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The Challenges of Reforming Intellectual Property Protection for Computer Software

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The public policy questions raised by intellectual property protection for computer software involve a complex and interrelated set of scientific, technological, economic, legal, institutional, and political issues. It is appropriate, therefore, that a team comprising two leading legal scholars who have focused their research on the protection of new technologies, a highly successful and forward-looking technologist/entrepreneur, and a leading computer scientist have united to confront the important challenges present in this area. Their collaborative effort, *A Manifesto Concerning the Legal Protection of Computer Programs*,[1] is the most elaborate attempt to date to reconceptualize this field and develop a coherent framework for computer software policy.

The starting place for this venture is promising. The current system is based on the recommendations of the National Commission on New Technological Uses of Copyrighted Works (CONTU),[2] a panel of copyright authorities that completed its work before many of the major developments of modern computer technology and markets were fully appreciated. It is widely recognized that the existing system was never designed to address many of the problems that have emerged in the 1980s and 1990s.[3]

This Comment examines three critical, interrelated challenges for those seeking to reform legal protection for computer software: (1) analyzing the market failures that might justify government intervention to define (or alter) the legal entitlements granted for software innovations; (2) predicting the likely path of computer technology; and (3) anticipating and navigating potential impediments to legislative reform of legal protection for software. Any one of these challenges creates a serious

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1. Pamela Samuelson et al., A Manifesto Concerning the Legal Protection of Computer Programs, 94 Colum. L. Rev. 2308 (1994) [hereinafter Manifesto].

2. See Nat'l Comm'n on New Technological Uses of Copyrighted Works, Final Report (1979) [hereinafter CONTU Report].

3. See Dennis S. Karjala, Copyright, Computer Software, and the New Protectionism, 28 Jurimetrics J. 33, 41–42 (1987); Peter S. Menell, Tailoring Legal Protection for Computer Software, 39 Stan. L. Rev. 1329, 1330 (1987) [hereinafter Menell, Legal Protection]; see also Pamela Samuelson, CONTU Revisited: The Case Against Copyright Protection for Computer Programs in Machine-Readable Form, 1984 Duke L.J. 663, 692–705 (discussing inadequacies of the CONTU report at time of publication).

obstacle for those seeking reform. In combination, these challenges pose a daunting series of hurdles and pitfalls.

I. The Analysis of Market Failure

The *Manifesto* builds its analysis upon the traditional public goods framework of neoclassical economics.[4] Public goods have two distinguishing features: (1) nonexcludability—it is difficult to exclude those who do not pay for the good from consuming it; and (2) nonrivalrous competition—additional consumers of the good do not deplete the quantity of the good available to others. Lighthouses, television signals, and national defense are traditional examples of public goods. Intellectual works, such as computer programs, also exhibit these attributes.[5] The market will tend to undersupply these goods because producers cannot reap the marginal (incremental) value of their investment in providing such goods. The traditional solution to the public goods problem in information markets is the creation of intellectual property rights by the government. These rights enable the creator to appropriate adequate reward and spur the discovery of new and better products.[6] Applying this framework, the *Manifesto* promotes the principle that all intellectual work bearing significant know-how on its face should be protected under intellectual property law. Otherwise, innovation will be unduly discouraged by competition in the marketplace.

This mode of analysis, however, is built upon a highly simplified view of the innovative process and excludes a number of other important policy concerns. Professor William Nordhaus's classic model of the innovative process assumes that investments in research produce a single independent innovation.[7] Without intellectual property protection, competitors could easily appropriate the value of the innovation before the original innovator could recover his or her investments in research and development. Nordhaus's economic framework also recognizes that creating property rights in innovations leads to deadweight loss as a result of monopoly pricing. The principal policy implication of this model is that the term of intellectual property protection should be calibrated to balance the incentive benefits of protection against the deadweight loss of monopoly pricing.

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4. See Paul A. Samuelson & William D. Nordhaus, Economics 48–49, 713–15 (12th ed. 1985); Manifesto, supra note 1, at 2365–69, 2371–78.

