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## Electronic Information Tools—The Outer Edge of World Intellectual Property Law

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# ELECTRONIC INFORMATION TOOLS—THE OUTER EDGE OF WORLD INTELLECTUAL PROPERTY LAW

J. H. Reichman\*

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## I. INTRODUCTION

Providing adequate legal protection for commercially valuable information is an old problem<sup>1</sup> that became of critical economic impor-

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1. See, e.g., 3 STEPHEN P. LADAS, PATENTS, TRADEMARKS, AND RELATED RIGHTS — NATIONAL AND INTERNATIONAL PROTECTION 1616-19 (1975); Alois Troller, *The Legal Protection of Know-How: General Report*, in THE PROTECTION OF KNOW-HOW IN 13 COUNTRIES 149 (H. Cohen Jehoram ed. 1972); Jane C. Ginsburg, *Creation and Commercial Value: Copyright Protection of Works of Information*, 90 COLUM. L. REV. 1865, 1888-93 (1990).

tance with the advent of electronic information processing.<sup>2</sup> Traditionally, contract and trade secret laws protect unpatented information in the form of industrial know-how.<sup>3</sup> These laws make third-party acquisition of pertinent information unlawful when obtained by means excluded by private agreements, forbidden by law or against public policy.<sup>4</sup> Viewed as know-how, information remains exempt from free competition so long as it is neither voluntarily revealed nor reverse engineered.<sup>5</sup>

Keeping information under a regime of actual or legal secrecy was never an easy task even in a less technologically advanced era. To begin with, commercially valuable information is often manifested in tangible working embodiments that function in the external environment.<sup>6</sup> Yet, the intangible, intellectual character of information makes it indivisible, inexhaustible, and potentially ubiquitous once disclosed.<sup>7</sup> To the extent that one who controls a tangible vehicle of communication fails to obtain effective control over the bundle of information it contains, neither contract nor trade secret laws may suffice to prevent third parties from appropriating the competitive advantages that exclusivity otherwise confers.<sup>8</sup> The capacity to be conveyed or transmitted, a key feature of all industrial know-how,<sup>9</sup> thus makes bundles of information resemble artistic works in the sense that disclosure or dissemination

2. See, e.g., OFFICE OF TECHNOLOGY ASSESSMENT, U.S. CONGRESS, *INTELLECTUAL PROPERTY RIGHTS IN AN AGE OF ELECTRONICS AND INFORMATION* 157-87 (1986) ("Electronic media establish an entirely new dimension for economies of scope in information production") [hereinafter *OTA REPORT*]; Franck Cavanagh, *Gestion et exercice des droits d'auteur dans les banques de données: modes d'exploitation des données*, in *BANQUES DE DONNEES ET DROIT D'AUTEUR* 23-37 (Institut de Recherche en Propriété Intellectuelle (IRPI) Henri Desbois ed. 1986).

3. See, e.g., Troller, *supra* note 1, at 151-52, 156-57 (discussing comparative surveys of thirteen countries, including the United States); see also FRANÇOIS DESSEMONTET, *THE LEGAL PROTECTION OF KNOW-HOW IN THE UNITED STATES OF AMERICA* 29-49 (2d rev. ed. 1976).

4. See generally JAY DRATLER, JR., *INTELLECTUAL PROPERTY LAW: COMMERCIAL, CREATIVE AND INDUSTRIAL PROPERTY* §§ 4.04, 4.05 (1991).

5. See, e.g., J.H. Reichman, *Computer Programs as Applied Scientific Know-How: Implications of Copyright Protection for Commercialized University Research*, 42 *VAND. L. REV.* 639, 657-58 (1989) (citing authorities); see also Edmund Kitch, *The Law and Economics of Rights in Valuable Information*, 9 *J. LEGAL STUD.* 683, 688-93, 699-701, 711-23 (1980).

