented circumstances. Some of these were set aside because they were about related matters.[11] We were obliged to consider different cases and histories of suppression, resulting in a heterogeneous data set. A subset of twenty cases and histories was carefully reviewed. For each, we generated a detailed description, which consisted of a summary of the facts, court's decision, issues that we saw as left unresolved by the decision, and new lines of inquiry about suppression.

We were attempting to build a predictive model to account for when suppression was more likely to occur. Eventually, we were forced to abandon this effort because we found suppression to be context-dependent, comprising dozens of factors and attributes (e.g., inadequate finances, incompetence of patent owners, delay in development of inventions, sunk costs, product and geographic markets, etc). However, we remained interested in patterns of suppressive behavior—and whether (a) certain types of innovations were more likely to be suppressed, and (b) certain market conditions were more conducive to suppression. Intuitively, it appeared to us that radical or revolutionary innovations might be more likely candidates for suppression. We analyzed innovations from the set of twenty cases and histories using the theoretical framework developed by Abernathy and Clark.[12] Our intuitions were mistaken; we discovered that all types of innovations had been suppressed.

In parallel, we attempted an economic analysis of technology change and market concerns, guided by the hypothesis that suppression was more likely to occur in highly concentrated markets.[13] Our hypothesis appeared to be borne out, although we lacked necessary additional

10. A patent thicket results when the number of the overlapping patents in an industry is so dense that potential innovators cannot easily obtain the licenses necessary to conduct further research, thereby blocking follow-on innovations. See Carl Shapiro, Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting, in 1 INNOVATION POL'Y AND THE ECON. 119, 121 (2001). At least one commentator disputes this approach to analyzing patent relationships that may stifle innovation and does so within the context of the software industry. *See* Ronald J. Mann, *The Myth of the Software Patent Thicket: An Empirical Investigation of the Relationship Between Intellectual Property and Innovation in Software Firms*, Research Paper No. 022 (2004), at http://ssrn.com/abstract=510103.

11. Listing of documents available upon request from authors.

12. *See infra* text accompanying notes 91–97.

13. *See infra* text accompanying notes 71–89.

information on the industries and product markets that would have allowed us to reach a definitive conclusion.

In the end, while we were unable to create a prescriptive model derived from innovation and market factors, we were able to devise a descriptive set of categories of suppressive tactics. A number of cases were selected to illustrate the use of these tactics, demonstrating the longevity of suppression, and its ongoing nature. Our inquiry led us to realize that anticipating and preventing suppression is nearly impossible. Nonetheless, the phenomenon of suppression can be better understood and business practices and legal measures can be put in place to reduce the likelihood of suppression and abbreviate its stifling effect.

A few final clarifications about our approach are in order. Our focus is on U.S. technologies and the U.S. patent system. We make no claims about suppression globally or in other nations. The U.S. has taken a strong property rights stance, whereas some other nations have admitted that suppression can occur and have remedies in place to address it when it does occur.

The cases we present are selective, intended as exemplars to represent key tactics of suppressive behavior. Moreover, we have not traced these technologies to see if they were commercialized any where else at any time; nor have we attempted to evaluate the superiority or marketability of these technologies. Such research would be extremely time-consuming and outside our current scope. Rather, our concern is with the issue of suppression and how the legal system may have created or contributed to this problem. The sources for our research come from documented reports, histories, journal articles, and fact patterns as set down in legal cases. Musings and explanations for why inventors may have done what they did fall beyond the scope of this investigation.

III. How are Technologies Being Suppressed Today?

Suppression is not simply a historical curiosity involving obscure technologies. Rather, it is a real occurrence involving well known and widely used products. While some inventions never see the light of day, others enter the spotlight after long delays and the factors that slowed the arrival of that innovation are ignored. In part, this is because suppression is most often recognized in hindsight; it is extremely difficult to detect suppression while it is occurring. In the following discussion, we identify several innovations only recently revealed as having been suppressed.

A. *Liggett & Myers and the "Safer" Cigarette*

In the 1960s, Liggett & Myers Company researchers believed that they had discovered which constituents of cigarette smoke were carcinogens, and that they had found a way to remove them. Despite Liggett officials' belief that the resulting product was commercially viable, Liggett's "safer" cigarette, a product called "XA," was never marketed and the XA project was abandoned.[14] Liggett did so for two reasons. First, disclosing the feasibility of a safer cigarette would imply that other, existing cigarettes were unsafe. Second, Philip Morris threatened Liggett with reprisal if Liggett violated an industry agreement not to disclose negative information on smoking and health. Liggett's Assistant Research Director, Dr. James Mold, reported that Liggett's president said that he was "told by someone in the Philip Morris Company that if we tried to market such a product that they would clobber us."[15] During the XA project, Liggett attempted to insulate the research by the use of company lawyers. Dr. Mold reported that after 1975, "all meetings that we had regarding this project were to be attended by a lawyer . . . . All paper that was generated . . . [was] to be directed to the Law Department."[16] Dr. Mold added that lawyers even collected all the notes after each meeting. He stated that despite its significance, the company lawyers not only ultimately succeeded in stopping the project, but they also ordered him not to publish the results.[17]

Liggett had also obtained a patent for the process it had discovered to produce its safer cigarette. The patent application described the reduction in cancer in studies of mice, prompting stories in the media that Liggett was the first cigarette company to admit that smoking caused

---

14. *See* First Am. Compl., ¶ 112, City & County of San Francisco v. Philip Morris, Inc. (N.D. Cal. 1996)(No. C-96-2090-DLJ), *available at* http://stic.neu.edu/ ca/sf/ 1stamcomplaint.htm (last visited Apr. 5, 2002). Liggett began its research by repeating the smoke condensate painting studies of mice performed by another researcher through a contract with a consulting firm. The consulting firm confirmed the findings, and, in 1968, Liggett began "a tobacco additive program designed to reduce or eliminate the tumorigenic activity of cigarette smoke." *Id.* at ¶ 113. By 1979, Liggett declared the work a success, stating: "Briefly, as a result of 20 years effort in cooperation with [the consulting firm], we have developed a cigarette system which produces smoke of reduced biological activity . . . . [T]here can be no argument that the use of the additives has resulted in a product with lower carcinogenic effects." *Id.*

15. *Id.* at ¶ 115.

16. *Id.* at ¶ 116.

17. When later asked why Liggett never marketed the safer XA cigarette, Dr. Mold explained that: "[Management] felt that such a cigarette if put on the market would seriously indict them for having sold other types of cigarettes that didn't contain this, for example. Or that they were carrying on this biological research at the same time saying it meant nothing." *Id.* at ¶ 118.

cancer.[18] Liggett responded by issuing a press release which stated: "Liggett and the cigarette industry continue to deny, as they have consistently, that any conclusions can be drawn relating such test results on mice in laboratories to cancer in human beings. It has never been established that smoking is a cause of human cancer."[19] At the time it issued this denial, Liggett estimated that it had spent a total of $10 million on research involving mice, in part to develop the safer XA cigarette.[20] Despite overwhelming scientific evidence, and the confirmation of this evidence by their own internal research, the cigarette manufacturers and their trade associations claimed for decades, in a unified stance, that there was no causal connection between cigarette smoking and cancer. Recent settlements in cases brought against cigarette manufacturers indicate some willingness to finally acknowledge their responsibility.

B. *Pharmaceuticals: Amgen and EPO, Brand and Generic Drugs*

Erythropoietin (EPO) has proven to be extremely effective in encouraging the development of oxygen-carrying red blood cells and has saved many anemic people, including premature infants, and those with anemia due to kidney failure or other disease.[21] However, recombinant bio-engineered EPO, made by Amgen, which holds the major patents on EPO, is very expensive. One of the reasons for the high cost is that each patient requires very high levels of EPO. Gisella Clemons, a scientist at the Lawrence Berkeley National Laboratory, came up with a protein binding factor that allowed EPO to bind in the body instead of being excreted immediately into the urine, thus increasing the uptake of EPO by a factor of 10–50 percent.[22]

A patent was issued to Lawrence Berkeley National Laboratory in April, 1997. Prior to the patent being issued, the invention was offered to drug companies, including Amgen.[23] Martha Luehrmann, who handles technology licensing for the Laboratory, remarked unofficially that

> Amgen wasn't interested because it would decrease their lucrative market for EPO. People would need much less EPO per dose, and Amgen didn't trust that they could make up the short-

18. *See id.* at ¶ 119.
19. *Id.*
20. *See id.* at ¶ 120.
21. *See* Email from Martha Luehrman to Jamie Love (April 7, 1998), *reprinted in* Posting of Jamie Love, love@cptech.org, to info-policy-notes@essential.org (Apr. 7, 1998), *available at* http://lists.essential.org/1998/info-policy-notes/msg00013.html.
22. *See id.*
23. *See id.*

> fall in selling more widely to people who at the present time can't afford the drug. Other drug companies weren't interested because they would have to combine the binding protein with EPO, and all the rights to EPO were in the hands of Amgen. So, a wonderful advance that could save hundreds of thousands of children from anemia and death stays on the shelf because the patent system protects a company that doesn't want to see any risk to its bottom line.[24]

Also at issue here is what obligation biotechnology companies have, if any, to act in the public interest when portions of their innovations stem from government-funded research programs.[25] Amgen's product, Epogen, was the result of government-funded research under the provisions of the Orphan Drug Act[26]—legislation enacted in 1983 to stimulate the development of drugs for rare diseases that often have a limited market. The statute provides companies with substantial tax credits for costs incurred during human drug trials, and gives companies seven years to exclusively market their product.[27] Amgen was awarded orphan drug status for Epogen, but this may have diminished any incentive for other companies to go forward with any development on their own versions of erythropoetin, simply because Amgen had seven years to build on its patent and gain further exclusivity.[28] Indeed, Amgen sued one of its rivals, Transkaryotic Therapies, Inc., to prevent it from selling its own version of Epogen, and a subsequent federal court

---

24. *Id.*

25. For discussions on the scope of patent protection that should be available for biotechnological innovations, as well as the obligations biotechnology firms should have in exchange for receiving such protection, *see* Margo Bagley, *Patent First, Ask Questions Later: Morality and Biotechnology in Patent Law*, 45 WM. & MARY L. REV. 469 (2004); Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1676–83 (2003); Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698 (1998).

26. Pub. L. No. 97-414, 96 Stat. 2049, 2049–56 (1983) (codified as amended in scattered sections of 21 U.S.C., 26 U.S.C. & 42 U.S.C.).

27. *See id.*

28. *See* Kristi Coale, *Nader Takes Biotech Patent to Task*, WIRED (Apr. 17, 1998), *available at* www.wired.com/news/news/technology/story/11740.html In 1998, Ralph Nader and James Love asked then President Clinton to investigate Amgen. Their letters concerned reports that Amgen had refused to support the development of an invention which would significantly reduce the average dose of EPO needed by patients, and that other biotechnology firms have declined to develop the invention independently because they fear litigation or loss of intellectual property licensing opportunities from Amgen. The letter observed that the invention was developed at Lawrence Berkeley Laboratory (LBL), a national laboratory, and was supported by grants from the National Institutes of Health (NIH), and received U.S. Patent 5,625,035 in 1997. *See* Information Policy Notes, Consumer Project on Technology (Apr. 16, 1998), *available at* http://www.cptech.org

ruling effectively blocked Transkaryotic from selling its version of erythropoietin.[29]

While Amgen's conduct represents a type of suppression, such practices are not limited to EPO. Recently, the pharmaceutical industry has received increased scrutiny for suppressive tactics against competing generic drugs. Some pharmaceutical firms have invoked provisions of the federal Hatch-Waxman Act[30] to delay the entry of generic alternatives into the market. Under this law, brand name drug manufacturers facing expiration of a patent can block a generic alternative for up to 30 months by alleging patent infringement. When the patents on brand drugs expire, other firms can make a generic version, which is available at a lower price. According to the FDA, the generic drugs are just as effective as the original drugs.[31]

Although the Hatch-Waxman Act is supposed to work this way, this is not always what happens. Lawyers and lobbyists have found so many loopholes in the law that some generic drugs are often delayed or never get to market. For instance, BuSpar is an anti-anxiety drug manufactured by Bristol-Myers Squibb. After the company had had a monopoly on the drug for years, the patent on BuSpar was set to expire on November 21, 2000, which meant that a cheaper generic version would be approved and available to consumers the next day.