5. See Kenneth J. Arrow, Economic Welfare and the Allocation of Resources for Invention, *in* The Rate and Direction of Inventive Activity: Economic and Social Factors 609, 614–16 (Nat'l Bureau of Economic Research ed., 1962). As the *Manifesto* emphasizes, computer programs often bear much of their know-how on their face. See, e.g., Manifesto, supra note 1, at 2333 (arguing that software programs are vulnerable to "trivial acquisition of behavioral equivalence").

6. See William D. Nordhaus, Invention, Growth, and Welfare: A Theoretical Treatment of Technological Change 86–90 (1969).

7. Id. at 3–7.

Since Nordhaus's important early work, economic historians and economic theorists have greatly enriched our understanding of the innovative process and the implications for public policy. Historical and industry studies of the innovation process find that inventions are highly interdependent: "Technologies . . . undergo . . . a gradual, evolutionary development which is intimately bound up with the course of their diffusion."[8] In fact, "secondary inventions"—including essential design improvements, refinements, and adaptations to a variety of uses—are often as crucial to the generation of social benefits as the initial discovery.[9] Economic theorists have more recently developed models of the innovative process incorporating concepts of rivalrous and cumulative innovation.[10] These models have uncovered a range of important effects beyond the reach of the Nordhaus framework. These more complex accounts of the innovative process alter the basic policy conclusions of the simpler public goods analysis. Excessive protection for first generation innovation can impede later stages, thereby undermining some of the salutary effects of strong intellectual property protection.[11] More generally, these models cast doubt on the notion that society can perfectly calibrate intellectual property rewards for each innovation. Although the *Manifesto* appropriately highlights the cumulative nature of software innovation,[12] its policy recommendations assume that the best legal regime is one that rewards all innovators in proportion to their value-added. The determination of the "optimal" form of protection would be extraordinarily complex in practice, however, suggesting that the fine tuning envisioned by the *Manifesto* is unachievable.[13]

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8. Paul A. David, New Technology, Diffusion, Public Policy, and Industrial Competitiveness 20 (Center for Economic Policy Research, Pub. No. 46, 1985); see generally, Richard R. Nelson & Sidney G. Winter, An Evolutionary Theory of Economic Change 275–307 (1982) (discussing technical and economic factors in technology diffusion); Nathan Rosenberg, Factors Affecting the Diffusion of Technology, 10 Explorations Econ. Hist. 3, 6–10 (1972) (defining technological improvement as a series of small advances).

9. See, e.g., John L. Enos, A Measure of the Rate of Technological Progress in the Petroleum Refining Industry, 6 J. Indus. Econ. 180, 189 (1958) (portraying benefits from improvement of existing processes in petroleum refining industry); James Mak & Gary M. Walton, Steamboats and the Great Productivity Surge in River Transportation, 32 J. Econ. Hist. 619, 625 (1972) (discussing evolutionary modelling of economic change).

10. See Morton I. Kamien & Nancy L. Schwartz, Market Structure and Innovation 105–24 (1982); Robert P. Merges & Richard R. Nelson, On the Complex Economics of Patent Scope, 90 Colum. L. Rev. 839, 843, 868–79 (1990); Suzanne Scotchmer, Standing on the Shoulders of Giants: Cumulative Research and the Patent Law, 5 J. Econ. Persp. 29, 33 (1991).

11. See id. at 38.

12. See Manifesto, supra note 1, at 2330–32.

13. See Scotchmer, supra note 10, at 40. The *Manifesto* qualifies its policy alternatives by noting that administrative concerns may be significant. See Manifesto, supra note 1, at 2420–29. Policy analysis, however, must directly incorporate these concerns into the comparison of alternatives. Otherwise policymakers have little basis for making real world decisions.