6. See, e.g., William Kingston, *The "Thesis" Chapters*, in *DIRECT PROTECTION OF INNOVATION* 2-3 (Kingston ed. 1987); see also LADAS, *supra* note 1, at 1617.

7. See, e.g., FRANÇOIS MAGNIN, *KNOW-HOW ET PROPRIÉTÉ INDUSTRIELLE* 115-16 (1974); ROBERT P. BENKO, *PROTECTING INTELLECTUAL PROPERTY RIGHTS: ISSUES AND CONTROVERSIES* 21 (1987) (stressing that "knowledge goods . . . create problems of market failure, externalities, and appropriability"); see also WILLIAM KINGSTON, *INNOVATION, CREATIVITY AND LAW* 83-85 (1990).

8. See, e.g., *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 159-64 (1989) (investing a competitor's right to reverse engineer unpatented, noncopyrightable products with constitutional underpinnings); see also John Shepard Wiley, Jr., *Bonito Boats: Uninformed But Mandatory Innovation Policy*, 1989 *SUP. CT. REV.* 283, 301-02 (1989).

subjects them both to the free-rider problems generally associated with "public goods."<sup>10</sup>

Because competitors would seldom need to pay for the economic value of information in a world without some form of legal protection, property rights enable gatherers to appropriate the value of their efforts,<sup>11</sup> especially in the absence of unfair competition laws that prohibit slavish duplication.<sup>12</sup> To the extent that publishers of information depend on these proprietary rights, they look to the standard subject-matter categories of classical intellectual property law, which are dominated by the patent and copyright paradigms.<sup>13</sup> Patent law, however,

10. See, e.g., *Feist Publications, Inc. v. Rural Tel. Serv. Co.*, 111 S. Ct. 1282, 1291 (1991) (noncopyrightable listings of telephone directory could be freely used by publisher of other directories; copyright law does not protect information as product of effort and labor, but only as an original work of authorship); see also *Key Publications Inc. v. Chinatown Today Publishing Enters.*, 945 F.2d 509 (2d Cir. 1991) (selection of businesses for ethnic telephone directory entitled to copyright protection, but was not infringed by directory based on different selection criteria). For the relation between the public good problem in copyright law and the larger problem of protecting industrial know-how, compare 1 PAUL GOLDSTEIN, *COPYRIGHT: PRINCIPLES, LAW AND PRACTICE* § 1.2 (1989 & Supp. 1992) with J. H. Reichman, *Design Protection and the New Technologies: The United States Experience in a Transnational Perspective*, 19 U. BALT. L. REV. 6, 144 (1989/1990) (arguing for sui generis protection of advanced technological know-how "that behaves in the marketplace like works of art and literature notwithstanding its industrial character.") See *infra* text accompanying notes 218-28.

11. See Ralph S. Brown, *Eligibility for Copyright Protection: A Search for Principled Standards*, 70 MINN. L. REV. 579 (1985); Wendy J. Gordon, *An Inquiry Into The Merits Of Copyright: The Challenges Of Consistency, Consent, And Encouragement Theory*, 41 STAN. L. REV. 1343 (1989); William M. Landes & Richard A. Posner, *An Economic Analysis of Copyright Law*, 18 J. LEGAL STUD. 325 (1989); see also Monroe E. Price, *Reexamining Intellectual Property Concepts: A Glimpse into the Future Through the Prism of Chakrabarty*, 6 CARDOZO ARTS & ENTERTAINMENT L. J. 443 (1988) (questioning the "theology" of property law). But see Stephen Breyer, *The Uneasy Case for Copyright: A Study of Copyright in Books, Photocopies, and Computer Programs*, 84 HARV. L. REV. 281 (1970) (questioning the economic necessity for copyright protection, even in the book trade); Tom G. Palmer, *Intellectual Property: A Non-Posnerian Law and Economic Approach*, 12 HAMLINE L. REV. 261 (1989).