> And then, just hours before its patent on BuSpar expired, Bristol-Myers Squibb got a new patent on what the drug becomes after you swallow it. And the law is written in such a way that Bristol-Myers was able to then keep the generic drug off the market, claiming that it would violate its new patent. There was no innovation involved—only an innovative legal strategy . . . . Bristol-Myers was sued by the generic companies, which claimed that the last-minute patent filed with the FDA should not keep the generic drug off the market. It took four months for a court to rule in the generic companies' favor. "During those four months, Bristol-Myers continued to have the exclusive right to sell this product on the market, no generic competition,

29. *See* Anna M. Stolley, *Amgen Wins Epogen Patent Suit Against Transkaryotic*, Bloomberg.com (Jan. 19, 2002), *available at* http://quote.bloomberg.com/fgcgi.cgi?s=AOmjrVhX2QW1nZW4g&T=marketsquote99_news.

30. Drug Price Competition and Patent Term Restoration Act of 1984 (Hatch-Waxman Act), Pub. L. No. 98-417, 98 Stat. 1585, 21 U.S.C. § 355(b)(2000).

31. *See* Generic Drug Entry Prior to Patent Expiration: An FTC Study (July 2002), *available at* http://www.ftc.gov/os/2002/07/genericdrugstudy.pdf.

and . . . during those four months, they made approximately $200 million."[32]

Similarly, the Federal Trade Commission ruled that Schering-Plough Corporation (Schering), and potential generic competitors Upsher-Smith Laboratories, Inc. (Upsher) and American Home Products (AHP), entered into illegal agreements in 1997 and 1998 to delay the entry of lower-cost generic competition for Schering's prescription drug K-Dur 20, which is used to treat people with low potassium.[33] According to the FTC, Schering and its potential generic competitors, Upsher and AHP, settled patent litigation with terms that included unconditional payments by Schering in return for agreements to defer introduction of the generic products.[34] These settlement agreements, involving "reverse" payments from the patentee to the alleged infringer, result in the elimination of a competitor's product from the market and thereby result in less competition than would likely have occurred absent the payment.[35] The FTC observed that, without "proof of other offsetting considerations, it is logical to conclude that the quid pro quo for the payment was an agreement by the generic to defer market entry beyond the date that represents an otherwise reasonable litigation compromise."[36]

C. *Alternative Fuel Vehicles*

Electric engines were around at the inception of the automobile, but the internal combustion engine clearly won out as the preferred power system because of its lower cost and higher performance levels.[37] Today,

---

32. *Bitter Medicine*, ABC News (May 29, 2002), *available at* http://abcnews.go.com/onair/ABCNEWSSpecials/pharmaceuticals_020529_pjr_feature.html

33. In the Matter of Schering-Plough Corp., et al., Docket No. 9297 (FTC Dec. 18, 2003), appeal docketed, No. 04-10688-AA (11th Cir. filed Feb. 13, 2004), *available at* www.ftc.gov/os/adjpro/d9297/031218commissionopinion.pdf

34. *See id.* at 86–87.

35. As of January 7, 2004, certain categories of agreements between brand-name and generic pharmaceutical companies now must be filed with the FTC and the DOJ. *See* Federal Trade Commission Pharmaceutical Agreement Notification Filing Requirements, www.ftc.gov/opa/2004/01/fyi0403.htm For further discussion of the anticompetitive effects of reverse payment settlements, see Herbert Hovenkamp et al., *Anticompetitive Settlement of Intellectual Property Disputes*, 87 MINN. L. REV. 1719 (2003); Carl Shapiro, *Antitrust Limits to Patent Settlements*, 34 RAND J. ECON. 391, 408 (2003).

36. *In re Schering-Plough Corp.* at 26. *See also Valley Drug Co. v. Geneva Pharmaceuticals, Inc.*, 344 F.3d 1294 (11th Cir. 2003); *In re Ciprofloxacin Hydrochloride Antitrust Litigation*, 261 F.Supp. 2d 188 (E.D.N.Y. 2003); *In re Tamoxifen Citrate Antitrust Litigation*, 262 F. Supp. 2d 17 (E.D.N.Y. 2003).

37. For comprehensive discussion of technological changes in the car industry, see generally WILLIAM J. ABERNATHY, THE PRODUCTIVITY DILEMMA: ROADBLOCK TO INNOVATION IN THE AUTOMOBILE INDUSTRY (1978).

as oil supplies dwindle, as roadways become increasingly congested, and as air quality deteriorates, contributing to the so-called greenhouse effect, there is increasing pressure to address these problems before they escalate. A number of states, most prominently California, have responded by encouraging conservation, regulating emission levels, and mandating the greater production and sale of alternative fuel vehicles.

However, according to the news media, the technology for alternative vehicles was neither available nor affordable.[38] While it is true that the performance of alternative vehicles continues to lag behind that of conventional automobiles, there is a long history of inventions that have been suppressed. There is evidence that several of these inventions could have yielded higher fuel performance and emitted much lower levels of pollutants. For example, in 1936, a number of prominent automotive industry observers were convinced that cars could attain more than 200 miles per gallon with the use of inventor Charles Pogue's carburetor. Speeds on tests of this device ranged from 2–70 m.p.h.[39] In the 1970s, Paul Pantone's carburetor, incorporating an internal refinery, used a process called thermal resonant cracking. His vehicle ran on crude oil and other unrefined fuels and yielded practically no pollution.[40] Tom Ogle's automotive system did not employ a carburetor, but used a series of hoses that fed a mixture of gas vapors and air directly into the engine. In May 1977, Ogle's Ford Galaxie reportedly averaged 100 miles per gallon at 55 miles per hour.[41] Finally, in the late 1960s and early 70s, there was an antitrust suit brought against the American automobile manufacturers, alleging that they had conspired to acquire and delay the introduction of patented air pollution control equipment. This case never went to trial and was settled in 1973.[42]

---

38. *See Selling Fuel Cells*, THE ECONOMIST (May 25, 1996), at 86–87. *See also* Spenser Michels, *All Charged Up,* The Newshour with Jim Lehrer (Sept 9, 1996); Spenser Michels, *Paying at the Plug*, The Newshour with Jim Lehrer (Aug. 20, 1997); *Patent System Promotes Suppression of Technology: David Carlson Interviewed by Dan Charles*, Morning Edition (May 23, 1993), Transcript #1351.

39. *See* Herb C. Braund, *Sensational Performance Seen in Pogue Carburetor Tests*, CANADIAN AUTOMOTIVE AUTOMOTIVE TRADE 37–38 (May 1936), *reprinted in* J. BRUCE MCBURNEY, THE SECRET SUPER HIGH MILEAGE REPORT (1996). McBurney and others continue to draw attention to these neglected and apparently suppressed automotive innovations. *See* Fred A. Ranz, Letter to the Editor: The Culprit: Carburetion, BUS. WK., at 5 (Apr. 7, 1973); *see also* JONATHAN EISEN SUPPRESSED INVENTIONS & OTHER DISCOVERIES (1999)(discussing Charles Pogue).

40. *See* Paul Pantone and Other Links, *available at* www.inett.com/himac.

41. Gregory Jones, The Tom Ogle Story, *available at* www.inett.com/himac/default.html See also John Doussard, *200 Miles On Two Gallons of Gas*, THE EL PASO TIMES (May 1, 1977).

42. *See* In re Multidistrict Vehicle Air Pollution, 367 F. Supp. 1298 (C.D. Cal 1973).

As a result of decades of commitment to improve air quality and to "force" development of automotive and fuel technologies, alternative vehicles are coming of age. Nonetheless, it is disturbing that other practical and economical solutions—including early improvements to the internal combustion engine— have been stymied and never reached the mainstream market.

D. *Future Impact*

These few examples show us that suppression is not specific to a particular technology domain. We have described instances of suppression in industries as diverse as pharmaceuticals, tobacco, and automobile manufacturing, and there is reason to believe that products ranging from artificial caviar[43] to photovoltaics[44] may have also been shelved. Clearly, technology suppression is alive and well. What then, we might ask, is the impact of the information age on innovation and suppression? What are the implications if the legal system continues to turn a blind eye to the existence and effects of suppression? Since the 1980s, the courts have expanded the scope of subject matter that can be patented. For example, it is now possible to patent business methods,software programs and designs, gene sequences, and processes of genetic engineering.[45] Many of these newly patentable inventions are bound up with the public interest and larger global and ethical issues.

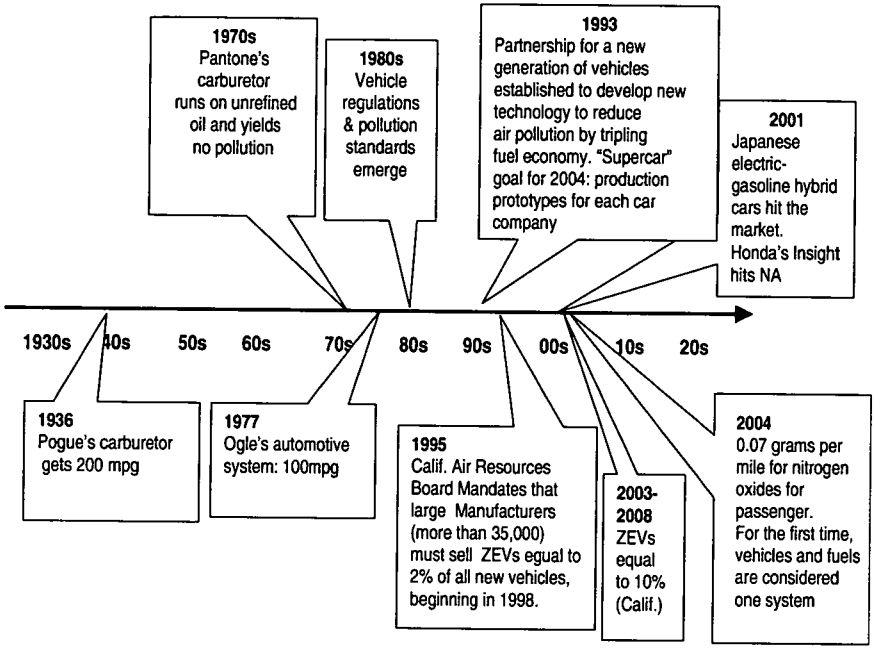
---

43. Romanoff Caviar Company developed a synthetic caviar as a "defensive marketing weapon" against a similar product developed in the Soviet Union. Romanoff's product would have sold for one-fourth the price of real, top-grade caviar, and apparently was never marketed because Romanoff did not want to compete with itself in the sale of real caviar in the small U.S.market. *See Ersatz Caviar*, BUS. WK., June 28, 1976, at 51.

44. Richard Fellmuth has outlined the possibility of the suppression of photovoltaic technology, which uses solar energy to generate electricity. Fellmuth warns that "oil-industry attempts to delay solar energy are to be expected" since "a large-scale shift to this resource is a real threat to continued profits from the oil-industry capital investment." *See* Fellmuth, *supra* note 5, at 201. *See also* Henry Etzkowitz, *Solar Versus Nuclear Energy: Autonomous or Dependent Technology?*, 31 SOCIAL PROBS. 417 (1984).

