COPYRIGHT PROTECTION OF OPERATING SOFTWARE, COPYRIGHT MISUSE, AND ANTITRUST

Dennis S. Karjala†

ABSTRACT

The fundamental problem in the Microsoft *antitrust litigation is not Microsoft's abusive or predatory* behavior *but rather the socially suboptimal combination of a strong copyright in operating software with a market in which network effects inexorably reduce the efficient number of competitors. Because of network effects, structural remedies like breaking up Microsoft are unlikely to be effective or to encourage an optimal level of technological innovation. It is Microsoft's overly strong* copyright *that must be limited, so that the public benefits of a large, standardized network are maintained while allowing firms other than the copyright owner to seek technological innovations in the dominant operating software. This is best achieved by mandating full public disclosure of the Windows source code and a compulsory license allowing third parties to develop improved versions of the software.*

INTRODUCTION

In the abstract, intellectual property and antitrust coexist in a state of superficial tension. The latter abhors monopolies, or at least the abuse of monopoly power, while the former actually creates monopolies through force of law. Traditionally, courts have resolved this tension in the only way possible that preserves the essence of both statutory regimes, particularly the integrity of the federal patent and copyright statutes: Exercise of the exclusive rights granted to an inventor or author, without more, is not unlawful under antitrust law. To rise to the level of an antitrust violation, a rights owner must use monopoly power, whether or not that power arises from intellectual property rights, either to expand the statutory intellectual property monopoly to products not covered by the underlying patent or copyright or to enter into agreements with others

† Professor of Law, Arizona State University. B.S.E. 1961, Princeton University; M.S. 1963, Ph.D. 1965, University of Illinois (Urbana); J.D. 1972, University of California (Berkeley). The author gratefully acknowledges helpful comments on an earlier draft from Professors Mark Lemley, Leo Raskind, Jon Rose, and Ralph Spritzer.

regarding the intellectual property rights (including others holding intellectual property rights in different products) that restrain trade.[1]

The antitrust litigation involving Microsoft Corporation, while of enormous potential importance to the economy and, perhaps, even to the future of innovation in the information age, fits easily within this traditional description. The government seeks to prove that Microsoft levered its legal copyright monopoly in the Windows operating software to restrain trade in a variety of compatible products designed to run on the Windows platform. If this enormously successful company is found to have violated the antitrust laws, the legal community will have to do some hard thinking about the appropriate remedy in an effort to ensure that we do not throw out the baby with the bath water.

This article does not attempt to analyze the facts, theories, or arguments in *Microsoft*. It does, however, recommend remedies that might be appropriate should Microsoft be found to be an antitrust violator. The proposal represents a cautious first step toward implementing a new theory of antitrust that permits remedial action even *without* a showing of the kind of predatory behavior that courts have heretofore required in finding an antitrust violation.[2] The article begins not from antitrust but rather from copyright and reconsiders Microsoft's exclusive copyright rights. It asks the questions: Why does one company have broad and very long-term copyright rights, as opposed to patent rights, in technology that serves (at least for the present) as the gateway to personal computing; did we err in affording copyright rights to computer software, or at least in failing to distinguish between application programs and operating systems; and if we did err in recognizing copyright protection in operating software, can the error be corrected through the normal legislative process?

It was completely predictable that proprietary rights in operating software would eventually allow a single company to dominate the gateway, because consumer desire for standards permitting interoperability drives the market in that direction. The dominant company can extract a higher toll from everyone traversing the gate than could be charged if there were multiple entry points. It also has a lower incentive to innovate

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[1] *See* Ronald S. Katz, Janet Arnold Hart, & Adam J. Safer, *Intellectual Property vs. Antitrust: A False Dilemma*, 15 COMPUTER L., No. 11, at 8, 9 (Nov. 1998) (arguing that patents and copyrights serve public purposes but that expansion of a resulting dominant position to another market outside these exclusive rights regimes may be an antitrust violation). The Supreme Court has stated that acquiring or maintaining a monopoly through "a superior product, business acumen, or historic accident" does not rise to the level of an antitrust violation. United States v. Grinnell Corp., 384 U.S. 563, 570-71 (1966).

[2] As this article went to press, the district court had just issued its determination that Microsoft did, in fact, engage in predatory behavior sanctionable by traditional antitrust law. For early commentary on Judge Jackson's findings of fact, see Robert H. Bork, *A Predatory Monopoly* and George L. Priest, *A Feeble Case*, WALL ST. J., Nov. 8, 1999, at A50.

than it would have in a more competitive market. Where operating software has become, for whatever reason, a de facto standard, continued recognition of full-fledged copyright rights is unwise social policy. Society should not allow these conditions to continue for the long term of copyright, regardless of whether the dominant company has engaged in the kind of predatory activity typically required to show an antitrust violation.[3]

If copyright is the problem, is not the answer then a revision of copyright to recalibrate the balance between creation incentives and free use, either for computer programs in general or for operating software in particular? Unfortunately, this logical approach raises another problem, which is the unwillingness (indeed, near structural incapacity) of Congress to retrench copyright rights once recognized. The extension of copyright protection to computer programs is probably the most dramatic, and least justifiable, expansion of copyright in its 200-plus years of existence in the United States, but it represents simply another step in the ever broader, stronger, and longer copyright rights that Congress has been recognizing from copyright's inception. Congress has a ratchet for copyright protection that sends it in only one direction–*more* for owners of existing copyrights and *less* for current and future authors and for the public generally. We cannot expect Congress to attempt to solve the problem, let alone come up with a solution that optimizes the public interest, by focusing on copyright law alone. The answer must come from outside of copyright or from the courts.

In fact, the judiciary has come alive in recent years with its increasing recognition of copyright misuse as a defense to a copyright infringement action. It seems possible that this doctrine will be serviceable to handle at least some of the special problems arising from computer program copyrights, particularly where the copyright owner seeks to parlay its program copyright into the power to control products or services not covered by the copyright. Copyright misuse, however, is unlikely to be a complete answer to the problem of long-term proprietary rights in the gateway. Because of network effects, the problems of very-long-term monopoly profits and reduced innovation in operating software remain even if the rights owner does not attempt to extend its monopoly beyond the scope of the copyright.

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[3] By making modest improvements every few years, the dominant company can parlay its initial position into one of near perpetuity, at least in principle. Given the pace of technological development, however, we would expect technology itself to provide the necessary "fix" eventually, even if the law is unresponsive. Although the entry barriers to the operating software market are high, the initial success of the Linux system may show that they are not insurmountable. Nevertheless, the same problem remains with us even if the initially dominant company is dislodged, unless the successor software, like Linux, is nonproprietary. *See infra* note 39 and text accompanying notes 33–46.

We are left with antitrust. As currently formulated, antitrust faces many of the same difficulties as copyright misuse in addressing the gateway problem. In principle, it is not an antitrust violation simply to exploit an intellectual property right to the extent of the scope of that right. Nevertheless, it seems more fundamentally sound to address the gateway problem from the perspective of antitrust policy rather than through application of the doctrine of copyright misuse. "Misuse" requires some wrongful act that offends copyright policy, which leaves the analysis within the overall copyright arena. Antitrust, on the other hand, invokes more general policies of free and open competition. These antitrust policies are not antithetical to copyright, but they place the problem in a different perspective. This perspective helps break the legislative logjam that prevents retrenching an overly strong copyright.[4] What we need is an antitrust theory that takes the dynamics of technological innovation into account in determining whether an intellectual property rights owner has unlawfully "monopolized" its statutory grant. The theory must encompass remedial action against such monopolies that preserves the public benefits of network externalities as well as the incentives to innovate supplied by intellectual property law.

I. COMPUTER PROGRAMS AS COPYRIGHT SUBJECT MATTER

Why are we suddenly so interested in the interrelationship of copyright and antitrust, and the related issue of copyright misuse? Simply put, the answer is copyright protection of digital technology. Traditional copyright subject matter like art, music, and literature rarely raise even colorable claims of market power or monopolization. Antitrust and misuse claims related to traditional copyrights have generally involved charges of expanding the copyright monopoly in individual works by means of agreements with other copyright owners[5] or by tying the purchase of less desirable works to the license of the desired work.[6] Many of these cases arose in the special contexts of film distribution or

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[4] See *infra* notes 47-67, 105 and accompanying text. At least one commentator has reached similar conclusions as those presented herein, namely, that the *Microsoft* problem derives not from bad behavior, but from Microsoft's market share, network effects that maintain market share, and the software copyright. *See* Jonathan Zittrain, *The Un-Microsoft Un-Remedy: Law can Prevent the Problem that it can't Patch Later*, 31 CONN. L. REV. 1361 (1999) (also recommending new legislation that would limit software copyrights to five years).

[5] *E.g.*, M. Witmark & Sons v. Jensen, 80 F. Supp. 843 (D. Minn. 1948) (refusal by performance rights society, representing many copyright owners, to offer licenses to movie theater owners covering individual works in place of a blanket license covering the society's entire portfolio held to be copyright misuse), *appeal dismissed on motion of appellee sub nom.* M. Witmark & Sons v. Berger Amusement Co., 177 F.2d 515 (8th Cir. 1949).

[6] *E.g.*, United States v. Loew's, Inc., 371 U.S. 38 (1962) (film distributor practice of tying unwanted films to license of desired feature films violates section 1 of the Sherman Act).

the operation of the performance rights societies, which represent simultaneously many owners of music copyrights.

At least one commentator has argued that traditional copyrights, by themselves, do not confer market power because there is a large degree of substitutability among literary and artistic works.[7] Perhaps an even stronger reason is that the monopoly in traditional copyright subject matter is self-limiting no matter how popular the work. Few read the same novel or see the same movie over and over again to the exclusion of other novels and movies. Consumers can read novels faster than authors can write them, so no single author can maintain a monopoly position in the sale of novels, even in the rare case of an author who has become so popular that she can be sure of having a best-seller before putting pen to paper. Thus, traditional copyright subject matter is an end in itself, rather than a tool that is often *reused*. The very nature of traditional works of authorship prevents large-scale market power from developing.

Of course, some types of copyright subject matter, such as dictionaries, maps, and, now, computer programs, *are* designed for reference and other purposes that require reuse by consumers. Copyright law addresses the potential problem of monopoly in these works in two ways, both of which are instructive on the market-power question.[8] First, the cases severely limit the scope of protection in informational or reference works so that the copyright protects only against verbatim copying or very close paraphrasing.[9] Such "thin" copyrights are effective against direct (misappropriative) copying but at the same time help insure that competitors who are willing to make a similar investment of time, money, and effort

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[7] Ramsey Hanna, Note, *Misusing Antitrust: The Search for Functional Copyright Misuse Standards*, 46 STAN. L. REV. 401, 415 (1994).

[8] The recognition that fundamental limits on copyright protection arise through a narrow definition of "expression" for informational works and a judicial reluctance to allow copyright in a protected work to control markets beyond the work itself been most fully developed and articulated by Professor Reichman. *See* J.H. Reichman, *Computer Programs as Applied Scientific Know-How: Implications of Copyright Protection for Commercialized University Research*, 42 VAND. L. REV. 639, 692-93 & n.288 (1989) [hereinafter *Applied Scientific Know-How*]; *see also* Brief *Amicus Curiae* of Copyright Law Professors, Sega Enterprises Ltd. v. Accolade, Inc., 977 F.2d 1510 (9th Cir. 1992), *amended by* Order and Amended Opinion, D.C. No. CV-91-3871-BAC, Jan. 6, 1993, at 18-22 [hereinafter *Sega Amicus Brief*], *reprinted* 33 JURIMETRICS J. 147, 156-59 (1992). *See generally* J.H. Reichman, *Goldstein on Copyright Law: A Realist's Approach to a Technological Age*, 43 STAN. L. REV. 943, 970-76 (1991).