In addition, the *Manifesto* largely overlooks a set of factors relevant to determining the need for intellectual property protection.[14] Even before appropriability concerns are addressed, non-market sources of revenue must be assessed. Government and private subsidies of research, especially at universities which publish and otherwise freely disseminate their discoveries, alleviate the public goods problem. Many ground-breaking areas of computer software research have been supported generously in this manner.[15]

Turning to appropriability concerns, as the authors of the *Manifesto* discuss, there are numerous modes of legal protection for intellectual work beyond copyright and patent, including trade secret, trademark, and joint ventures.[16] The *Manifesto* is skeptical of the efficacy of these means of appropriation because software products often bear their know-how on their face. Yet even this observation must be significantly qualified. Much of the know-how necessary to succeed in the rapidly evolving software market relates to product marketing, support, and reputation.[17] The continual upgrading of products serves to maintain market share even as clones appear. Although important aspects of software products are easily observed by potential competitors, competitors must be able to marshal multiple competencies (or be wise enough to collaborate with others who can) in order to compete successfully in software markets.

In this vein, appropriability can and does occur through contractual means in the software industry.[18] Clear property rights, even if they do not perfectly reward all those involved in the chain of innovation, can provide the basis for a well-functioning licensing regime. An implicit system of "private" intellectual property can arise through such contracting.

Beyond appropriability concerns, the social value generated by computer technology depends significantly on the extent to which network

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14. See Menell, Legal Protection, supra note 3, at 1339, 1354–57.

15. See Peter S. Menell, An Analysis of the Scope of Copyright Protection for Application Programs, 41 Stan. L. Rev. 1045, 1064 (1989) [hereinafter Menell, Application Programs]; Menell, Legal Protection, supra note 3, at 1357.

16. Cf. Richard C. Levin et al., Appropriating the Returns from Industrial Research and Development, 1987 Brookings Papers on Economic Activity 783 (surveying effectiveness of several legal protection schemes).

17. See David J. Teece, Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy, 15 Res. Pol'y 285, 288–89 (1986) (discussing "tacit" know-how and role of "complementary assets," such as marketing, manufacturing, and after-sales support, in appropriating returns to research and development).

18. In fact, one of the major concerns is excessive appropriability in the form of monopolization of product areas. The *Sega* and *Nintendo* litigation highlight this problem. See Sega Enters. Ltd. v. Accolade, Inc., 977 F.2d 1510, 1518–20 (9th Cir. 1992) (addressing limitations of copyright upon reverse engineering); Atari Games Corp. v. Nintendo of America, Inc., 975 F.2d 832, 842–45 (Fed. Cir. 1992) (discussing fair use of copyrighted work and policies behind such use).

externalities are realized.[19] Intellectual property protection plays a critical role in determining the size and quality of these networks.[20] Software products or attributes affecting the size of networks should, therefore, not generally receive intellectual property protection unless they require significant research efforts.[21] Thus, the *Manifesto*'s anticloning regime, with no novelty or nonobviousness requirement, would unduly inhibit the realization of network externalities. Although the *Manifesto* recognizes the interoperability concern,[22] it fails to offer concrete proposals to address this problem.

In summary, legal protection for computer software should be approached within a rich economic framework emphasizing the cumulative nature of innovation; the broad range of legal and non-legal methods for appropriating revenues from innovation; network effects; and the limitations and costs of comprehensive legal rules for appropriating returns to innovation, including the costs of keeping abreast of the rights of others and the costs of avoiding infringement.[23] At various points, the *Manifesto* discusses some of these other factors; nonetheless, its emphasis on developing a comprehensive appropriability regime promotes a simplistic theoretical perfectionism over a more realistic targeting of salient problems. Moreover, it employs an outmoded economic framework for analyzing legal protection for intellectual work.

The *Manifesto*'s approach to the public goods problem raised by software innovation is analogous to another theoretically appealing but practically infeasible solution to the public goods problem created by environmental externalities. According to the traditional economic model, the market system will overproduce goods creating pollution because the full social cost of these goods (resource costs plus pollution harm) is not adequately reflected in the price system.[24] The standard prescription is

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19. The term "network externality" describes a class of goods for which the utility (or satisfaction) derived from the good's consumption increases with the number of other persons consuming the good. See Michael L. Katz & Carl Shapiro, Network Externalities, Competition, and Compatibility, 75 Am. Econ. Rev. 424, 424 (1985). In the computer field, network externalities flow from standardized user interfaces, interoperable systems, compatible file structures, and reusable software components, among other features.