45. *See* Rebecca S. Eisenberg, *Analyze This: A Law and Economics Agenda for the Patent System*, 53 VAND. L. REV. 2081, 2083–84 (2000)("Once confined to traditional fields of applied technology such as mechanics and chemicals, the patent system has moved into agriculture, medical procedures, computer software, and business methods.") (footnotes omitted).

FIGURE 1
KEY EVENTS RELATED TO ALTERNATIVE VEHICLES



The proliferation of patents granted and the expansion of patentable subject matter have increased opportunities for suppression of technologies, thus raising public interest concerns. We believe the effects of suppression are more serious and far reaching in an information age and global economy. A cure for a rare disease, a genetically engineered treatment for crop infestation, or a new business method to serve customers and suppliers all represent innovations that, if suppressed, would have dire consequences for global food supplies, trade and commerce, and national and international security. There is enormous risk when such inventions, privately owned and protected by a patent, can be held hostage or held back from the marketplace.

IV. DEFINING SUPPRESSION

To what extent is it possible to see tell-tale signs of suppression? Some of the fingerprints may include: refusals to license, creation of patent pools and patent "thickets," takeovers of competitors, and the filing of baseless suits for patent infringement. These are not necessarily predictors of suppression, but they often coexist along with nonused patents. Inventions may be suppressed as a result of sound business judgment[46] or for anticompetitive reasons—to gain a monopoly, fix prices, or otherwise restrain trade. In this paper, we are concerned with patented technologies that have been suppressed by the owner or licensee in order to stifle competition.[47]

We focus specifically on the intentional nonuse and nondiffusion of patented technologies. All nonuse is intentional, but when it is combined with a refusal to license for anticompetitive reasons, the result is suppression. How does this occur? Suppression may result from a "fencing" patent "on an improvement to the product of a competitor and held in nonuse to restrict him to an inferior technology or to more effectively compete when the basic patent expires."[48] Suppression may also result from obtaining patents on close substitutes, which achieve

46. For instance, a patent owner may conclude that the invention is not workable or marketable for any number of reasons: economic conditions have changed, consumer demand has abated, production costs are too high, or the invention has been superseded by other technological developments.

47. Inventions can also be legitimately maintained as trade secrets. A trade secret is any information that has competitive value due to not being generally known. *See* Donald S. Chisum & Michael A. Jacobs, UNDERSTANDING INTELLECTUAL PROPERTY LAW § 3C[1] (1992).

48. George E. Frost, *Legal Incidents of Non-Use of Patented Inventions Reconsidered*, 14 GEO. WASH. L. REV. 273, 276 (1946).

the same result as an existing innovation, thereby "blocking" competitors from development.[49] Exclusive license agreements may also lead to suppression.[50]

The study of technology suppression is particularly challenging because management science and strategic R&D literature do not readily acknowledge its existence. Moreover, the courts have been unwilling to view patent suppression as unlawful. Two additional factors complicate the understanding and resolution of technology suppression: (1) a characterization of patents as a form of private property rather than a publicly-granted privilege, and (2) a conceptual incompatibility between the purposes behind intellectual property and antitrust law.

A. *Private Property vs. Public Privilege*

Patents are thought to serve three purposes: to promote invention, to encourage development and commercialization of inventions, and to encourage inventors to disclose their inventions.[51] Today, patents are considered to be another form of property.[52] Historically, however, a patent was a privilege granted by the Crown, in the form of a temporary monopoly given to an inventor who promised to put the invention to use.[53] In 1623, the Statute of Monopolies forbade all grants of exclusive privilege by the Crown and the power shifted to Parliament to grant patents to inventors for a period of fourteen years.[54] In the United States, the Supreme Court first addressed the issue of nonuse of a patented technology in the case of *Continental Paper Bag Co. v. Eastern Paper Bag Co.*,[55] an action to enjoin infringement of a patent on a machine for manufacturing paper bags. The defendant argued that an injunction would be inequitable since the plaintiff was not using its patent. In allowing the injunction against the defendant's infringing use, the Supreme Court explained:

---

49. *See* Wesley M. Cohen, et al., PROTECTING THEIR INTELLECTUAL ASSETS: APPROPRIABILITY CONDITIONS AND WHY U.S. MANUFACTURING FIRMS PATENT (OR NOT) 21–24 (Nat'l Bureau Econ. Research, Working Paper No. W7552 (2000).

50. *See infra* text accompanying notes 175–98.

51. *See* F.M. SCHERER, INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE 440 (2d ed. 1980).

52. The Federal Trade Commission, for example, has stated that intellectual property is comparable to any other form of property. FEDERAL TRADE COMMISSION STAFF REPORT, ANTICIPATING THE 21ST CENTURY: COMPETITION POLICY IN THE NEW HIGH-TECH, GLOBAL MARKETPLACE—VOLUME I, at 215 (1998) [hereinafter FTC Staff Report]. *See also* 35 U.S.C. § 261 (1988)("[P]atents shall have the attributes of personal property").

53. *See* Chisum & Jacobs, *supra* note 47, at 2B n.1.

54. *See id.* at § 2B[1] n.2.

55. 210 U.S. 405 (1908).

> [C]an it be said, as a matter of law, that a nonuse was unreasonable which had for its motive the saving of expense that would have been involved by changing the equipment of a factory from one set of machines to another? And even if the old machines could have been altered, the expense would have been considerable. As to the suggestion that competitors were excluded from the use of the new patent, we answer that such exclusion may be said to have been the very essence of the right conferred by the patent, as it is the privilege of any owner of property to use or not use it, without question of motive.[56]

This line of reasoning was later reaffirmed by the Supreme Court in *Special Equipment Co. v. Coe*.[57] In that case, the inventor of a machine for canning pears sued to compel the Patent Office to issue a patent for a subcombination of elements of the machine. The inventor sought to suppress the subcombination in order to prevent competitors from developing a similar technology. The majority of the members of the Court found that no issue of suppression existed; however, Justice Douglas in the dissent argued against the notion that patents should be treated as private property:

> It is a mistake therefore to conceive of a patent as but another form of private property. The patent is a privilege "conditioned by a public purpose." . . . [*Continental Paper Bag*] subordinated the public purpose of the grant to the self-interest of the patentee. The result is that suppression of patents has become commonplace. Patents are multiplied to protect an economic barony or empire, not to put new discoveries to use for the common good. "It is common practice to make an invention and to secure a patent to block off a competitor's progress."[58]

Once again, in *Hartford-Empire Co. v. United States*,[59] the Supreme Court rejected a lower court decision that would have effectively forced a patent holder to license its patent. The Court rejected the argument that a patent was a public privilege that might impose a duty to use the technology: "A patent owner is not in the position of quasi-trustee for the public or under any obligation to see that the public acquires the free right to use the invention. He has no obligation either to use it or to

56. *Id.* at 429.
57. 324 U.S. 370 (1945).
58. *Id.* at 747 (Douglas, J., dissenting) (citations omitted).
59. 323 U.S. 386 (1945).

grant its use to others."[60] This position was apparently embraced by Congress in enacting section 271(d)(4) of the Patent Act, which states: "No patent owner otherwise entitled to relief for infringement . . . shall be denied relief or deemed guilty of misuse . . . by reason of having . . . refused to license or use any rights to the patent . . . ."[61]

Debates on the consequences of the recent patenting "frenzy" have not resulted in clear answers about whether new policies on the scope of patent protection will stifle or spur innovation.[62] Heller and Eisenberg believe that strong and broad patent protection will stymie innovation, and they relate this problem to the tragedy of the anti-commons:

> By conferring monopolies in discoveries, patents necessarily increase prices and restrict use—a cost society pays to motivate invention and disclosure. The tragedy of the anti-commons refers to the more complex obstacles that arise when a user needs access to multiple patented inputs to create a single useful product. Each upstream patent allows its owner to set up another tollbooth on the road to product development, adding to the cost and slowing the pace of downstream . . . innovation.[63]

Similarly, Ziedonis and Hall warn that the rush to acquire patent portfolios might slow the generation of new ideas.[64] While the courts have made a choice to treat patents as private property, this choice may be problematic with respect to suppression and nonuse. For example, where federal funds have been used to develop an innovation, especially in the area of critical technologies, a public investment has been made.[65]

---

60. *Id.* at 432–33 (2000).

61. 35 U.S.C. § 271(d)(4) (2000).

62. *See, e.g.*, Kevin G. Rivette & David Kline, *Discovering New Value in Intellectual Property*, HARV. BUS. REV. 54 (2000); Ron Wilson, *The Patent System Has Just Gone MAD*, ELEC. ENG'G. TIMES (Jan. 9, 1999), *available at* http://www.eetimes.com/showArticle.jhtml?articleID=18300855; Mark Gemein, Jay Walker, *Patent Mania*, SALON (Sept. 8, 1999), *available at* http://www.salonmagazine.com/tech/feature/1999/08/27/priceleine/index.html; J. William Gurley, *Patent Here, Patent There, Patent, Patent Everywhere*, CNETNews (Jun. 14, 1999), *available at* http://www.CNETNews.com.

63. Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698, 699 (1998), *available at* http://www.sciencemag.org/cgi/content/full/280/5364/698.

64. *See* Rosemarie H. Ziedonis & Bronwyn H. Hall, *The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979–1995*, 32 RAND J. ECON. 101 (2001).

65. The government retains march-in rights to innovations that are developed at federal R&D facilities and with federal funding under the Stevenson-Wydler Technology Innovation, 15 U.S.C. §§ 3701–14 (2000), and the Bayh-Dole Act, 35 U.S.C. §§ 200–212, 301–307 (2001). Sometimes, the government itself suppresses technology on the basis of public interest. For instance, the Army Judge Advocate General's office seizes control of

Nevertheless, the classification of patents as a form of private property, rather than as a publicly-granted privilege, has had important implications for the problem of technology suppression.

B. *Purposes of Patent and Antitrust Law*

Legal treatment of technology suppression has very often arisen in the context of patent nonuse or misuse. Traditionally, the courts have held that intentional nonuse of patented technology by its owner or licensee is neither a violation of the antitrust laws nor a misuse of the patent.[66] They have done so on the grounds that it is the option of the patent holder to use or not use the patent, irrespective of motive, as is the case with any other form of private property.[67] This justification also highlights the sometimes conflicting purposes underlying antitrust law and the patent law.

The traditional view was that there is longstanding conceptual incompatibility between antitrust law, which is designed to preserve competition and prevent monopolies, and patent law, which grant a "monopoly" to the patent owner.[68] Patents serve as an incentive to invent by promising inventors a twenty year monopoly based on a grant of exclusive property rights, whereas antitrust law prohibits monopolies because they are economically inefficient and not in the public interest.[69] The current view is that patents do not automatically confer monopoly power and that the patent and antitrust laws are "complementary, as both are aimed at encouraging innovation, industry, and competition."[70] While there are persuasive economic reasons to accept this perspective, it further inhibits the courts from using antitrust law to address technology suppression through patent nonuse.

---

private inventions that fall into certain pre-determined categories under the Invention Secrecy Act, 35 U.S.C. §§ 181–188. The Defense and Justice Departments have selected a series of subject categories that comprise sensitive military functions, which are contained in the Patent Security Category Review List, and approximately 3 percent of all patent applications fall into these categories and are reviewed by the military and the Justice Department. *See* Sabing H. Lee, *Protecting the Inventor Under the Peacetime Provisions of the Invention Secrecy Act*, 12 BERKELEY TECH. L. J. 345 (1997).

66. *See infra* notes 120–38 and accompanying text.

67. *See supra* notes 51–65 and accompanying text.

68. *See SCM Corp. v. Xerox Corp.*, 645 F.2d 1195, 1203 (2d Cir. 1981)("While the antitrust laws proscribe unreasonable restraints of competition, the patent laws reward the inventor with a temporary monopoly that insulates him from competitive exploitation of his patented art . . . [thus] the patent and antitrust laws necessarily clash ").