[9] *See, e.g.*, Feist Pubs., Inc. v. Rural Tel. Serv. Co., 499 U.S. 340 (1991) (factual compilation); Bellsouth Advertising & Pub. Corp. v. Donnelley Information Pub., Inc., 999 F.2d 1436 (11th Cir. 1993) (en banc) (yellow page categories and information contained therein); Landsberg v. Scrabble Crossword Game Players, Inc., 736 F.2d 485 (9th Cir. 1984) (game strategy); Miller v. Universal Studios, Inc., 650 F.2d 1365 (5th Cir. 1981) (history); Hoehling v. Universal City Studios, Inc., 618 F.2d 972, 980 (2nd Cir. 1980) (historical theory), *cert. denied*, 449 U.S. 841; Rosemont Enterprises, Inc. v. Random House, Inc., 366 F.2d 303 (2nd Cir. 1966), *cert. denied*, 385 U.S. 1009 (1967) (biography); Continental Casualty Co. v. Beardsley, 253 F.2d 720 (2nd Cir. 1958) (legal form), *cert. denied*, 358 U.S. 816 (1958).

are able to produce works that can compete on the merits.[10] This was the basis of the "sweat of the brow" theory of copyright originality that was overturned by the Supreme Court[11] but is likely soon to return in the form of a new database protection statute purportedly grounded on Commerce Clause powers.[12]

Second, until computer programs came along, copyright generally eschewed protection of truly functional works – works whose value inheres in what they do for human beings rather than in what they say or how they appear to human beings. The copyright in a book, for example, does not extend to systems and procedures that are described in the book.[13] Similarly, copyright in a two-dimensional design document or

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10 *See generally* Dennis S. Karjala, *Copyright and Misappropriation*, 17 U. DAYTON L. REV. 885 (1992) (discussing the role of misappropriation notions in defining the scope of copyright protection for various classes of copyright subject matter) [hereinafter *Copyright and Misappropriation*].

11 Feist Pubs., Inc. v. Rural Tel. Serv. Co., 499 U.S. 340 (1991).

12 H.R. 354, 106th Cong., 1st Sess. (1999). For an argument that database legislation based on the Commerce Clause may be unconstitutional unless more carefully tailored to correct a market failure and not simply to reverse a constitutionally grounded Supreme Court decision, see Malla Pollack, *The Right to Know? Delimiting Database Protection at the Juncture of the Commerce Clause, the Intellectual Property Clause, and the First Amendment*, 17 CARDOZO ARTS & ENT. L.J. 47 (1999). Professor Patry has argued more generally, based on Supreme Court jurisprudence and constitutional structure, that Congress may not adopt legislation protecting unoriginal works, or elements of works, under either the Patent and Copyright Clause or the Commerce Clause. *See generally* William Patry, *The Enumerated Powers Doctrine and Intellectual Property: An Imminent Constitutional Collision*, 67 GEO. WASH. L. REV. 359 (1999). Professor Patry distinguishes federal trademark law (except for the recently created right against dilution of famous marks) as not creating a "property" right but rather as legislation aimed at preventing consumer confusion. *Id.* at 391-93. A second bill is moving through the House of Representatives via the Commerce Committee, rather than the Judiciary Committee, to which "intellectual property" legislation is normally referred. H.R. 1858, 106th Cong., 1st Sess. (1999). This bill purports not to create a new "property right" in databases, but does protect against misappropriation of the expensive-to-gather information they contain. *See House Commerce Approves Database Bill: Modifications Possible Prior to Floor Vote*, 4 BNA ELECTRONIC COMMERCE & L., No. 31, at 713 (August 11, 1999).

13 This is the basic message of Baker v. Selden, 101 U.S. 99 (1880) (holding that the copyright in a book explaining a new system of accounting did not extend to the system itself) and section 102(b) of the Copyright Act, 17 U.S.C. ' 102(b)(1994). *See also, e.g.*, Chamberlin v. Uris Sales Corporation, 150 F.2d 512 (2nd Cir. 1945) (copyright in a rulebook for the card game "Acy-Ducy" not infringed by a book describing the same rules in different language); Affiliated Enter., Inc. v. Gruber, 86 F.2d 958 (1st Cir. 1936) (promotional scheme protectible only by patent, regardless of quality or development cost); Affiliated Enter., Inc. v. Gantz, 86 F.2d 597 (10th Cir. 1936) (similar promotional scheme); Brief English Systems, Inc. v. Owen, 48 F.2d 555, 556 (2nd Cir. 1931) (only patent is available to protect a new system of shorthand), *cert. denied*, 283 U.S. 858; Arica Institute, Inc. v. Palmer, 761 F. Supp. 1056 (S.D.N.Y. 1991) (method of describing psychological traits not protected); Kepner-Tregoe, Inc. v. Carabio, 203 U.S.P.Q. 124, 130 (E.D. Mi. 1979) (no monopoly on pedagogical technique involved in management training program); Seltzer v. Sunbrock, 22 F. Supp. 621 (S.D. Cal. 1938) (system for conducting roller skating races). *See generally* Pamela Samuelson, *Computer Programs, User Interfaces, and Section 102(b) of the Copyright Act of 1976: A Critique of Lotus v. Paperback*, 6 High Tech. L.J. 209, 226-27 & n.73 (1992).

blueprint does not extend to the useful article portrayed. Thus, it does not infringe to copy a functional work like a three - dimensional boiler, lamp, or dress,[14] even though the reverse engineering of any complex product normally involves making intermediate two-dimensional designs based on the product being copied.[15] These cases stress the importance of insuring that copyright, with its low threshold of eligibility for protection, does not displace the more stringent requirements for protection of functional works under patent law.[16] Moreover, even exact copying of graphic forms has been permitted when the form was designed to interoperate with a physical instrument calibrated in a way that rendered substitute expression of the form impossible (if the user were to have correct readings of the quantity being measured).[17]

It is therefore not surprising that copyright in a single, traditional work has rarely raised serious questions under the antitrust laws or even a strong argument for copyright misuse. Digital technologies, coupled with our decision to bring computer programs under the protective umbrella of copyright, change all that. Products of technology, unlike novels or even music, are used and reused as tools to accomplish work in

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[14] *See, e.g.*, Combustion Engineering, Inc. v. Murray Tube Works, Inc., 222 U.S.P.Q. (BNA) 239, 244 (E.D. Tenn. 1984) (boiler manufacture using plaintiff's detailed drawings); Kashins v. Lightmakers, Inc., 155 F. Supp. 202 (S.D.N.Y. 1956) (lamps made from a study of illustrations in plaintiff's copyrighted catalogue do not infringe, nor does an independently prepared catalogue showing defendant's lamps); Fulmer v. United States, 103 F. Supp. 1021 (Ct. Cl. 1952) (parachutes produced from plaintiff's design); Muller v. Triborough Bridge Authority, 43 F. Supp. 298 (S.D.N.Y. 1942) (no copyright remedy even if defendant used plaintiff's copyrighted drawing in designing and constructing a bridge approach); Jack Adelman, Inc. v. Sonner's & Gordon, Inc., 112 F. Supp. 187 (S.D.N.Y. 1934) (dress design document does not prohibit making a dress based on it). Prior to the Architectural Works Copyright Protection Act, Pub. L. No. 101-650, tit. VII, 104 Stat. 5133 (1990), the same principle was well established for buildings, namely, that copying architectural plans was infringement but constructing the building depicted in the plans was not. *See, e.g.*, Demetriades v. Kaufman, 680 F. Supp. 658, 666 (S.D.N.Y. 1988).

[15] *See Sega Amicus Brief*, *supra* note 8, at 19-20, 33 JURIMETRICS J. at 157 (the primary author of this portion of the brief was Professor Reichman). When new designs are drawn up based on the copyright-unprotected three-dimensional product, they are likely to be substantially similar to, and indirectly taken from, the plaintiff's copyright-protected design documents.

[16] *See* Reichman, *Applied Scientific Know-How*, *supra* note 8, at 692. *Baker* itself emphasized this point:

> To give to the author of the book an exclusive property in the art described therein, when no examination of its novelty has ever been officially made, would be a surprise and a fraud upon the public. That is the province of letters - patent, not of copyright.

101 U.S. at 102.

[17] *See* Brown Instrument Co. v. Warner, 161 F.2d 910 (D.C. Cir. 1947), *cert. denied*, 322 U.S. 801; Taylor Instr. Co. v. Fawley-Brost Co., 139 F.2d 98 (7th Cir. 1943), *cert. denied*, 321 U.S. 785 (1944); *but see* Harcourt, Brace & World, Inc. v. Graphic Controls Corp., 329 F. Supp. 517 (S.D.N.Y. 1971) (holding that a test answer sheet designed to be read by an optical scanner was copyright protected).

the physical world. Computer software is such a technological product; it is used repeatedly as a tool to accomplish useful results. Technologies invariably raise questions of efficiency and compatibility.[18] While most novels may follow one of a few basic structural forms, the detailed story line of one novel does not depend on nor is it intended to improve upon that of an existing novel. Technology, however, develops by incremental improvement. If a given improvement is sufficiently creative ("nonobvious"), its inventor may be entitled to a 20-year patent upon compliance with the stringent formal and substantive requirements for patent protection. If no patent is obtained, the inventor has a monopoly position only for the lead time required for competitors to recognize the value of the invention and incorporate it into their own competitive products. And even if a patent issues, its scope is limited to its precise claims and their equivalents.[19]

Now, however, we have a technological product that is protected by the more lenient copyright regime, with its much longer term and more vague scope of protection.[20] Copyright was not designed for the protection of functional works of technology.[21] Thus, we fundamentally

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18 *See* Dennis S. Karjala, *Copyright, Computer Software, and the New Protectionism*, 28 JURIMETRICS J. 33, 38-40 (1987) [hereinafter *New Protectionism*].

19 If a patent does issue, it is in important ways stronger than a copyright. The reverse doctrine of equivalents is reminiscent of the copyright doctrine of fair use, in that it may supply a defense to literal infringement when a second comer radically improves the underlying product. However, it is rarely applied and differs from fair use in important ways. *See* Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 TEX. L. REV. 989, 1010-13, 1024-29 (1997). Patents are also stronger in that a patent protects even against independent invention of the same product, whereas a copyright does not. *See, e.g.*, Alfred Bell & Co. v. Catalda Fine Arts, Inc., 191 F.2d 99, 103 (2nd Cir. 1951). It is impossible, however, independently to create compatible operating software. At a minimum, the creator of the compatible system would have to be aware of what she was trying to clone and of the full panoply of the target system's input/output responses (its specifications). This would not be independent creation under copyright law, which holds even unconscious copiers liable for infringement. *See* Bright Tunes Music Corp. v. Harrisongs Music, Ltd., 420 F. Supp. 177, 180 (S.D.N.Y. 1976). Indeed, independent creation of any complex work, whether a traditional work of literature or a modern product of digital technology, is utterly improbable. We simply would not believe anyone who claimed independently to have re-created Keats' *Ode on a Grecian Urn*, notwithstanding Judge Learned Hand's oft-cited use of that example. *See* Sheldon v. Metro-Goldwyn Pictures Corp., 81 F.2d 49, 54 (2nd Cir. 1936), *cert. denied*, 298 U.S. 669; *see* Donald S. Chisum & Michael A. Jacobs, UNDERSTANDING INTELLECTUAL PROPERTY LAW 4C[5][a] (1999 reprint), at 4-88 (stating that "[i]ndependent creation of a complex, fanciful work, such as Keats' Ode, is not probable").

20 On the question of the relative scope of software copyrights versus patents, see Dennis S. Karjala, *The Relative Roles of Patent and Copyright in the Protection of Computer Programs*, 17 J. MARSHALL J. COMP. & INFO. L. 41, 45 n.8 (1998) [hereinafter *Relative Roles*].