12. See, e.g., *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 155-168 (1989) (holding state laws forbidding unauthorized reproduction of product configurations by direct molding process unconstitutional under *Sears-Compco* decisions of 1964); *Sears, Roebuck & Co. v. Stiffel Co.*, 376 U.S. 225 (1964); *Compco Corp. v. Day-Brite Lighting, Inc.*, 376 U.S. 234 (1964). But see *International News Serv. v. The Associated Press*, 248 U.S. 215 (1918) (sole Supreme Court decision recognizing "quasi-property right" in information as product of labor and investment). See generally Douglas G. Baird, *Common Law Intellectual Property and the Legacy of International News Service v. Associated Press*, 50 U. CHI L. REV. 411 (1983); Leo J. Raskind, *The Misappropriation Doctrine as a Competitive Norm of Intellectual Property Law*, 75 MINN. L. REV. 875, 900-906 (1991) (criticizing the "quasi-property" focus of *INS*, but justifying misappropriation doctrine rooted in "predatory, extra-commercial conduct" that is inconsistent with socially beneficial economic rivalry).

13. See J.H. Reichman, *supra* note 5, at 648-55; cf. John H. Barton, *Adapting the Intellectual Property System to New Technologies*, paper presented to the National Research Council's Conference on Intellectual Property Rights in the Global Arena of Science and Technology, Washington, D.C., January 9-10, 1992.

excludes writings as such<sup>14</sup> and requires industrial applications of technical information to meet strict substantive prerequisites.<sup>15</sup> The copyright model characteristically presupposes a degree of personal expression independent of the utilitarian tasks for which information is compiled.<sup>16</sup> Left to its own devices, classical intellectual property law does not necessarily provide the proprietary rights that disseminators of information need in order to overcome the free-rider problem common to all intellectual creations.<sup>17</sup>

Most Berne Union countries responded to this dilemma by tolerating strained applications of the classical copyright paradigm to unpatentable bundles of information that could not be protected as trade secrets.<sup>18</sup> This historic accommodation, however, always underestimated the extent to which information protected as a literary work

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14. See U.S. CONST., art. I, § 8, cl. 8 (distinguishing the writings of an author from patentable discoveries with the latter understood to mean "inventions"); 35 U.S.C. §§ 100(a), 101 (1988); 17 U.S.C. § 102(a) (1988) ("original works of authorship"); PETER D. ROSENBERG, 1 PATENT LAW FUNDAMENTALS § 6.02[3] (rev. ed. 1990). See further Pamela Samuelson, *Benson Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions*, 39 EMORY L.J. 1025, 1122-33 (1990) [hereinafter *Benson Revisited*].

15. 35 U.S.C. §§ 101-103 (1988) (requiring novelty, utility, and nonobviousness).

16. See Justin Hughes, *The Philosophy of Intellectual Property Law*, 77 GEO. L. J. 287, 330-54 (1988) (discussing origins and implications of the "property/person connection"); Ginsburg, *supra* note 1, at 1869-70, 1881-93 (confirming the emphasis on personal expression, but stressing the persistence of an incentive rationale to justify copyright protection of low-authorship productions); see also J.H. Reichman, *Goldstein on Copyright Law: A Realist's Approach to a Technological Age*, 43 STAN. L. REV. 943, 951-52 (1991) [hereinafter *Realist's Approach*] (demonstrating convergence of domestic and foreign standards of originality and creativity even before *Feist*); Paul Edward Geller, *Copyright in Factual Compilations: U.S. Supreme Court Decides Feist Case*, \_\_\_\_ I.I.C. \_\_\_\_ (forthcoming 1992) (noting that the United Kingdom remains "the most significant exception to this consensus," and suggesting that a very low threshold of eligibility could conflict with the emerging law of the European Community).

17. See, e.g., EJAN MACKAAY, *ECONOMICS OF INFORMATION AND LAW* 117-18 (1982); *infra* text and authorities accompanying notes 218-223.

