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The Semiconductor Chip Protection Act of 1984: A Swamp or Firm Ground?

Robert W. Kastenmeier*
and Michael J. Remington**

[CHAIRMAN] KASTENMEIER: [D]o you think society would be better served if the law responds to changes as they occur, or tries to anticipate them? . . .

[PROFESSOR] COMPAINE: I think to try to anticipate change is futile. It is a real swamp. . . . 1

. . . .

[REPRESENTATIVE] MAZZOLI: I am beginning to think of some dank forest, [where] if you take a wrong step you will get sucked up by quicksand. . . . 2

. . . .

[REPRESENTATIVE] SAWYER: I think you correctly described it when you said it was a kind of a swamp. Since I have been in Congress, I have never gotten involved in anything that was more complex and more defying of an intelligent solution that satisfied all of the questions. 3

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The views expressed herein are the authors' own and do not represent the views of the Committee on the Judiciary, United States House of Representatives.

The authors are indebted to Richard Stern, Dorothy Schrader, and William Patry for constructive comments and sage advice on previous drafts. Of course, any errors, omissions or distortions are the responsibility of the authors.


2. Id. at 25 (remarks by Rep. Romano Mazzoli).

3. Id. at 26 (remarks by Rep. Harold Sawyer).

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INTRODUCTION

The congressional debate reflected in the above remarks, although arising during the midsummer of 1983 in the larger context of "copyright and technological change," accurately depicted the political landscape that existed when consideration of semiconductor chip legislation began early in the 98th Congress. Members of Congress not only conjured up visions of swamps and quicksand, but also spoke of being "trapped in a technological snake pit." Although representatives expressed trepidation, the challenge presented by the inquiry into highly technological issues also evoked optimism and resolve. Members of Congress were admonished that "[w]hen you are working on the cutting edge of technology, the main thing is to stay behind the blade." Senator Charles McC. Mathias, Jr., spoke for the optimists when he observed:

Perhaps we are . . . like Balboa, . . . "Silent upon a peak in Darien." When Balboa first saw the Pacific Ocean, that great South Sea, he could hardly have known what he was seeing. A great sheet of water lay before him, but what it was, how far it extended, what shores it lapped and what it meant were all matters of conjecture. That is more like our situation. We know that we are on the edge of a great unknown . . . .

The congressional mindset existing during the 98th Congress reflected these competing feelings of optimism and pessimism, and contrary desires to move forward or backward. Out of this tension came a constructive and favorable environment for consideration of semiconductor chip legislation. Congress, in a spirit of optimism, moved forward. Technological creativ-

6. Appendix I, Materials from Congressional Copyright and Technology Symposium, Fort Lauderdale, FL, February 4-6, 1984, House Hearings on Copyright and Technological Change, supra note 1, at 169 (summary of Rapporteur Paul Goldstein) [Rapporteur Goldstein's summary will be cited hereinafter as Goldstein Summary, Congressional Copyright and Technology Symposium and the Symposium materials as Congressional Copyright and Technology Symposium].
7. See id. at 173 (remarks by Sen. Charles McC. Mathias, Jr.); see also Goldstein Summary, id. at 166.
ity was met by legislative innovation. A freestanding or *sui generis* system of protection for semiconductor chip products was developed. Congress added a new chapter to Title 17 of the United States Code—a unique provision that does not amend any part of existing copyright law—and thereby charted a new course for American intellectual property law.

This Article discusses the fundamental choices that Congress had to make in processing the Semiconductor Chip Protection Act of 1984. The Article begins with a survey of the legislative landscape existing at the time of the Act's passage, including a magnified view of the constitutional bases of the legislation, its legislative history, and the need for the legislation given the unique characteristics of the semiconductor chip industry. The Article then develops a five-part political test for assessing the merits of proposed intellectual property legislation in areas of new technology, and demonstrates how the Semiconductor Chip Protection Act fulfilled the requirements of this test. In addition, the Article discusses how the Act deals with international aspects of chip protection. Finally, the Article identifies the salient lessons to be learned from the Act and the Act's precedential value for American intellectual property law, especially as it relates to other new technologies.

I. LEGISLATIVE LANDSCAPE

In enacting the Semiconductor Chip Protection Act of 1984, Congress created the first significant intellectual property right in nearly one hundred years. The significance of extending proprietary protection to semiconductor chip products was recognized during House floor debate by Representatives Don Edwards and Norman Y. Mineta, the semiconductor chip bill's


10. Congress created the last new form of statutory intellectual property in 1881, when it passed the Trademark Act. Ch. 138, 21 Stat. 502 (1881). Initial congressional attempts to create a statutory system of trademarks—represented by the Trademark Acts of 1870, 1871 and 1876—failed due to a finding of constitutional invalidity by the United States Supreme Court. See The Trademark Cases, 100 U.S. 82, 94 (1879) (holding the copyright clause, see U.S. CONST. art. I, § 8, cl. 8, does not permit trademarks to be protected as writings). Subsequent trademark laws have been based on congressional power to regulate commerce.

11. Semiconductor chips, as such, are not protected under the Act. Rather, "mask works," which embody the design of the semiconductor chip, see infra notes 68 and 90 and accompanying text, are given protection; see also infra notes 117-118 and accompanying text.
chief sponsors in the House, and was underlined by President Reagan on November 8, 1984, when he signed the Semiconductor Chip Protection Act of 1984 into law as Public Law 98-620. The President aptly observed: "By strengthening the rights of people who are willing to risk commercializing new ideas to reap their just rewards, this legislation encourages individuals to create and develop new technologies."

A. CONSTITUTIONAL BASES FOR THE ACT

It is uncontestably within Congress's power to modify, amend, or expand this nation's intellectual property laws. The Constitution confers this authority when it states, "[t]he Congress shall have Power . . . to Promote the Progress of Science and Useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their Writings and Discoveries."

The Semiconductor Chip Protection Act was grounded in this constitutional authority. Both the House and Senate premised their legislation on a clear finding that original mask works are "writings" within the meaning of Article I, section 8, clause 8. To avoid constitutional challenges on the issue of whether mask works are protectable as "writings," however,

12. See 130 CONG. REC. H11,613-14 (daily ed. Oct. 9, 1984); see also id. at H11,610 (remarks of Rep. Robert Kastenmeier) ("The fundamental import of [the chip legislation] is that it recognizes industrial property as a right.").

13. Although the President's signing statement is dated November 9, 1984, see infra note 15, the actual date of signing was November 8, 1984, in Santa Barbara, California. The bill was probably signed late in the day; the statement was issued the next day. The statement was inadvertently omitted from the relevant issue of the Weekly Compilation of Presidential Documents, but will nonetheless appear in the Public Papers of the Presidents. Telephone interview with Ronald Geisler, Executive Clerk, White House (Nov. 22, 1985).


15. White House, Office of the Press Secretary, Statement by the President (Nov. 9, 1984) (copy on file at the Minnesota Law Review).


17. See infra note 87 and accompanying text for a definition of a mask work.

the Act also sets forth a commerce limitation, so that only piracy “in or affecting commerce” is circumscribed.\textsuperscript{19} This precaution, found unnecessary in the House Report but insisted upon by the Senate, was characterized as “suspenders” and used to better support the legislation.\textsuperscript{20}

Congress’s decision to base the Semiconductor Chip Protection Act on both the copyright and the commerce clauses reflects not only a decision to bolster the legislation, but also a concern that the Act not breach constitutional parameters of either the commerce or the copyright clauses. Former Representative, now Judge Abner Mikva has emphasized Congress’s obligation to respect the Constitution, stating that members of Congress “should remember that their constitutional oath is not just a ceremonial ritual but an entrusting to their care of a

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\textsuperscript{19} See 17 U.S.C. § 910(a) (Supp. II 1984). \textsuperscript{20} See H.R. REP. No. 781, 98th Cong., 2d Sess. 16 n.36, 1984 U.S. CODE CONG. & AD. NEWS 5750, 5765 n.36 [hereinafter cited as HOUSE REPORT] (All citations to the House Report are to the star print. United States Code Congressional and Administrative News contains the initial version of the House Report. The star print corrected typographical errors in the initial version and contains three additional pages.). As stated by Professor Arthur Miller, “the use of two constitutional clauses to protect a copyrighted work is nothing more than using a belt and suspenders to protect that work.” The Semiconductor Chip Protection Act of 1983: Hearings on S. 1201 Before the Subcomm. on Patents, Copyrights and Trademarks of the Senate Comm. on the Judiciary, 98th Cong., 1st Sess. 91 (1983) (statement of Arthur Miller, Professor of Law, Harvard University) [hereinafter cited as 1983 Senate Hearings]. Professor Melville Nimmer agrees with this thought: “The possibility exists that if Congress were to enact copyright legislation in a manner which exceeded the authority of the Copyright Clause, authority to do so might be found under the Commerce Clause.” 1 M. NIMMER, NIMMER ON COPYRIGHT § 1.09, at 1-60 (1985); see also Hearings on Copyright Law Revision Before Subcomm. No. 3 of the House Comm. on the Judiciary, Part I, 89th Cong., 1st Sess. 259 (1965) (remarks of Rep. Robert Kastenmeier).

As a general proposition, American patent and copyright law has avoided using suspenders when only a belt is necessary. See Schrader Statement, 1983 House Hearings, supra note 18, at 108 (“Congress has never enacted a copyright law based on the Interstate Commerce Clause.”); see also 1983 House Hearings, supra note 18, at 234-35 (letter to Rep. Robert W. Kastenmeier from Robert C. Denicola, Professor of Law, University of Nebraska). An express legislative finding that a statute is rooted in the patent and copyright clause of the Constitution has been sufficient to withstand attacks of constitutional infirmity. Schrader Statement, id. at 171.

The Act, by requiring an interstate commerce nexus, may create more work for the federal judiciary. Problems of proof will inevitably occur and constitutional challenges may be muddied by factual disputes concerning whether commerce has been affected. There is not a single case that stands for the theory that the commerce clause would sustain a finding of constitutional validity if the copyright and patent clause was insufficient. See 1 M. NIMMER, supra, § 1.09, at 1-60.\end{flushleft}
document that gives this republic its unique longevity.” Congress, by relying on the commerce clause as an alternative constitutional basis for the semiconductor chip legislation, has taken seriously this caretaking responsibility.

Congress’s power to regulate intellectual property is subject to other limitations in addition to the commerce limitation and “writings” requirement. Congress must also consider the public benefit derived from conferring protection on a particular interest. The Supreme Court has stated that the monopoly privileges that Congress may confer on creators of intellectual property “are neither unlimited nor primarily designed to provide a special private benefit. Rather, the limited grant is a means by which an important public purpose may be achieved.” In other words, the primary objective of the intellectual property laws is not to reward the author or inventor, but rather to secure for the public the benefits derived from the labors of authors and inventors. This objective is achieved by giving authors and inventors an incentive to create. The law


22. Sony Corp. of Am. v. Universal City Studios, 464 U.S. 417, 429 (1984); accord, United States v. Masonite Corp., 316 U.S. 265, 278 (1942) (same as to patents); see also Stedman, Invention and Public Policy, 12 LAW & CONTEMP. PROBS. 649, 649 (1947) (“the furtherance of the public interest has been a basic premise [of the patent system]”). This principle appears to have first been stated in Pennock v. Dialogue, 27 U.S. (2 Pet.) 1, 9 (1829).

23. 1 M. NIMMER, supra note 20, § 1.03[A], at 1-20.2; see also Nimmer, New Technology and the Law of Copyright: Reprography and Computers—Foreword, 15 UCLA L. REV. 931, 932 (1968) (discussing the public right “to fully exploit the marvels of the new technology”); Samuelson, CONTU Revisited: The Case Against Copyright Protection for Computer Programs in Machine-Readable Form, 1984 DUKE L.J. 663, 749 (“[T]he content of a copyrighted work has always had some nonfunctional aesthetic, informational, or entertaining qualities which are communicated to a human audience.” (emphasis in original)).

The House Report accompanying the 1909 revisions to the copyright law clearly expressed this idea:

The enactment of copyright legislation by Congress under the terms of the Constitution is not based upon any natural right that the author has in his writings, for the Supreme Court has held that such rights as he has are purely statutory rights, but upon the ground that the welfare of the public will be served and progress of science and useful arts will be promoted by securing to authors for limited periods the exclusive rights to their writings. The Constitution does not establish copyrights, but provides that Congress shall have the power to grant such rights if it thinks best. Not primarily for the benefit of the author, but primarily for the benefit of the public, such rights are given. Not that any particular class of citizens, however worthy, may benefit, but because the policy is believed to be for the benefit of the
gives the creator exclusive control over the creation for a limited period of time, after which it enters the public domain. The public arguably benefits at least twice from this bargain: first when the original invention or expression is created and made available to the public, and second when the term of protection expires and the creation is added to the public domain.

The framers assigned to Congress, the most politically representative of the three branches of government, the role of defining the scope of the limited monopolies granted to authors and inventors in exchange for public access to their creations. The framers therefore envisioned a political balancing of equities between the public interest and the proprietary rights of creators. Congress struck that balance when it enacted the first patent and copyright laws. As changes occurred and new technologies were developed, Congress adjusted the patent and copyright laws to incorporate new subject matters and to

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great body of people, in that it will stimulate writing and invention, to give some bonus to authors and inventors.

In enacting a copyright law Congress must consider, as has been already stated, two questions: First, how much will the legislation stimulate the producer and so benefit the public; and, second, how much will the monopoly granted be detrimental to the public? The granting of such exclusive rights, under the proper terms and conditions, confers a benefit upon the public that outweighs the evils of the temporary monopoly.