21 Most works of copyright subject matter are nonfunctional in the sense that distinguishes patent from copyright, because they do no more than supply information or portray an appearance to human observers. Thus, recipe books, dictionaries, maps, and even code books are not functional in this important sense. *See* Dennis S. Karjala, *A Coherent Theory for the Copyright Protection of Computer Software and Recent Judicial Interpretations*, 66 U. CIN. L. REV. 53, 56-66 (1997) [hereinafter *A Coherent Theory*]. On the other hand, some traditional

changed the intellectual property landscape when we decided to place computer programs under the copyright umbrella. The spate of lawsuits alleging copyright misuse in computer program cases, and new concerns about the abuse of market power in connection with computer program copyrights, should have been expected, even predicted. Network effects compound the social policy difficulties associated with the copyright protection of operating software.[22] When efficiency or compatibility advantages operate to reduce the traditional opportunities for incremental improvement or give the dominant market participant a virtual monopoly not only in the protected program itself but in all other programs and devices (usually created by third parties) that are designed to be compatible with it, something has to give.

II. APPLICATION PROGRAMS VERSUS OPERATING SYSTEMS

Notwithstanding increasing blurriness at the border, it remains convenient for most legal purposes to divide the software universe into application programs and operating systems. An operating system is essentially a layer of platform software designed for particular hardware and presenting an interface to the user (including the application programmer) that permits the more convenient writing or using of application programs. Application programs are those that perform the ultimate tasks desired by users, such as word processing or video games. While applications are increasingly bundled into, for example, the dominant Windows operating system of Microsoft, as a practical matter there are hundreds of "pure" application programs that run only on Windows. It is the need for that extra layer between application programs and the

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copyright-protected works, such as legal forms and standardized test questions, are truly functional in this sense. They accomplish a utilitarian function other than simply to convey information or portray an appearance to human beings. *See* Karjala, *supra* note 10, at 920-26. In the case of legal forms, courts have addressed the problems of efficiency and compatibility by recognizing an extremely narrow scope of protection. *See* Continental Casualty Co. v. Beardsley, 253 F.2d 702 (2nd Cir. 1958), *cert. denied*, 358 U.S. 816 (1958); *see also supra* notes 8-10 and accompanying text. In the case of standardized test questions, courts seem not to have realized that they are dealing with a truly functional work. (Everyone would agree that a syringe for extracting blood for testing is functional. Standardized tests are works that seek to measure intelligence or psychological makeup by probing with words rather than with needles.). At least there is no explicit recognition of this in the opinions. *See* Applied Innovations, Inc. v. Regents of the Univ. of Minnesota, 876 F.2d 626 (8th Cir. 1989) (standardized psychology test questions held copyright protectible); Educational Testing Serv. v. Katzman, 793 F.2d 533 (3rd Cir. 1986) (Scholastic Aptitude Test questions held copyright protectible). Perhaps the economic stakes are not sufficiently high in the highly specialized world of standardized tests that the issue of the appropriate scope of copyright protection for such functional works has been litigated to the extent necessary to bring out all of the social policy factors.

[22] For a discussion of network effects, see *infra* notes 33-46 and accompanying text.

hardware that justifies continued use of the term "operating system" in connection with programs like Windows.[23]

Application programs, no less than operating software, involve questions of technological efficiency and compatibility with other software or hardware with which they are designed to interoperate or with the needs and desires of their human users.[24] The potential for undue market power from copyright protection has been muted for application programs, however, by judicial interpretation. Technological efficiencies arising from program structure, for example, are filtered out of the copyright analysis before the substantial similarity analysis for infringement begins.[25] Moreover, intermediate copying of programs is a permissible fair use when effected for the purpose of extracting copyright-unprotected elements from the otherwise unintelligible electronic object code in which programs are distributed.[26] Without this interpretation by the courts, we may have seen more claims of copyright misuse - using the copyright in the object-code form of the program to withhold from competitors copyright-unprotected information necessary to compete in the market for compatible programs.[27] Finally, while the scope-of-protection problem in user interfaces remains a matter of some debate, the leading case has decided that functional aspects of interfaces are unprotected methods of operation under section 102(b).[28] Consequently,

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[23] Sun Microsystems' Java technology is not, in itself, an operating system. Its primary component is rather an interface language (Sun would like it to become the universal interface language) that will run on any computer whose operating system has the necessary compiler and related components to translate commands written in Java into binary electronic instructions for that particular computer. It is perhaps aptly described as a "meta-operating system." *See* Mark A. Lemley & David McGowan, *Could Java change everything? The competitive propriety of a proprietary standard*, 43 ANTITRUST BULL. 715, 751-52 (1998) [hereinafter *Could Java change everything?*]. If the interface language is and remains universal (or standard), any program written in that language will run on any computer. Again, then, the distinction between the application programs written in the Java language and the compilers and operating system programs that accept Java as an input and translate it into executable code for specific machines seems reasonably clear, at least conceptually. For a judicial explication of the Java technology, see Sun Microsystems, Inc. v. Microsoft Corp., 21 F. Supp. 2d 1109, 1112-17 (N.D. Cal. 1998) (discussing the Java licensing agreement between Sun and Microsoft), *rev'd on other grounds* 188 F.3d 1115 (9th Cir. 1999).

[24] *See* Peter S. Menell, *An Analysis of the Scope of Copyright Protection for Application Programs*, 41 STAN. L. REV. 1045, 1066-71 (1989) (discussing the role of standardization and user friendliness in determining the scope of protection in computer-human interfaces).

[25] *See* Computer Associates Int'l Inc. v. Altai, 982 F.2d 693, 707 (2nd Cir. 1992) (adopting the "abstraction, filtration, comparison" test for determining the protected nonliteral elements of a computer program).

[26] *See* Sega Enterprises Ltd. v. Accolade, Inc., 977 F.2d 1510, 1527-28 (9th Cir. 1992), *amended by* Order and Amended Opinion, D.C. No. (CV-91-3871-BAC), Jan.e6,e1993.

[27] On facts similar to those in *Sega*, the claim was made in Atari Games Corp. v. Nintendo of America, Inc., 975 F.2d 832, 845-46 (Fed. Cir.ri992); however, the court declined to decide it on the ground of unclean hands.

[28] *See* Lotus Development Corp. v. Borland Inter'l, Inc., 49 F.3d 807, 815 (1st Cir. 1995), *aff'd by an equally divided court*, 116 S. Ct. 804, 133 L. Ed. 2d 610 (1996); *but see*

there appears to be no urgency in adapting antitrust law, or perhaps even the doctrine of copyright misuse, to insure competitive markets in applications software.

While the narrow interpretations of the scope of program copyrights apply to operating software as well as applications programs, operating systems have characteristics that may require special attention. That is the subject of the next section.

III. COPYRIGHT AND THE PROTECTION OF OPERATING SOFTWARE

A. THE EARLY DEVELOPMENT

Our failure to consider carefully the ramifications of protecting technology with copyright and to distinguish between the various forms of program technology has brought about a new state of affairs in which important intellectual property monopolies in software technology depend heavily on copyright. Professor Samuelson's seminal article, pointing out the inadequacies of the CONTU Report[29] and arguing eloquently for *sui generis* legislation, did not appear until 1984, some 4 years after CONTU's recommendation to rely on copyright was adopted by Congress.[30] Moreover, by that time case law had already established that we would not distinguish between application programs and operating software in applying the congressional directive to protect computer programs under copyright.[31] And, in any event, to leave operating software

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Mitel, Inc. v. Iqtel, Inc., 124 F.3d 1366, 1372 (10th Cir. 1997) (upholding a determination of noninfringement but declining to adopt the *Lotus* approach to section 102(b)). In view of the Supreme Court's even division in *Lotus*, there is perhaps a touch of wishful thinking in my characterization of *Lotus* as the "leading case" on interface protection. In any event, I regard *Lotus* as correctly decided and correctly reasoned. *See A Coherent Theory*, *supra* note 21, at 94-110.

29 The National Commission on New Technological Uses of Copyright Works (CONTU) was established by Congress "to assist the President and Congress in developing a national policy for protecting both the rights of copyright owners and insuring public access to copyrighted works when they are used in computer . . . systems, bearing in mind the public and consumer interest." Final Report of the National Commission on New Technological Uses of Copyright Works 3 (1978) [hereinafter "CONTU Report"].

30 Pamela Samuelson, *CONTU Revisited: The Case Against Copyright Protection for Computer Programs in Machine-Readable Form*, 1984 DUKE L.J. 663.

31 *See* Apple Computer, Inc. v. Franklin Computer Corp., 714 F.2d 1240, 1249-54 (3rd Cir. 1983), *cert. denied*, 464 U.S. 1033 (1984). The defendant in *Franklin* argued that an operating system was an unprotectible system or method of operation under section 102(b) of the Copyright Act, and the court correctly held that operating software did not differ from applications software in this regard. *Id.* at 1252. Moreover, the defendant had made essentially a verbatim copy of the protected program, so again the court was correct in rejecting the argument that the idea/expression distinction absolved the defendant from infringement liability. *Id.* at 1252-54. If verbatim copying of object code is not infringement, Congress's attempt to protect computer programs under copyright would become meaningless. Indeed, it is the protection of literal code against misappropriative copying that supplies the primary basis for

outside the umbrella of copyright protection would, in the absence of additional legislation, arguably have left the bulk of the world's operating systems without any intellectual property protection at all, not even protection against verbatim electronic copying for sale in competition with the creator of the software.[32]

Therefore, given that copyright is to protect computer programs, the existing law and at least some social policy analysis argue for treating application programs and operating software the same. Still, as the dominant position of Windows in the personal computing market dramatically illustrates, important differences remain between the two types of computer programs that might call for differences in regulatory treat-

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turning to copyright for the protection of this technology in the first place. *See, e.g., A Coherent Theory, supra* note 21, at 67.

The defendant in *Franklin* failed to make the one argument that might have had some chance of success - if not before that particular court, at least before a court that was aware of some of the problems of protecting computer programs under copyright and willing to tune the scope of protection to align it better with underlying social policy. Under the United States Copyright Act, a computer program is "a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result." 17 U.S.C. § 101 (1998) (definition of "computer program"). Both operating systems and application programs consist of statements or instructions, but the term "computer" in the statutory definition is undefined. An application program fits neatly into this definition, because it brings about the "certain result" of word processing, spreadsheet operations, or the like. But what is the "certain result" brought about by operating software? Indeed, even an application program used with operating software for which it is not designed will not bring about its "certain result." It would therefore not be too great a stretch of language to interpret the term "computer" in the statutory definition to include the hardware *plus* a given operating system. It is that combination that renders the technology conveniently available to users to achieve the results they desire. See *supra* note 23 and accompanying text. Under this approach, the same hardware would become a different "computer" when used with different operating software. Operating software would then simply be a machine part - part of a "computer" and not a "computer program" under the Act.

32 Patents are increasingly available for software. The PTO's 1996 Guidelines have largely eliminated the metaphysical subject matter inquiry from the analysis, by treating any medium embedded with a computer program as an "article of manufacture." *See* Examination Guidelines for Computer-Related Inventions, 61 Fed. Reg. 7478 (1996); *Relative Roles, supra* note 20, at 43. More recently, the Federal Circuit in *State Street Bank* has eliminated the "business methods" exception to patentability. *See* State Street Bank & Trust Co. v. Signature Financial Group, Inc., 149 F.3d 1368 (Fed. Cir. 1998); *see also* Leo J. Raskind, *The* State Street *Decision: The Bad Business of Unlimited Patent Protection for Methods of Doing Business*, 10 Fordham Intell. Prop. Media & Ent. L.J. 61 (1999). We can expect a flood of patent applications claiming computerized versions of doing business, especially on the Internet. Nevertheless, properly interpreted, the patent in a computer program (as opposed to a patent in a computer-related invention independent of the specific program that implements the invention) will not cover the entire program but rather only new and nonobvious programming methodologies that enhance computer-use technology. *See Relative Roles, supra* note 20, at 57-69. Many programs today contain no patentable elements at all. For the others only the patented elements are covered, such as a particular structure or algorithm. In both cases, the unpatented elements would remain free for fast, cheap, and easy taking but for the program copyright.

ment. The most important difference is the extent to which network effects enter the economic analysis.