69. For extended discussions of the patent and antitrust law interface, see Sheila F. Anthony, *Antitrust and Intellectual Property Law: From Adversaries to Partners*, 28 AIPLA Q. J. 1 (2000); Norman F. Rosen, *Intellectual Property and the Antitrust Pendulum*, 62 ANTITRUST L. J. 669 (1994); Louis Kaplow, *The Patent-Antitrust Intersection: A Reappraisal*, 97 HARV. L. REV. 1813 (1984).

70. Atari Games Corp. v. Nintendo of Am., 897 F.2d 1572, 1576 (Fed. Cir. 1990).

V. CONTEXT AND CONDITIONS FOR SUPPRESSION

We set out to identify and better understand the possible contributors to technology suppression. We considered a set of variables — the nature of the market, the nature of the innovation, and related secondary concerns, including the roles of labor and standardization. All of these factors appeared to be relevant to our investigation. Our goal was to discern patterns that allowed us to predict when suppression was likely to occur. If we could identify such patterns, we could then consider measures that would anticipate and discourage technology suppression. Each of these factors is addressed in turn.

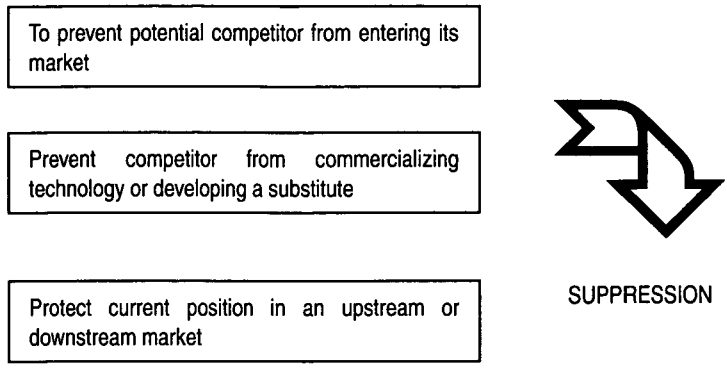
A. *Nature of the Market*

While technology suppression is not exclusively tied to any one condition, we theorized that heavily concentrated markets might be associated with suppression. In a competitive marketplace, a firm is likely to innovate, but when one firm dominates the market and its revenue stream is constant, that firm is likely to choose to preserve the status quo.[71] This may also be true in oligopolistic markets, where leading firms may collude on what will and will not change.[72] We believe that a firm is most likely to suppress a patented technology in order (1) to prevent a potential competitor from entering its market, (2) to prevent a current competitor from commercializing the technology or developing a close substitute, or (3) to protect its current position in an upstream or downstream market that would be affected by the patent.

71. *See* Scherer, *supra* note 51, at 428.

72. *See* John M. Blair, *Economic Concentration: Structure, Behavior and Public Policy* 232 (1972).

FIGURE 2
REASONS FOR SUPPRESSION



Ironically, in each instance, the exclusive rights of the patent are used to suppress the invention rather than to bring it to market. This seems at odds with the argument that one of the primary purposes of patents is to stimulate innovation. "If a patent has value in the marketplace, the rational patentee will generally make direct use of it, license it, or both,"[73] or, as the old adage goes, "If a man can write a better book, preach a better sermon, or make a better mousetrap than his neighbor, though he builds his house in the woods, the world will make a beaten path to his door."[74] Empirical evidence suggests however, that in many industries, patents may not provide the strongest incentive for innovation, and that a majority of industries do not consider patents to be very important assets.[75] This may be due to economies and diseconomies of scale:

> [S]mall firms may be adequate for handling minor innovations, but other innovations may be so large that only a large firm can mass the needed funds, equipment, talent, and sustained effort. Also, the risk may be so high that only secure dominant firms can take the chance.... [I]nnovation is often speeded when several firms race to invent or innovate first. The resulting gain

73. Phillip Areeda & Lawrence Kaplow, *Antitrust Analysis* 441 (4th ed. 1988).

74. Ralph Waldo Emerson, *in The Columbia World of Quotations* (1996), *available at* http://www.bartleby.com/66/67/19467.html.

75. FTC Staff Report at 4. "The evidence suggests that both intellectual property protection and competition are important to spur innovation. Business testimony asserted the importance of intellectual property protection to encourage initial innovation, but some noted that, if intellectual property protection is overbroad, it may stifle follow-on innovation. Business testimony also stressed the significance of competition as a force motivating innovation, a principle that economics so far neither conclusively confirms nor rejects."

in competitive speed may offset any economies of scale in innovation that might exist.[76]

Suppression is less likely to occur when there is such a race. A race is likely to arise when there is technology forcing caused by government mandate or subsidy, a crisis situation (health, environmental, or military), high consumer demand, or the sudden appearance of an innovation that spurs others to copy.[77] Sometimes, new technologies can be imitated so quickly that the inventor cannot recover sufficient profit to justify the cost of development. "Free riders" may appropriate the benefits of the invention by imitating it and reaping the profits. "[I]nnovators need a period of monopoly, it is claimed, so they can reap enough gains to justify their costs before the free riders . . . capture the rest."[78] However, dominant firms have little to gain by introducing new inventions immediately, unless their competitors also do so.[79] A dominant firms gains less from innovating than does a competitive firm, because the dominant firm "replaces itself" when it innovates.[80]

If the new technology requires replacing the existing plant and equipment with costly new tooling and infrastructure, there are substantial sunk costs involved in adopting the new technology.[81] As the Supreme Court in the *Continental Paper Bag* case pointed out, "[A p]atentee may not find it profitable to scrap existing machinery in order to adopt a new production process or eliminate a product line that would be superseded by the new product."[82] The firm may patent and then suppress the new technology to avoid competition until it has to replace its existing plant and equipment at a later date.[83] Likewise, a firm may suppress an innovation until it has exhausted the revenue stream from a "cash cow."[84] By contrast, if a new competitor could use the patented

---

76. WILLIAM G. SHEPHERD, THE ECONOMICS OF INDUSTRIAL ORGANIZATION 145 (1990).

77. "R&D competition can be likened to a race for a patent. In this situation, each firm . . . accelerate[s] its research program at the cost of incurring additional expenses." Tirole, supra note 80, at 394.

78. *See id.* at 145–46.

79. *See* Scherer, *supra* note 51, at 428.

80. *See* Jean Tirole, *Research and Development and the Adoption of New Technologies, in* THE THEORY OF INDUSTRIAL ORGANIZATION 392 (1988).

81. Sunk costs are those capital investments that a new firm must bear to gain entry into a market. *See* William J. Baumol & Robert D. Willig, *Fixed Costs, Sunk Costs, Entry Barriers, and Sustainability of Monopoly*, 96 Q. J. ECON. 405, 406–07 (1981).

82. Areeda & Kaplow, *supra* note 73, at 441.

83. *See* Richard J. Gilbert & David M. G. Newberry, *Preemptive Patenting and the Persistence of Monopoly*, 72 AM. ECON. REV. 514, 518 (1982)

84. The macro-effects of such corporate decisions have been discussed by historians of American technology such as David Noble. *See* David F. Noble, *The Corporation as In-*

technology, it could invest in the required infrastructure or new product development upfront, without the need to deal with any sunk costs.

"Of course, the patentee could always license the patent to the new entrant; however, innovation is associated with strong first-mover advantages, so the first company to manufacture and to sell a product is likely to maintain a dominant position even after the patent expires and after further inventions supersede the original one.[85] Thus, licensing to competitors may not be an attractive option for many patentees."[86] Sunk costs are also important when the patentee is in an upstream or downstream market that would be affected by the patent.

> Consider the rumor that Exxon purchased and buried the design for the "momentum" engine, which would tremendously increase automobile engine efficiency (and therefore tremendously decrease the demand for gasoline). It could produce and sell the momentum engine, using the revenues from those sales to offset its loss in gasoline revenues. However, Exxon is not in the engine business and is likely to be less efficient at that business than it is at refining and selling gasoline. Its profit-maximizing course may therefore be to conceal the invention, so that no one else can use it, and to continue to sell gasoline.[87]

Another variation on related markets concerns "network effects." The more a firm sells of a particular product or service, the more consumers desire it, because the increasing adoption of the product or service increases its value to the next consumer.[88] Once a network gets a sufficiently large number of consumers, it becomes almost impossible for a new entrant, without access to the network, to successfully

---

ventor: Patent-Law Reform and Patent Monopoly, in AMERICA BY DESIGN: SCIENCE, TECHNOLOGY, AND THE RISE OF CORPORATE CAPITALISM 84 (1977) (recording the emergence of corporate control of the patent system that made possible the exploitation and suppression of innovations).

85. *See* Tirole, *supra* note 80, at 393.

86. *See* ROBERT P. MERGES, ET AL, INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE 288 (1996).

87. *Id.*

88. The classic example is the telephone: the more people on a given network, the more value the network has to potential users, making it easier to get the next customer, and so on (Klein, 2000). "[N]etworks can be real or virtual. Real networks include communications and transportation networks, such as telephone, facsimile, computer, railroad, or electricity networks. Virtual networks are collections of users who have adopted compatible technology" (e.g., users of MacIntosh computers, Sega video game machines, or VHS video players). Carl Shapiro, Antitrust/Intellectual Property Claims in High Technology Markets, Antitrust in Network Industries, Address to the American Law Institute and American Bar Association (Jan. 25, 1996), *available at* http://www.usdoj.gov/atr/public/speeches/shapir.mar.txt.

challenge its dominance.[89] Thus, alternative technologies may be shelved due to the predominance of an existing network.

B. *Nature of the Innovation*

We also set out to investigate whether the nature of the innovation might be a predictor for technology suppression. Much controversy surrounds the nature of innovations and whether they are radical or routine.[90] Professors Abernathy and Clark argue that "the significance of innovation for competition depends on . . . 'transilience'—that is, its capacity to influence the firm's existing resources, skills and knowledge."[91] They argue that "the particular combination or pattern of technology and market transilience . . . is important in determining competitive impact."[92] Abernathy and Clark depict these effects by creating a transilience map made up of four quadrants, each representing a different kind of innovation. These quadrants are: architectural, niche, regular and revolutionary, which "are closely linked to patterns of industry development, and . . . represent phases of innovative development."[93]

The *architectural* quadrant includes new technology that "departs from established systems of production and in turn opens up new linkages to markets and users."[94] Technology in the *niche* quadrant opens new market opportunities through the use of existing technology but "here the effect on production and technical systems is to conserve and strengthen established designs."[95] *Regular* innovations are "often almost invisible, yet can have a dramatic cumulative effect on product cost and performance . . . [involving] change that builds on established technical and production competence and that is applied to existing markets and customers."[96] A *revolutionary* innovation "disrupts and renders established technical and production competence obsolete, yet is applied to existing markets and customers."[97]

---

89. *See* Joel Klein, *Rethinking Antitrust Policies for the New Economy*, Speech at the Haas/Berkeley New Economy Forum, Haas School of Business, University of California at Berkeley (May 9, 2000), *available at* http://www.usdoj.gov/atr/public/speeches/4707.htm

90. *See* Tornatzky & Fleischer, *supra* note 3, at 18–20.

91. William J. Abernathy & Kim B. Clark, *Innovation: Mapping the Winds of Creative Destruction* 14 RES. POL'Y 3, 5 (1985).

92. *Id.* at 7.

93. *Id.*

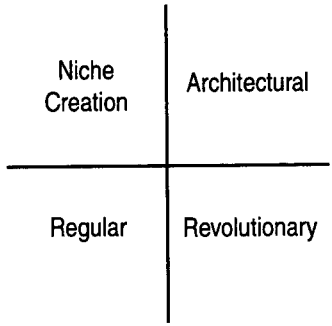
94. *Id.*

95. *Id.* at 10.