25. See supra note 16 and accompanying text.

26. Representative Bruce Morrison expressed a similar political thought on the House floor: "The congressional role, then, is to define the scope of the monopoly granted to the creator in order to serve as an incentive to the creation of new works for the benefit of the public. Clearly this necessitates a balancing of interests." 130 CONG. REC. H9296 (daily ed. Sept. 11, 1984) (statement of Rep. Morrison) (debate on audio "first sale" legislation).

27. The first patent and copyright laws were enacted during the 1st Congress. Act of Apr. 10, 1790, ch. VII, 1 Stat. 109, 124 (1790).

redefine the balance between public and proprietary interests. In rare situations, however, it may not be possible for Congress to incorporate a new subject matter into the existing intellectual property framework without fundamentally altering the balance inherent in those laws. For example, the changes necessary to accommodate the new subject matter might distort the existing law to such a degree that it threatens to upset the balance struck for other protected works. Similarly, the balance between public and proprietary rights reflected in existing law may be inappropriate for the new subject matter. In such cases it may be necessary for Congress to establish a sui generis system of protection. That was in fact the solution Congress adopted when faced with the problem of providing protection for semiconductor chips.

B. LEGISLATIVE HISTORY

The Semiconductor Chip Protection Act represents six years of congressional effort that spanned three Congresses. In terms of the legislative clock, six years is a relatively short period in which to achieve successful enactment of a statute, especially when the problem is highly technological and requires a novel solution. Perhaps the most fundamental political message behind the passage of the Act is that Congress is institutionally able to consider and ultimately vote upon thorny technological problems. Admittedly, "Congress does not initiate policy easily, but... given sufficient cause and provocation, it rises to the challenge."30

Congress originally considered protecting semiconductor chip products by incorporating them in copyright law. In 1979, during the 96th Congress, the House Copyright Subcommittee held a one-day hearing on the matter in San Jose, California.31 The legislation then pending was short and simple. Consisting of only one sentence, H.R. 1007 would have added the following language to the definition of "[p]ictorial, graphic, and sculptural

29. To satisfy its constitutional mandate to balance interests, Congress may have to spend more time in hearings on such legislation, solicit the views of a wider spectrum of individuals and interests, consider more amendments, and spend more time in debate than would normally be the case.
works" protected by copyright law: "Such pictorial, graphic and sculptural works shall also include the photographic masks used to imprint patterns on integrated circuit chips and the imprinted patterns themselves even though they are used in connection with the manufacture of, or incorporated in a useful article."32 The brevity of this language was matched by the measure's short lifespan. The proposed legislation generated substantial controversy among copyright experts and within the semiconductor industry itself. If anything, the San Jose hearing revealed that there were no quick and easy legislative fixes to intellectual property questions caused by complex new technologies.

The 1979 proposal was controversial for a number of reasons. First, it violated a fundamental tenet of copyright law that states that copyright does not protect useful or utilitarian articles standing alone. This rule, codified in 17 U.S.C. § 10133 and consistently followed by the courts,34 specifies that copyright protects the design of a useful article only to the extent that artistic features can be identified separately and independently from the utilitarian components of the copyrighted article.35 Copyright only protects expressions, and not ideas, plans or processes.36 Any proposed legislation, therefore, would have

32. H.R. 1007, 96th Cong., 1st Sess. (1979), reprinted in id. at 3-4. The proposed legislation was a direct outgrowth of an attempt by Intel Corporation in a mandamus action filed in Federal court to compel the Register of Copyrights to accept for deposit two chips as the published form of previously filed plastic sheets, which were photocopies of masks for a chip. The case was settled after the commencement of the interrogatory and deposition process. The Copyright Office refused to accept the chip as the "published" form of the plastic sheets. See Barker, Copyright for Integrated Circuit Designs: Will the 1976 Act Protect Against Chip Pirates?, 24 S. Tex. L.J. 817, 842 (1983).


34. See, e.g., White-Smith Music Publishing Co. v. Apollo Co., 209 U.S. 1, 18 (1907) (holding that perforated rolls for player pianos do not violate composers' statutory rights); Baker v. Selden, 101 U.S. 99, 104 (1879) ("The use of the art is a totally different thing from a publication of a book explaining it. The copyright of a book on book-keeping cannot secure the exclusive rights to make, sell, and use account-books prepared upon the plan set forth in such book.").

35. See Schrader Statement, 1983 House Hearings, supra note 18, at 88-89; see also Brown Instrument Co. v. Warner, 161 F.2d 910 (D.C. Cir.) ("Articles intended for practiced use in cooperation with a machine are not copyrightable."); cert. denied, 332 U.S. 801 (1947); Taylor Instruments Co. v. Fawley-Brost Co., 139 F.2d 98, 100-01 (7th Cir. 1943) (holding charts used to record thermometer readings were not subject to copyright protection), cert. denied, 321 U.S. 785 (1944).

to address squarely the potential problems created by allowing copyright protection of a useful article.\textsuperscript{37} A second basis for opposition to the 1979 proposal concerned the issue of reverse engineering. H.R. 1007 threatened to expose members of the industry to legal liability, perhaps criminal liability, for performing a standard industry practice—electronically dissecting new chips to see if unique processes were employed.\textsuperscript{38} Finally, the bill did not define “integrated circuit chips” or “imprinted patterns” and did not adequately anticipate new chip production technologies. All of these problems would have to be considered in greater detail and resolved in a satisfactory manner before any legislation could be passed.\textsuperscript{39}

Very little happened during the 97th Congress until late 1982, when new bills were introduced in the House and Senate.\textsuperscript{40} These measures, in contrast to their predecessor, extensively amended the Copyright Act to protect mask works in their own right. The proposals were clearer in definitional scope and grappled for the first time with the concept of reverse engineering. Both persisted in using copyright as the basis for protecting mask works, despite the fact that mask works were useful articles. No formal action on these bills occurred in either the House or Senate. These proposals did, however,

\textsuperscript{37} See 1979 House Hearings, supra note 31, at 12 (statement of Jon Baumgarten, General Counsel, Copyright Office); id. at 52-53 (statement of John Finch, Vice-President and General Manager, National Semiconductor Corp.).

\textsuperscript{38} In 1979, at the time of the House hearing, it was thought that chip manufacturers would uniformly support the pending legislation. However, on the issue of reverse engineering, the industry split into two opposing camps: Intel and Mostek supported H.R. 1007; Fairchild Camera & Instrument Corporation, National Semiconductor Corporation, and Texas Instruments opposed the bill. See 1979 House Hearings, supra note 31, at 31 (statement of L.J. Sevin, President, Mostek Corp.); id. at 31-32 (statement of Andrew Grove, President, Intel Corp.); id. at 51 (statement of John Finch, Vice-President and General Manager, National Semiconductor Corp.); id. at 57 (statement of James M. Early, Director of Research and Development, Fairchild Camera & Instrument Corp.); id. at 77 (statement of George H. Heilmeier, Vice-President, Corporate Research, Development, and Engineering, Texas Instruments); see also Barker, supra note 32, at 842-44 (describing the advantages and injustices of reverse engineering).

\textsuperscript{39} At the termination of the hearing, the bill’s chief sponsor, Representative Don Edwards, observed: “We’ve certainly not come far enough in the hearing to even come close to a definitive answer.” Electronic News, Apr. 23, 1979, at 1, col. 1, at 76, col. 5.

provide a foundation for bills sponsored early in the next Congress.

During the 98th Congress, companion bills were introduced in the House and Senate, and the relevant subcommittees signalled their intention to consider the issue of copyright protection for semiconductor chips. The House and Senate held hearings early and ultimately compiled extensive hearings records on the subject. At the initial mark-up stage, the Senate subcommittee opted to retain an approach rooted in copyright; the House Copyright Subcommittee, on the other hand, decided to develop a free standing or *sui generis* form of protection. The two bills then followed a routine legislative course in both the House and Senate: the bills were debated and voted upon in full committee, committee reports were filed, and both bodies then debated and voted on the bills on the floor. The different bills passed unanimously in both the House and Senate. Although unanimous support for different bills reflected a widespread feeling that the subject of inadequate protection for semiconductor chips deserved congressional attention, there nonetheless appeared to be few strong feelings on how the solution should be framed. Unanimous House


42. See generally 1983 House Hearings, supra note 18; 1983 Senate Hearings, supra note 20.


44. See HOUSE REPORT, supra note 20, 1984 U.S. CODE CONG. & AD. NEWS at 5750; S. REP. NO. 425, 98th Cong., 2d Sess. (1984) [hereinafter cited as SENATE REPORT]. Although the Senate Report discusses the House *sui generis* approach, see id. at 12-14, the Senate hearing record is devoid of debate on the issue. See 1983 Senate Hearings, supra note 20.

45. On May 16, 1984, the Senate, after accepting a technical amendment, passed S. 1201 by voice vote. See 130 CONG. REC. S5837-38 (daily ed. May 16, 1984). To review the debate, see id. at S5833-38.

On June 11, 1984, the House passed H.R. 5525, under suspension of the rules, by a roll call vote of 388 to 0. See 130 CONG. REC. H5524 (daily ed. June 11, 1984). To review the debate, see id. at H5489-97.

46. See supra note 45.

47. If there had been strong convictions in the House, these feelings would have either been alluded to during floor debate or registered in the
support for a *sui generis* bill was proof that such an approach could be developed and, if judged fair and effective, could ultimately become the vehicle for enactment of a public law.

After passage of the respective bills, a parliamentary glitch occurred that may confuse those studying the history of the chip legislation. The House, in deference to earlier passage of the Senate bill, endorsed its own bill and then by unanimous consent took the Senate bill from the Speaker’s table, struck out the bill’s text, and inserted the text of the House bill. The Senate bill, as amended, was then passed by the House.

This typical parliamentary maneuver was an obligatory step in setting the stage for a conference between the House and Senate.

The House, however, did not immediately request a formal conference, allowing the two bodies to engage in informal negotiations. In fact, the more formal conference approach was never required because an agreement was reached between the House and Senate subcommittees in mid-September of 1984. Although the accord was based on the *sui generis* House bill, it

form of a negative vote on the legislation. Not a single member of the House spoke in favor of the Senate approach during floor consideration and there was not a “no” vote cast on the legislation. During the Senate debate, a brief discussion of the House bill occurred when Senators Charles McC. Mathias, Jr. and Patrick Leahy cautioned their colleagues about the merits of the House approach. See 130 CONG. REC. S5833, S5836-37 (daily ed. May 16, 1984). No senator rose in support of the House bill on the Senate floor. An optimistic vote was registered by Senator Patrick Leahy, who observed: “Both committees have put in a lot of hard work on this effort, and I am confident that we will not allow our differences to stand in the way of an effective piece of legislation in this Congress.” Id. at S5837.

Lack of conviction among members of Congress about which approach to take should not be misunderstood to mean that the difference between a copyright and a *sui generis* approach was only a war of words. The House Report is clear on the issue, stating that there would be “formidable philosophical, constitutional, legal and technical problems associated with any attempt to place protection for mask works or semiconductor chip designs under the copyright law . . . .” HOUSE REPORT, supra note 20, at 10, 1984 U.S. CODE CONG. & AD. NEWS at 5759. See also Samuelson, Creating a New Kind of Intellectual Property: Applying the Lessons of the Chip Law to Computer Programs, 70 MINN. L. REV. 471, 473-74 (1985).

49. See id. at H5524.
50. Both houses had passed differently worded versions of the same bill, so that a conference was permissible.
51. The conference committee is generally convened as a last resort. A. MIKVA & P. SÀRIS, supra note 30, at 240. The executive branch, the Copyright Office, the Legislative Counsels’ Offices in the House and Senate, and representatives of the Semiconductor Industry Association and the Association of American Publishers assisted in the compromise process.
also contained drafting improvements offered by the Senate, which made the final version even more unique in approach.\(^5\)

Despite having the chip compromise in hand, the Senate leadership was still unable to call up the bill for consideration. The 98th Congress had entered into its final days, and the frenetic beat of impending presidential and congressional elections controlled the tempo. Unwilling to let a good deal of hard work come to nothing, several senators requested that an omnibus court reform/intellectual property bill be scheduled.\(^5\) The chip measure would be the primary piece of legislation and all the other bills, with one exception,\(^5\) would be measures that previously had been approved by the House Committee on the Judiciary and also had received a majority vote on the House floor.\(^5\) The packaging maneuver proved successful and the chip bill ultimately became part of a Senate amendment to H.R. 6163,\(^6\) an unrelated bill to create several places for holding federal court. The omnibus bill was unanimously endorsed,

\(^{52}\) Explanation of the House-Senate compromise, contained in the Senate amendment, is found in an explanatory memorandum submitted into the record by Senator Charles McC. Mathias, Jr. during floor debate. See Explanatory Memorandum—Mathias-Leahy Amendment to S. 1201, 130 CONG. REC. S12,916 (daily ed. Oct. 3, 1984) [hereinafter cited as Mathias-Leahy Explanatory Memorandum]. A similar document was introduced during House floor consideration. See Explanatory Memorandum of the Senate Amendment to H.R. 6163, Title III, as Considered by the House of Representatives, 130 CONG. REC. E4432 (daily ed. Oct. 10, 1984) (introduced by Rep. Kastenmeier) [hereinafter cited as House Explanatory Memorandum]. For the most part, the explanatory memoranda track each other’s language. The Senate explanation, however, is lengthier, and the House document relies heavily on the House Report, which provided the foundation for the final version of the bill. Compare id. with HOUSE REPORT, supra note 20, 1984 U.S. CODE CONG. & AD. NEWS at 5750.


\(^{54}\) The exception involved government patent policy amendments, which had been favorably reported by the House Committee on Science and Technology. See 130 CONG. REC. H11,614 (daily ed. Oct. 9, 1984) (remarks of Rep. Don Fuqua). See generally id. at H11,615 (remarks of Rep. Doug Walgren) (explaining government patent policy amendments).