B. NETWORK EFFECTS

Economists have developed theories of network effects (or "network externalities") to account for the extent to which consumer value in a product derives not from the intrinsic functionality or quality of the product itself but from the fact that a large number of other persons (i.e., a network) use the same or a compatible product.[33] All programs, whether application program or operating software, potentially benefit from network effects through their user interfaces. The more users there are of a given program, the easier it is for each user to exchange files with friends and coworkers, to ask advice on using the program and fixing problems, or to change jobs without having to retrain. For application programs, however, especially as long as functional aspects of user interfaces are deemed copyright-unprotected methods of operation,[34] entry barriers do not seem too high for application programmers who seek to emulate the performance of popular programs whose user interfaces may involve elements that benefit from user "lock in."[35] They simply need write independent code that brings about the same "certain result" with respect to functional input/output devices.

When network effects are present, however, the market has a tendency to "tip" in the direction of whatever firm gains an initial edge.[36] Stronger network effects can be expected in connection with operating

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[33] Recently, Professors Mark Lemley and David McGowan have published a thorough analysis of the implications of network theories for various areas of law, including intellectual property law. *See* Mark A. Lemley & David McGowan, *Legal Implications of Network Economic Effects*, 86 CALIF. L. REV. 479 (1998) [hereinafter *Network Economic Effects*]. For a general description of network effects, see *id.* at 483-84. These same authors have also applied network theory specifically to operating software in the Windows and Java context. *See Could Java change everything?, supra* note 23. Professor Peter Menell has carefully analyzed how network features should affect the level of copyright protection for protocols and interface specifications as well as logical systems for structuring tasks to be performed on a computer via a computer-user interface. *See* Peter S. Menell, *An epitaph for traditional copyright protection of network features of computer software*, 43 ANTITRUST-BULL. 651 (1998) [hereinafter *Network Features*]. Professor Menell was among the first to apply network economics specifically to the legal analysis of program protection. *See* Peter S. Menell, *Tailoring Legal Protection for Computer Software*, 39 STAN. L. REV. 1329, 1340-45 (1987). Network effects and possible "tipping" of the market in favor of one participant are discussed in another case involving Microsoft, where the workstation and server markets were at issue. *See* Bristol Technology, Inc. v. Microsoft Corp., 42 F. Supp. 2d 153, 169, 171 (D. Conn. 1998) (evidence did not support the conclusion that these markets "tipped" in the direction of Microsoft).

[34] *See supra* note 28 and accompanying text.

[35] User "lock in" is a noneconomist's word for user psychology that resists retraining to learn new methods of operation for accomplishing the same function with a computer. *See New Protectionism, supra* note 18, at 44-48, 69-71.

[36] *See* Michael L. Katz & Carl Shapiro, *Systems Competition and Network Effects*, 8 J. ECON. PERSP. 93, 105-06 (1994).

systems than with applications software.[37] As long as the technology is comprised of software layers running in tandem, as has been the case up to now, network effects should tend to bring one basic operating system to the fore. Most consumers want computers that perform applications and are likely to buy computers that give them the applications they need. In general, when other things are equal, they will buy the operating system that runs the most applications. Third-party programmers also do not write programs for the "best" operating system in some abstract sense. Rather, they write programs that they hope consumers will buy, which means programs written for the most popular operating system. These two mutually reinforcing effects eventually are likely to snowball into a single dominant operating system and high entry barriers for designers of competing but incompatible systems.[38]

We should expect that technology will develop neither as rapidly nor as efficiently when only one company is in a position to modify and improve upon the existing base. We are more likely to develop solutions to problems when many people work in an "open" environment than if all rights to make incremental improvement are held by a single company, even a giant like Microsoft, whose benevolence for present purposes we may assume.[39] No matter how good its intentions, such a

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[37] *See Network Economic Effects*, *supra* note 33, at 492.

[38] *See id.* at 501-02. Again, a noneconomist's approach to this problem can be expressed in terms of compatibility with third-party programs. Unless competitors can enter the market with operating systems that, with near 100% reliance, will run applications written for the dominant operating system, the monopoly in the operating software itself is extended to a monopoly on all application programs that are designed to run in tandem with it. *See New Protectionism*, *supra* note 18, at 63-65.

Interestingly, the same problem nearly arose with respect to personal computer *hardware*. When the IBM PC was first introduced, IBM claimed proprietary rights in its BIOS, the basic input output system. This BIOS was a layer of operating software that was more fundamental than even Microsoft's MS-DOS, which ran "on top" of the BIOS. Had the IBM BIOS not been reverse engineered, IBM would have had a monopoly in all the hardware that could run programs written for MS-DOS, through its copyright in the BIOS. Fortunately, IBM's BIOS was sufficiently simple that Phoenix Technologies was able to clone it through "clean room" procedures, insulating it from an IBM charge of copyright infringement. *See* James Langdell, *Phoenix Says Its BIOS May Foil IBM's Lawsuits*, PC NEWS, July 10, 1984, at 56; *see also Network Features*, *supra* note 33, at 660, 667. (Apparently, IBM never brought an action asserting that replication of its BIOS interface infringed even if the competitor's product was written in independent code. Under the standards of *Lotus v. Borland*, 49 F.3d 807 (1st Cir. 1995), such a claim would have lost.) No one can say what the personal computing world would look like today had IBM been successful at retaining a dominant hardware position through intellectual property rights in a simple but crucial part of the "gateway" software, but it is difficult to imagine that it would be *more* competitive in favor of consumers than what we now see.

[39] That there is value in allowing broad-scale incremental development in computer software is suggested by recent reports on the Linux operating system, a variation of UNIX that reportedly is rapidly growing in popularity for its stability, speed, and power, especially in the internet server and local-area-network environments. *See* Joseph Alper, *From Army of Hackers, an Upstart Operating System*, 282 SCIENCE 1976 (Dec. 11, 1998). This program is not only distributed without charge; following the principles of the open-source software

dominant rights owner does not have the same incentive to improve that it would have in a competitive environment, nor can we expect the level of innovation that we would see in an open environment.[40] These problems are structural and are present whether or not the holder of the intellectual property rights in some sense "abuses" its monopoly position. They are thus not Microsoft dependent; they arise no matter which company wins the standards or networks effects competition, as long as a single owner holds proprietary rights in the gateway.[41]

Professors Lemley and McGowan have pointed to the difficulty of separating network effects from legitimate competition in an industry prone to standardization.[42] Moreover, they argue that even if Microsoft's dominance is derived largely from network effects, those effects are an inherent part of the market and may not be amenable to correction through antitrust law. It makes little sense to force more competitors into a market that operates most efficiently with fewer participants, perhaps even just one. Finally, they argue that because consumers benefit from the adoption of standards (one large, standard network is better for consumers than several smaller but mutually incompatible networks), even the absence of competition after victory by a single company in the standards competition may leave a net gain for consumers to the extent that

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(OSS) movement, the Linux native code is also open to allow users to tinker. One enthusiast is quoted as saying, "Essentially, you harness the power of millions of users to find problems, whether they be bugs or just deficiencies, and thousands of programmers to fix them quickly." *Id.* at 1977. Even a Microsoft product manager is quoted as saying, "The ability of the OSS process to collect and harness the collective IQ of thousands of individuals across the Internet is simply amazing." *Id.* Like other forms of UNIX operating software, Linux apparently still suffers from complexities and user-unfriendliness that render it intimidating to the average user. However, the OSS movement is now working on a project called GNOME that may make it more acceptable to the technologically challenged (which group includes the author of this article). For a general discussion of these developments, see Charles C. Mann, *Programs to the People*, TECHNOLOGY REVIEW, January/February 1999, at 36.

Professor Lemley has pointed out to me that open standards can result in slower development if a large number of players must coordinate their activities. It seems to me that this addresses another aspect of the network problem. That is, open standards can result in fragmentation into a set of mutually incompatible systems, with the result that many of the network benefits are lost, perhaps to such an extent that the losses overshadow the gains in innovation that follow from open standards. The market, however, is not unaware of the benefits of compatible networks and, indeed, we should expect that sooner or later the market will "tip" in the direction of a single standard for that reason. Innovations that do not preserve compatibility are unlikely to make much headway, and even if they do, in an open-standards environment anyone can adopt the new standard for continued innovation.

40 *Network Features, supra* note 33, at 674.

41 *Cf. Could Java change everything?, supra* note 23, at 728 ("The risk of welfare loss due to ownership of an important standard in potentially bottlenecking technology is constant; the variable is merely which firm owns the standard").

42 *Network Economic Effects, supra* note 33, at 502, 595-96.

the social welfare benefits of the larger network outweigh the anticompetitive effects of standardization.[43]

Professors Lemley and McGowan, however, seem largely to be taking Microsoft's intellectual property rights, in particular, its copyrights in the Windows software, for granted.[44] If it is true that the operating system market would gravitate toward a single dominant system, and if as a result traditional antitrust remedies could not keep the market open to competition in the long run,[45] it remains likely that incremental improvement of the dominant system would occur more efficiently under an open system environment (limited or no proprietary rights) than under the current system of copyright protection. Even if a net social benefit accompanies the winning of a standards competition by a single company, because the positive network effects outweigh the losses from inferior products, an even greater social benefit might accrue if the dominant company's advantage in improving its product and in building compatible products, resulting from its copyrights, is reduced.[46]

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[43] *See id.* at 501-07; *see also Could Java change everything?, supra* note 23, at 723.

[44] This is not intended as a criticism of the Lemley and McGowan work. All analysis must start somewhere, and their primary focus is the role of network theory in antitrust. Within that context, they assume that copyright is rationally based on supplying a supracompetitive return as an incentive to investment. *Could Java change everything?, supra* note 23, at 748. They explicitly leave open the possibility of using network theory in the design of the intellectual property system itself. *See id.* at 748-49 n.81 ("We are only arguing here that once the proper level of intellectual property protection has been determined, antitrust should be loath to intrude upon that determination."). Indeed, these authors suggest some normative content to intellectual property rights in network markets along with their economic analysis. For example, they argue in favor of reverse engineering rights both for the purpose of making compatible products and where reverse engineering promotes compatibility with an industry standard. *See Network Economic Effects, supra* note 33, at 523-27. They also apply network theory to analyze the scope of copyright protection in program interfaces. *See id.* at 531-37. Moreover, they offer possible reasons to explain why no one has succeeded in cloning Microsoft's Windows software, given that copyright law today does permit reverse engineering for these purposes. They suggest a combination of collateral legal rules (those affecting shrinkwrap licenses and patents, which are not subject to legal reverse engineering), the difficulty of achieving 100% compatibility through independent coding, periodic updates by Microsoft that would render a competitor incompatible, and Microsoft's pricing policy (which may hold profits low enough to scare off potential competitors). *See id.* at 527-30. *Cf. Now Bust Microsoft's Trust*, ECONOMIST, Nov. 13, 1999 (pointing out that even IBM, after spending a fortune trying to be Windows compatible, could not convince consumers that IBM's operating system could run a critical mass of Windows applications, and Microsoft was always able to stay one jump ahead).

[45] *See Network Economic Effects, supra* note 33, at 502. Professor Priest has strongly criticized Judge Jackson's initial findings in part for failing to take into account the beneficial effects of networks. See George L. Priest, *A Feeble Case*, WALL ST. J., Nov. 8, 1999, at A50. He, too, seems to assume that the scope and strength of Microsoft's copyrights are not on the table for discussion.