96. *Id.* at 12.

97. *Id.*

FIGURE 3
INNOVATION QUADRANTS (ABERNATHY & CLARK, 1985)



As we have suggested, in exploring technology suppression and its circumstances, we considered whether certain types of innovation might be more likely to be suppressed. Intuitively, it seemed to us that revolutionary or architectural technologies (radical innovations) were more likely candidates for suppression. This would corroborate our findings on the nature of the market, and on how market dominance in conjunction with sunk costs might discourage innovation. In considering the full range of legal cases and historical examples available to us—approximately forty instances—we were unable to discern any pattern with respect to the nature of the innovation. In other words, to our surprise, we identified examples of all types of technology having been suppressed—architectural, niche, regular, and revolutionary.

We considered whether Shepherd's distinctions between innovation and imitation would be more helpful: "Invention is the creation of a new idea. . . . Innovation converts the idea to practical use . . . Imitation then follows as the innovation is copied by others."[98] The concept of imitation is related to the development of close substitutes by free riders. As we have already seen, a patent owner may delay introducing a product in order to prevent competition by an imitator until the patent owner is ready to invest in retooling.

Finally, in addition to the nature of the market and the innovation, we considered whether research and development strategy contributed to suppression. Competitive pressures sometimes influence companies to match one another in R&D activities, though dominant or monopolistic firms may not be affected by this pressure. Tornatzky observes that "industry concentration per se does not have much influence on R&D

98. Shepherd, *supra* note 76, at 142.

strategy";[99] however, we have seen that the nature of the market, including industry concentration, may encourage suppression. In addition, R&D strategy may be guided by government technology policy. We believe that government-sanctioned joint ventures and cooperative activities facilitate development and commercialization, thus making suppression less likely.[100]

C. *Additional Conditions*

Several additional factors are noteworthy, including the role of labor and standardization.

1. Role of Labor in Technology Suppression

In the same way that firms may be reluctant to introduce new technologies that will displace existing plant and equipment, they may hesitate to introduce new technologies that may displace workers, especially if the workforce is unionized and management fears strikes and other backlash. "Change in technology may mean obsolescence in labor as well as in machines, and therefore workers have opposed inventions that threaten their jobs."[101] This quandary is not new. For instance, in Europe, from 1400 to 1700, guilds prohibited the use of machines, such as pin head pressing machines, looms, and button weaving machines in order to fence out innovation and protect their constituents.[102] "Workers can hardly be expected to be receptive to technological changes in the specific fields in which they are employed, when they are cognizant that their skills will be rendered worthless and their status and very livelihood imperiled by the resultant unemployment."[103]

---

99. *See* Tornatzky & Fleischer, *supra* note 3, at 91.
100. *See infra* notes 200–01 and accompanying text.
101. Vaughan, 1956, p. 22.
102. *See* Stern, *supra* note 8, at 14.
103. *Id.* In 1996, the European Commission recognized such concerns in its Green Paper on the information society. The paper acknowledged that while the adoption and widespread use of information and communication technologies offer great opportunity for the creation of wealth and increased standards of living, there are many concerns still to be reckoned with about the impact of the information society on the quality of life. Two key questions were framed: (1) Will these technologies not destroy more jobs than they create and will people be able to adapt to the changes in the way they work? (2) Will the complexity and the cost of the new technologies not widen the gaps between industrialized and less developed areas, between the young and the old, between those in the know and those who are not? *See* EUROPEAN COMMISSION, DIRECTORATE GENERAL V, EMPLOYMENT, INDUSTRIAL RELATIONS AND SOCIAL AFFAIRS, LIVING AND WORKING IN THE INFORMATION SOCIETY: PEOPLE FIRST (1996).

2. Standards

Standards identify a specific technology for adoption by all firms and are usually mandated by government or agreed upon by private industry committees in order to ensure compatibility.[104] The drivers for standardization are to avoid excess inertia and to reduce user search and coordination costs.[105] A firm that controls a technology that becomes established as a standard can have an extremely profitable market position, what Ferguson and Morris call an "architectural franchise."[106] Dominant firms in the market may set de facto standards. Standards may eliminate or discourage competition of a more radical nature: an "agreed upon standard may eliminate competition between technologies and channel it into other forms of competition such as price, service and product features."[107]

In addition to suppressing competition, firms participating in standards development may be tempted to collude to set a standard, or to keep an existing standard in place to resist change or innovation.[108] A standard in place can become an ingredient in sunk costs and can discourage future innovation in products and, consequently, the evolution of existing standards. The cost of switching from one technology to another may result in "lock-in" to a specific technology since consumers will be unwilling to switch to another standard unless the new standard offers significant improved functionality.[109]

VI. Legal Cases & Research: Tactics

In reviewing over forty cases and histories concerning technology suppression, we identified at least five categories of tactics by which innovations have been shelved or delayed.

---

104. *See* David Friedman, *Standards as Intellectual Property: An Economic Approach,* 19 Dayton L. Rev. 1109, 1119–21 (1994).

105. *See id.* at 1121–24.

106. See Charles Ferguson & Charles Morris, Computer Wars: How the West Can Win in a Post-IBM World, 131 (1993).

107. Stanley M. Besen, & Joseph Farrell, *Choosing How to Compete: Strategies and Tactics Standardization,* 8 J. Econ. Persp. 117, 119–20 (1994); *see also* Joseph Farrell, *Standardization and Intellectual Property,*30 Jurimetrics 35 (1989).

108. *See* Herbert Hovenkamp, Federal Antitrust Policy: The Law of Competition and Its Practice 178–79 (West 2d ed. 1999).

109. *See* Patrick D. Curran, *Standard-Setting Organization: Patents, Price Fixing, and Per Se Illegality,* 70 U. Chi. L. Rev. 983, 990 n.26 (2003).

TABLE I
TACTICS OF TECHNOLOGY SUPPRESSION

TACTIC	DEFINITION
Sham Litigation	baseless litigation and threats to sue made with the intent to suppress competition
Patent Nonuse	intentional refusal to use or license a patent
Patent Abuse	patent is exploited or extended for anticompetitive purposes, including patent consolidation, creation of patent thickets, and patent pooling
Horizontal Takeovers & Acquisitions	one firm acquires another in order to suppress the development of a competing innovation
Exclusive Licensing Arrangements	patentee grants an exclusive license to a firm that expresses a desire to develop the innovation; the firm then attempts to suppress the innovation through patent nonuse or abuse

A. *Sham Litigation*

Sham litigation, involving predatory patent infringement suits or threats of suits, may lead a competitor to withhold an innovation when it cannot afford to defend the case. Such litigation and threats are made in bad faith, with the intent to suppress the patented invention and competition.[110] Larger firms have an advantage in developing and promoting new innovations and an ability to intimidate smaller firms through legal challenges to the validity of their patents. Smaller firms may have no choice but to settle.[111] Sham litigation can effectively dampen competition or create a sense of disruption and trepidation, and misuse of the courts and the regulatory process can be an effective way to stifle competition.[112]

110. *See* Vaughan, *supra* note 4, at 265, 270–77.
111. *See* Scherer, *supra* note 51, at 449–450.
112. *See* Areeda & Kaplow, *supra* note 73, at 268–70.

Such was the case in *Hartford-Empire Co. v. United States,*[113] in which it was alleged that Hartford-Empire and several other companies entered into agreements to monopolize the glass container manufacturing industry, and to restrain trade in violation of the antitrust laws.[114] Hartford-Empire obtained numerous and sometimes competing patents, which it suppressed through various means, including threats of litigation against competitors. In one instance, Hartford-Empire pursued and won an infringement suit on a patent that it had fraudulently obtained. Hartford-Empire bullied small competitors into granting it exclusive patent licenses under threat of lawsuits, which a federal district court condemned as "litigation expensive beyond the dreams of the average man."[115] On appeal, the Supreme Court found that Hartford-Empire unlawfully conspired, monopolized, and attempted to acquire and maintain monopolies of patents in the manufacture and distribution of glass-making machinery and the sale of glass products.[116]

Under current antitrust law, challenging sham litigation remains very difficult. For a lawsuit to be adjudged a sham, it "must be objectively baseless in the sense that no reasonable litigant could realistically expect success on the merits."[117] In addition, the court must decide that "the baseless suit is intended to be an anticompetitive weapon, directly interfering with the business of the competitor.[118] This standard of proof is almost impossible to meet.

B. *Patent Nonuse*

Patent nonuse involves the intentional refusal to use or license a patent.[119] The patentee attempts to "block" competitors from using that technology or developing a close substitute.[120] "Suppression of patented inventions . . . may result from a 'fencing' patent secured on an improvement to the product of a competitor and held in nonuse to restrict him to an inferior technology."[121] In addition, an exclusive licensing agreement may lead to nonuse when the licensee refuses to work the

113. 323 U.S. 386 (1945).
114. *See id.* at 400.
115. *United States v. Hartford-Empire Co.*, 46 F. Supp. 541, 618 (N.D. Ohio 1942).
116. *See* 323 U.S. at 431–32.
117. *Prof'l Real Estate Investors, Inc., v. Columbia Pictures Indus., Inc.*, 508 U.S. 49, 60–61 (1993).
118. FTC Staff Report at 220–221.
119. *See* Dunford, *supra* note 5, at 513.
120. The matter of what constitutes a close substitute is not always clear; for instance, either a subcombination (reconfiguration) or an incremental innovation (extension) may qualify as a substitute. *See* Areeda & Kaplow, *supra* note 73, at 561–64.
121. *See* Frost, *supra* note 48, at 276.

invention.[122] Two documented instances of suppression involving patent nonuse concern telecommunications inventions developed by AT&T in the early part of the twentieth century. We briefly discuss both of these inventions: first, magnetic recording devices, and then wireless telephony.

1. AT&T and Magnetic Recording

In 1930, AT&T's Bell Laboratories decided to fund research in magnetic recording based upon its involvement in sound recording research. At this time, Bell Laboratories had developed the "Vitaphone," which produced sound for motion pictures.[123] In an effort to entice AT&T to complete further work on magnetic recording, many outside firms, including the Dictaphone Corporation, pressured Bell to produce magnetic recording devices. At AT&T, Clarence Hickman's pioneering research led to a shift from phonograph-based technology to magnetic recording.[124] In 1934, prior to his departure from the magnetic recording project team, he assembled a prototype of a telephone answering machine that was tested successfully in-house and in limited field tests.[125]

Nevertheless, AT&T's management decided to abandon commercial development of magnetic recording "for ideological reasons stemming from the corporate culture of the Bell system . . . . Management feared that availability of recording devices would make customers less willing to use the telephone system and so undermine the concept of universal service."[126] Corporate memoranda document the concern that commercial negotiations by telephone would be inhibited because they were recorded, and that individuals would not use the telephone if they intended to discuss illegal and immoral issues.[127] Since telephone users were already concerned about privacy, because wiretapping was legal at this time, AT&T believed that the possibility of recording would increase their apprehensions.[128]

Moreover, AT&T desired to control the nature of the telephone system and to prevent attachment of devices to its circuits that were outside its control.[129] It may have been seeking to extend its monopoly into radio,

---

122. *See infra* notes 175–76 and accompanying text.
123. *See* Mark Clark, *Suppressing Innovation: Bell Laboratories and Magnetic Recording*, 34 TECH. & CULTURE 516, 520–24 (1993).
124. *See id.* at 524–25.
125. *See id.* at 529–30.
126. *Id.* at 533–534.
127. *See id.* at 534.
128. *See id.* at 534–35.
129. *See id.* at 534–37.

film, and television, but was aware that such extensions would bring increased antitrust scrutiny about venturing into new markets.[130] Magnetic recording devices finally emerged when the U.S government funded Armour Research Foundation and Brush Development Company to develop and supply magnetic recorders to the military during World War II. This later stimulated post-war consumer demand and resulted in markets for AT&T's competitors.[131]

2. AT&T and Wireless Telephony

From the beginning, AT&T was aggressive about occupying the field of telephone technology by patenting around its inventions and examining new patents by others with an eye toward acquiring these patents or enforcing its own patents.[132] In 1909, AT&T engineer John Carty argued for intensive research into wireless technology because of the potential threat of radio.[133] He was concerned that radio broadcasting might refine sound transmission technology and then enter AT&T's market. In response, AT&T organized a research effort aimed at producing a quality system of wireless telephony transmission and reception as a defensive measure.[134] Sensitivity about market intrusions and overlapping markets persisted. In 1927, General Electric (GE) commercial manager, Otterson, wrote the "Four Square Memorandum" in which he analyzed the role played by scientific developments in fields closest to telephony.[135] The memo discussed the conflicts of interest between AT&T on the one hand, and RCA, GE, Western Union, and International Telephone & Telegraph on the other. The various interests represented were the power and light group, radio group, telegraph group, and foreign telephone service.[136]

---

130. *See id.* at 536.