20. See generally Menell, Application Programs, supra note 15, at 1066–71 (discussing negative effects of existing legal protection on establishment of networks); Menell, Legal Protection, supra note 3, at 1340–45 (evaluating effect of legal protection on networks, innovation, and competition in complementary products).

21. See Joseph Farrell, Standardization and Intellectual Property, 30 Jurimetrics J. 35, 49 (1989); Menell, Application Programs supra note 15, at 1095–96; Menell, Legal Protection, supra note 3, at 1357–59, 1362–63.

22. See Manifesto, supra note 1, at 2320–21.

23. See, e.g., Menell, Application Programs, supra note 15, at 1098–1102; Menell, Legal Protection, supra note 3, at 1363–67, 1371. Cf. Merges & Nelson, supra note 10, at 884–85, 908–11 (discussing the possible negative effect of current discussions on scope of patent protection on future development of technology).

24. See Peter S. Menell & Richard B. Stewart, Environmental Law and Policy 54–57 (1994).

to internalize externalities by imposing taxes on creators of externalities equal to the additional (non-priced) effects of the activities. Taking this theory to its logical extreme, every member of society should wear an externality meter and be billed regularly for the external harms that he or she causes. In the real world, however, such a policy would obviously be impossible in view of the difficulty of monitoring, the costs of administration, and the complex interactions of activities in society. Society opts, instead, for a mixed approach in which those externalities for which it is feasible (economically and politically) to charge are internalized through fees; other forms of pollution are addressed by other regulatory means and social policies (including doing nothing where regulation is infeasible). As direct internalizing approaches become feasible, for example through the advent of less expensive metering technologies,[25] they can be incorporated into the policy matrix.

The *Manifesto*'s focus on achieving perfect appropriability is akin to outfitting innovators and product developers with externality meters.[26] Given real-world institutional constraints and the complexities of technology markets, such an approach is unrealistic. As with environmental policy, intellectual property policy must reflect economic and institutional constraints. The resulting policy will inevitably be somewhat untidy, yet that may be the best that can be achieved in a complex world.

II. Technology Prognostication

A second major challenge in analyzing legal protection for new technology is in predicting the future path of the technology. The appropriate form of protection for some technological developments may hinder the progress of other innovations. Had CONTU foreseen the explosive growth of microcomputers, for example, its recommendations might have been significantly different.[27] It is even possible that the choice of legal regime may substantially affect which fields of technology will flourish.

By its very nature, technology prognostication is a risky business. The authors of the *Manifesto*, including one who has successfully pre-

25. See Peter S. Menell, Beyond the Throwaway Society: An Incentive Approach to Regulating Municipal Solid Waste, 17 Ecology L.Q. 655, 706–08 (1990).

26. See, e.g., Manifesto, supra note 1, at 2413 (suggesting that every innovator should be compensated for his or her work); id. at 2419 (suggesting that the level of royalties and degree of protection be calibrated to the "remoteness" of the copier's "market segment"). As noted earlier, see supra note 13, the *Manifesto* cautions that many of the alternatives present significant administrative problems. By failing to confront these problems, however, the *Manifesto* severely limits its usefulness to policymakers. Had the *Manifesto* confronted these problems, the authors would have anticipated the methodological criticism raised herein.

27. See Office of Technology Assessment, U.S. Congress, Finding a Balance: Computer Software, Intellectual Property and the Challenge of Technological Change 188–89 (1992) (summarizing dramatic changes in the software industry and technology since CONTU).

dicted the direction of software technology (and markets) and another who is a leading researcher in artificial intelligence, are better placed than most to assess these matters. Nonetheless, the *Manifesto* provides few revelations about what computer technology might look like in twenty years. In fact, the *Manifesto* argues that the legal regime should be independent of the current state of technology.[28] Without some effort to foresee the path of technology, however, it is difficult to see how the proposals of the *Manifesto* will prove any less anachronistic than the CONTU deliberations or earlier attempts to address future technological change through the design of intellectual property regimes.[29]