\(^{55}\) See 130 CONG. REC. H11,608 (daily ed. Oct. 9, 1984) (remarks of Rep. Robert Kastenmeier); id. at H11,612-13 (remarks of Rep. Carlos Moorhead). Other titles of the Senate amendment related to Trademark Act clarification (Title I); creation of a State Justice Institute (Title II); federal courts improvements (including elimination of statutory civil priorities, district court organization, and amendments to the Federal Courts Improvements Act of 1982) (Title IV); and government research and patent policy (Title V). Id.

first by the Senate and then by the House. On November 8, 1984, two days after the national election, President Reagan signed the bill into law.

C. SEMICONDUCTOR CHIPS IN A CHANGING SOCIETY

The congressional perspective of proposals for statutory change is commonly referred to as a "big picture" view. Special interests are represented, but the usual rule is that Congress will ultimately consider the general welfare of the entire country. To visualize the broader congressional vista for any particular bill, one must use a wide angle lens of societal, economic, and technological change.


Before taking the bill to the House floor, the House Committee on Rules fashioned a resolution setting forth a procedure pursuant to which the bill could be considered. See H.R. Res. 606, 98th Cong., 2d Sess., 130 Cong. Rec. H11,595 (daily ed. Oct. 9, 1984). The rule, fashioned by Rules Committee Chairman Claude Pepper and Representative Joseph Moakley, floor manager for the Committee on Rules, provided for an up-or-down vote, with no amendments on the Senate amendment to the House bill. See 130 Cong. Rec. H11,595 (daily ed. Oct. 9, 1984). Representative Trent Lott expressed nominal opposition to the rule, but did not request a roll-call vote on adoption. See id. at H11,596.

The rule was a critical step in the path to enactment of Public Law 98-620 for two reasons related to the timing of the vote on H.R. 6163. First, the session was virtually over, and the offering of amendments would have led to protracted debate, using finite House time that did not exist. Second, if an amendment had passed, the amended bill would have had to be returned to the Senate for further action. Under this latter scenario, the Senate compromise might well have broken down, creating an impasse between the two houses.


59. See House Hearings on Copyright and Technological Change, supra note 1, at 9, 85 (statements of Benjamin M. Compaine, Exec. Dir., Prog. on Information Resources Policy, Harvard University; Fred Weingarten, Prog. Manager, Communication and Information Technologies Program, Office of Technology Assessment).

In an apt observation to members of Congress, Professor Martin Greenberger made a similar point:

Technological advance is a driving force and an impetus for change. But the effects are not just in one direction. Progress in technology is itself determined and modified by complex social forces interacting with political and economic interests finding expression in customs and contracts, legislation and law.
In politics as in life, change is one of the few things that society can approach with certainty.\textsuperscript{60} Technology has accelerated the pace of change far beyond anyone's wildest expectations. Even copyright lawyers have trouble remembering that the movie industry is only about seven decades old, the television industry is barely into its fourth decade, and in comparison the integrated circuit or semiconductor industry is relatively young.\textsuperscript{61} The evolution of integrated circuits reflects the revolutionary nature of change in our society. In 1959, Jack Kilby and Robert Noyce independently invented the first semiconductor chips.\textsuperscript{62} The microprocessor, or "computer on a chip," was invented in 1971 by Ted Hoff.\textsuperscript{63} Robert Noyce himself has observed that progress since invention of the integrated circuit has been "astonishing, even to those of us who have been intimately engaged in the evolving technology."\textsuperscript{64}

A short twenty years ago, soon after invention of the integrated circuit, few would have imagined that creators could express themselves through a silicon wafer: a topography of intricate layers of materials with designs etched on them, all told no bigger than a postage stamp. Technology has advanced so that today, chips are used to operate pacemakers, word processors, personal computers, pollution control devices, microwave ovens, blood testing equipment, telephones and other medical, consumer, and business products. In a remarkably short time period, the once prescient notion that our "industrial" society was being transformed into an "information" soci-

\textsuperscript{61.} See HOUSE REPORT, supra note 20, at 2, 1984 U.S. CODE CONG. & AD. NEWS at 5731. As one observer noted: "[W]e used to talk in terms of the rate of change. I think today it's the rate of the rate of change. . . . [T]hings used to take decades, then they took years. Now they're taking months and we're seeing weeks." See Congressional Copyright and Technology Symposium, supra note 6, at 190 (remarks of Pat Wilson, North American Consumer Electronics).
\textsuperscript{63.} \textit{Id.} at 371.
\textsuperscript{64.} Noyce, MICROELECTRONICS, SCI. AM., Sept. 1977, at 63, 65. Jack Kilby recently observed, "We've come further and faster than anyone expected." Broad, First of the 'Superchips' Arrive, N.Y. Times, July 23, 1985, at C1, col.2, C3, col. 3.
ety has become a cliche. 

In its consideration of the semiconductor chip legislation, Congress was not only faced with the societal and economic importance of integrated circuits and the disincentive to innovation created by chip piracy, but had to become familiar with the technological features of the chip and the process by which chips are manufactured. Chips, as such, are not accorded protection under the Act. Rather, “mask works” embodying the design of semiconductor chip products are granted exclusive rights. To understand the Act, it is necessary to comprehend the integrated circuit as well as the painstaking and protracted creative and manufacturing processes used to design mask works. A review of the manufacturing process demonstrates that the chip design process entails sufficient creativity to entitle designs to protection under the intellectual property clause of the Constitution.

1. The Semiconductor Chip

As its name implies, a semiconductor is an element or compound that partially conducts electricity. A semiconductor is intermediate between a conductor, which fully conducts electricity, and insulators, which do not appreciably conduct elec-

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The House Report on the semiconductor chip legislation noted that:

The fundamental shift from an industrial to an informational society is no longer just a prediction but is a reality. The majority of the American workforce is engaged not in the production of goods but in the creation, processing and distribution of information. Expanding information technology, from computers to satellites, from television to teletype, ensures that we will become even more of an information society in the future. The semiconductor chip is at the vortex of this new society.

HOUSE REPORT, supra note 20, at 2, 1984 U.S. CODE CONG. & AD. NEWS at 5751.

66. Seeinfra notes 157-159 and accompanying text.

67. Early in its deliberations, the National Commission on New Technological Uses of Copyrighted Work (CONTU), created by Congress to provide recommendations on copyright law revision, similarly discovered that “it would have to educate itself on the actual and potential technologies and practices in the two areas [computer software and reprography] of its mandate.” NATIONAL COMM’N ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS, FINAL REPORT 5 (1979) [hereinafter cited as CONTU FINAL REPORT].

68. For further explanation of mask works, see infra notes 87-91 and accompanying text.

69. See supra note 16 and accompanying text.
tricity. The semiconductor material most often used today is silicon.\textsuperscript{70} Silicon is preferred because the electrical properties of pure silicon can be precisely controlled by introducing measured amounts of chemical impurities into the silicon.\textsuperscript{71} In addition, the surface of silicon can be readily oxidized into an electrically insulating glaze.

A semiconductor "chip" is simply another name for an integrated circuit.\textsuperscript{72} An integrated circuit is basically just a combination of many electrical components on or in a single substrate, such as silicon.\textsuperscript{73} A complex of microscopic switches, functionally transistors, which control electric current, are patterned in and on the chip's silicon base. The switches are then joined by "wires" etched from extremely thin films of metal or heavily doped zones of semiconductor material. "Under a microscope the chip's intricate terrain often looks uncannily like the streets, plazas, and buildings of a great metropolis, viewed from miles up."\textsuperscript{74}

The city blocks of a chip are transistors. These transistors work together to perform assigned electronic functions. The

\begin{itemize}
\item[70.] Other semiconductor materials are germanium and gallium arsenide. Gallium arsenide crystals conduct electricity ten times faster than silicon. Osbourne, \textit{Business in Space}, \textit{The Atl.}, May 1985, at 45, 47. Due to the volatile nature of gallium arsenide, these crystals, when grown on earth, suffer serious imperfections caused by gravitational convective flow. If grown in a gravity free atmosphere, such as outer space, gallium arsenide crystals can be produced almost to perfection. Given the vast new horizons opened by the space shuttle and skylab, new technological possibilities are still unfolding. \textit{Id.}

\item[71.] This process is called "doping." Boraiko, \textit{The Chip}, 162 NAT'L GEO. 421, 434 (1982). For a more extensive explanation of chip technology, \textit{see id.}; 1979 \textit{House Hearings}, \textit{supra} note 31, at 22 (statement of L.J. Sevin, President, Mostek Corp.); \textit{see also} 1983 \textit{House Hearings}, \textit{supra} note 18, at 21, 30 (statement of F. Thomas Dunlap, Jr., Corporate Counsel and Secretary, Intel Corp.) [hereinafter cited as Dunlap Statement, \textit{1983 House Hearings}]. \textit{See generally R. STERN, SEMICONDUCTOR CHIP PROTECTION § 1.1 (1986) (describing generally semiconductor chip technology).}

\item[72.] Semiconductor chips can be divided into two broad categories: microprocessors and memory chips. The microprocessor, often referred to as a "computer on a chip," has logic circuits that are equivalent to those contained in the central processing unit of a computer, which enable it to interpret and execute instructions. \textit{See HOUSE REPORT, supra} note 20, at 11, 1984 U.S. CODE CONG & AD. NEWS at 5760. A memory chip, on the other hand, stores information. This information might be instructions, upon which the microprocessor will operate, or information which has already been operated on but which needs to be saved for future computations. Not surprisingly, the functions of a microprocessor and a memory can be integrated on a single chip. \textit{See Dunlap Statement, 1983 House Hearings, supra} note 71, at 22.

\item[73.] Noyce, \textit{supra} note 64, at 64-65.

\item[74.] Boraiko, \textit{supra} note 71, at 421.
\end{itemize}
latest generation of chips on the market contains more than one million transistors arranged on a silicon wafer that is only a quarter inch on each side, smaller than a baby's thumbnail.\textsuperscript{75} The small size and integrated nature of a chip are extremely important.\textsuperscript{76} Large amounts of time and money are spent trying to put greater numbers of transistors on a single chip. By 1990, engineers hope to squeeze ten million transistors on a single chip, "making it as complex as a city nearly 1,000 miles square."\textsuperscript{77} A billion-transistor chip may be within technological reach someday.\textsuperscript{78}

2. Creative Process and Marketing

Several distinct marketing and creative stages, requiring the talents of many individuals, are generally involved in bringing a new semiconductor chip to market. The intellectual work, including the imaginative activity, is done by teams.\textsuperscript{79} The process usually starts with technology definition. A firm

\textsuperscript{75} See id. By way of comparison, 5,000 transistors operate a digital watch; 20,000 are used for a pocket calculator; and 100,000 are necessary for a relatively small computer. Id. at 429. A pocket calculator contains one hundred times as many transistors as a radio or television receiver. Noyce, supra note 64, at 63. "Today's chips . . . have more computing power, compute faster, consume far less power, are more reliable, and sell [for substantially less money] than mainframe computers of the early 1970s." HOUSE REPORT, supra note 20, at 11, 1984 U.S. CODE CONG. & AD. NEWS at 5760 (footnote omitted).

\textsuperscript{76} The integrated circuit lacks soldered wires, which reduces the number of failure points and makes it extremely reliable. Boraiko, supra note 71, at 429. The small size of the chip means that transistors are close together, and electrical signals must travel only a short distance from switch to switch. See Marbach, Cook, Willenson, Sandza, Bigney & Foltz, The Race to Build a Supercomputer, NEWSWEEK, July 4, 1983, at 58, 63. A 1,000-transistor chip does more work, more quickly, than a 10-transistor chip. Boraiko, supra note 71, at 429. Furthermore, smaller chips use less silicon "real estate," allowing more chips to be produced from a single silicon wafer during manufacture. See HOUSE REPORT, supra note 20, at 12, 1984 U.S. CODE CONG. & AD. NEWS at 5761. The end result is a better harvest of good chips at lower cost.

In 1964, Gordon E. Moore predicted that the complexity of the semiconductor chip would double every year. To date, there has not been any substantial departure from what is referred to in the semiconductor industry as Moore's Law. Noyce, supra note 64, at 65.

\textsuperscript{77} Boraiko, supra note 71, at 433-34. This would be equivalent to a megapolis almost twice the size of Alaska. Id. at 434.

\textsuperscript{78} Id. at 425. "A memory chip of such complexity could store the text of 200 long novels." Id.

\textsuperscript{79} The teamwork demanded in the creative process demonstrates that the intellectual travail is not dominated by any single "author," and further reveals a symbiotic relationship between works of the human brain and machines, as well as computer software, in carrying out the creative process.
conducts a market study to determine the functions that potential customers would like performed. The firm can, at this early stage, preliminarily define physical and electrical characteristics. The firm considers potential demand for the product, and analyzes the financial horizon.

After the market goals of a chip have been established, a team of circuit design engineers develops circuits to implement the desired electronic ideas. The circuit engineers construct a circuit by making “schematic” representations on paper of the manner in which transistors must be connected to implement the appropriate electronic functions. The creativity employed by design engineers is analogous to the task of urban planners or architects:

[A city planner who drafts a plan to build a town in a given location that will have houses, a school and a shopping center. The planner then hires an architect to design the town. Blueprints are drawn that specify where the streets are to be situated, how large the shopping center will be, what types of houses will be built and other specifics. Eventually, consideration is given to such minor details as the plumbing to be installed in the individual houses.]