131. *See id.* at 537–38.

132. A 1892 annual report written by the patent attorney for American Bell Telephone Co. describes the effects of suing competitors for patent infringement:

> [I]t appears to me that the policy of bringing suit for infringement on apparatus patents is an excellent one because it keeps the concerns which attempt opposition in a nervous and excited condition since they never know where the next attack may be made, and since it keeps them all the time changing their machines and causes them ultimately, in order that they may not be sued, to adopt inefficient forms of apparatus.

N.R. DANIELIAN, A.T.&T. THE STORY OF INDUSTRIAL CONQUEST, 98 (1939).

133. *See id.* at 104–05.

134. *See id.* at 105–07.

135. *See id.* at 114–116.

136. *See id.*

Finally, in 1926, AT&T entered into a license agreement with the radio group whereby AT&T agreed to withdraw from the radio broadcast, phonograph, and motion picture markets, and provide its wire service to the other companies at reduced rates. In exchange, AT&T received exclusive licenses for all GE, RCA, and Westinghouse two-way wireless telephony patents, so that wireless telephony became the exclusive field of AT&T, which also gained a monopoly of both domestic and international radio telephony.[137] "The inescapable result of the . . . pooling arrangement . . . was not to create competition for markets, but to monopolize the exploitation of improved equipment and to give a free hand to particular companies to press or delay, as interests dictated, the development of new industries under protection of monopoly."[138] By amassing and refusing to use its patent rights, and by building a monopoly position for itself, AT&T suppressed wireless telephony for over four decades. We suspect that AT&T may have done so due to its sunk costs in its existing technology and infrastructure, out of fear of encouraging new entrants to the potential market for wireless telephony, and in order to avoid disrupting the status quo in the radio broadcast market.

C. *Patent Abuse*

Patent abuse occurs when the patentee misuses the patent for anti-competitive purposes, including such practices as patent consolidation, patent pooling, and creation of patent thickets.[139] Patent consolidation seeks to gain control of key patents held by others with the goal of influencing or slowing the development of competing technologies.[140] Pooling occurs when a group of patentees collude to cross license each other so as to dominate the market for a technology by preventing new competition from outside the group.[141] Patent thickets (sometimes known as "patent blankets" or "patent blitzkrieg") involves amassing a large number of patents with the intent to "fence in" or "block" the path of would-be competitors in their efforts to invent around the patented

137. *See id.* at 126–32.
138. *See id.* at 132.
139. *See* Dunford, *supra* note 5, at 517.
140. *See id.*
141. *See id.* Although pooling arrangements may have anti-competitive effects when they involve output restraints, market division, collusive pricing, and technology suppression, they may also yield pro-competitive benefits. For instance, patent pools, accompanied by cross-licensing, may promote technology diffusion by integrating complementary technologies, reducing transaction costs, clearing technology blockages, and avoiding expensive infringement suits. *See Antitrust Guidelines for the Licensing of Intellectual Property*, U.S. Dept. of Justice & Fed. Trade Comm'n, § 5.5 (1995).

technology.[142] While these activities are not illegal in themselves, they may become abusive and unlawful when used with the intent to stifle competition.[143] Instances involving patent abuse are evident in the histories of the electric lamp and chemical industries.

1. The Electric Lamp Industry and Fluorescent Lighting

The collusive nature of the light industry led to delay of improvements in incandescent lighting and the suppression of fluorescent lamps. Following the patenting of the first incandescent electric lamp in 1880, the manufacture of electric lamps evolved from a craft to a highly mechanized and automated process. Firms in the industry needed a large investment of fixed capital and specialized plants with a high proportion of overhead costs and low labor costs per unit produced.[144] These conditions, along with the inelastic demand for electric lamps where a decrease in price was not accompanied by an increase in demand, made competition unattractive and cartelization more appealing.[145] General Electric (GE) took the lead in the U.S. lamp industry and GE "officials frequently . . . placed on record their fear of impending competition and their intention to use cross licensing patent agreements to build a market structure so stable that the expiration of General Electrics' basic patents could not shake it."[146]

By the 1920s, in order to bolster its position in the lighting industry, GE had entered into cross-licensing agreements with its competitors to divide domestic markets, fix prices, and regulate exports.[147] An international cartel was formed to exchange patents and technical information and to divide markets. The cartel established a testing lab in Switzerland for the stated purpose of standardizing quality. However, the standardization program had the actual purpose of increasing sales by eliminating quality competition in the sale of lamps and by limiting or reducing the life of lamps.[148] Later, during the Depression and World War

142. *See* Dunford, *supra* note 5, at 517.

143. Many other variants of abuse exist. "[B]litzkrieg is facilitated by the use of 'umbrella patents' (patents that are so broad as to prevent the development of similar products), 'accordion patents' (patents that begin with the single invention but expand to include products and processes used in association with it), and 'bottleneck patents' (patents that control the use of inventions without which the industry cannot operate)." *Id.* For further discussion of antitrust issues as to patent accumulation, *see* Areeda & Kaplow, *supra* note 73, at 557–62.

144. *See* George W. Stocking & Myron W. Watkins, *Cartels in Action: Case Studies in International Business Diplomacy* 305–12 (1946).

145. *See id.* at 325.

146. *Id.* at 327.

147. *See id.* at 308.

148. *See id.* at 351–55.

II, suppression of longer life bulbs ended when the cartel began to break down as patents expired and other competitors entered the market to sell longer life bulbs.

The introduction of fluorescent lighting was similarly delayed. The basic technology for fluorescent lighting was widely known in the 1920s, yet GE and Westinghouse, the leading U.S. manufacturers, decided to saturate the incandescent light market before introducing the new product.[149] This delay was partly in response to pressure from electric utilities, which believed that the increased efficiency of fluorescent lighting would lead to lower demand for electricity and reduced profits.[150] The two industries were highly interdependent. Since the fluorescent lamp had been "acclaimed as several times more efficient than incandescent lighting, there was a possibility that the lighting load would be seriously affected ... [and so] the utilities seem to have wished to retard the rate of introduction of fluorescent lighting."[151] Eventually, GE and Westinghouse released fluorescent lights into the market in 1938 when a new competitor, Sylvania, successfully introduced fluorescent lighting and threatened to emerge as the leading manufacturer and seller of these bulbs.[152]

2. I.G. Farben, Standard Oil, and Synthetic Oil

Historically, major chemical companies preferred to collaborate, settle their disputes peacefully, and equitably divide up their areas of influence. Companies agree on changes to products and processes, and it is unusual for one to competitively supplant another's product or process. "Through pooling their knowledge, experience, and monopoly privileges, chemical companies can eliminate costly litigation, increase the fruitfulness of their research, and gain a tremendous advantage over outside would-be innovators."[153] However, this spirit of collaboration sometimes lent itself to anticompetitive collusion, and we see this in the behavior of two leading chemical companies, prior to the Second World War.

In 1929, I.G. Farben and Standard Oil entered into a mutual commitment not to compete by recognizing the primacy of Standard in petroleum and Farben in chemicals. Standard gained ownership and control of Farben's existing and future hydrogenation processes outside

149. *See* Arthur A. Bright, *The Electric-Lamp Industry: Technological Change and Economic Development from 1800 to 1947* at 400–01 (1949).
150. *See id.* at 401.
151. *Id.* at 401–402.
152. *See id.* at 404.
153. Stocking & Watkins, *supra* note 144, at 427.

of Germany, and became a junior partner with Farben in the manufacture of new chemical products derived from petroleum and natural gas.[154] Once Standard acquired these patents, it exhibited little interest in using the hydrogenation processes in production; rather, it was more interested in blocking the threat of liquid fuels and coal lubricants to the oil industry.[155] Standard then leveraged its rights to draw other petroleum refining companies into patent pools, thereby extending its original rights and discouraging synthetic production of liquid fuels and coal lubricants.

In 1931, Farben developed a new synthetic oil product, known as Paraflow, which was a pour-point depressant that reduces the temperature at which oil flows. In 1932, Standard obtained exclusive rights to Paraflow from Farben, added complementary patents of its own, and used these to eliminate any competition to Paraflow. One competing product known as Santopour, which was more efficient and economical, threatened to displace Paraflow. After reaching an agreement to acquire the patent rights to Santopour, Standard considered either increasing the price, or diluting the product in an in an internal memo:

> We would have to tell a rather embarrassing story to explain the marked change in either price or potency of Santopour, and the real reason for the change would be obvious to the trade. Our conclusion is, therefore, that the best policy is to retire Santopour quickly and quietly as possible, and to market only Paraflow of present potency.[156]

Soon afterwards, Standard withdrew Santopour from the market and proceeded to suppress it.[157]

D. *Horizontal Takeovers and Acquisitions*

A horizontal merger or acquisition that creates or enhances market power in an already highly concentrated market is likely to be unlawful under the federal antitrust laws.[158] The courts determine the legality of such a merger by defining the "relevant market" and estimating the

---

154. *See id.* at 491.

155. *See id.* at 492.

156. *Id.* at 498 (quoting, *Patents, Hearings before the Committee on Patents,* 77th Cong. 1824 (1941).

157. *See id.* ("Our conclusion is, therefore, that the best policy is to retire Santopour as quickly and as quietly as possible, and to market only Paraflow of present potency.").

158. Horizontal mergers occur between competitors where the two firms that are combining formerly stood in a competitive relationship, i.e., they sold the same product or a close substitute in a shared geographic market. *See* HERBERT HOVENKAMP, FEDERAL ANTITRUST POLICY: THE LAW OF COMPETITION AND ITS PRACTICE 492 (2d ed. 1999).

pre- and post-merger levels of concentration in the market.[159] "If one company acquires another while the latter is in control of the development of a new technology, the former is placed in a position to suppress the development of that technology."[160] The *Johnson & Johnson* cases, discussed below, address takeovers by a leading firm in a current product market and a potential competitor in a new product market. In each case, the potential competitor, StimTech in the first case and Meditemp in the second case, was not a participant in the current product market, but endeavored to develop a next-generation product that would displace a current product.

1. Johnson & Johnson: The TENS Device

The case of *McDonald v. Johnson & Johnson*,[161] concerned StimTech, a small corporation that had been formed to develop and market a transcutaneous electronic nerve stimulation (TENS) device to control pain through the use of electrical impulses.[162] Essential to the success of StimTech's marketing strategy was the securing of additional financing. Johnson & Johnson learned of StimTech's need for additional capital and approached its owners with an offer to acquire StimTech in exchange for a promise to market the TENS device. The original owners of StimTech were to become employees.[163] After the owners agreed to the sale, Johnson & Johnson imposed a number of highly restrictive measures – including a hiring freeze, a cap on R&D funding, and inventory reduction—on StimTech that prevented any expansion in sales of the TENS device and eliminated further research directed toward refinement of the device.[164]

As a result, StimTech incurred operating losses of $7.3 million and its original owners were forced out.[165] They sued, alleging that Johnson & Johnson had violated the antitrust laws by acquiring StimTech to suppress the TENS device and thereby eliminate competition with Johnson & Johnson's pain control medication products.[166] The court refused to

159. The analytical approach applied by the courts follows that used by the Federal Trade Commission and the Antitrust Division of the Justice Department. *See* U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N HORIZONTAL MERGER GUIDELINES, 57 Fed. Reg. 41552 (Sept. 10, 1992). The relevant market is defined by a product or group of products and by the geographic area in which the product is produced and sold. *See id.* § 1.0.