18. See *infra* note 33 (citing authorities on foreign law). For strained applications in United States law, compare, e.g., Robert C. Denicola, *Copyright in Collections of Facts: A Theory for the Protection of Nonfiction Literary Works*, 81 COLUM. L. REV. 516, 530-31 (1981) (advocating sweat-of-the-brow theory of protection for compilations and data bases) with Robert A. Gorman, *Copyright Protection for the Collection and Representation of Facts*, 76 HARV. L. REV. 1569, 1603-04 (1963) (advocating judicial identification of "originality" with "social contribution" of diligent compiler, but limiting scope of protection to verbatim copying) and Robert A. Gorman, *Fact or Fancy? The Implications for Copyright*, 29 J. COPYRIGHT SOC'Y 560 (1982) (rejecting sweat-of-the-brow rationale in favor of original selection and arrangement theory). See also L. Ray Patterson & Craig Joyce, *Monopolizing the Law: The Scope of Copyright Protection for Law Reports and Statutory Compilations*, 36 UCLA L. REV. 719, 728-31, 792-813 (1989) (criticizing strained applications of copyright law to factual works in particular and abusive extension of the copyright monopoly in general); Gary L. Francione, *Facing The Nation: The Standards for Copyright, Infringement, and Fair Use of Factual Works*, 134 U. PA. L. REV. 519 (1986) (rejecting copyright protection of facts as such in any form). See *infra* text accompanying notes 33-

often constituted a business tool, not unlike other tools<sup>19</sup> that were normally relegated to the different legal logic of industrial property laws.<sup>20</sup> The advent of electronic information processing, and the crucial role it will play in twenty-first century economics, mandates a reconsideration of the inherently tool-like nature of these productions.

This article briefly explores some of the tensions that arise when information is viewed either as a "literary work" or as a "tool" for purposes of attracting legal protection within the classical intellectual property framework. The article then suggests that these and other tensions confirm the need for a new intellectual property model that is not premised on the classical distinction between "art" and "inventions." This model would not only facilitate legal protection of data bases, computer programs, and applications of artificial intelligence, it would also benefit industrial design, biogenetic engineering, and other important technologies that fit imperfectly within the classical intellectual property system.<sup>21</sup>

## II. INFORMATION THROUGH THE PRISM OF CLASSICAL INTELLECTUAL PROPERTY CONCEPTS

### A. Copyright Protection of Small-Change Literary Productions

At first glance, the factual and functional works known abroad as "the small change of copyright law" seem to present fewer systemic anomalies than ornamental designs of useful articles, which never secured a firm foothold in the international copyright conventions.<sup>22</sup> To be sure, catalogues, directories, rule books, instruction manuals and printed forms often exhibited the same chronically low levels of creative authorship that characterize the bulk of commercial designs. Their barebones nature conflicts with the emphasis on personal expression

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19. Cf. Pamela Samuelson, *Allocating Ownership Rights in Computer-Generated Works*, 47 U. PITT. L. REV. 1185, 1205-09 (1986).

20. See, e.g., *Baker v. Selden*, 101 U.S. 99 (1879); see *infra* notes 46-54 and accompanying text.

21. See *infra* text accompanying notes 224-28.

22. Compare Berne Convention for the Protection of Literary and Artistic Works, Sept. 9, 1886, as last revised at Paris, July 24, 1971 [hereinafter Berne Convention], Art. 2(1) ("The expression 'literary and artistic works' shall include every production in the literary and artistic domain, whatever may be the form or mode of its expression, such as books, pamphlets, and other writings . . .") with *id.*, arts. 2(7), 7(4) (requiring member states to protect works of "applied art," but allowing these states to determine the criterion for distinguishing this category of protectible works from nonprotectible industrial designs and also to determine "the conditions under which . . . designs and models shall be protected"); and Paris Convention for the Protection of Industrial Property, March 20, 1883, as last revised at Stockholm, July 14, 1967 [hereinafter Paris Convention], art. 5 *quinquies* (mandating the protection of industrial designs). See SAM RICKETSON, *THE BERNE CONVENTION FOR THE PROTECTION OF LITERARY AND ARTISTIC WORKS*:  
 Published by Cambridge University Press (1991)

that traditionally drives the mature copyright paradigm.<sup>23</sup> At the same time, copyright protection of low-authorship compilations never appeared to endow proprietors with competitive advantages in the general products market like those accruing from copyright protection of industrial art.