A team of layout design engineers takes the detailed schematic or logic diagram and determines the most efficient way to organize it on the chip. Trial and error is used to select the optimum layout, and complex computer programs have been developed to assist in the process. Given the tremendous number of transistors and interconnections that must be positioned, it is not surprising that the layout stage is time-consuming and extremely costly. Ultimately, however, a three-

83. See Boraiko, supra note 71, at 433.
dimensional layout is developed that shows the position of every transistor and interconnection on the chip. This may be a “composite” drawing of the various layers of the chip, shown in different colors on a very large sheet of paper. The same information can be recorded in digital form, however, by storing all of the relevant coordinates of points in the composite drawing on a magnetic tape known as a “data base tape.” Despite the progressive automation of the layout process, the technical skill and creative genius of a chip architect will always be needed.

3. The Manufacturing Process

Semiconductor chips are frequently manufactured by a process known as “photolithography” or “masking.” The three dimensional layout encoded in the data base tape is typically used to generate a series of stencils called “masks.” Masks are basically glass or metal plates with a pattern printed on them that has opaque and transparent regions. A number of different masks used in succession are usually necessary to create a chip. Each mask, like a stencil, can be used repeatedly.

To begin the manufacturing process, silicon is melted, purified, grown into long crystals, and then sliced into thin wafers and polished. Each wafer is typically a five-inch diameter disk approximately .025 inches thick. Hundreds of chips are made simultaneously on each wafer. As described in the House Report, the process is as follows:

A silicon wafer is coated with a layer of silicon dioxide, which (unlike silicon itself) is soluble in hydrofluoric acid. The silicon dioxide layer is then covered with a thin film of natural or synthetic rubber, known as “resist,” because it resists the action of acid. Over the wafer is then

85. Id. at 12-13, 1984 U.S. CODE CONG. & AD. NEWS at 5761.
86. For the interconnection layers of gate arrays, the process already is automated. Semiconductor production facilities will in the future be entirely automated because the delicate task for shrinking chips into microscopic size (more than one million transistors) will have to occur in a contamination free environment. The mere presence of a human being could pollute the process. See Wilson & Ticer, Superchips: The New Frontier, BUS. WK., June 10, 1985, at 82-83.
87. HOUSE REPORT, supra note 20, at 12, 1984 U.S. CODE CONG. & AD. NEWS at 5761. A new design process, referred to as E-Beam (electron-beam) technology, is presently being used to create mask works. No masking process is utilized. E-Beam technology “writes” the layout and interconnection patterns encoded in a database tape directly on a silicon wafer. See SENATE REPORT, supra note 44, at 4.
88. HOUSE REPORT, supra note 20, at 13, 1984 U.S. CODE CONG. & AD. NEWS at 5762.
placed a stencil, which typically is a glass mask having opaque and transparent regions that correspond to one of the patterns of the mask work. Ultraviolet light is then cast on the mask. The radiation passes through the transparent parts of the mask but is blocked by the opaque parts. Where the ultraviolet light contacts the resist, the rubber is polymerized or "hardened" and becomes relatively insoluble in organic solvents. As a result, when next the wafer is washed in a solvent, the unhardened parts of the rubber film are dissolved away, while the hardened parts remain, leaving the mask pattern laid out in "resist" on the surface of the wafer. The wafer is then placed in hydrofluoric acid, which dissolves away the silicon dioxide that is not protected by resist. The resist is then removed, and a hill and valley pattern has been etched into the wafer. Additional silicon is then laid down, masked, and stripped. Chemical impurities or dopants may be deposited to create negative and positive conducting zones. The manufacture of a chip usually involves a number of masking steps, each using a different mask, and each adding a different layer onto the chip. After completion of the masking process, the original pure silicon wafer has been converted into several hundred chips laid out side by side, like extremely small postage stamps on a mint sheet. The individual chips are then tested. Acceptable chips are cut from the wafer with a diamond saw, wired into frames, and sealed in small plastic or ceramic cases equipped with plug-in prongs for use in electronic equipment.

4. The Problem of Chip Copying

The chip industry is capital-intensive and becoming more so every day. Marketing studies, research and development, the layout and design processes, and the preparation of the photographic mask used to manufacture the chip require substantial effort from a squad of engineers and technicians and can cost millions of dollars. The investment needed to design a single new "cutting edge" chip could reach $100 million in the near future. Yet, in three to six months, for a cost of roughly $50,000 to $100,000, a copyist firm can photograph a chip and its

89. Id.
91. See R. STERN, supra note 71, § 1.1[E] (describing the manufacturing process).
92. See Wilson & Ticer, supra note 86, at 84. The research and development costs of a complex chip can reach approximately $4 million. See 1983
layers and make a perfect copy. For less than $1 million, an entire family of chips can be duplicated. The pirate firm, since it avoids the costs of marketing studies and research and development borne by the innovating firm, can undersell the innovator and flood the market with less expensive copies of the chip, or at least force the innovating firm to reduce the price at which it can sell its product. Either way, the creative firm loses revenue and market share. Such appropriation of creativity thus creates a devastating disincentive to necessary research and development. Ultimately, innovation, the life-blood of industry, is jeopardized.

A potential threat to the economic health of a creative enterprise is not, in and of itself, sufficiently serious to warrant protective intellectual property legislation. Other factors, such as the efficacy of existing law, the effect of a statutory change on current law, the parameters of protection, the costs and benefits which flow from new legislation, impact on the public domain, and the international aspects of protection must also be considered. In order to demonstrate precisely why the Semiconductor Chip Protection Act of 1984 was enacted into law, the Act must be considered in light of these other considerations.

II. A POLITICAL TEST FOR INTELLECTUAL PROPERTY LEGISLATION

In a constantly changing society such as ours, the legal system must be continually restructured to reflect larger changes that occur outside the law. Any legislative proposals for change, however, must meet general standards. One such standard is a common understanding among legislators that statutes

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94. See Senate Report, supra note 44, at 5.

should respond to problems. "If it ain't broke, don't fix it," is a familiar statement in the halls of Congress. Furthermore, all legislation must be subjected to rules of proceeding; otherwise anarchy will prevail. In addition, legislators agree that "wise legislation will not proceed by deduction from a monistic premise but upon a series of judgments about ends served and disserved by particular measures." Not only is wise legislation well-reasoned and justified, but it should be flexible, to "admit the variety, and flux of experience, and leave room for ready correction over time."

Congress applies general policy standards to any proposed legislation; in addition, Congress can and should apply a consistent and stringent set of standards, tailored to each type of legislative proposal. As regards copyright law, absent another massive rewriting of the law similar to the 1909 and 1976 revisions, congressional treatment of copyright issues in the 1980s will be on an incremental and ad hoc basis. Without the application of a set of strict standards to a new proposal in copyright legislation there is a danger that the proposal will creep outside of the larger copyright scheme, creating an inconsistency with prior law and causing ramifications for the public and creative community far beyond the initial error.

Therefore, in the tradition of courts of law and other deliberative institutions, the consideration of intellectual property

96. Thomas Jefferson observed long ago:
So far the maxim is certainly true, and is founded in good sense, that as it is always in the power of the majority, by their numbers, to stop any improper measures proposed on the part of their opponents, the only weapons by which the minority can defend themselves against similar attempts from those in power are the forms and rules of proceeding which have been adopted as they were found necessary, from time to time, and are become the law of the House, by a strict adherence to which the weaker party can only be protected from those irregularities and abuses which these forms were intended to check, and which the wantonness of power is but too often apt to suggest to large and successful majorities . . . .


98. Kaplan, supra note 97, at 854.
issues should be governed by standards and procedures that are understood in advance and applied uniformly from case to case. At the outset, the proponents of change should have the burden of showing that a meritorious public purpose is served by the proposed congressional action. Whether the proponents of change have met this burden can be measured against a political test.

Such a political test—a type of “civil procedure” in Professor David Lange’s words—was implicitly applied to legislative proposals to extend copyright protection to semiconductor chips. The test was also used to consider record rental legislation, the only other amendment to the Copyright Act enacted into law by the 98th Congress. An explicit exposition of the test may prove useful to proponents of additional changes in the intellectual property laws. Ultimately, this is the standard Congress can apply to any proposals before enacting future intellectual property legislation, including changes to the patent laws.

The test is fourfold in scope. First, the proponent of a new interest ought to show that the interest can fit harmoniously within the existing legal framework without violating existing principles or basic concepts. The proponent must further indicate whether fundamental aspects of current law, such as the term of protection and exclusive rights, are compatible with the protection sought for the new interest. Degradation of current law must not be allowed. Where applicable, an advocate of a new protectable interest should provide a mechanism for

99. See House Hearings on Copyright and Technological Change, supra note 1, at 64-65 (statement of David Lange, Professor of Law, Duke University) [hereinafter cited as Lange Statement, House Hearings on Copyright and Technological Change]. A similar burden might appropriately be placed on those who seek exceptions to protection.
100. Id. at 65.

102. A similar test is laid out by Professor David Lange in five parts in Lange Statement, House Hearings on Copyright and Technological Change, supra note 99, at 57-58, 65-68.
dealing with the international aspects of intellectual property law. This is especially true when a *sui generis* form of protection is proposed, because it will probably not fall within the ambit of existing multilateral treaties. Intellectual property is international and any system of protection will have to recognize this fact.

Second, the proponent of a new intellectual property interest must be able to commit the new expression to a reasonably clear and satisfactory definition. The interest should be defined both in terms of what it is and what it is not. Lack of definitional clarity is unfair to the agency that administers the law and the courts that interpret it. Further, any legal interest that cannot be explained to elected members of Congress certainly should not be scheduled for a vote. Uncertainty in the law is perhaps most unfair to the public, which must understand the law to obey and exercise its rights. Proponents must be scrupulously honest on the issue of retroactivity (today's protection for yesterday's rights) or retrospectivity (tomorrow's protection of yesterday's rights), because ambiguity affecting the public domain can wreak havoc with both individual rights and previously made financial decisions. Additionally, any exception to the new protectable interest, be it defined in terms of fair use, reverse engineering, or innocent infringement, must be clarified and reaffirmed.

Third, the proponent of change should present an honest analysis of all the costs and benefits of the proposed legislation. The proponent must show the difference between the status quo and the future contemplated by the legislation. Since we live in a society of winners and losers, the proponent must also candidly identify the groups that will bear the adverse consequences of the proposal and explain why they should bear those losses. The argument that a particular interest group will make more money and therefore be more creative does not satisfy this threshold standard\(^{103}\) or the constitutional requirements of the intellectual property clause.

Fourth, any advocate of a new protectable interest should show on the record how giving protection to that interest will enrich or enhance the aggregate public domain.\(^{104}\) The aggre-

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103. As a general rule, it is safe to assume that the proponents of change will derive some benefit from their proposal. The potential benefit provides the incentive for the proposal.

104. For further discussion of public domain, see *infra* notes 178-185 and accompanying text.
gate public benefit should outweigh the proprietary gains which result from protection. Congress can safely move forward if the cost to the public of the monopoly is deemed to be less than the value to the public of the total benefits caused by the law.105

Although Congress did not explicitly apply this four-prong test when it considered proposals to protect semiconductor chips, the four factors were implicit in the legislative discussion of the issue. A review of the product of that debate, the Semiconductor Chip Protection Act of 1984, demonstrates that it satisfies all four prongs of the test.

A. HARMONY WITH EXISTING LAW

The Semiconductor Chip Protection Act of 1984, by creating a *sui generis* and freestanding protection for chip products, is clearly in tune with the existing framework of copyright law. The new statutory scheme creates a form of proprietary protection separate from and independent of the Copyright Act.106

The original proposals to grant protection to semiconductor chip products under the Copyright Act were fatally flawed. Inherent in these proposals was a danger that, by tailoring fundamental copyright principles to accommodate the unique nature of the use of chip designs in the manufacturing process, the legislation would distort the way in which copyright was applied to other categories of copyrightable works.107 A representative

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106. By clear and concise language, the Chip Act provides that nothing in new chapter 9 of title 17 "shall affect any right or remedy held by any person under chapters 1 through 8 of this title . . . , or under title 35." 17 U.S.C. § 912(a) (Supp. II 1984).

Professor Melville Nimmer, after finding that "the protection afforded in Chapter 9 is sufficiently analogous to copyright protection, and the issues raised sufficiently likely to be posed in litigation which also raise copyright issues," has included extensive discussion of the Act in his excellent and useful treatise. 4 M. NIMMER, *supra* note 23, § 18.01. For in-depth analyses of the Act and its contents, see id. §§ 18.01-18.12; R. STERN, *supra* note 71. The valuable Stern treatise is devoted entirely to the Semiconductor Chip Protection Act.

107. For further discussion of this important point, see *HOUSE REPORT*, supra note 20, at 5-11, 1984 U.S. CODE CONG. & AD. NEWS at 5754-60. Eventu-
of the book publishing industry explained that:

(O)ur concern is not born out of a mere desire for ideologically pure copyright law,... or an aversion to innovative legislation. Our concerns do lie with the blurring or distortion of principles and the establishment of precedents that may have untoward and unintended consequences for copyright protection of our works,... and those of other copyright proprietors.\textsuperscript{108}

This thought was echoed by several other commentators during the congressional hearings and elsewhere.\textsuperscript{109}

The taproot of the Chip Act is found in the proposition that dissimilar items should not be similarly treated. A mask work is not a book or a movie or a record, and therefore is not treated as these items are under the Copyright Act.\textsuperscript{110} The chip legislation does not treat copyright law as a large tent designed to protect proprietary interests that reach far beyond its surface perimeter. The Act therefore does not either degrade or make a mockery of copyright law, as has sometimes been the case in the past.\textsuperscript{111}

The issue of whether to distinguish mask works from books or movies for purposes of protection was of major import. Congress, if it works by analogy, as it often does, must be exceedingly careful that it chooses the right one.\textsuperscript{112} The analogy that grips the congressional mindset at any particular moment
is often the analogy that controls the debate.\textsuperscript{113} The outcome of a vote may depend on acceptance of a false premise, or an attractive but fallacious analogy. As relates to the need to protect semiconductor chip products, an apt analogy could not be found in existing copyright law. Consequently, Congress chose not to force one more camel's nose under an already overcrowded tent.