160. *See* Dunford, *supra* note 5, at 520.

161. 722 F.2d 1370 (8th Cir. 1983). For a detailed analysis of this case, see Kurt. M. Saunders, *Diluting Our Antitrust Laws: Federal Standing Analysis Under Section 4 of the Clayton Act*, U. PITT. L. REV. 241 (1984).

162. *See* 722 F.2d at 1372 n.1.

163. *See id.* at 1372.

164. *See id.* at 1372–73.

165. *See id.* at 1373.

166. *See id.* at 1376.

hear the case on the grounds that the owners had voluntarily sold StimTech and the patent rights to the TENS device and were now no longer competitors with Johnson & Johnson. As such, the court ruled that they no longer had a remedy under the antitrust laws.[167] Although StimTech's forced withdrawal from the TENS market may not have resulted in injury to its competitors, the suppression of StimTech benefited Johnson & Johnson by reducing competition in the pain control market.[168]

2. Johnson & Johnson: The Meditemp Thermometer

The facts and pattern of conduct leading to the *Turner v. Johnson & Johnson*[169] case are strikingly similar to those in the *McDonald* case. Turner, president of American Medical Electronics Corp. (AMEC), invented, manufactured, and marketed an electronic thermometer known as Meditemp.[170] In 1975, AMEC and Johnson & Johnson began negotiating for the purchase of AMEC's assets. Johnson & Johnson, already developing its own electronic thermometer called Survalent, promised to promote the development and sale of Meditemp.[171]

After the acquisition, Johnson & Johnson refused to provide sufficient funding or support to develop and successfully market Meditemp; and in 1979, Johnson & Johnson discontinued Meditemp.[172] Turner sued, asserting fraud and antitrust violations by Johnson & Johnson to gain control of AMEC in order to suppress the device and eliminate AMEC as a competitor in the thermometer market.[173] The court dismissed the antitrust claim for lack of standing as the court in the *McDonald* case had done, but allowed the fraud claim to go to trial.[174]

E. *Exclusive Licensing Arrangements*

An exclusive license is one by which the patentee agrees to grant a license to another and not to any other third parties.[175] When a patentee is unable or unwilling to work a patent, he or she may grant an exclusive license to a firm that expresses an interest in developing and marketing

167. *See id.* at 1376–79.
168. *See* Saunders, *supra* note 161, at 259.
169. 549 F. Supp. 807 (D. Mass. 1982).
170. *See id.* at 809.
171. *See id.* at 811.
172. *See id.* at 810.
173. *See id.* at 809–10.
174. *See id.* at 811–12.
175. *See* JANICE M. MUELLER, AN INTRODUCTION TO PATENT LAW 271 (2003).

the invention. The exclusive licensee may then suppress the invention through nonuse during the term of the license.[176]

1. *Nestler v. Exxon Corp.*: The Nested Plastic Bagging Device

Richard Nestler developed a nested plastic bagging device in the mid-1960's. This device, which inserted polyethylene bags made from petroleum resins inside one another, was to be located at grocery store checkout counters to reduce the time and cost of packaging items.[177] Nestler established a factory, acquired private financing, and obtained a machine from Sheldahl Co. to produce plastic bags for sale and to use with his device.[178] In 1968, he entered into an exclusive licensing agreement with Exxon, the largest petroleum producer in the U.S. Exxon represented that it was interested in new markets for its petroleum resins and agreed to finance the cost of developing a market for the bagging device. Meanwhile, Exxon had learned that Sheldahl was to be the only producer of the nested bag machine. Exxon secretly entered into an agreement with Sheldahl to acquire control of the process for producing nested bags.[179]

Nestler later sued Exxon, claiming that Exxon failed and refused to manufacture his device, to deliver the device and bags to customers, and to expand production capacity. Nestler also claimed that Exxon failed to provide customer information and capacity forecasts so that he could make the innovation available to customers. He argued that Exxon deprived the public of the benefits of competition and the use of the bagging device in that "Exxon undertook a calculated and planned program to squeeze Nestler out of business . . . leaving Exxon with control of the U.S. license and Nestler excluded from obtaining a nested bag machine to use in competition with Exxon . . . ."[180]

The federal district court granted summary judgment and found that there was no breach of the licensing agreement because the payment of royalties was dependent upon production of the device.[181] In addition, the court found that there was not enough evidence to conclude that Exxon's purpose was to achieve an unreasonable restraint of trade and

176. Previously, we discussed instances of patent abuse and nonuse such as I.G. Farben and AT&T. These cases also involved exclusive licensing arrangements. *See supra* notes 132–38 & 153–57 and accompanying text.

177. *See Nestler v. Exxon Corp.*, 1976-1 Trade Cas. (CCH) ¶ 60,876, 68,832 (D.D.C. 1976).

178. *See id.* at 68,834.

179. *See id.* at 68,832–834.

180. *Id.* at 68,834–35.

181. *See id.* at 68,834.

held that the licensing agreement allowed Nestler to produce the device if Exxon did not produce nested bags.[182] The court apparently overlooked the fact that Exxon had control over the raw materials for plastic bags (i.e., oil resins) and, through its alliance with Sheldahl, also controlled the sole means of production. Even if Nestler was free to produce his nested bagging device, it would be useless without plastic bags.

2. *Bloch v. SmithKline Beckman Corp.*: The MgK Dietary Supplement

Dr. Maurice Bloch, a medical researcher, licensed his product idea for a dietary supplement to his employer, SmithKline. In 1974, they agreed to a licensing arrangement for the development, marketing, and patenting of the MgK dietary supplement, containing magnesium and potassium compounds for use in diuretic therapy.[183] Bloch confidentially disclosed "his idea that the amount of potassium in the body changes in proportion to the amount of magnesium in the body."[184] At that time, most diuretic drugs on the market were potassium-depleting, which led to various adverse side effects, such as fatigue, dizzy spells and confusion.[185] SmithKline agreed that if it did not further develop MgK in the United Kingdom, or did not apply for a product license, it would give up its exclusive rights to Bloch. Moreover, if SmithKline obtained a product license but did not market within twelve months of the grant of the license, it would also relinquish exclusive rights to Bloch.[186] Later, when SmithKline failed to use the rights to the drug, Bloch sued for fraud and antitrust violations.

Bloch asserted that MgK had been suppressed because of potential competition with Dyazide, SmithKline's product. Specifically, he contended that: (1) SmithKline intentionally frustrated clinical studies that would have confirmed Bloch's test results; (2) SmithKline falsely led Bloch to believe that testing and development of MgK as a marketable product was continuing, in order to prevent Bloch from asserting his right to reacquire the product idea; (3) SmithKline suppressed its own test results that longtime use of Dyazide depleted magnesium led to potassium depletion; and (4) SmithKline committed patent fraud by continuing to misrepresent and not reveal its test results concerning

182. *See id.* at 68,836
183. *See Bloch v. SmithKline Beckman Corp.*, No. CIV A. 82-510, 1988 WL 117927 (E.D. Pa. Nov. 1, 1988).
184. *Id.* at *1.
185. *See id.*
186. *See id.* at *3.

Dyazide.[187] After reviewing the evidence, the court believed that there was a genuine issue of material fact that the alleged suppression had occurred. The court also found that Bloch had standing to sue because SmithKline was "purposely obstructing the development of a potentially competitive product" and because Bloch could have marketed MgK without SmithKline.[188]

F. *Exceptions to the General Rule*

Although it remains the general rule that there is no prohibition against patent nonuse or suppression of a patented technology,[189] exceptions have been made in the cases of health, safety, and the environment. For instance, in *City of Milwaukee v. Activated Sludge*,[190] the inventor of an apparatus for treating raw sewage by aeration sued the City of Milwaukee for patent infringement, even though he was not working the patent. The court found that the patent had indeed been infringed, but refused to issue a permanent injunction since it would have led to the closing of the sewage plant and forced the city to dump raw sewage into Lake Michigan, causing pollution and a public health hazard.[191]

Likewise, in *Vitamin Technologists v. Wisconsin Alumni Research Foundation,*[192] the inventor of a process that enriched oleomargarine with Vitamin D through irradiation refused to license the patented process so as not to compete with butter, which naturally contains the vitamin. Although the court invalidated the patent and so avoided dealing with the issue of suppression, it made note of evidence indicating the importance of the process in preventing scurvy and rickets in low-income consumers, stating that the refusal to license a patent such as this was a "public offense."[193] Similarly, in *Bliss v. Brooklyn*,[194] the owner of a patent on a fire hose coupling, who had chosen not to use or license, was unable to obtain an injunction against the city's use of the coupling. The court explained that the safety of its citizens was more important in that the coupling was necessary for the city's use in preventing fires.[195]

These few cases demonstrate that the courts are only willing to require the compulsory licensing of a patent when the public interest is at

187. *See id.*
188. *Id.* at *5.
189. *See supra* notes 55–61 and accompanying text.
190. 69 F.2d 577 (7th Cir. 1934).
191. *See id.* at 593.
192. 146 F.2d 941 (9th Cir. 1945).
193. *Id.* at 945.
194. 3 F. Cas. 706 (C.C.E.D.N.Y. 1871).
195. *See id.* at 707.

stake. Congress has been similarly circumspect in addressing this issue. In only a few instances has Congress required the working of a patent. Under the Clean Air Act, a court may order a patentee of an air pollution control technology to license it when there are no alternative technologies available, and the lack of an alternative may create a monopoly that substantially lessens competition.[196] Similarly, the Atomic Energy Act forbids the holder of a patent affected with the public interest from preventing the use of its invention.[197]

These exceptions, whether created judicially or legislatively, demonstrate that use of a patented technology has been required in limited circumstances. The exceptions have favored health, safety, and the environment—all of which are considered to be in the public interest. Nonetheless, the courts and Congress continue to maintain that patents are private property, even though these exceptions are clearly tied to the public interest.

VII. Potential Deterrents to Technology Suppression

The notion of the lone inventor working in a garage workshop is increasingly romantic and quaint. In fact, today's R&D and patenting processes are more a matter of corporate investment than the avocation of individual inventors. Given this reality, we believe that it is time to revisit the original intent behind the patent laws to ensure that the laws remain faithful to their purpose—disclosure and diffusion of new inventions.

We have demonstrated that technology suppression occurs, even though the management literature does not acknowledge its existence, and the courts have been reluctant to view this conduct as unlawful. By necessity, remedies for technology suppression are limited and must be conceived of in the short term through contractual provisions, and in the longer term through technology policy and forcing and changes to current law.

196. *See* 42 U.S.C. § 7608 (2000).

197. *See* 42 U.S.C. § 2183. For examples of other compulsory patent licensing provisions, *see, e.g.*, Semiconductor Chip Protection Act, 17 U.S.C. § 901-14, Tennessee Valley Authority Act, 16 U.S.C. § 831(r), Plant Variety Protection Act, 7 U.S.C. § 2404, Helium Act, 50 U.S.C. § 167b, Coal Research & Development Act, 30 U.S.C. § 666, Arms Control & Disarmament Act, 22 U.S.C. § 2572, and the Solid Waste Disposal Act, 42 U.S.C. § 3253(c).