[46] Professor Lemley has pointed out to me that this argument, too, is predicated on an assumption that the dominant operating system has been created and offered to the public. If we are to change the rules of intellectual property protection, we must consider the reduced incentives that less protection for operating software will engender. Without intellectual prop-

IV. REFORMULATE COPYRIGHT?

The discussion in the previous section brings us to the crux of the matter: If copyright protection of software, or of operating systems, is the problem, is that problem not solved by reformulating copyright to accommodate better the needs of the digital age?[47]

In principle, it is difficult to argue with this logic. Maybe it is time to follow Professor Samuelson's recommendation to adopt *sui generis* legislation aimed specifically at the intellectual property protection of computer programs.[48] Were we to do so, we could tailor the statutory protection to the special characteristics of particular kinds of programs and industries so as to optimize the social policy balances.[49] Unfortunately, it seems too late in the day to take this eminently sensible ap-

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erty rights that internalize costs and benefits of costly innovation, coordination problems might result in a relatively stagnant standard. *See Could Java change everything?*, *supra* note 23, at 731. The question, however, is not whether to supply an incentive through protection as intellectual property but rather the scope of such protection. Operating software is nontraditional copyright subject matter and, indeed, *technological* subject matter. See *supra* notes 18-21 and accompanying text. I therefore see no reason for assuming *a priori* that the rules of traditional copyright should be given any special weight in determining the level of protection that will most closely optimize incentives. The example of Linux suggests that the strong protection offered by traditional copyright may be more than necessary to supply an incentive to produce operating software. Ultimately, we need an analysis based on the specifics of the software industry, and operating software in particular. At least two recent studies suggest that healthier innovation in software technology occurs when information is treated not as property vulnerable to misappropriation but rather as a resource that grows incrementally through the contributions and interactions of many participants. *See* Gillian C. Dempsey, *Knowledge and Innovation in Intellectual Property: The Case of Computer Program Copyright*, Ph.D. thesis, Australian National University (March 1998) (copy on file with the author); AnnaLee Saxenian, REGIONAL ADVANTAGE: CULTURE AND COMPETITION IN SILICON VALLEY AND ROUTE 128 (1994); *see also* Dennis S. Karjala, *Copyright Protection of Computer Program Structure*, 64 BROOK. L. REV. 519, 536-38 & n.60 (1998).

[47] *See* Thomas F. Cotter, *Intellectual property and the essential facilities doctrine*, 44 ANTITRUST BULL. 211, 248, 250 (Spring 1999).

[48] *See* Pamela Samuelson, *supra* note 30; Pamela Samuelson, *Creating a New Kind of Intellectual Property: Applying the Lessons of the Chip Law to Computer Programs*, 70 MINN. L. REV. 471 (1985).

[49] *Cf.* Pamela Samuelson et. al., *A Manifesto Concerning the Legal Protection of Computer Programs*, 94 COLUM L. REV. 2308, 2420-29 (1994). These authors are primarily interested in what they perceive to be too little protection under current intellectual property law for computer software, namely, for those elements of computer programs beyond literal code that either now or in the future will be subject to "market failure"—fast and easy cloning of elements that are costly to create in the first instance. Consequently, their scheme would apparently supplement the copyright protection in computer programs, although they call for reconsideration of program patents. *See id* at 2424. I have suggested that, if we are seeking an exclusive *sui generis* regime, we could do well to start with this concept of market failure, or misappropriation, but to focus on copying methods that are responsible for the market failure rather than seek to identify explicit types of subject matter that should be taken out of the patent and copyright regimes into the new paradigm. *See* Dennis S. Karjala, *Misappropriation as a Third Intellectual Property Paradigm*, 94 COLUM. L. REV. 2594 (1994).

proach. The TRIPS Agreement[50] has solidified the treatment of computer programs internationally as literary works under copyright law[51] at the insistence of developed countries, including the United States.[52] Indeed, when Japan announced that it had appointed a commission to consider adopting an explicit provision on reverse engineering to harmonize its copyright law with that of the European Union[53] and the United States,[54] the howls of complaint from the United States trade negotiators were so strident that the Japanese backed down.[55] One can only imagine the uproar that would ensue from a proposal to limit copyright protection in operating software, from which Microsoft derives so much international trade revenue.

More generally, the domestic politics of copyright have reached the stage at which legislative retrenchment in the length, breadth, or strength of copyright law is nearly impossible. Professor Litman has written extensively on the process by which copyright legislation is adopted.[56]

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50 *Annex IC, Agreement on Trade-Related Aspects of Intellectual Property Rights*, in FINAL TEXTS OF THE GATT URUGUAY ROUND AGREEMENTS INCLUDING THE AGREEMENT ESTABLISHING THE WORLD TRADE ORGANIZATION AS SIGNED ON APRIL 15, 1994, MARRAKESH MOROCCO 319-52 (Office of the United States Trade Representative, Executive Office of the President, Washington D.C. 1994).

51 Article 10(1) of the TRIPS Agreement states that "[c]omputer programs, whether in source or object code, shall be protected as literary works under the Berne Convention (1971)." The December 1996 treaty adopted under the auspices of the World Intellectual Property Organization also provides, "Computer programs are protected as literary works within the meaning of Article 2 of the Berne Convention. Such protection applies to computer programs, whatever may be the mode or form of their expression." WIPO Copyright Treaty, Adopted by the Diplomatic Conference on December 20, 1996, Art. 4, available at <http://www.dfc.org/history/international/treaty01.html>(visited April 17, 2000).

52 J.H. Reichman, *The Know-How Gap in the TRIPS Agreement: Why Software Fared Badly, and What Are the Solutions*, 17 HASTINGS COMM. & ENT. L.J. 763, 774-75, 783 (1995).

53 Directive 91/250, art. 6, 1991 O.J. (L. 122) 42 (permitting decompilation of computer programs to the extent necessary to achieve interoperability).

54 Sega Enters. Ltd. v. Accolade, Inc., 977 F.2d 1510 (9th Cir. 1992) (holding that intermediate copying of a program in object-code form is a fair use when effected for the extracting of unprotected elements, provided no copyright-protected elements are used in creating a new program), *amended by* Order and Amended Opinion, D.C. No. CV-91-3871-BAC, Jan. 6, 1993.

55 Betsy E. Bayha, *Reverse Engineering of Computer Software in the United States, the European Union, and Japan*, in ANTI/INTELLECTUAL PROPERTY CLAIMS IN HIGH TECHNOLOGY MARKETS, C137 ALI-ABA 175, 190-91 (American Law Institute – American Bar Association Continuing Legal Education, January 26, 1995). Professors Reichman and Samuelson have suggested that United States trade negotiators may be following a "digital agenda" that sacrifices the public interest in balanced intellectual property laws for the benefit of private interests of right owners. *See* J.H. Reichman & Pamela Samuelson, *Intellectual Property Rights in Data?*, 50 VAND. L. REV. 51, 109-13 (1997); *see also* Pamela Samuelson, *The U.S. Digital Agenda at WIPO*, 37 VA. J. INT'L L. 369 (1997).

56 Jessica Litman, *Copyright, Compromise, and Legislative History*, 72 CORNELL L. REV. 857 (1987) [hereinafter *Copyright, Compromise*]; *see also* Jessica Litman, *Revising Copyright Law for the Information Age*, 75 OR. L. REV. 19 (1996) [hereinafter *Revising Copyright Law*]; Jessica Litman, *Copyright and Information Policy*, 55 L. & CONTEMP. PROBS. 185 (1992) [hereinafter *Copyright and Information*]; Jessica Litman, *The Public Domain*, 39 EMORY L.J.

Congress has largely abdicated its constitutional role as drafter of copyright statutes and acts primarily as middleman, enacting into statutory law whatever compromises are reached among the various interest groups that, at that particular time, have copyright concerns. The result of this process is a statute with broad and increasingly powerful general rights, limited by narrow exemptions carved out of the general rights by interest groups with enough political clout to stop the bill unless they get their way.[57] A fundamental problem with this method of legislating is that interest groups that do not yet realize how or even that they will be affected (perhaps because the technology that would define their interest has not yet been invented) are unrepresented.[58] More importantly, the *public* interest in a balance between owners' and users' rights that maximizes the interest of society in a vibrant and expanding public domain on which future authors can build new works is almost wholly unrepresented in this process.[59]

Moreover, copyright has become so complex that few members of Congress have much interest, let alone understanding, of its basic principles or how it works. Copyright legislation starts out in the Judiciary Committees (in the case of the House, the Subcommittee on Courts and Intellectual Property). The repeat players in the copyright legislation

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965 (1990); Jessica Litman *Copyright Legislation and Technological Change*, 68 OR. L. REV. 275 (1989) [hereinafter *Copyright Legislation*].

[57] *See Copyright, Compromise, supra* note 56, at 883 ("The [1976 Act] granted authors expansive rights covering any conceivable present and future uses of copyrighted works, and defined those uses very broadly. It then provided specific, detailed exemptions for those interests whose representatives had the bargaining power to negotiate them."); *Copyright Legislation, supra* note 56, at 281 (strategy arising out of negotiations on the 1976 Act "granted broad, expansive rights, including future as well as currently feasible uses of copyrighted works. Each of the copyright users represented in the negotiations, meanwhile, received the benefit of a privilege or exemption specifically tailored to its requirements, but very narrowly defined.").

[58] *See Copyright Legislation, supra* note 56, at 333 ("The representatives of yet-to-develop technology cannot be present in a bargaining room filled with current stakeholders").

[59] *See Revising Copyright Law, supra* note 56, at 48 ("There are .n . few signs that the entities proposing statutory revision have taken the public's interests very seriously."); *Copyright and Information, supra* note 56, at 205 ("In the rush to enhance American competitiveness, Congress has accommodated industry coalitions and yielded to political expediency without serious consideration of the implications of restricting the public's access to the contents of copyrighted works."); *Copyright Legislation, supra* note 56, at 312 ("Although a few organizations showed up at the conferences purporting to represent the 'public' with respect to narrow issues, the citizenry's interest in copyright and copyrighted works was too varied and complex to be amenable to interest group championship. Moreover, the public's interests were not somehow approximated by the push and shove among opposing industry representatives. To say that the affected industries represented diverse and opposing interests is not to say that all relevant interests were represented."). *Cf.* William F. Patry, *Copyright and the Legislative Process: A Personal Perspective*, 14 CARDOZO ARTS & ENT. L.J. 139, 145 (1996) ("Copyright legislation is . . nabout money and not principles. As a result, those with the most money are the best organized and represented . . . . The interests of individual authors, who are rarely well-organized, get trampled in the process.").

game – the publishing and entertainment industries, for example – fully understand the committee system and how to get their views across to committee members. And it is in the House Subcommittee and the Senate Judiciary Committee that copyright legislation is adopted. In the House, the full Judiciary Committee usually rubber-stamps the action of the Subcommittee and the bill goes to the floor under rules prohibiting amendments.[60]

In the Senate, copyright legislation is usually called up under a procedure that requires unanimous consent.[61] One would think that this would allow the public interest at least to get a hearing, on the theory that there must be at least *one* Senator willing to take the time to understand the issues and to demand fuller and more open debate. Unfortunately, that rarely happens. The automatic renewal legislation in 1992[62] and the term extension legislation in 1998[63] drastically reduced the public do-

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[60] *See* Patry, *supra* note 59, at 146. An exception was the Sonny Bono Copyright Term Extension Act, which passed the House on March 25, 1998, together with a floor amendment expanding the exemption from the public performance right for over-the-air music played in business establishments. *See* H.R. 2589, 105th Cong. The bill was ultimately adopted as S. 505, 105th Cong. (1998). The amendment was opposed by the copyright protectionists who control the committees because it limits one of the exclusive rights of copyright. This is a rare example in which a particular interest group has enough clout in the Congress that it could hold the wholly unrelated term extension legislation hostage until its own desires were met. The result was not a victory for the public, however, except in the highly indirect sense that the cost of doing business for bars and restaurants may decrease slightly. Moreover, a WTO panel has just issued an interim report finding that these limitations on the public performance right are inconsistent with U.S. obligations under Article 9(1) of the TRIPS Agreement to comply with the Berne Convention. *See WTO Panel Issues Preliminary Ruling Against U.S. Rules for Licensing Music*, 59 BNA PATENT, TRADEMARK & COPYRIGHT J., No. 1471, at 863 (Apr. 11, 2000).