The political issue created by the original chip legislation was therefore larger than the mere question of protectability of chips. The original proposal to protect semiconductor chip products under copyright was arguably a "pilot project" for other new technologies seeking statutory shelter.\textsuperscript{114} Recognizing that the development of general principles of law and consistent application of those principles are matters of great import to any developed legal system, the real question for Congress became one of preserving the integrity of copyright by maintaining a set of consistent principles.\textsuperscript{115}

In short, the original proposal to protect chip designs through copyright was not in harmony with existing law. It would have required distortion of the fundamental principles of copyright.\textsuperscript{116} Congress recognized that mask works could not be protected in the same way a book, movie, or record is protected. For this reason, Congress adopted a \textit{sui generis} approach. \textit{Sui generis} chip protection passed the initial hurdle of being in harmony with the existing structure of copyright.

\textsuperscript{113} Referring to Judge Breyer's warning, Professor Paul Goldstein characterized false analogies as dangerous, stating "the analogy that grips Congress' attention will be the one that controls it." Goldstein Summary, \textit{id.} at 167.

\textsuperscript{114} See Patterson Statement, \textit{1983 House Hearings, supra} note 109, at 62.

\textsuperscript{115} Professor L. Ray Patterson has stated: "While consistency for its own sake is a virtue of small consequence, consistent principles for a body of law are essential for integrity in the interpretation and administration of that law." \textit{Id.} at 54. Although Professor Patterson previously has lamented that there are "no clearly defined principles for copyright," he nonetheless recognizes the continuing obligation to strive for general principles of law: "It is the choice of principles that determines whether a legal concept is to have the degree of consistency necessary for a unified whole, or whether it is to consist primarily of a series of fragmented rules." L. \textit{RAY PATTERSON, supra} note 97, at 222.

\textsuperscript{116} For a discussion of the inadequacies of copyright, patent, and state trade secret laws to protect chips against piracy, see Samuelson, \textit{supra} note 47, at 487-90; see also \textit{infra} note 161.
B. DEFINITIONAL CLARITY

The Act clearly defines what is and is not protected under the *sui generis* scheme. Definitional clarity is important so that the public and industry understand what is protected and the duration of protection. In addition, definitional clarity will assist the Copyright Office and the federal courts in applying the Act.

The Act meets these needs by plainly defining expressions to be protected and the bundle of exclusive rights to be conferred on owners. Clarity in the definitional and exclusive rights sections, however, is not the only element of certainty in the Act. The Act also clearly sets forth a registration requirement, a limited ten year period of protection, and an optional notice provision.

1. What Is Protected

The core of the Act protects "mask works," which are essentially defined as a series of related images that have been employed to stencil two- and three-dimensional features of shape and configuration onto a chip, thereby creating a semiconductor chip product that potentially will perform electronic circuitry functions.\(^\text{117}\) The mask work must be "fixed" in a semiconductor chip product for a period, or a time of more than "transitory" duration.\(^\text{118}\) The rights accorded under the Act belong to the "owner" of the mask work.\(^\text{119}\) The owner is defined as the "person who created the mask work," his or her legal representative or transferee, or the employer for whom the person created the work.\(^\text{120}\) The "exclusive rights" that accrue to the owner are: "(1) to reproduce the mask work by optical, electronic or any other means; (2) to import or distribute a semiconductor chip product in which the mask work is embodied; and (3) to induce or knowingly to cause another person to do any of the acts described [above]."\(^\text{121}\) The rights of reproduc-

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118. The House Report makes clear that fixation of a mask work in a data base tape (a magnetic tape in which the coordinates of relevant points in a mask or set of masks is encoded in digital form) does not fit within the definition of fixation provided by the Act. See HOUSE REPORT, supra note 20, at 17, 1984 U.S. CODE CONG. & AD. NEWS at 5766.
119. 17 U.S.C. § 903(a) (Supp. II 1984). Use of the term "owner" indicates that the Act creates an industrial form of property as opposed to an "author's" right. Earlier versions of the bill used the term "author."
121. Id. § 905. Early legislative formulations to protect chips contained a
tion, importation and distribution are similar to those found in copyright law. The contributory infringement provision does not have an express statutory analogue in the Copyright Act, but is derived from case law.

The Act provides unconditional protection to all mask works whose owners are nationals or domiciliaries of the United States or are stateless persons. Similarly, the Act protects all mask works which were first commercially exploited in the United States. The Act provides possible protection for mask works of foreign nationals that were not first commercially exploited in the United States. Such mask works will be protected if the owner of the mask work is “a national, domiciliary, or sovereign authority of a foreign nation that is a party to a treaty affording protection to mask works to which the United States is also a party,” or if the mask work falls within the scope of a presidential proclamation. The President is authorized to issue a proclamation conferring protection

more extensive catalogue of rights to be enjoyed by the owner of the mask work. One of these rights, the “use” right, was found to be slightly duplicative of the other rights and potentially harmful to the corpus of copyright law which does not contain such a right. The “use” right therefore was deleted. See House Report, supra note 20, at 21 n.40, 1984 U.S. Code Cong. & Ad. News at 5770 n.40; Senate Report, supra note 44, at 20-21.

122. See House Report, supra note 20, at 20, 1984 U.S. Code Cong. & Ad. News at 5769. The reproduction right finds its ancestry in section 106(1) of the Copyright Act; the distribution and importation rights have close relatives in sections 106(3) and 602(a) of the Copyright Act. See 17 U.S.C. §§ 106, 602(a) (1982). These rights are also similar to the patent law’s exclusive rights to make and sell the subject matter of a patented invention. See 35 U.S.C. §§ 154, 271 (1982).


The package of exclusive rights created by the Act will be enforced by a panoply of civil and injunctive remedies, including statutory damages up to the amount of $250,000, exclusion of infringing products from entry into the United States, temporary restraining orders, monetary relief for damages and lost profits, and seizure and impoundment of infringing products. See 17 U.S.C. §§ 910-911 (Supp. II 1984). Criminal penalties, which are not available under the Act, were not deemed by Congress to be appropriate or necessary due to the unique nature of the mask work design process, the microscopic characteristics of semiconductor chip products, and resultant questions of proof and scienter.

125. Id. § 902(a)(1)(B).
126. Id. § 902(a)(1)(A)(ii).
127. Id. § 902(a)(1)(C); see also House Report, supra note 20, at 18-19, 1984 U.S. Code Cong. & Ad. News at 5767-68.
under the Act upon a finding that a foreign nation extends protection to mask works of American origin on "substantially the same basis" as it protects mask works of its own nationals and domiciliaries, as well as mask works first commercially exploited in that nation.\textsuperscript{128} Equality of treatment is not enough, however. The foreign nation must provide protection that is substantially equivalent to the protection available under the United States Act.\textsuperscript{129}

The so-called "formalities" of the American law add clarity and certainty to the system. Statutory protection under the Act is lost, and the mask work falls into the public domain, if registration does not occur within two years after the date on which the mask work was first commercially exploited anywhere in the world.\textsuperscript{130} Failure to respect the two-year window will not be construed to forfeit any protection that might have occurred during this time period. When commercial exploitation occurs first, and the two-year registration window still is open, registration is still required as a prerequisite to a civil infringement action.\textsuperscript{131}

\textsuperscript{128} 17 U.S.C. § 902(a)(2)(A) (Supp. II 1984). The President was petitioned under section 902 to issue proclamations extending protection to Great Britain and Australia. Due to the difficulty of making a section 902 determination, both petitions were appropriately treated by the Department of Commerce under the interim and more flexible provisions of section 914. See infra notes 186-200 and accompanying text.

\textsuperscript{129} For example, a nondiscriminatory foreign law that offered its own and American citizens alike a one-year period of protection should not qualify for a Presidential proclamation. See HOUSE REPORT, supra note 20, at 8, 1984 U.S. CODE CONG. & AD. NEWS at 5757.

\textsuperscript{130} 17 U.S.C. § 908(a) (Supp. II 1984).

\textsuperscript{131} Id. § 910(b)(1). The Semiconductor Chip Protection Act became effective on its date of enactment, November 8, 1984. See id. § 913(b). However, chips that were commercially exploited between July 1, 1983, and November 8, 1984, will receive protection under the Act, provided registration occurred before July 1, 1985, subject to a two-year compulsory license that permits infringers to continue to sell and distribute their inventory of chip products in existence on the date of enactment if they agree to and do pay reasonable royalties. See id. § 913(d)(1)(2). On July 1, 1987, all privileges in this regard will have expired, and any preenactment mask work that qualifies for protection will be treated identically with one created after the date of enactment. See id. § 913(d)(2); see also House Explanatory Memorandum, supra note 52, at E4434.

Chips commercially exploited before July 1, 1983, are not protectable under the Act. Passage of a public law probably would not have occurred absent an understanding by the House and Senate that the legal status of these chips, as well as the legality of copying them, rests on statutory provisions in effect prior to enactment of the Act. Whether under federal law (including copyright and patent law), state law, or common law, the Act is not intended to affect any rights available to chip products commercially exploited before
Protection of mask works is for a period of ten years. The ten-year term meets both the characteristics of the item protected and the needs of the public. Protection continues until the end of the calendar year of the tenth year after registration or commercial exploitation, whichever occurred first.\(^\text{132}\)

Notice of mask work protection is optional and “is not a condition of protection.”\(^\text{133}\) Permissible notice consists of the words mask work, the symbols *M* or ®; and “the name of the owner or owners of the mask work or an abbreviation by which the name is recognized or is generally known.”\(^\text{134}\) Although notice is discretionary, it is considered prima facie evidence of the defendant’s knowledge of protection.\(^\text{135}\)

2. What Is Excluded from Protection

The Act not only defines what creative works deserve protection; it also delineates areas that are not protectable or are exceptions to protection. The Act does not protect mask works that are not “original.”\(^\text{136}\) As the House Report makes clear, the meaning of “original” is drawn from the law of copyright.\(^\text{137}\) The Act will not protect a mask work that “consists of designs that are staple, commonplace, or familiar in the semiconductor industry, or variations of such designs, combined in a way that, considered as a whole, is not original.”\(^\text{138}\) In other


133. 17 U.S.C. § 904 (Supp. II 1984). The ten-year period of protection heeds Thomas Macaulay’s admonition that protection “ought not to last a day longer than is necessary for the purpose of securing the good.” Macaulay, supra note 105, at 735. Stated differently, society should not pay monopoly rent in excess of the value of the benefits that flow to proprietors in exchange for securing the good.

134. Id. § 909(b).

135. Id. § 909(a).

136. Id. § 902(b)(1).


words, the combination of arcs, lines and rectangles in the mask work must possess the requisite degree of originality when considered as a whole, even though, if the mask work were dissected away from the whole it might appear familiar or commonplace.139

The proprietary rights granted by the Act are limited by a number of exceptions. Most significant is the provision that permits reverse engineering.140 The reverse engineering exception allows a person to reproduce a mask work “for the purpose of teaching, analyzing, or evaluating the concepts or techniques embodied in the mask work or the circuitry, logic flow, or organization of components used in the mask work.”141 After such an analysis or evaluation, the results may be incorporated “in an original mask work which is made to be distributed.”142 The mature fruit of the reverse engineering process therefore qualifies for protection under the Act if the originality standard is met.143 By allowing the results of reverse engineering to be used for commercial purposes and by allowing copying of the entire work, the reverse engineering exception differs dramatically from the “fair use” doctrine of copyright law.144

139. HOUSE REPORT, supra note 20, at 19, 1984 U.S. CODE CONG. & AD. NEWS at 5768.
140. 17 U.S.C. § 906 (Supp. II 1984). See also SENATE REPORT, supra note 44, at 21-22. To date, the most enlightened commentaries on reverse engineering are found in W. PATRY, THE FAIR USE PRIVILEGE IN COPYRIGHT LAW 340-46 (1985), and R. STERN, supra note 71, § 5.5.
142. Id. § 906(a)(2).
143. “If the resulting semiconductor chip product is not substantially identical to the original, and its design involved significant toil and investment so that it is not a mere plagiarism, it does not infringe the original chip, even if the layout of the two chips is, in part, similar.” This explanatory language and the textual change in § 906 were made at the last moment during the House-Senate informal conference. See House Explanatory Memorandum; supra note 52, at E4433; Mathias-Leahy Explanatory Memorandum, supra note 52, at S12,917. The Mathias-Leahy Memorandum uses the phrase “in substantial part” rather than “in part,” stating that the two works may be “substantially similar” but that the reverse engineering defense should be withheld if the two works are substantially identical. See id.; see also Letter from Alan H. MacPherson to Hon. Robert W. Kastenmeier (Aug. 7, 1984) (copy on file at the Minnesota Law Review); 1983 House Hearings, supra note 18, at 201 (statement of Robert Hinckley, General Counsel, NEC Electronics U.S.A., Inc.).
144. See HOUSE REPORT, supra note 20, at 23 n.45, 1984 U.S. CODE CONG. & AD. NEWS at 5712 n.45; SENATE REPORT, supra note 44, at 22; W. PATRY, supra note 140, at 342-46. However, an equitable doctrine akin to that of “fair use” in copyright may develop a life and character of its own under the provisions of the Chip Act, much as its cousin did under copyright prior to the 1976 Copyright Act. A comparison of reverse engineering and fair use suggesting that
From a practical standpoint, it should not be terribly difficult for the federal courts to differentiate between reverse engineering and infringement. The reverse engineering exception strikes an appropriate balance between the rights of creators and owners of mask works, on the one hand, and the rights of teaching and research institutions, competitor firms, users, and customers on the other. The courts, in deciding whether a reproduction qualifies for a reverse engineering exception, will of course do so on a case-by-case basis, just as they do in many other areas of the law, including the “fair use” doctrine in copyright. The inquiry will be simpler, however, because the additional creative work required to fall within the reverse engineering exception will normally leave a “paper trail” not found in the files of copyist firms.