Based upon general trends in software innovation of the past two decades, it is possible to predict some important contours of computer technology markets in the coming two decades. Many of the major tasks for which computers hold particular promise have been recognized. Computer software now performs most word-processing, information processing, scientific calculations, record-keeping, and business analysis. It also assists in numerous other business and technical applications, such as engineering analysis, industrial design, and architectural design. Software performs numerous functions in automated control systems—ranging from simple home devices such as microwave ovens to air traffic control systems. Software plays a growing role in the education and entertainment fields. Although dramatically new applications for computer software may yet be tapped, it is likely that the next generation of technological innovation in software will largely improve upon the usability of the existing applications. As hardware innovations expand computing speed and memory, we can expect to see improvements in interface design, voice recognition, multi-tasking, networking, and software integration. We can also expect to see further development of multimedia.

It is not at all clear that the anticloning legislation promoted by the *Manifesto* would address these directions for computer technology particularly well. Patent or patent-type legislation (with shortened duration and improved examination) should do well in handling new techniques for improving the operation of software and hardware. The major problems on the horizon appear to relate to network externalities in the contexts of interface design and interoperability (especially networking) and the more traditional copyright problems attendant to assembling compilations for multimedia works. The *Manifesto*'s proposed anticloning legislation would likely exacerbate the former problem[30] by protecting non-novel or obvious product standards. It would do little to address the problems plaguing the multimedia market because the problems

28. See Manifesto, supra note 1, at 2407.

29. See Jessica Litman, Copyright Legislation and Technological Change, 68 Or. L. Rev. 275, 358–61 (1989).

30. As noted earlier, see supra note 22 and accompanying text, the *Manifesto* recognizes network concerns, typically under the rubric of interoperability, yet it offers no concrete proposals to ameliorate these concerns.

there relate significantly to access to traditional copyright subject matter.[31]

III. The Political Economy of Intellectual Property Reform

Like much academic public policy scholarship, the *Manifesto* offers a novel, comprehensive legal regime tailored to the problems it diagnoses in the existing system. This ambitious plan would reorder much of the existing legal landscape and significantly alter economic interests. Consequently, it is essential to assess the political impediments to the proposed reforms.

Over the past decade, legal and public policy scholars have emphasized the influence interest groups wield in the legislative process.[32] Intellectual property reform is particularly dominated by interest group politics. Professor Jessica Litman has described in detail how the nature of the legislative process is largely to blame for the difficulties that copyright law has had in accommodating technological change.[33] In the words of one commentator intimately familiar with the legislative process:

> Congress is generally not in the business of satisfying abstract concerns about "good copyright policy." Rather, Congress is an intensely political body, loath to impose one-sided losses on legitimate interest groups. Since "good copyright policy" would often require precisely such one-sided losses, copyright reforms may languish for decades before being enacted, or may simply be abandoned.[34]

The political economy of reforming intellectual property law to accommodate new technologies creates a particularly perplexing dilemma. From the standpoint of a political economist, the opportunity for comprehensive reform is most propitious before interest groups form around a new technology. Unfortunately, policymakers usually do not have sufficient understanding of the path of such technology and the implications for an appropriate intellectual property regime during this nascent stage of development. Policymakers thus are left in the awkward position of

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31. See Robert D. Sprague, Multimedia: The Convergence of New Technologies and Traditional Copyright Issues, 71 Denv. U. L. Rev. 635, 659–69 (1994); Heather J. Meeker, Note, Multimedia and Copyright, 20 Rutgers Computer & Tech. L.J. 375 (1994); Mary L. Mills, Note, New Technology and the Limitations of Copyright Law: An Argument for Finding Alternatives to Copyright Legislation in an Era of Rapid Technological Change, 65 Chi.-Kent L. Rev. 307, 330–36 (1989).