[61] *See* Patry, *supra* note 59, at 147.

[62] Pub. L. 102-307, 106 Stat. 264 (1992). This statute eliminated the requirement that the copyright owner take formal renewal action to preserve a pre-1978 copyright, without which it expired 28 years after publication. A huge cache of works that otherwise would have been freely available after a relatively short 28-year term thus became protected for 75, and now 95, years. One can argue that the elimination of this formality for maintaining copyright protection was required by our treaty obligations under the Berne Convention, but that very argument exposes the sophisticated level at which copyright protectionist interests have been operating. In 1989 Congress was convinced that by eliminating the requirement for notice of copyright on each copy of a work the United States could join and be in compliance with the Berne Convention. Once the U.S. became a member, these same forces used the Berne Convention to argue that our level of protection was insufficiently strong. See *infra* note 66. It is another example of the way copyright protection ratchets only in one direction. *Cf.* Dennis S. Karjala, *United States Adherence to the Berne Convention and Copyright Protection of Information-Based Technologies*, 28 JURIMETRICS J. 147 (1988) (arguing that the advent of digital technology was precisely the wrong time to add the rigidity of Berne to the mix in trying to achieve the optimal social policy balances for computer programs).

[63] Sonny Bono Copyright Term Extension Act, S. 505, 105th Cong. (1998). The term extension legislation assures that virtually nothing new will enter the public domain for 20 years. This is the first time in United States history that the country will experience such a no-growth period in the public domain. (At the time of the previous retroactive term extensions, including the 19-year extension effected by the 1976 Act, much material continued to fall into

main, and yet both sailed through Congress virtually unopposed.[64] Architectural works came under copyright protection in 1990,[65] along with a U.S. version of moral rights.[66] Not only does copyright legislation ratchet solely in the direction of ever longer, stronger, and broader protection, but the tempo with which rights previously held by the public are being converted into private property has increased drastically with and since the adoption of the 1976 Act.

This is not to say that everything desired by copyright and intellectual property protectionists is adopted by Congress. Obviously, many

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the public domain as a result of copyright owners' failure to renew their initial 28-year copyrights. That avenue to the public domain, however, was closed in 1992.) For more information on the term extension legislation and its demerits, visit the "Opposing Copyright Extension" home page, <http://www.public.asu.edu/~dkarjala> (visited April 17, 2000). Harvard Professor Larry Lessig is spearheading a constitutional challenge to the Sonny Bono Copyright Term Extension Act, but his arguments were rebuffed by the District Court for the District of Columbia. An appeal is pending. The documents filed in the case may be viewed at <http://cyber.law.harvard.edu/eldredvreno/legaldocs.html> (visited April 17, 2000).

64 The public domain was further reduced in 1997, when Congress added section 303(b) to the Copyright Act, providing that the distribution of phonorecords before 1978 does not constitute a publication of the underlying musical work recorded. Pub. L. No. 105-80, 111 Stat. 1534 (1997). This means that the failure to attach a copyright notice to the distributed phonorecords did not cause the underlying musical work to fall into the public domain. *See* Mayhew v. Allsup, 166 F.3d 821 (6th Cir. 1999). And in 1994 Congress amended section 104A of the statute as part of the legislation implementing the Uruguay Round of General Agreement on Tariffs and Trade. *See* Pub. L. No. 103-465 '0514, 108 Stat. 4976 (1994). This action *restored* copyright in foreign works that had fallen into the public domain due to failure to comply with the formalities of copyright notice or renewal. One commentator has argued that reviving copyrights in this way is constitutional because the Berne Convention provides for just compensation to the parties. *See* Tung Yin, *Reviving Fallen Copyrights: A Constitutional Analysis of Section 514 of the Uruguay Round Agreements Act of 1994*, 17 LOY. L.A. ENT. L.J. 383 (1997). This analysis, however, considers only harms or claimed harms to reliance parties who have exploited works that had fallen into the public domain because of procedural defects. It does not consider the public trust doctrine, under which Congress is prohibited from giving away public property without just compensation. *See* Richard A. Epstein, *Congress's Copyright Giveaway*, WALL ST. J., Dec. 21, 1998, at A19, available at <http://www.public.asu.edu/~dkarjala/constitutionality/EpsteinWSJ12-21-98.html> (visited April 17, 2000).

65 *See* Architectural Works Copyright Protection Act of 1990, Pub. L. No. 101-650, tit. VII, 104 Stat. 5133 (1990). Together with related provisions, this statute added a definition of "architectural work" to the Copyright Act and specifically included such works in the list of copyright subject matter. *See* 17 U.S.C.A. " 101 (definition of "architectural work") & 102(a)(8). Architectural works follow computer programs to constitute the second type of functional work expressly to be placed under copyright.

66 *See* Visual Artists Rights Act of 1990, Pub. L. No. 101-650, tit. IV, 104 Stat. 5133 (1990). Legislation creating moral rights and the protection of architectural works won much of its support from the argument that both were required to meet our commitments under the Berne Convention, notwithstanding that Congress was told at the time of adherence to Berne that existing law would leave us in compliance. *See Final Report of the Ad Hoc Working Group on U.S. Adherence to the Berne Convention*, 10 COLUM.-VLA J. L. & ARTS 513, 547-57 (1986). The Berne Convention explicitly includes works of architecture in its category of protected "literary and artistic works." BERNE CONVENTION FOR THE PROTECTION OF LITERARY AND ARTISTIC WORKS, Art. 2 (Paris Text, 1971).

proposals to expand intellectual property protection do engender opposition and at least a degree of compromise among the interested parties. Nevertheless, once legislation is enacted, retrenchment becomes nearly impossible, because the same forces that make it difficult to get legislation passed in the first instance now work in favor of the special interests whose intellectual property rights are belatedly understood to be stronger than optimal social policy balancing would call for. Congress may not be controlled by protectionist interests, notwithstanding the increasing skill that those interests have shown in getting their programs adopted into law. But, absent a major crisis of a type that is difficult to imagine, Congress *is* institutionally incapable of correcting a legislative error in recognizing intellectual property protection that is too long, too strong, or too broad. Therefore, if copyright protection of computer operating software is the problem, legislative reformulation of copyright is not a realistic solution.[67]

V. RESOLVING THE QUANDARY

Assuming that copyright law will not be fixed legislatively, three possibilities come to mind for dealing with the problem of copyright monopolies in operating systems. First, we might do nothing and hope that things work out for the best in the long run. Second, we might ask the courts to apply copyright doctrine, especially the doctrine of copyright misuse, to inhibit the copyright monopolist from extending its monopoly in the protected product to copyright-unprotected products and services. More generally, we might ask the courts to limit the copyright in operating systems in ways that more closely implement underlying copyright policies. Third, we might ask the courts to apply other branches of law to achieve optimal social policy results. The most natural candidate -- indeed, the only candidate that readily springs to mind -- is antitrust.[68]

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[67] Professor Lemley has pointed out that there may be a constitutional problem with reducing copyright protection, in that such a reduction is arguably a "taking" of "property."

[68] The Court of Justice of the European Communities has approved the use of antitrust ("competition law") to rein in local recognition of an overly strong copyright. *See* Radio Telefis Eireann (RTE) v. Commission of the European Communities, [1995] E.C.R. I-743, [1995] 4 C.M.L.R. 718, referred to as the *Magill* case after one of the private parties seeking relief. The Court found abuse of a dominant position under Article 86 of the Treaty of Rome in the refusal of television broadcasters to license the publication of their program listings more than 1, or occasionally 2, days prior to actual broadcast. The broadcasters argued that refusal to license, for any reason, was within the traditional rights of a copyright owner; that the Treaty of Rome under Article 36 did not derogate from the normal exercise of intellectual property rights; and that therefore a refusal to license could not be an abuse under Article 86. The logic of this argument is essentially identical to that of Microsoft as owner of the copyright in Windows. The problem in *Magill* was that England and Ireland apparently recognize copyright protection in some kinds of information, in this case the information contained in the program listings. As a matter of social policy, recognition of copyright rights in such information, at least in the opinion of this author, is fundamentally misguided. In the European Union,

A. LEAVING THINGS ALONE

Few monopolies last forever, even without legal intervention.[69] Indeed, in the case of operating systems, a challenger to Microsoft is already on the horizon in the form of Linux.[70] Widespread adoption of Linux would eliminate the structural problems caused by proprietary operating software,[71] because Linux is nonproprietary. Moreover, Sun Microsystem's Java technology has some potential for eliminating the need for complex operating systems like Windows.[72] While that technology is proprietary,[73] Sun claims, at least for the present, to support open systems.[74] To the extent Java is open to incremental improvement

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remedial action could in principle have been taken at the Union level, harmonizing E.U. law and expressly denying copyright in the informational content of program listings. That, however, is probably no more likely to happen than action by the United States Congress retrenching copyright rights once granted. Consequently, the Court had to choose between a socially undesirable monopoly in supplying weekly television listings and applying antitrust law to overcome the unduly powerful copyright.

69 For an argument that network effects do not lead to permanently entrenched monopolies, see Mit Spears, *The DOJ and the "network effect,"* UPSIDE, Oct. 1998, at 39.

70 For a brief description of Linux, see *supra* note 39.

71 *See supra* notes 44-46 and accompanying text.

72 According to Ed Zandor, the Chief Operating Office of Sun, instructions written in Java will execute on any microprocessor independent of the operating system, as long as the microprocessor can interpret Java. *See* Richard L. Brandt, *Zander, at war with Windows*, UPSIDE, July 1998, at 87, 128 (interview of Edward J. Zander); *see also supra* note 23 and accompanying text.

73 Sun licensed the "Java technology" to Microsoft. *See* Sun Microsystems, Inc. v. Microsoft Corp., 21 F. Supp. 2d 1109, 1112 (N.D. Cal. 1998). To the extent Java is simply a programming language, the commentary has generally concluded that copyright protection is neither available nor a good idea. *See, e.g.*, Richard H. Stern, *Copyright in Computer Programming Languages*, 17 RUTGERS COMPUTER & TECH. L.J. 321, 378 (1991); Elizabeth G. Lowry, Note, *Copyright Protection for Computer Languages: Creative Incentive or Technological Threat?*, 39 EMORY L.J. 1293, 1349 (1990). More generally, a programming language is simply an interface between the programmer and the compiler (or interpreter) program that translates the programmer's source code into lower-level, executable object code. As such, it is a method of operation that should be denied protection under section 102(b). *See* Dennis S. Karjala, *Copyright Protection of Computer Software in the United States and Japan Part I*, 13 EUR. INTELL. PROP. REV. 195, 199-200 (1991). To the extent that Java is an architecture, its functionality should be denied copyright protection either because it is not copyright subject matter or, if such architecture constitutes a nonliteral element of a computer program, under the filtering analysis of Computer Associates Internat'l Inc. v. Altai, 982 F.2d 693, 707 (2nd Cir. 1992). However, individual pieces of Java are undoubtedly computer programs in their own right and protected at least against verbatim copying. Indeed, Sun's complaint against Microsoft included a charge of infringement of Sun's source code copyrights for the Java technology. *See Sun Microsystems*, 21 F. Supp. 2d at 1112. Even a copyright in the implementing computer programs, however, would not legally prohibit a competitor from writing programs that performed the same function with noninfringing code.