The Act also creates an exception to protection based on the “exhaustion of monopoly rights” and “first sale” doctrine. As in copyright law, the owner of a mask work does not have a continuing right to exercise control over the pricing, resale, or other business conduct of semiconductor chip customers once the chips have legitimately been procured. The “first sale” doctrine serves as a limitation on the importation and distribution rights of the mask work owner, but does not circumscribe the reproduction right.

A third limitation on the exclusive rights of mask work there are fair uses of a mask work is found in R. Stern, supra note 71, § 5.6. The Chip Act is silent on these developmental possibilities.


As was cogently explained by a representative of the chip industry:

Whenever there is a true case of reverse engineering, the second firm will have prepared a great deal of paper—logic and circuit diagrams, trial layouts, computer simulations of the chip, and the like; it will also have invested thousands of hours of work. All of these can be documented by reference to the firm’s ordinary business records. A pirate has no such papers, for the pirate does none of this work.


148. 17 U.S.C. § 906(b) (Supp. II 1984). Without question, the first sale exception to the Act permits “gray marketing” of integrated circuits by bona fide purchasers overseas. Gray marketing refers to a process by which goods are “imported from abroad and sold, frequently at deeply discounted prices,
owners is contained in the innocent infringement section of the Act.\textsuperscript{149} If the purchaser of some infringing chips resells them before ever receiving notice that the chips are protected, the purchaser is exempted from liability. The innocent infringement exception applies only to importation and distribution rights, and not to reproduction.\textsuperscript{150} Furthermore, under the innocent infringement exception, if a person purchases infringing chips innocently, and then is given notice of infringement prior to reselling the chips, the innocent purchaser may resell the chips in question subject to payment of a reasonable royalty to the mask work owner.\textsuperscript{151}

The innocent infringement provision safely navigates the turbulent channel between property rights and consumer interests. On one side, the proprietary interests of chip owners must be respected as a matter of fundamental fairness and as an investment incentive. On the other side, innocent parties who invest in chip products should not have their good faith purchases jeopardized by proprietary rights that could not reasonably be foreseen.\textsuperscript{152} Recognizing the tension that exists between these competing interests, the Act suggests that parties attempt to resolve their differences prior to instituting an infringement action in federal court.\textsuperscript{153}

In sum, the Act defines what creative works deserve protection; in addition, it delineates areas that are not protectable or are excluded from protection. The public and industry should have relatively few problems understanding what is and is not protected. Furthermore, the Copyright Office and the federal courts should be able to discharge their respective administrative and adjudicative responsibilities with minimal impact on their already heavy workloads.


\textsuperscript{150} A limited reproduction right for innocent infringers was found in the bills passed by the House and Senate, but was eliminated from the final version of the compromise bill. \textit{Compare} H.R. 5525, 98th Cong., 2d Sess. §§ 901(7), 907, 130 CONG. REC. S5489-90 (daily ed. June 11, 1984) \textit{and} S. 1201, 98th Cong., 2d Sess. § 511, 130 CONG. REC. S5838 (daily ed. May 16, 1984) \textit{with} 17 U.S.C. §§ 901-914 (Supp. II 1984).


\textsuperscript{152} See \textit{SENATE REPORT}, supra note 44, at 23-25.

\textsuperscript{153} 17 U.S.C. § 907(b) (Supp. II 1984). The suggested alternatives to litigation include negotiation, mediation, and binding arbitration.
C. Cost-Benefit Analysis

Any congressional examination of costs and benefits will not be a litmus test, indicating one color for passage of a bill and another for defeat. Unlike the preceding analysis concerning harmony with existing law and clear definition of what is protectable and what is not, an analysis of costs and benefits is more subjective and less quantifiable. This dusty enterprise, like insulating the attic, is both painful and rewarding; any itchiness is only temporary and the work will result in long-term benefits.

The semiconductor chip industry has been threatened by the problem of chip copying. Congress, before deciding to provide protection to a particular enterprise, must necessarily consider alternative ways in which the industry can or is protecting itself. Knowledge of the industry gained in such an inquiry can indicate whether proposed legislation will involve costs or benefits for the industry; in addition, the analysis can provide a frame of reference from which to consider costs and benefits of protection for society as a whole.

Congressional enactment of patent and copyright laws, or of any *sui generis* intellectual property laws, involves a serious decision because such an enactment creates a limited economic monopoly. Congressional study of an industry might reveal effective alternatives to granting monopoly rights, or such study might reveal that existing law is adequate and no further legislation is warranted. A mere showing that an initial creator’s costs are high, while copying costs are low, is not sufficient to establish the masonry necessary for protection.

The semiconductor industry was not totally helpless against chip piracy prior to enactment of the chip protection legislation. The initial chip manufacturer enjoyed the built-in armor of “lead time.” By reaching the market first, the original manufacturer could develop a pricing strategy that resulted in rapid return of investment. The first chips to come off the line were highly priced; prices plummeted as chips were sold. Chip piracy, which at its quickest takes several months,

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154. See supra notes 106-153 and accompanying text.
155. See supra notes 92-95 and accompanying text.
156. Breyer, supra note 105, at 351.
158. Historically, semiconductor chip prices drop 28% to 30% every time that total output doubles. Noyce, supra note 64, at 2, 7-8; see Federal Trade Commission, Staff Report on the Semiconductor Industry: A Survey of
could not affect early sales and the quick recoupment of development expenses. Sometimes called "learning curve pricing," this strategy's objective was the rapid creation of large demand, the spurring of cost reductions, the discouragement of competition, and the avoidance of piracy.\footnote{159} Chips could be sold with sufficient speed and in large enough quantities to spell the difference between profit and loss. The piracy attack, which came later, delivered a serious but not fatal blow. Learning curve pricing did have significant drawbacks, however; by hampering the accumulation of capital, the industry suffered some self-inflicted harm.\footnote{160}

Although the type of protection semiconductor chips should receive was ambiguous under law existing before the

\footnote{STRUCTURE, CONTENT, AND PERFORMANCE 73-83, 139-40 (1977) (stating that industry executives subscribe to experience curve theory: when output doubles, costs will decline by a constant percentage and prices will concomitantly drop) [hereinafter cited as FTC STAFF REPORT]. The price of EPROM (erasable, programmable read-only memory) chips, useful for storing instructions in a wide variety of machines, fell 75% in one year. Browning & Yoder, Hitachi Ltd's Pricing for Semiconductor Prompts Protest by American Officials, Wall St. J., June 5, 1985, at 34, col. 3.}

\footnote{159. \textit{See Chip Wars: The Japanese Threat}, BUS. Wk., May 23, 1983, at 80, 83 [hereinafter cited as Chip Wars]; see also FTC STAFF REPORT, supra note 158, at 82 (noting that "[i]n response to declining cost and often in advance of cost declines, firms tend to cut prices in order to increase their share of the existing market and in order to create incentives for users to design their semiconductors into new products and thus increase the total demand for the product." This could also be described, however, as an effort to "increase or retain market share" and "also discourage new entry.").}

The learning curve traditionally has related to the on-the-job acquisition of skills, knowledge and team productivity. After introduction of a new product, workers and management learn and hone their respective job skills and are better able to work together as a team. The result—in principle—is higher productivity at lower costs as a product goes down its learning curve. \textit{Id.} at 45-46.

\footnote{160. \textit{See Chip Wars}, supra note 158, at 83. Learning curve pricing is not likely to disappear in the foreseeable future, as long as there is intense competition among chip manufacturers. \textit{See Browning & Yoder, supra note 158, at 34, col. 3, reporting a decision by Hitachi, found in a memo to its distributors, to beat all competitor prices for EPROM chips by ten percent. The Hitachi memo states: "Quote 10% below their price. If they requote, go 10% again. Don't quit till you win." \textit{Id}.}

At some point, learning curve pricing can become predatory pricing. If predatory practices can be proved, remedies may lie in either section 301 of the 1974 Trade Act, 19 U.S.C. § 2411(a) (1982) (giving the President authority to take all appropriate and feasible action within his power to enforce the rights of the United States under any international trade agreement or otherwise respond to discriminatory trade practices of other countries) or the Sherman Act, 15 U.S.C. §§ 1-7 (1982) (providing procedures and penalties in cases of domestic price fixing).}
Act,\textsuperscript{161} the threat of legal action served as a deterrent to piracy. Any pirate conceivably faced the inherent cost and delay of litigation, factors exacerbated in controversies arising from technologically complicated subject matters. Although retaliatory rhetoric rarely led to the filing of a lawsuit or the commencement of a proceeding before the International Trade Commission,\textsuperscript{162} such legal threats did create a favorable climate for licensing.\textsuperscript{163}

\textsuperscript{161} During consideration of the chip protection legislation, Congress took no position on the efficacy of copyright law as a basis for protection of semiconductor chips. See Mathias-Leahy Explanatory Memorandum, \textit{supra} note 52, at S12,918; House Explanatory Memorandum, \textit{supra} note 52, at E4433-34. The House Report took a more definite stance, stating that copyright was inadequate to provide protection for semiconductor chips. See \textit{House Report, supra} note 20, at 3-4, 8, 1984 U.S. CODE CONG. & AD. NEWS at 5752-55, 5757 ("the Committee notes that the present copyright law does not protect useful articles, as such, and semiconductor chip products are useful articles, as defined in the Copyright Act"). Nonetheless, suits against alleged "copyists" or "infringers" had been grounded in copyright causes of action. See, \textit{e.g.}, Layton Statement, 1983 Senate Hearings, \textit{supra} note 93, at 80 (noting that Intersil had filed suit against a firm that had allegedly copied some of its circuits, based on a belief that mask designs were protected by federal copyright law).

\textsuperscript{162} An actual illustration or two suffice to make this point. Zilog, an American corporation, and Nippon Electronic Company (NEC), a Japanese firm with an American subsidiary, were able to arrive at a settlement after Zilog's charges before the International Trade Commission and in federal district court that NEC had copied a microprocessor chip, and in response to NEC's countercharge that Zilog had violated NEC's patent. Under the terms of the settlement, NEC received a license to manufacture other Zilog products, and Zilog received licenses to manufacture specific NEC-designed products. Zilog Corp. v. Nippon Elec. Co., No. C83-1241 (N.D. Cal. filed March 14, 1983); Zilog Corp. v. NEC Elec. Co., No. 337-TA-153 (I.T.C. filed June 13, 1983), terminated on the basis of settlement, 49 Fed. Reg. 4856 (1984). Litigation in a federal court between Intersil and Teledyne also settled. In this case, Intersil filed a complaint for copyright infringement, unfair competition, and related causes, alleging that Teledyne had copied an entire family of analog to digital converter chips. In addition to requesting a preliminary injunction, Intersil asked the court to award $7 million in actual damages. Intersil, Inc. v. Teledyne Inc., No. C82-4187 (N.D. Cal. filed Sept. 7, 1982). For further information, see 1983 House Hearings, \textit{supra} note 18, at 214-15 (statement of Robert C. Hinckley, General Counsel, NEC Electronics U.S.A., Inc.); Layton Statement, 1983 Senate Hearings, \textit{supra} note 93, at 80.

\textsuperscript{163} Data shows that licensing agreements between American and Japanese semiconductor manufacturers increased more than tenfold between 1975 and 1983. See Dataquest Inc., Research Newsletter 5 (March 30, 1984) (unpublished) (copy on file at the \textit{Minnesota Law Review}). Licensing practices between American companies probably increased in a similar manner. The House and Senate hearing records are devoid of examples of piracy that did not lead to subsequent licensing arrangements. Time after time, misappropriation is alleged, but the official record does not show actual cases of mask work "rip-off" without recompense.
Legal threats were bolstered by the fact that it is exceedingly difficult to copy a chip without detection. Similar to a watermark on a currency bill, the semiconductor chip is so complex that it has unique identifying characteristics.\textsuperscript{164}

Another factor which served to check piracy to some extent was the trade negotiations that began in 1980 between Japan and the United States, the two countries which produce the most chips and where chip competition is the keenest. These negotiations arguably resulted in a reduction of piracy between citizens of the two countries.\textsuperscript{165}

Finally, state trade secret laws were available to the chip industry up to the time the chip was commercially exploited. As a general proposition, any item of intellectual property can be a trade secret, provided that the item is not known to others, is kept secret, and conveys a competitive advantage to the individual or entity possessing it.\textsuperscript{166} Furthermore, trade secret protection can last indefinitely. This early line of defense was, and continues to be, of assistance to the industry before the first commercial exploitation of the chip.\textsuperscript{167}

A candid appraisal of these defenses against piracy reveals unique inadequacies in each of them.\textsuperscript{168} Collectively, they did not provide effective protection against piracy. Congress has an

\textsuperscript{164} Integrated circuits have unique “fingerprints” of code that may be used to identify their design. The unique features of a chip occur either intentionally or as a result of a mistake. The copying of Intel’s 8086 microprocessor several years ago was discovered because two tiny unneeded transistors, disconnected and dangling from the chip in a useless bed of silicon, were copied by a competing firm. See Battling to Innovate and Emulate: Intel Versus Nippon Electric, Wash. Post, May 2, 1983, at A1, col. 1, reprinted in 1983 House Hearings, supra note 18, at 38.