Two-dimensional designs of useful articles that obtain copyright protection as art are routinely embodied in three-dimensional products that compete on the general products market. That market is normally regulated by the patent system.<sup>24</sup> Copyright protection in the name of art thus enables manufacturers to avoid competition on the market for industrial products without meeting the strict standards of the patent paradigm. This "two-market conundrum"<sup>25</sup> eventually persuaded most Berne Union countries to relegate three-dimensional industrial art to *sui generis* design laws built on modified patent principles.<sup>26</sup> Sooner or later, these laws induce courts and legislators to derogate from the principle that eligibility in copyright law never depends on qualitative discrimination.<sup>27</sup>

In contrast, writings that convey utilitarian information were seldom embodied in products sold on the general products market, and their admission to copyright law exerted less immediate pressure on the frontier with patent law than was true of ornamental designs. Such pressure would, of course, have arisen if copyright law had admitted facts or ideas, or if the exclusive reproduction rights indirectly denied access to facts and ideas that were otherwise ineligible. Once courts and legislatures took steps to counter these vices,<sup>28</sup> however, no *sui generis* laws were needed to deal with a "two-market conundrum" mainly because industrial literature had yet to be invented!

Low-authorship factual and functional writings also bear a topographical resemblance to more creative works of a technical or scien-

23. See, e.g., *Feist Publications, Inc. v. Rural Tel. Serv. Co.*, 111 S. Ct. 1282 (1991); 2 GOLDSTEIN, *supra* note 10, § 8.5, at 116-17; Ginsburg, *supra* note 1, at 1873-93.

24. See, e.g., *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141 (1989); *Baker v. Selden*, 101 U.S. 99 (1879).

25. See generally Reichman, *supra* note 10, at 130-33.

26. See *id.* at 8-10 (citing foreign authorities), 19-56 (discussing U.S. design patent law after Congressional failure to enact *sui generis* design law), 56-81 (discussing noncopyrightability of modern three-dimensional designs in U.S. copyright law). *But see* Yves Gaubiac, *La théorie de l'unité de l'art*, 111 R.I.D.A. 2 (1982) (describing and criticizing French regime of copyright protection for commercial designs).

27. See, e.g., RICKETSON, *supra* note 22, at 231-32; *Bleistein v. Donaldson Lithographing Co.*, 188 U.S. 239 (1903).

28. See, e.g., 17 U.S.C. §§ 102(b), 103(b), 107, 113(b) (1988); *Baker v. Selden*, 101 U.S. 99 (1879); cf. Paul Katzenberger, *Copyright Law and Data Banks*, 21 I.I.C. 310, 322-26 (1990) (discussing and criticizing case law in Federal Republic of Germany).

tific character.<sup>29</sup> To exclude small-change literary productions from copyright law on subject-matter or authorship grounds thus appeared to entail another derogation from the principle of nondiscrimination, one that seemed harder to justify in the absence of direct industrial exploitation.<sup>30</sup> Such an exclusion would also have discouraged the gathering and dissemination of commercially valuable information by leaving it at the mercy of third-party duplicators who added no value of their own.<sup>31</sup> The resulting state of chronic underprotection could, moreover, give way to countervailing bouts of overprotection if courts tried to bridge the gap in intellectual property law with expansive applications of unfair competition law.<sup>32</sup>

The historical solution adopted in the Berne Union countries allowed most small-change literary productions to enter copyright law qua writings that conveyed information,<sup>33</sup> while most industrial designs