74 Ed Zander, *Why Not Java?*, UPSIDE, October 1998, at 56. Mr. Zander is the Chief Operating Officer of Sun Microsystems. *Cf. Could Java change everything?*, *supra* note 23, at 751 ("While Sun might or might not be a more benevolent monopolist than Microsoft, the real promise of Java is based on the standard remaining open and offering us the joint benefits of network effects and intrastandard competition.").

by persons outside of Sun, the structural problems associated with proprietary operating software, such as a reduced level of innovation, are less likely to arise after an assumed ultimate displacement of Windows by Java. Consequently, whatever problems stem from Microsoft's monopoly over the gateway may be resolved sooner or later in a way that does not permit the permanent extraction of monopoly rents *and* achieves an optimal level of innovation.

Of course, if a new proprietary operating system displaces Windows, we only shift the problem from Microsoft to the new dominant controller of the gateway.[75] And in any event, we must ask how long it will take before Microsoft's dominant position is broken by "natural" forces and whether we are willing to wait that long. Microsoft's founders and shareholders have received quite extraordinary returns on their investments and in exchange have given the public a product that few would claim represents the best that technology could offer.[76] If it is true that open systems software would give the public better products for less money, it is at least worth considering whether legal intervention could achieve enough of those public benefits to justify the obvious potential costs of such intervention (inefficient government regulation or judicial oversight, for example, or possibly a lower level of incentive for operating system innovators).

B. REGULATING WITHIN COPYRIGHT—COPYRIGHT MISUSE

The inclusion of computer programs within the categories of copyright subject matter has caused the courts to take a new look at the doctrine of copyright misuse.[77] The first circuit court decision to uphold the doctrine as a defense to copyright infringement was *Lasercomb America, Inc. v. Reynolds*,[78] holding that an attempt through contract to extend a conceded right to prohibit the copying of program code to prevent the development of noninfringing competing software was a misuse of the program copyright. Since then, a number of courts, especially in cases involving computer programs, have considered and upheld the misuse defense.[79]

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[75] *See supra* notes 39-41 and accompanying text.

[76] *Cf., e.g.*, Jonathan Littman, *Microsoft: running off track?*, UPSIDE, June 1998, at 74, 134 ("While [makers of chips, drives, monitors, and printers] have made huge breakthroughs, PCs are still expensive – and hard to use – largely because of Microsoft's bloated software.").

[77] *See generally* Aaron Xavier Fellmeth, *Copyright Misuse and the Limits of the Intellectual Property Monopoly*, 6 J. INTELL. PROP. L. 1 (1998); William E. Thomson Jr. & Margaret Y. Chu, *Overstepping the Bounds: Copyright Misuse*, 15 COMPUTER LAW, Nov. 1998, at 1; Stephen J. Davidson & Nicole A. Engisch, *Copyright Misuse and Fraud on the Copyright Office: An Escape for Infringers?*, 13 COMPUTER LAW., July 1996, at 14; Hanna, *supra* note 7.

[78] 911 F.2d 970, 978-79 (4th Cir. 1990).

[79] *See* Hanna, *supra* note 7, at 403 (this defense is raised most often in software cases and cases involving bundled sales of music or motion picture performance rights). For a table

Can copyright misuse be successfully asserted against Microsoft? It certainly could, especially in light of the court's findings that Microsoft actually did much of what it was accused of,[80] whether or not the court ultimately finds those activities to be an antitrust violation.[81] However, the misuse doctrine remains simply a shield to an infringement action. No court has yet allowed its use as a sword.[82] Although a finding of abuse would prevent Microsoft from enforcing its copyrights, enforceability would be restored with the end of the abuse. It is unlikely that a competitor would engage in serious efforts to improve Windows knowing that its work could become an enforceable copyright violation essentially at any time. Therefore, the basic question of whether the pace and direction of innovation can be optimized when only one company controls the right to innovate the dominant system would remain. If the rights holder in the dominant system is not engaging in copyright abuse, innovative improvements can only be effected with its permission. And, almost by its very terms, it is difficult to find copyright *misuse* if we assume that the dominant rights owner has not entered into licensing arrangements for its operating software aimed at giving it an advantage in, for example, applications software designed to run on that operating system or otherwise tried to lever that monopoly unfairly onto other products. In other words, copyright misuse does not directly deal with the structural problems that arise from the combination of strong network effects and the copyright itself.

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of district and circuit court decisions on copyright misuse through about 1995, see Davidson & Engisch, *supra* note 77, at 18. Even before *Lasercomb*, Professor Menell argued that the functional nature of computer programs and their interfaces justified the development of a copyright misuse doctrine along the lines of patent misuse. *See* Peter S. Menell, *An Analysis of the Scope of Copyright Protection for Application Programs*, 41 STAN. L. REV. 1045, 1102 n.302 (1989). The most recent circuit court decision is Alcatel USA, Inc. v. DGI Technologies, Inc., 166 F.3d 772 (5th Cir. 1999), in which the court upheld a jury determination of misuse where a program license allowed use only with the copyright owner's hardware, which indirectly gave control over non-copyright-protected elements.

80 Judge Jackson's findings of fact are available on line from the Government Printing Office, <http://usvms.gpo.gov>(visited April 17, 2000).

81 The weight of authority and the recent commentary suggest that an antitrust violation is not necessary to the misuse defense. *See* Lasercomb, 911 F.2d at 978 (holding that it was unnecessary to decide the Clayton Act charge because maintenance of the suit was in any event against public policy in view of the copyright misuse); *see also Alcatel USA*, 166 F.3d at 784, 795 (upholding both a finding of copyright misuse and the dismissal of the antitrust counterclaim); Fellmeth, *supra* note 77, at 38 (arguing that the misuse defense should primarily be a public policy doctrine); Hanna, *supra* note 7, at 445 (arguing for the development of a common law of misuse tailored to copyright, not antitrust, policies).

82 Thomson & Chu, *supra* note 77, at 5 (raising the question of whether misuse can form the basis for an affirmative claim for an injunction or damages).

C. REGULATING OUTSIDE COPYRIGHT—ANTITRUST

The obstacles to using the misuse doctrine to solve the structural problems arising from the copyright in operating software also present difficulties in the antitrust analysis. For one, antitrust as currently formulated does not provide a remedy unless monopolization or some other antitrust violation is proved.[83] Traditionally, mere exploitation of a statutorily granted intellectual property right does not amount to an antitrust violation. Moreover, much of the need for the copyright misuse doctrine comes from the differing policies of copyright and antitrust.[84] Now that misuse has freed itself from antitrust to pursue the public policy goals of copyright,[85] why should we return to antitrust in the context of operating systems?

The answer lies in the flexibility of the remedies available. At least if an antitrust violation is proved, the court has available to it a wide range of potential remedies, ranging from an injunction against the illegal conduct to compulsory licensing or publication of the program's source code. The court could even order structural relief, such as separating ownership of the operating system rights from rights in application programs or auctioning off the source code to a number of purchasers who would then compete.[86] Neither of these latter approaches is likely to optimize consumer benefits, however.[87] Creating an open system environment through mandatory publication of source code and all underlying technical data, together with compulsory licensing to allow incremental improvement by innovators outside of the copyright owner, is a much better solution that at least addresses the basic structural problem arising from the network externalities. Compulsory licensing is anathema to hard-core copyrightists,[88] so this remedy is particularly difficult to reach under a copyright misuse theory.

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[83] *See supra* note 1 and accompanying text.

[84] *See* Hanna, *supra* note 7, at 435-47 (arguing that antitrust is both too broad and too narrow to effect policy goals for goods in which technological innovation is crucial).

[85] *See supra* note 81.

[86] *See* Steve Lohr, *Calling in Experts to Fix Microsoft if It's Broken*, N.Y. TIMES, Feb. 16, 1999, at C7; *What Happens to Microsoft if It Loses Antitrust Case?*, WALL ST. J., November 16, 1998, at A40.

[87] Separating ownership of the operating system from the application program developers does not deal with the problem of achieving the optimal level of innovation in operating software, because one company would continue to own exclusive rights in the dominant system. Even requiring Microsoft to sell off its operating system rights to a number of purchasers might not be effective in the long run. The network externalities analysis suggests that the market is likely to gravitate to one or a small number of operating systems. *See Network Economic Effects, supra* note 33, at 502-03; *see also supra* notes 33-46 and accompanying text. In that case, competition among the purchasers could lead to one of their number again becoming dominant, bringing us back to the starting point.

[88] Article 13 of the Berne Convention permits compulsory licensing of musical works for use in phonorecords once an authorized recording has been made, and Article 11 permits

What we need, then, is a theory that looks to the *policies* underlying copyright to determine whether there is a problem and the remedies of antitrust to fix it. Constructing such a theory is admittedly difficult when one recalls that the starting point for the analysis was the congressional incapacity to solve the copyright problem legislatively.[89] The courts would have to find that underlying copyright policies of promoting the public welfare by increasing access to and use of desired works[90] are actually undercut by allowing exploitation of copyright rights in operating systems to the same extent as allowed for traditional works.[91]

Still, antitrust may be robust enough to allow this approach. Congress has never directly spoken to the copyright protectibility of operating software. Indeed, Congress has never even addressed the question of the scope of protection in computer programs generally.[92] At an earlier stage, the courts could plausibly have determined that operating software

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placing conditions on the broadcasting of works, but the Convention does not otherwise authorize compulsory licensing. *See* Berne Convention for the Protection of Literary and Artistic Works, July 24, 1971 Arts. XIII & XI. Indeed, by implication compulsory licensing is prohibited outside these contexts. This conclusion is reinforced by Article II of the Appendix to the Convention [Special Provisions Regarding Developing Countries], which affirmatively permits compulsory licensing in developing countries, under certain circumstances, of published and printed works.

89 *See supra* notes 47-67 and accompanying text.

90 *Cf.* Hanna, *supra* note 7, at 420 ("[T]he primary objective of American copyright law is to promote the public welfare by enhancing the public's access to an expanding pool of creative works. . . .").

91 The Supreme Court has consistently stated that the primary object of copyright legislation is promotion of the public welfare. *See, e.g.*, Twentieth Century Music Corp. v. Aiken, 422 U.S. 151, 156 (1975) ("The immediate effect of our copyright law is to secure a fair return for an 'author's' creative labor. But the ultimate aim is, by this incentive, to stimulate artistic creativity for the general public good."); Fogerty v. Fantasy, Inc., 510 U.S. 517, 524 (1994) ("The primary objective of the Copyright Act is to encourage the production of original literary, artistic, and musical expression for the good of the public."); Feist Publications, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 349-350 (1991) ("The primary objective of copyright is not to reward the labor of authors, but 'to promote the Progress of Science and useful Arts.'"); Sony Corp. of America v. Universal City Studios, Inc., 464 U.S. 417, 429 (1984) ("The monopoly privileges that Congress may authorize 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."); United States v. Paramount Pictures, Inc., 334 U.S. 131, 158 (1948) ("The copyright law, like the patent statutes, makes reward to the owner a secondary consideration."); Fox Film Corp. v. Doyal, 286 U.S. 123, 127 (1932) ("The sole interest of the United States and the primary object in conferring the [copyright] monopoly lie in the general benefits derived by the public from the labors of authors."); *see also* Sega Enterprises Ltd. v. Accolade, Inc., 977 F.2d 1510, 1523 (9th Cir. 1992) ("It is precisely this growth in creative expression, based on the dissemination of other creative works and the unprotected ideas contained in those works, that the Copyright Act was intended to promote."), *amended by* Order and Amended Opinion, D.C. No. CV-91-3871-BAC, Jan. 6, 1993.