\textsuperscript{166} A trade secret is “any formula, pattern, device or compilation of information which is used in one’s business, and which gives him an opportunity to obtain an advantage over competitors who do not know or use it.” \textit{Restatement of Torts} \textsection 757 comment b (1939).


Trade secret laws are not preempted by the Act, as they provide a different form of protection from that found in Chapter 9. The continued existence and efficacy of state trade secret law is doubly important because it provides protection for chips during a time period, prior to registration or commercial exploitation, when none is available under the Act.

\textsuperscript{168} For a discussion of the inadequacies of copyright, patent, and state trade secret laws in protecting against piracy, see Samuelson, supra note 47, at 487-90; see also supra note 161.
affirmative obligation to monitor present and future threats to this country's most creative industries, especially those producing ideas and information. After finding a threat, Congress can inform its interest by further examining the costs and benefits of proposals to eliminate the threat.

Today's economy has a substantial zero-sum element, and legislative solutions to the problems of the 1980's must recognize this fact. As a general rule, in exchange for a benefit granted to a specific group or industry, some other group must absorb a loss. Gains accrue to one group, and losses are borne by another. A threshold showing that the industry would benefit from protection is not sufficient to justify congressional intervention. Congress's concerns are broader than the concerns of any one industry, and Congress must satisfy itself that the benefits to society as a whole are outweighed by the costs. If a legislative solution stimulates economic growth, jobs will develop and the government's tax base will broaden. In this manner, the positive impact of a statutory change can exceed the negative impact. Nonetheless, some losses are inevitable.

At a societal level, the principal costs of the Semiconductor Chip Protection Act emanate from the granting of monopoly rights to a chip owner for a ten-year period of time. These monopoly rights are less than those conferred by copyright law, both because the term of protection is shorter and because the

169. "A zero-sum game is any game where the losses exactly equal the winnings." L. Thurow, The Zero-Sum Society 11 (1980). Most sporting events, for example, are zero-sum games. For every winner there is a loser. As regards economic solutions to our problems—and it is arguable that intellectual property law is a solution—Professor Lester Thurow argues: "When the economic pluses and minuses are added up, the pluses usually exceed the minuses, but there are large economic losses. These have to be allocated to someone, and no group wants to be the group that must suffer economic losses for the general good." Id. at 10. Many high-tech industries such as the chip industry, as contrasted from smokestack industries, are based on an inexhaustible supply of resources. Consequently, the stark reality of the zero sum game is somewhat lessened.

170. Id. at 10-11. Professor David Lange, speaking of copyright, makes a similar argument:

...it is fair for the copyright law to entertain arguments on behalf of one industry or another for change. I think those changes ought to come, however, only if the proponents of the change can show both why they are entitled to it and why, as against their entitlement, someone else who may now be benefited by the law the way it is, ought to have to bear the burden of that change. Because generally, there is a tradeoff involved.

Lange Statement, House Hearings on Copyright and Technological Change, supra note 99, at 74.

171. L. Thurow, supra note 169, at 11, 17, 212-14.
exclusive rights are limited by the reverse engineering and innocent infringement provisions. Still, Congress must be cognizant of the fact that someone might have to pay higher prices for the protected work-product, which in this case consists of semiconductor chips. An owner of a monopoly right is allowed to adopt a marketing strategy that maximizes profits, providing that the antitrust laws are respected. The Act, by conferring limited monopoly rights, may well create an atmosphere for pricing practices that were not previously foreseeable. Chip prices may rise. Alternatively, consumers might see chips offered at low prices initially, but without dramatic decreases throughout the product cycle. Learning curve pricing may become a marketing antique. The more probable course is that learning curve pricing will continue, fueled in part by an overriding competitive desire to capture both the domestic and world markets. The consumer, despite the owner's monopoly, should continue to reap the benefits of quality products at low prices due to an extremely competitive, perhaps even predatory, market.172

The lack of opposition to the chip protection legislation may be a good indication that its costs are low. In a democracy, when the costs of legislation are expected to be high and a large number of people are potentially adversely affected, then political resistance to a statutory change will occur as a natural course. The Chip Act was virtually unopposed; not a single negative vote was cast in either the House or Senate. The virtual unanimity which surrounded the Act allows speculation that the new law will entail relatively few costs.

The actual implementation costs of the Act, borne by the taxpayers, are expected to be low. A low-cost forecast for the Act is supported by the Congressional Budget Office,173 which estimated net costs of approximately $200,000 per year in fiscal years 1985 through 1987, and less than $100,000 annually thereafter.174 All of these costs arise from the need to create a registration system within the Copyright Office.175 Since the Act

172. See supra note 160.
173. HOUSE REPORT, supra note 20, at 32 (statement of the Congressional Budget Office).
174. Id.
175. The Register of Copyrights is made responsible for all administrative functions and duties under the Act. The Copyright Office is directed to establish a registration system and is authorized to establish rules, including those relating to fees, notice, deposit requirements, recordation and certification of registration. See 17 U.S.C. § 908 (Supp. II 1984); see also Final Regulations,
does not create any criminal penalties, costs will not be borne by the Department of Justice. Some budgetary impact may be felt by the Treasury, Postal Service, Customs Service, International Trade Commission, and the federal judiciary. When compared to the overall budgets of these entities, however, the cost of implementing the Act will be miniscule.

The interests most seriously affected by the chip legislation are those of the chip pirates, both present and prospective. Copyists will no longer be able to take unfair advantage of the substantial amounts of time and money expended by innovating firms to develop newer and better chips. Proprietary rights, however, are tempered by the reverse engineering provision, which should prevent the Act from affording too much protection, thereby depriving the public and industry of the benefits of free and open competition.

Although potential costs to all but copyist firms will likely be low, the benefits to be derived from the Act are expected to be great. Semiconductor production is an important and rapidly growing segment of the economy. The chip protection legislation rewards and stimulates technological innovation, which will lead to the creation of more jobs, increased opportunities for investment, augmented tax revenues, and cheaper, better quality consumer products. Fundamentally, law is a skeleton providing an inner frame for the ordering of society. The Act's main benefit is that it shapes the bones for a relatively new industry, allowing the industry room and protection to compete and create new designs with foreknowledge of the basic rules of the game.

In the future, businesses and investors can rely on the fact that investments in research and development will be pro-


The Copyright Office has reported that as of October 24, 1985, 1774 petitions for registration had been filed. Mask Work Unit Statistics, provided by Dorothy Schrader, General Counsel, Copyright Office (Oct. 24, 1985) (copy on file at the Minnesota Law Review).

176. The International Trade Administration, U.S. Department of Commerce, forecasts that in 1985 the industry will ship more than $20.5 billion of semiconductor devices. Moreover, the semiconductor industry is expected to continue its 20% rate of annual growth through 1990. See 1985 U.S. INDUSTRIAL OUTLOOK 32-3; see also Wilson & Ticer, supra note 86, at 84. Over the years, the United States Government has been the largest single buyer of integrated circuits and products containing integrated circuits (principally for defense, aerospace, and information processing).

tected, and that innovating firms will be rewarded for their efforts. The Act will benefit the public by rendering accessible the works of creators. Technological innovation will continue, and jobs will be created, resulting in improved quality of life for all Americans. The tax revenues generated by the augmented prosperity of the chip industry will more than offset the actual taxpayer costs of the legislation. Perhaps more importantly, the public domain will benefit in several important regards.

D. ENHANCEMENT OF THE PUBLIC DOMAIN

More than a nodding acquaintance with the concept of public domain is essential to comprehension of intellectual property law and the role of the United States Congress in creating that law. The addition of a creation to the public domain is an integral part of the social bargain inherent in intellectual property law. It is one of the general benefits received by the public in return for providing protection to authors and inventors. It should not be viewed simply as a form of punishment imposed on authors and inventors when for some reason, such as failure to respect formalities, they lose control of their creations. Viewed another way, "the public domain is the accumulated wisdom of the ages."178

A creation can enter the public domain in a number of ways. First, the material may fall outside the ambit of the intellectual property clause of the Constitution. Alternatively, the material may fall outside the ambit of the intellectual property statutes, even though it is theoretically within the scope of constitutional protection. Congress may decide not to protect all the material it is constitutionally permitted to protect. Additionally, the material may not be given protection for procedural or formal reasons. Untimely applications or items already within the public domain that do not receive retroactive protection fall within this category. Finally, the material may be in the public domain because its term of protection has already expired, thereby making it free for all to use. The Semiconductor Chip Protection Act adequately addresses these

178. R. BROWN & B. KAPLAN, CASES ON COPYRIGHT, UNFAIR COMPETITION, AND OTHER TOPICS BEARING ON THE PROTECTION OF LITERARY, MUSICAL, AND ARTISTIC WORKS 3 (3d ed. 1978). For an insightful analysis of the concept of public domain, about which very little has been written, see Lange, Recognizing the Public Domain, 44 LAW & CONT. PROB. 147 (1981).
various facets of the public domain in defining what interests are protectable.

From a constitutional standpoint, mask works are protected as "writings" within the Constitution's intellectual property clause. By limiting protection to mask works, and not the actual chip itself, the Act does not create a shelter larger than the supporting walls of the Constitution. Any material that fails to qualify as a writing does not receive protection under the Act. Furthermore, chips that are not "original" do not receive protection. Chips may lack the requisite originality either because the chips contain staple or commonplace designs, or because they have designs that are staple, commonplace, or familiar in the semiconductor industry, combined so that they are not original when considered as a whole.

The Act also addresses the issue of retroactivity. Those chips commercially exploited prior to July 1, 1983, are not protected. These chips remain in the public domain to the extent they were in the public domain prior to the Act's passage. Moreover, the Act does not protect any subject matter that, although protectable, previously failed to meet any standard of formalities, such as notice or registration, prior to enactment. In this latter regard, the new statute is not a private relief bill.

Furthermore, because the Act establishes a sui generis form of protection, it does not affect subject matter that previously fell under intellectual property protection, and for which a limited term of protection has tolled.

From a larger political perspective, the greatest betrayal of the public domain that could ever occur is that Congress would confer protection above and beyond that necessary to stimulate a desired creative activity. Such an error could happen if protection is vague, excessive, unjustified, or misconceived. The Semiconductor Chip Protection Act is not excessive in terms of the rights conferred. In theory, the Act should benefit the public domain over the long term. Prior to enactment of the Act,

179. See House Explanatory Memorandum, supra note 52, at E4433.
180. See id. at E4452; supra notes 136-139 and accompanying text.
181. See supra notes 138-139 and accompanying text.
182. See supra note 131.
183. Although the Act confers protection on chips commercially exploited on or after July 1, 1983, this provision is retrospective and not retroactive. See 17 U.S.C. § 904 (Supp. II 1984).
184. Lange Statement, House Hearings on Copyright and Technological Change, supra note 99, at 64.
insufficient protection coupled with a capital intensive industry vulnerable to piracy created a distinct danger of reduced innovation and creativity by the semiconductor industry. Statutory protection under the Act provides an incentive for industry to take risks, commit resources, engage in research and development and ultimately to share the products developed with consumers. Over time, remembering that each integrated circuit qualifying for protection receives protection for a relatively short term of ten years, the public domain will be enriched.185

III. INTERNATIONAL CONSIDERATIONS

Although the international ramifications of semiconductor chip legislation were not incorporated in the political test for the legislation, the Semiconductor Chip Protection Act was progressive in its attention to international concerns. This precedent suggests that any proponent of a new intellectual property interest will have to expressly consider the burgeoning internationalization of intellectual property law.

International protection for chips would ideally have been based on multilateral treaty obligations, as is the case for patents, trademarks, and copyrights. Since the United States was the first country to create a sui generis form of protection, however, a unilateral scheme of international protection was the only recourse.

The Act sets forth an “international transition provision” which creates a favorable climate for other countries to develop their own chip protection legislation.186 This provision, devel-

185. Any conclusion that an enlargement of proprietary rights will enrich the public domain is not easily made. One must remember that “[i]t is the public domain that . . . is most seriously threatened when new technology and new ideas for protection in new technology are raised.” Id. at 56.

As for creation of a new right, the public domain is a positive entity better defined in terms of what it is as opposed to what it is not. Professor David Lange discusses the relationship between public and private interests in these words: “[N]o exclusive interest should ever have affirmative recognition unless its conceptual opposite is also recognized. Each right ought to be marked off clearly against the public domain.” Lange, supra note 178, at 150. Application of a “burden of persuasion” test to the proponents of new forms of intellectual property, as has been done in this article, shows if nothing else that the public domain is not a mere abstraction but is a subject of great import to the policymaker.

186. See 17 U.S.C. § 914 (Supp. II 1984). The Act has firm roots in the proposition that intellectual property law, to be viable in the years ahead, must be international in scope.