TABLE 2
SHORT AND LONG-TERM DETERRENTS

Time Frame	Deterrents
Short Term	contractual provisions
Long Term	technology policy & forcing changes to existing law: compulsory licensing, antitrust

Our goal here is to suggest steps that individuals and policy makers can take to decrease the likelihood of suppression. This is important for innovators or entrepreneurs who want to increase the chances that their innovations will not be suppressed as a result of acquisition or merger, exclusive licensing arrangements, or an in-house decision to shelve an invention. Likewise, R&D managers responsible for bringing products to market are operating in a domain where their own organization, or a competitor's, may be the victim or perpetrator of suppressive tactics.

A. *Contractual Provisions*

When a contractual agreement exists between two parties related to the development and use of a patented technology, provisions to guard against suppression may be inserted. The use of such provisions is appropriate in three settings. First, a firm enters into a licensing agreement with an inventor for a patented technology. Second, one party enters into an agreement by which it merges with or acquires another party, which may also own a patented technology. Third, an employer acquires rights in an invention created by an employee through a license or an assignment.

An inventor may license a patented technology to another. If so, the inventor can either decline to grant an exclusive license for an extended period of time, or seek to obtain an exclusive license that builds in provisions that discourage suppression of the innovation. For example, the agreement can specify that the license is conditioned upon development and commercialization, and can be revoked if the licensee does not do so within a specified period. This strategy is roughly equivalent to creating a privately fashioned, compulsory use requirement. Inventors should not presume that a standard-form licensing agreement will meet their needs.

B. *Technology Policy and Forcing*

Technology forcing, including such measures as subsidies and incentives, promotes innovation. Indirectly, these measures also reduce the likelihood of the suppression of targeted technologies. In the United States, technology policy is a controversial subject; however, "critical technologies" have long been promoted. Initially, the concept of critical technologies was tied to the development of superior weapon systems—a means "to guard scientific knowledge about technology to protect national security."[198] Many technology forcing regulations are related to environmental protection.[199] Subsequently, the concept has been expanded to encompass a commitment to national growth and prosperity.

The government's pledge to foster competitiveness through cooperation and technology policy has had a direct impact on industry. Partnerships of two kinds have resulted: between government and industry, and between industry competitors. For example, in response to Japanese semiconductor manufacturers flooding the American chip market during the mid 80s, SEMATECH (SEmiconductor MAnufacturing TECHnology) was launched in 1987. This cooperative effort engaged fourteen leading American companies and the U.S. government, and had as its goal the restoration of American leadership in semiconductor manufacturing.[200] Similarly, the Microelectronics and Computer Technology Corporation (MCC) was created in 1982 to secure and enhance U.S. technological competitiveness in computers against the Japanese.[201] All of these examples demonstrate the effectiveness of technology and competitiveness policy—and function as an indirect deterrent for suppression. The matter of technology policy and forcing, however, is beyond the control of individuals and the private sector. Rather, the government determines which sectors of the economy are seen as critical or strategic, thereby making suppression less likely in those areas.

---

198. Linda D. Soloman & Simon E. Schoch, *Developing Critical Technologies*, 9 COMP. & HIGH TECH. L.J. 153, 153 (1993).

199. *See* Alan S. Miller, *Environmental Regulation, Technological Innovation, and Technology-Forcing*, 10 NAT. RESOURCES & ENV'T. 64 (1995).

200. *See* Michelle K. Lee & Mavis K. Lee, *High Technology Consortia: A Panacea for America's Technological Competitiveness Problems?*, 6 HIGH TECH. L.J. 335 (1991).

201. See Gibson, D. V. & Everett Rogers, *R&D Collaboration on trial: The story of MCC—America's first major, for-profit R&D consortium and its quest for competitiveness of American high-tech firms.* (1994). SEMATECH would likely have been regarded as a combination in violation of the antitrust laws but for the initiative of the federal government in fostering its formation, and through the National Cooperative Research and Production Act of 1984 (Public Law 98-462).

C. *Changes to Existing Law*

1. Compulsory Licensing

An existing mechanism that could be applied to the problem of suppression involves the use of compulsory licensing, whereby a court orders a patent owner (who is not using a patent) to license the patent to someone who wishes to use it.[202] When a compulsory license is ordered, the court must also determine the royalty that the licensee must pay to the patent owner.[203] The remedy of compulsory licensing has been suggested by many others[204] and is used in other nations;[205] however, there is continued resistance to wider use of compulsory licensing under U.S. law.[206] We propose that this form of relief would only be invoked when the patent owner was acting in bad faith or with an anticompetitive purpose.[207] The table below summarizes common arguments in favor of and against compulsory licensing:

---

202. *See* Chisum & Jacobs, *supra* note 47, at § 2G[3].

203. *See id.*

204. *See, e.g.*, Martin J. Adelman, *Property Rights Theory and Patent-Antitrust: The Role of Compulsory Licensing*, 52 N.Y.U. L. REV. 977 (1977); Tom Arnold & Paul Janicke, *Compulsory Licensing Anyone?*, 55 J. PAT. OFF. SOC'Y 149 (1973); A. Jason Mirabito, *Compulsory Patent Licensing for the United States: A Current Proposal*, 57 J. PAT. OFF. SOC'Y 404 (1975).

205. For an analysis of the approach to compulsory licensing in the European Union, see Maurits Dolmans, *Restrictions on Innovation: An EU Antitrust Approach,* 66 ANTITRUST L. J. 455 (1998).

206. The Agreement on Trade-Related Aspects of Intellectual Property (TRIPs), to which the U.S. is a signatory as a member of the World Trade Organization, expressly permits the use of compulsory licensing for limited periods of time in situations involving public emergency or extreme urgency. *See* Agreement on Trade-Related Aspects of Intellectual Property, Part II, Art. 31, 1996, *available at* http://www.wto.org/english/tratop_e/ trips_e/t_agm3_e.htm) For a detailed discussion of compulsory licensing under Article 31 of the TRIPs Agreement, see Carlos Correa, *The GATT Agreement on Trade-Related Aspects of Intellectual Property Rights: New Standards for Patent Protection,* 16 EURO. INTELL. PROP. REV. 327, 331–33 (1994).

207. Under circumstances of bad faith, an approach to compulsory licensing could consist of the following factors. Patent owners would be allowed a period of exclusivity of three to four years. Evidence of bad faith or anticompetitive behavior and a demonstration of how the public interest would be served by the invention are also required. Once these conditions have been met, a reasonable royalty can be determined. Royalties should account for R&D and related legal costs, risks undertaken in first producing the invention, potential market price and profit margin, and advertising and administrative expenses. We recognize that these factors may be difficult to quantify and are subject to interpretation and evaluation, especially in the case of radical innovations, which may create completely new markets.

TABLE 3
COMPULSORY LICENSING

OBJECTIONS TO COMPULSORY LICENSING	COUNTERARGUMENTS
Compulsory licensing reduces the inventor's incentive to develop.	There is no evidence that patent protection stimulates invention Inventors who do not wish to use/disclose can maintain invention as a trade secret
Compulsory licensing is unconstitutional: a patent is an exclusive property right, which cannot to be taken without compensation.	Courts and the Congress have already approved compulsory licenses for certain inventions deemed to be in the public interest.
Compulsory licensing will hurt the U.S. in international trade. (A license issued to a foreign competitor with cheaper production costs could encroach upon the American competitor's market.)	We are now competing in a global economy. This is an issue only if you fail to work your patent or refuse to license to a domestic competitor.
U.S., as signatory to World Trade Organization's Agreement on Trade-Related Aspects of Intellectual Property, is restricted to using compulsory licenses for limited periods of time in situations involving public emergency or extreme urgency.	Other signatories, with compulsory licensing laws already in place, have successfully modified these laws in compliance with the WTO Agreement.
Impossible to compute reasonable royalties fairly and accurately. Presumes that courts can precisely set a royalty that fairly reflects the future commercial value of the patent.	Compulsory licensing systems of other nations, & many proposals offer practical starting points for computing royalties.

The debate on compulsory licensing continues. Most recently, several members of the U.S. House of Representatives unsuccessfully proposed the "Affordable Prescription Drugs and Medical Inventions Act."[208] This bill sought to require a patent owner who is not using an invention relating to health care, and who is engaged in anticompetitive behavior, to license the patent when the Secretary of Health and Human Services and the Federal Trade Commission determine that doing so is in the public interest.[209]

208. Affordable Prescription Drugs & Medical Inventions Act, H.R. 1708,107th Cong. (1st Sess. 2001).
209. *See id.*

2. Antitrust Law

We have previously noted the tension between the patent and antitrust laws; nonetheless,[210] we propose that antitrust law can be more liberally applied to offer a deterrent to suppression. The purpose of antitrust law is to promote competition. However, patent suppression can and has been used as an anticompetitive strategy. When suppression occurs, not only is competition harmed, but one of the original purposes of the patent laws is defeated: inventions are not disclosed and diffused to the public. In instances where a patent owner also has monopoly power,[211] patent suppression should be treated as a violation of the federal antitrust laws and subject to the remedies that these laws provide to those who have been injured.

VIII. CONCLUSION

Most people accept that suppression occurs and can easily name an example or two of inventions that have been allegedly suppressed: runless pantyhose, intermittent windshield wipers, color in motion pictures, and long-lasting light bulbs. All of these are a part of technology folklore. Some argue that in the long run, beneficial or valuable innovations will always see the light of day. Why care then about technology suppression? As Justice Douglas contended in his dissenting opinion in *Special Equipment Co. v. Coe*,[212] there are important reasons for not condoning patent suppression. In addition to undercutting the economic and public policy rationale for the existence of the patent system, Justice Douglas saw suppression as unconstitutional and contrary to the purpose of the Patent Act:

> The use of a new patent is suppressed so as to preclude experimentation which might result in further invention by competitors. A whole technology is blocked off. The result is a clog to our economic machine and a barrier to an economy of abundance. . . . Can the suppression of patents which arrest progress of technology be said to promote that progress? It is likewise difficult to see how suppression of patents can be reconciled with the provision of the statute which authorizes a grant of the "exclusive right to

210. *See supra* notes 66–70 and accompanying text.

211. Monopoly power is a high degree of power to influence prices and control output within a relevant market and is not necessarily a function of firm size. *See* Hovenkamp, *supra* note 108, at 269–72.

212. 324 U.S. 370 (1945)(Douglas, J., dissenting).

> make, use, and vend the invention or discovery." How may the words "make, use, and vend" be read to mean "not to make, not to use, and not to vend?"[213]

Suppression takes many guises and is not restricted to a single tactic. In addition, suppression is only evident after the fact—once it is uncovered or no longer occurring. Thus, it is very difficult to detect and nearly impossible to predict. However, there is value in better aligning the patent system with its goal of encouraging innovation and competition. Unless we reckon with the longstanding conceptual incompatibility within patent law—between seeing a patent as private property versus seeing the same patent as public privilege—this value will not be realized.[214] We argue against seeing patents exclusively as private property, and in favor of a balanced perspective that is more mindful of the nature of patents as public privilege.

The consequences of suppression, as we have shown, are more severe in the information age and the global economy. An array of federal statutes, [215] as well as the TRIPs Agreement,[216] have acknowledged the role of compulsory licensing in the public interest and that without compulsory licensing, patents that are necessary to alleviate health, environmental, and security could be shelved under the auspices of private property rights. There is significant risk when such innovations, privately owned and protected by a patent, can be held hostage or held back from the public and the marketplace for anticompetitive reasons. The advent of the information revolution, in tandem with the expanding scope of patentable subject matter, underscore the need to accord greater weight to the public interest in technology suppression.

213. *Id.* at 382–83.
214. *See supra* notes 51–65 and accompanying text.
215. *See supra* notes 196–97 and accompanying text.
216. *See supra* note 206.