92 *See A Coherent Theory, supra* note 21, at 67-70; Dennis S. Karjala, *Copyright Protection of Computer Software, Reverse Engineering, and Professor Miller*, 19 DAYTON L. REV. 975, 988 (1994) (originally published under the erroneous title *Copyright Protection of Computer Documents, Reverse Engineering, and Professor Miller)* [hereinafter *Reverse Engineering and Professor Miller*].

was not protected by copyright at all.[93] They remain free to limit the scope of copyright protection in operating software, as they have done for many other types of works,[94] until Congress explicitly instructs to the contrary. If the courts find that low levels of innovation and competition in operating software are harming not only the public's economic interest in free markets but also the public's fundamental social welfare interest in optimizing the quality and quantity of available works, there is no basic conflict between antitrust and copyright. Whatever one's view of the notion of congressional intent, it would be very difficult to make the case that Congress affirmatively intended to create an intellectual property protection system for computer programs that would likely lead to unregulated monopoly power in the most important market of the digital age.[95]

Moreover, section 2 of the Sherman Act makes it a felony simply "to monopolize any part of the trade or commerce among the several States."[96] Over the years the courts have narrowed this flat prohibition against monopolization to require as a condition for an antitrust violation that the accused has engaged in some predatory activity or other antisocial behavior. However, this is all judge-made law, admittedly now well entrenched, that the courts at least in principle are free to reconsider or refine. The *Microsoft* litigation provides a good opportunity. Although the copyright courts have correctly concluded that an antitrust violation is not a predicate of copyright misuse,[97] there is no reason in principle that the courts could not treat copyright misuse by someone with market power as an antitrust violation. One step further, and the monopoly itself, arising because of market "tipping" and an overly powerful copyright, is subject to regulation under antitrust law independent of any antisocial behavior by the copyright owner – because the combination of a tipped market and copyright together violates fundamental policy goals of *both* statutes.

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93 *See supra* note 31.

94 *See supra* notes 8-12 and accompanying text.

95 CONTU stated its objectives for copyright protection of programs as follows:

> To provide reasonable protection for proprietors without unduly burdening users of programs and the general public, the following statements concerning program copyright ought to be true:
>
> 1. Copyright should proscribe the unauthorized copying of these works.
> 2. Copyright should in no way inhibit the rightful use of these works.
> 3. Copyright should not block the development and dissemination of these works.
> 4. Copyright should not grant anyone more economic power than is necessary to achieve the incentive to create.

CONTU Report, *supra* note 29, at 12; *see generally Reverse Engineering and Professor Miller*, *supra* note 92, at 998-1000.

96 15 U.S.C. § 2.

97 *See supra* note 81.

The traditional antitrust approach that comes to mind is the essential facilities doctrine. This doctrine starts from *United States v. Terminal Railroad Association*[98] and applies section 2 of the Sherman Act to persons who own facilities that, as a practical matter, cannot be duplicated. If such facilities are essential to competition, the owner is required to share them on fair terms.[99] One commentator has pointed out that the essential facilities doctrine does not, in fact, emphasize wrongful *conduct* – the traditional target of antitrust – but rather the provision of a compulsory access *remedy* under antitrust in a setting that is akin to a natural monopoly.[100] He concludes, as does this article, that treating software standards as essential facilities would be consistent with the general trend of the software cases to deny copyright protection to such standards. Moreover, such treatment represents a good compromise between handling software standards like a regulated industry and heavy-handed (and in this case unworkable) traditional remedies of antitrust, such as dissolution.[101] Once we realize that the fundamental problem is independent of Microsoft's conduct and stems from the natural monopoly represented by Microsoft's copyrights, we should stop insisting on tying the application of antitrust law to a traditional antitrust violation involving predatory or exclusionary conduct.[102]

Obviously, any reduction in copyright protection brings at least theoretical costs in the form of a lower incentive to create products that promote the public welfare. There is no reason, however, to think that traditional copyright law – designed for art, music, and literature – will automatically draw the public interest/private rights balance at the appropriate point for works of technology, especially those with strong network effects.[103] The courts tailor the scope of copyright protection all the time in an effort to further underlying copyright policies.[104] This is not necessarily easy, but the only fundamentally new aspect suggested here is that antitrust, rather than copyright itself, supplies the "hook" for devising remedies that are simply unavailable under copyright, such as compulsory licensing of the right to make improvements (derivative works).

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98 224 U.S. 383 (1912).

99 *See* Cotter, *supra* note 47, at 230-31.

100 *See* Teague I. Donahey, Terminal Railroad *Revisited: Using the Essential Facilities Doctrine to Ensure Accessibility to Internet Software Standards*, 25 AIPLA Q.J. 277, 308 (1997). I am indebted to my student, Dan Bell, for bringing Mr. Donahey's excellent article to my attention.

101 *See id.* at 323, 327-28.

102 *But see* Cotter, *supra* note 47, at 248, 250 (recommending that the balance between incentives and access should be addressed through intellectual property law rather than by means of the essential facilities doctrine of antitrust).

103 *See supra* note 46 and accompanying text.

104 *See supra* notes 8-17 and accompanying text.

If a traditional antitrust violation is found in the actual *Microsoft* case, of course, there will be no need to turn to new theories of liability. The essential facilities doctrine, however, will still be instructive in designing a remedy. In the case of a traditional violation, the remedy should relate at least partly to the behavior constituting abuse. However, it should also correct for the unusual market power arising from the copyright in operating software. One can only advise the court to use the utmost caution in moving to regulate one of the most successful business corporations in United States history. Careful consideration of the underlying policies, together with recognition that the problem arises from the compound action of network effects and a strong copyright not fully thought out by Congress, can help the court keep its bearings.

The goal of the court should be to devise limitations on Microsoft's copyrights that continue to give Microsoft a reasonable return on its contribution to technology but at the same time allow the full software community to participate in, and profit from, incremental improvements to the nearly universal base that is Windows. Once the goals and standards are correctly understood in this case, where (by hypothesis) at least copyright misuse has been proved, it may be easier in later decades to deal with similar monopolies that arise from intellectual property rights, especially copyright and similar rights, in information technologies. Properly effected, this approach to *Microsoft* can be the bridge to a new mode of thinking about intellectual property monopolies of this type. It might even stimulate Congress to assess the matter in a more representative and balanced way than is possible if the problem is treated strictly as one of copyright.[105]

As briefly discussed above,[106] neither forced separation of Microsoft's operating system division from its applications division nor the auctioning of its operating software to a number of purchasers is

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105 Professor, now Judge, Calabresi has written about how to determine who should carry the "burden of inertia" when a validly enacted statute seems no longer to fit "the whole fabric of the law." GUIDO CALABRESI, A COMMON LAW FOR THE AGE OF STATUTES 118-19, 164 (1982). Copyright may represent what he calls "an asymmetry in the effect of a retentionist or revisionist bias." *Id.* at 124. As described above, copyright protectionists have access to the legislative process, while the public interest is unrepresented when legislative compromises are made. *See supra* notes 47-67 and accompanying text. If the courts overuse antitrust in attempting to limit the market power of a monopoly that Congress really *does* believe is in the public interest, it is relatively easy for the affected interests to have Congress reassess the matter and reverse the judicial intervention. If, on the other hand, the degree of market power conferred on the owner of copyright rights in what turns out to be the dominant computer operating system was simply an unintentional by-product of a more general legislative scheme (bringing programs under copyright protection), judicial intervention is imperative to overcome the legislative inertia. In using antitrust to limit monopoly power flowing from such copyrights, the courts would be placing the burden of inertia "on the side that can more easily obtain majoritarian reconsideration of the allocation." CALABRESI, *supra* at 126.

106 *See supra* note 87.

likely solve the basic structural problem in the long run. Because the goal should be to allow innovative improvement by the whole of the software technology community, rather than just Microsoft, the best approach may be a mandatory publishing of the source code and all supporting documentation for Microsoft's operating software. This should be coupled with a judicially enforced compulsory license that will allow third parties to develop improved versions of the software, with some royalty payment to Microsoft to reward it for its contribution to the now-improved technology.

This suggested remedy raises questions about the improved versions of Windows that we would expect to appear on the market after the compulsory license is put into effect. Network effects will continue to be at work in the market for Windows improvements, so it is quite possible that the market will again "tip" in the direction of one of their number. If full proprietary rights exist in the improved versions, we run the risk of returning to our starting point, with some other company now holding the key to the gateway through its copyright in the new standard. On the other hand, it is possible that many of the improvers will be believers in open systems, and tipping could be in that direction. There is little point in basing a once-and-for-all solution to such future problems on speculation. Nor is there any need for a definite answer today. The most conservative approach is to go forward with what we are used to, which means the recognition of proprietary rights in improvements as in other computer programs. The court could retain jurisdiction, however, to force a second round of compulsory licensing (as part of the initial license) when and if a new monopoly develops that again threatens to stifle innovation.[107]

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[107] Professor Lemley has raised the very important question of how this theory would apply outside the context of operating software. Does it apply to patents, for example, or to Intel Corporation's dominant position in microprocessors? The best answer I can give at this point is that we should move cautiously in any such area. Crucial to the analysis here is the combination of strong network effects and an overly powerful copyright. While in principle the same situation could develop if one company has a dominant and fundamental patent, I am unaware of any patent that gives the kind of power in a huge market that Microsoft derives from its operating system copyrights. Moreover, the patent term of 20 years may make acceptance of one-firm domination more tolerable, should it occur. Intel's position in microprocessors does seem to be closer to Microsoft's position in operating software. A possible distinction is the nature of the intellectual property rights pursuant to which Intel maintains its position. While Intel and one of its competitors, Advanced Micro Devices, have disputed over microcode, both companies (and others) make chips that run the most popular software, which suggests that the copyright in microcode (if any) may not be crucial to Intel's dominance. Moreover, to the extent Intel relies on the Semiconductor Chip Protection Act, the 10-year period of protection may again be short enough to make its monopoly tolerable, should Intel stop innovating. Following the rule that one should be conservative when one does not know what to do, the better part of valor at this time is likely to worry about the Microsoft problem and to use our experience from attempts to resolve it when problems develop in these other areas.

VI. CONCLUSION

It is time to begin thinking "outside the box." For reasons that we may not condone, but cannot ignore, Congress is institutionally incapable of retrenching the rapid growth in the length, breadth, and strength of copyright protection that we have witnessed with the adoption of the 1976 Copyright Act and subsequent copyright legislation. Copyright protection for computer programs, notwithstanding their technological nature, seemed like a reasonable idea for protecting these works from out-and-out piracy. Although it was foreseeable, Congress did not foresee that this apparently simple decision would lead to a long-term monopoly in a technological gateway. The fundamental problem is structural: Network effects inexorably lead to a single dominant firm in operating software. If the dominant firm has proprietary rights in that software, we can expect to see lower levels of innovation and monopoly rents, even if the dominant firm does not otherwise engage in predatory or other antisocial activity that heretofore has been a necessary predicate of an antitrust claim.

The government has now succeeded in proving that Microsoft did, in fact, engage in the behavior of which it was accused. The case thus becomes a good one for testing the kinds of structural remedies that courts can use to deal with the problem of a copyright that is stronger than socially optimal. The court will not have to invent any new legal theories to get to the remedies question, assuming that Microsoft's predatory behavior is also determined to be an antitrust violation. That gives us both time and experience with which to ponder appropriate action even in those cases in which the dominant firm has not abused its monopoly position in a traditional antitrust sense. Whatever the details in a particular case, that action must be aimed at the source of the problem, which is treating operating software under copyright as if it were a novel. It is the *copyright* that must be limited, not the structure of the company owning it or the market in which it operates.