32. See William N. Eskridge, Jr. & Philip P. Frickey, Legislation Scholarship and Pedagogy in the Post-Legal Process Era, 48 U. Pitt. L. Rev. 691, 717–21 (1987); William N. Eskridge, Jr., Politics Without Romance: Implications of Public Choice Theory for Statutory Interpretation, 74 Va. L. Rev. 275 (1988); Jonathan R. Macey, Promoting Public-Regarding Legislation Through Statutory Interpretation: An Interest Group Model, 86 Colum. L. Rev. 223, 227–33 (1986).

33. See Litman, supra note 29, at 277.

34. Thomas P. Olson, The Iron Law of Consensus: Congressional Responses to Proposed Copyright Reforms Since the 1909 Act, 36 J. Copyright Soc'y U.S.A. 109, 111 (1989) (footnote omitted).

either creating a regime before they adequately understand the problem or waiting until the contours of the problem emerge, at which point economic interests have vested, and reform, if it is possible at all, is severely constrained.

The history of legal protection for computer software illustrates this dilemma well. At the time CONTU was created, there was a real political opportunity for establishing a novel, comprehensive legal regime to govern computer software. Neither patent nor copyright had yet been important in the software area. The industry had developed principally through trade secret protection. Hence the range of options was rather large. On the other hand, there was relatively little appreciation of the problems that lay ahead, in particular the possibility of impeding network externalities and the potential for misapplication of copyright protection to functionality.[35] The outcome of the CONTU process was not surprisingly a rather naive set of recommendations, closely approximating the status quo.[36] More recently, Congress passed the Semiconductor Chip Protection Act,[37] a modest protection regime crafted by the affected interests.[38] Thus far, sui generis regimes for software more generally, such as that proposed in the *Manifesto*, have generated little enthusiasm in the legislature.[39]

In view of the substantial vesting of economic interests that has already occurred around the existing legal regime for computer software, it is difficult to imagine Congress giving serious attention to a comprehensive reform effort without a crying need.[40] After many years of confusion, the existing legal regime appears to be muddling through. In the view of most commentators, the recent *Altai*[41] and *Sega*[42] decisions have correctly resolved two of the three major problems that have plagued copyright protection for software.[43] The *Lotus* case,[44] which presents the scope of

35. See Karjala, supra note 3, at 69–72; Menell, Application Programs, supra note 15, at 1066–71; Samuelson, supra note 3, at 749–53.

36. See CONTU Report, supra note 2, at 1–2.

37. 17 U.S.C. §§ 901–14 (1988).

38. See Robert W. Kastenmeir, The 1989 Horace S. Manges Lecture—Copyright in an Era of Technological Change: A Political Perspective, 14 Colum.-VLA J.L. & Arts 1, 23 (1989); John G. Rauch, The Realities of Our Times: The Semiconductor Chip Protection Act of 1984 and the Evolution of the Semiconductor Industry, 75 J. Pat. & Trademark Off. Soc'y 93, 93–95 (1993).

39. See Litman, supra note 29, at 356–57.

40. The *Manifesto* suggests that the further development of rapid decompilation technology may potentially create this need. See Manifesto, supra note 1, at 2422.

41. Computer Assocs. Int'l, Inc. v. Altai, Inc. 982 F.2d 693 (2d Cir. 1992).

42. Sega Enters. Ltd. v. Accolade, Inc., 977 F.2d 1510 (9th Cir. 1992).

43. See Brief Amicus Curiae of Copyright Law Professors, Lotus Dev. Corp. v. Borland Int'l Inc. (1st Cir. 1994) (No. 93-2214) (24 law professors approving of decision in *Altai*); Brief Amicus Curiae of Eleven Copyright Law Professors, *Sega* (No. 92-15655), reprinted in 33 Jurimetrics J. 147 (1992). The *Altai* case addressed the scope of copyright protection for nonliteral elements of program code. The *Sega* case addressed the limitations of copyright law upon reverse engineering of computer programs.