The importance of international law to intellectual property and its relevance to the policy maker has been noted by former Register of Copyrights
oped cooperatively by the Senate and House during negotiations for reconciliation of the differences between each chambers’ bills.\textsuperscript{187} is significant both in terms of American intellectual property law and in terms of world trade and foreign affairs. During Senate floor debate, Senator Mathias aptly observed:

\begin{quote}
The United States will be the first country to adopt legislation explicitly protecting chip designs against unauthorized copying. As the trailblazers, we must grapple with the question of how to treat those other nations that may wish to follow us down the path of chip protection. In the global market in which semiconductor chip products move, few questions are of greater importance.\textsuperscript{188}
\end{quote}

The Act responds to these concerns by authorizing the Secretary of Commerce to extend to foreign nationals, on an interim basis, the right to obtain chip protection under the Act.\textsuperscript{189} In making a decision, the Secretary is bound under the Act to find that the foreign nation in question is progressing—either by enactment of a statute or by treaty negotiation—towards a legal regime of mask work protection generally similar to that found in the Act; that its nationals and persons controlled by them, such as subsidiaries or affiliated companies, are not engaging in and have not recently engaged in chip misappropriation or the sale of products containing infringing semiconductor chip components; and that issuing the order would promote the overall goals of the Act and international comity with respect to the protection of mask works.\textsuperscript{190}

The Secretary may exercise his decision-making authority upon his own motion or in response to a petition of any person. The Secretary's order is to be made in an informal rule making proceeding, reviewable under the Administrative Procedure Act for abuse of discretion. In order to ensure maximum legislative oversight of the Secretary’s actions in this regard, the

\begin{footnotes}
\item[187.] See supra notes 51-52 and accompanying-text.
\item[190.] Id.
\end{footnotes}
Secretary's power is terminated or, in common congressional parlance, "sunsetted" after three years. The Secretary must also report to the Congress within two years concerning the progress being made in the direction of international comity regarding mask work protection, and delineate what further steps, if any, are deemed appropriate. Pursuant to the statute, the Secretary has delegated his responsibility in this regard to the Assistant Secretary and Commissioner for Patents and Trademarks.

Japan was the first country to apply for interim protection under section 914. In response to the Japanese petition, which noted that Japan had enacted a *sui generis* bill similar to the American law, the Department of Commerce issued an order extending one year of interim protection under the Act. For all intents and purposes reciprocity now exists between the two countries that produce approximately ninety per cent of the world's semiconductor chips. Recently, petitions from Sweden, the Netherlands, Australia, the United Kingdom, Canada, and the Commission of the European Communities on behalf of the European Economic Community were filed with the Secretary of Commerce. All received favorable dispositions.

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191. See id. § 914(e).

192. Id. § 914(d)(2). For further information on this important section, see House Explanatory Memorandum, supra note 52, at E4434; Mathias-Leahy Explanatory Memorandum, supra note 52, at S12,919.


On May 24, 1985, Japan's Diet enacted "An Act Concerning the Circuit Layout of a Semiconductor Integrated Circuit," which provisionally has been assigned Law No. 60-63. The Japanese legislation has been described as being a "dead copy" of the American Act: "It is fortunate that U.S. Government documents are not eligible for copyright protection, because the U.S. Congress, if it were so disposed, might have a good claim that its Act has been infringed upon. Then again, perhaps it is simply a slick job of reverse engineering." Statement of Robert S. Schwartz on behalf of the Electronic Industries Association of Japan (EIAJ) Before the Acting Commissioner of Patents and Trademarks (May 8, 1985) (copy on file at the Minnesota Law Review).


196. See Petition to the Secretary of Commerce to issue an Order ex-
The adoption of legislative schemes in other industrialized countries, providing protection to chip designs in roughly the same manner as in the United States, creates a favorable climate for continuing cooperation on a wide array of intellectual property issues.

A neutral observer has to be impressed with the dispatch and substance of these bilateral developments. Prior to enactment of the American law, Akio Morita, the President of the Electronic Industries Association of Japan (EIAJ) and Chairman and Chief Executive Officer of the Sony Corporation, wrote that passage of legislation by the United States Congress was "highly desirable, both [in and] of itself and as an indication of the proper direction for the international protection of such intellectual property." He9 His words have proven prophetic.

On the multilateral level, cooperation is similarly flourish-

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197. To date, Sweden has received one year interim protection (50 Fed. Reg. 25,618, 25,619 (June 20, 1985)); Australia has received one year (50 Fed. Reg. 26,818, 26,820 (June 28, 1985)); Great Britain and Northern Ireland three years (50 Fed. Reg. 26,818, 26,820 (June 28, 1985)); the Netherlands one year (50 Fed. Reg. 26,818, 26,820 (June 28, 1985)); Canada one year (50 Fed. Reg. 27,649, 27,650 (July 5, 1985)); and Member States of the European Economic Community one year (50 Fed. Reg. 37,892, 37,894-95 (Sept. 18, 1985)).

198. See Letter from Akio Morita to Hon. Robert W. Kastenmeier (July 18, 1984) (copy on file at the Minnesota Law Review). In his letter, Mr. Morita referred to the joint recommendations of the United States-Japan Work Group on High Technology Initiatives (Nov. 1983), see supra note 165:

Both governments should recognize that some form of protection to semiconductor chip producers for their intellectual property is desirable to provide the necessary incentives for them to develop new semiconductor products. And both governments should take their own appropriate steps to discourage the unfair copying of semiconductor products and the manufacturing and distribution of the unfairly copied semiconductor products.

Id.
ing. While there is little disagreement that any *sui generis* approach to mask work protection falls outside the shadow of protection cast by the Universal Copyright Convention and the Paris Convention, positive movement towards a new form of international protection has nonetheless already begun. Dr. Arpad Bogsch, Director General of the World Intellectual Property Organization (WIPO), recently inquired "whether a multilateral treaty would not, in the long run, be a safer, simpler response to the need of protection on the international level."\(^9\) WIPO already has held informal consultations with experts from Australia, West Germany, Japan, the United Kingdom, and the United States. A more formal meeting has occurred at which a broader expanse of world governments, including the Third World, have been represented.\(^{200}\) Drafting of a new multilateral convention has already commenced and the holding of a diplomatic Conference is a distinct possibility.\(^{201}\)

**CONCLUSION**

Let us now, in Macaulay's words, "descend from these high regions where we are in danger of being lost in the clouds, to firm ground and clear light."\(^{202}\) The Semiconductor Chip Protection Act does indeed leave us on dry land with solid footing underneath. The swamp is nowhere to be seen. This endeavor shows that application of a consistent and stringent set of standards to intellectual property proposals is feasible; advocates of change, if pressed, can satisfy their heavy burden of proof. The proponents of proprietary protection for semiconductor chip products showed, and Congress found, that a meritorious public purpose would be served by legislative action. The Semiconductor Chip Protection Act is consistent with current intellectual property law. Copyright is not a large circus tent equipped to cover diverse and unrelated rings. The Act does not suffer

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Forcing protection for utilitarian articles into copyright would actually have weakened the fabric of copyright law, stretching copyright beyond its philosophical and conceptual limits. Theoretical emptiness at the center of copyright law ultimately would contribute to instability, making it a ship with a great deal of sail but a very shallow keel, vulnerable to the winds of economic pressures or technological changes. The Semiconductor Chip Protection Act deepens the keel, adding stability to the boat. Current copyright law is stabilized and possibly even strengthened.

A *sui generis* approach preserves copyright, and protects mask works: the best of all possible worlds. The rights and responsibilities created by the Act are concisely defined and not overbroad. The packet of rights created is appropriately circumscribed by several key exceptions, including reverse engineering, innocent infringement and first sale, and is then further limited by a shorter term of protection and a registration requirement. The proponents of change presented an honest and candid analysis of the costs and benefits of their proposal. *Sui generis* protection for mask works did not subvert the social bargain inherent in all intellectual property law. Rather, the public domain is fortified and enhanced by several aspects of the Act. Ultimately, the advantages of the Act clearly outweigh the disadvantages.

The Act also manifests the burgeoning internationalization of intellectual property law in the information era. Ideally, international mask work protection would have been established upon multilateral treaty obligations; and, as is the case for patents, trademarks and copyrights, such alliances should be an integral and working part of international law. Since the United States was the first country to protect clearly mask works in specific implementing legislation, Congress had no recourse but to create a unilateral scheme that hopefully will spawn a movement towards first bilateralism and then multilateralism. Bilateral and multilateral developments have already occurred with rapidity since enactment of the Act.

The Act teaches a number of other important lessons. The first lesson is that Congress is institutionally capable of confronting difficult problems posed by new technologies. Admit-

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203. This phrase was coined by Commissioner John Hersey, and concerned copyright protection for computer software. *See* CONTU FINAL REPORT, *supra* note 67, at 27, 31 (dissenting views of Commissioner Hersey).
"[l]egislation . . . involves the difficulties and the perils of prophecy." In the legislative process, "[i]t is easier to accept situational pressures toward drift and inertia than to labor to formulate issues and muster support of interested parties to get a bill drawn and pressed to final passage." The lawmaking process is full of risks and is very time-consuming, problems which are exacerbated by the rules of the legislative process, human nature and our complex society. Congress could have chosen not to examine the questions raised by the proposed chip legislation. In a spirit of optimism, however, a decision was made to move ahead and meet the future. The initial lesson of the Act, therefore, is that Congress can be trusted to consider issues arising from technological developments and to craft appropriate solutions conferring statutory protection on the creative work-product of new technologies.

The Act's second lesson is that Congress can and should weigh equities between the public interest and proprietary rights. Intellectual property law presents lawmakers with a delicate job of bartering between what are often contrary interests. There is always the danger of striking a bad bargain on behalf of the public. Choices are not impossible, however; the delicate balancing of interests is both possible and preferable. Federal courts and the Copyright Office should keep firmly in mind the overall balance struck by Congress as they confront problems that arise under the Act.

Third, the Act reveals that increasingly proffered arguments that the gusty wind of public opinion is the greatest threat to intellectual property law, especially copyright, are insubstantial. The enunciated fear, put in a stark electoral perspective, is that there are more voters on the consumer side of any copyright issue than on the proprietary side. Consumer politics, so the argument goes, is an insidious threat to copyright. Long ago, however, at the birth of this Nation,
Thomas Jefferson observed that "the people are the only sure reliance for the preservation of our liberty."\textsuperscript{210} Just as we can rely on the citizenry to protect our fundamental liberties, so too can we feel confident that the electoral process will preserve and protect intellectual property, and create new forms of protection if they are necessary. Liberty and property are not incompatible.\textsuperscript{211} The framers of the Constitution, by placing the intellectual property clause in Article I of the Constitution and thereby allocating lawmaking power to the most representative of the branches of government—the legislature—determined that promoting the progress of science and the useful arts could occur through a democratic decision-making process. The Chip Act shows the wisdom of that historic decision; Congress stands ready to promote the progress of science and the useful arts. The citizenry and consumers of this country will not oppose new forms of proprietary protection if the public interest is well-served.

A fourth lesson of the Act is its confirmation of the proposition that any history of an American law is really nothing more than an assessment of American society.\textsuperscript{212} The legal system cannot anticipate change; to the contrary, law is a mirror held up against life. The Chip Act appropriately brings an exciting new technology into the mainstream of the American legal system. The law now reflects present day technology, with sufficient flexibility to meet the foreseeable needs of the future.

Last, and most important, the Act has precedential value for other new technologies. The chip legislation is the first significant expansion of intellectual property in over a century. The fundamental import of the Act is that industrial property is recognized as a right. Already described as radical in approach,\textsuperscript{213} the Act paves the way for consideration of unique and special forms of protection for scientific advances that fall outside the protection of traditional patent and copyright laws.\textsuperscript{214} Recent strides in the fields of artificial intelligence, molecular and genetic engineering, information processing,

\textsuperscript{211}211. See Ladd, The Harm of the Concept of Harm in Copyright, 30 J. COPYRIGHT SOC'Y 421, 426 (1983).
\textsuperscript{212}212. L. FRIEDMAN, A HISTORY OF AMERICAN LAW 595 (1973).
\textsuperscript{213}213. Samuelson, supra note 47, at 472.
computer software, and telecommunications also provide fertile ground for future congressional scrutiny and oversight. Uncontentably, legislation previously enacted to respond to new


As a general proposition, ornamental designs do not involve new technologies. Therefore the Chip Act has little precedential value for proposals to create sui generis protection for designs. At the very least, however, one can state that sui generis protection for utilitarian semiconductor chips creates a statutory breach in the wall that previously did not exist. It now might be easier for protection of industrial designs of useful articles to follow, bearing in mind of course the dangers of false analogies. See Congressional Copyright and Technology Symposium, supra note 6, at 237 (statement of Judge Stephen Breyer); Goldstein Summary, id. at 167.

Professor Paul Goldstein, summarizing the learning of the congressional symposium on copyright and technological change, poses a question and offers a response:

> Is copyright the appropriate vehicle for protecting software? Copyright law's traditional design has evolved over centuries to meet quite different needs, and may not be appropriate to this subject matter. Copyright might, for example, offer more protection than is needed in some respects, and less than is needed in others.

Id. at 167. For a similar conclusion, see Samuelson, supra note 23, at 769.

The President's Commission on Industrial Competitiveness has remarked on the implications of the Act:

The semiconductor chip development illustrates one approach to legislation to deal with new technologies. Indeed, it points to the need to rethink and broaden our concepts of protectable intellectual property. This goes hand-in-hand with the growing recognition that knowledge itself, however embodied, has economic value. Although the application of our intellectual property rules has been adjusted over time in response to changing commercial practice and evolving technologies, the continuing outburst of the new scientific advances calls for rethinking the very concepts derived from earlier centuries on which those rules are based. New concepts of what intellectual property is and how it should be protected—beyond patents, trademarks, trade secrets, and copyrights—may well be needed, as may sweeping changes in intellectual property laws, and how they are administered and enforced.

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technologies "should be subject to a periodic review to determine its adequacy in the light of continuing technological change,"\textsuperscript{216} and the political test underlying the Act provides one way of assessing the merits of any legislative proposals to address such changes.

The United States, in the age of information, will increasingly rely on technical fields and new technologies in which unconventional and unforeseen kinds of property are created. The Semiconductor Chip Protection Act demonstrates that the enactment of a \textit{sui generis} form of protection is possible and in fact provides the most equitable balance between public and proprietary interests.

\textsuperscript{216} \textit{CONTU Final Report, supra} note 67, at 2.