44. Lotus Dev. Corp. v. Borland Int'l, Inc., No. 93 Civ. 2214 (1st Cir. 1994).

copyright protection for user interfaces, could potentially resolve the last major difficulty inherent in the application of copyright law to computer software.[45] Patent protection for software may prove to be problematic, although the extent of problems to date has been modest. The *Manifesto*'s concern for underprotection has yet to find vocal support, even among the economic interests that would clearly benefit from strengthening intellectual property protection.

Any attempt at sui generis reform would face not only the private interests vested in federal copyright law, but also the inertia flowing from the hard-won battle to establish an international copyright regime for computer software. As the authors of the *Manifesto* recognize, the United States government devoted substantial energy over the past decade to browbeating most of the developed nations into following its path.[46] Neither the U.S. government nor the many entities desiring uniform protection for their products across national borders are eager to start a new fight.

In this political climate it would be more efficacious to address the individual problems most amenable to reform than to attempt a comprehensive, sui generis scheme. The two most important targets appear to be concerns about patent protection and impediments to the nascent field of multimedia software products.

Whether patent protection will prove to be a serious problem for the software industry is a matter of controversy.[47] Some of the concerns that have been raised, such as inconsistency in the examination process and the lack of a comprehensive repository of prior art, can and are being addressed without legislative changes.[48] Nonetheless, other aspects of the patent system, such as the long term of protection and the lack of compulsory licensing, pose serious potential problems. Congress may be politically unable to address these problems once powerful economic interests vest in strong patent portfolios. Hence it would be opportune for Congress to take up this matter in the very near future, especially in light of the race among software firms to build patent portfolios.

Similarly, Congress may have a window of opportunity for addressing the legal issues posed by the emerging multimedia field. The basic problem—developing an efficient and equitable means for obtaining rights to

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45. See Brief Amicus Curiae of Professor Dennis S. Karjala and Professor Peter S. Menell at 3, *Lotus* (No. 93-2214); Brief Amicus Curiae of Copyright Law Professors at 23–24, *Lotus* (No. 93-2214).

46. See Manifesto, supra note 1, at 2313.

47. See Public Hearings and Request for Comments on Patents Protection for Software-Related Inventions, 58 Fed. Reg. 66,347 (1993); Richard Stallman & Simson Garfinkle, Against Software Patents, Communications of the ACM, Jan. 1992, at 17; Pamela Samuelson, *Benson* Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions, 39 Emory L.J. 1025, 1025–26 (1991).

48. See David R. Syrowik & Roland J. Cole, The Software Patent Institute and the Challenge of Software-Related Patents, 73 Mich. B.J. 544 (1994); Software Examiners Begin Training, N.Y. Times, July 4, 1994, at 36.

use copyrighted works—is not new. Yet multimedia technology offers powerful methods for combining vast amounts of material in useful ways. Under existing copyright law, developers must either negotiate express licenses for each work used or make such limited use as to come within the fair use defense. New institutions that facilitate obtaining permission have started to develop.[49] Nonetheless, this is a propitious time for the legislature to consider alternative regimes—such as limited compulsory licensing—to spur this technology, particularly in the educational sector.

Recognition of the political dimensions of intellectual property reform should not be interpreted as an excuse for despair. The *Manifesto* must be commended for its explication of the technology and the appropriability problems that exist, comprehensive diagnosis of problems with the existing system, delineation of an ambitious comprehensive regime, and analysis of alternatives. This work, however, should be more fully integrated with an analysis of the institutional realities so as to put forth a pragmatic agenda for reform. Timing is a critical element in the passage of any legislation, especially with respect to a rapidly changing area like software protection. The opportunity for comprehensive reform of legal protection for computer software, such as that outlined by the *Manifesto,* may have passed, at least for the present. Nonetheless, the time may still be ripe for some of the problems highlighted by the *Manifesto* and others—including software patents, compatibility concerns, and copyright permissions for multimedia works—to be effectively addressed by the legislature.

49. Cf. Robert P. Merges, Of Property Rules, Coase, and Intellectual Property, 94 Colum. L. Rev. 2655, 2661–64 (1994) (arguing that high transaction costs encourage producers and users of vested intellectual property rights to develop institutions that economize on the cost of exchange).