29. See, e.g., 2 GOLDSTEIN, *supra* note 10, § 8.4, at 97 (stating that factual works "differ from works of art in degree, not kind" and adding that it is only "the rare fact work that does not bear some trace of the author's hand"); Adolph Dietz, *Federal Republic of Germany*, §§ 2[2], [3], in 1 INTERNATIONAL COPYRIGHT LAW AND PRACTICE (Paul E. Geller rev. ed. 1990) (comparing "scientific works" mentioned expressly in German Copyright Act with compilations based on selection and arrangement of pre-existing elements, which qualify as "derivative works" when sufficiently "original and personally distinctive in fashion or form"). But see RICKETSON, *supra* note 22, at 232-33 (criticizing reference to scientific productions in Berne Conv., art. 2(1)); Ginsburg, *supra* note 1, at 1881-1900 (criticizing personality-based theories of copyright protection and distinguishing between low- and high-authorship works).

30. See, e.g., RICKETSON, *supra* note 22, at 231-32; WORLD INTELLECTUAL PROPERTY ORGANIZATION. GUIDE TO THE BERNE CONVENTION FOR THE PROTECTION OF LITERARY AND ARTISTIC WORKS (Paris Act 1971) 12-13 (L. Masouyé & W. Wallace eds. 1978) [hereinafter WIPO GUIDE] (describing universally recognized principle of nondiscrimination, even though the Berne Convention itself imposes no express standard of eligibility and does not mention nondiscrimination).

31. See, e.g., Dietz, *supra* note 29, § 2[2] (stressing that "without copyright protection, this 'small change' of literary works would be left without any protection at all"); cf. Denicola, *supra* note 18, at 530-31.

32. See, e.g., *International News Service v. Associated Press*, 248 U.S. 215, 239 (1918); Raskind, *supra* note 12 (stressing need to restrain misappropriation branch of unfair competition law); Luigi Carlo Ubertazzi, *Copyright Protection of Computer Data Bases in Italy*, 16 I.I.C. 725, 733 (1985) (concluding that Italian copyright law gives only limited protection to data bases, but arguing that unfair competition rules "prohibit . . . systematic reproduction of another's information"); cf. Reichman, *supra* note 10, at 81-123 (documenting and criticizing recent expansion of Lanham Act § 43(a) to protect unpatented, noncopyrightable product configurations against imitation as such).

33. See, e.g., RICKETSON, *supra* note 22, at 238-39; Frank Gotzen, *Grand orientations du droit d'auteur dans les états membres de la C.E.E. en matière de banque de données*, in BANQUES DE DONNEES ET DROIT D'AUTEUR 86-98 (Institut de Recherche en Propriété Intellectuelle (IRPI) Henri Desbois, ed. 1986). See further Michel Vivant, *Etendue de la protection par le droit d'auteur: les données protégées - le traitement des données*, in BANQUES DE DONNEES ET DROIT D'AUTEUR, *supra*, 13-21; Katzenberger, *supra* note 28; Ubertazzi, *supra* note 32, at 726-32; André Lucas, *General Report — Data Bases and Copyright*, in L'INFORMATIQUE ET LE DROIT DE L'AUTEUR 332, 333-36 (proceedings of the ALAI Annual Congress, Quebec, Canada, Sept. 26-30, 1991). See also Thomas, *Public Access to Information: A Japanese Perspective*, 1991 *Computer Data Base Protection — The Impact of Japanese*



were denied copyright protection qua products.<sup>34</sup> Consequently, domestic, foreign and, to some extent, international law recognized compilations of information that constituted original works of authorship as copyrightable subject matter.<sup>35</sup>

At the same time, courts in leading Berne Union countries acknowledged that the factual or utilitarian nature of these low-authorship literary productions required measures to limit the systemic contradictions they might breed. While the legal stratagems of choice varied from one jurisdiction to another,<sup>36</sup> and sometimes even within the same jurisdiction at different times,<sup>37</sup> the overall tendency was to

*Legislative Developments on United States and Japanese Copyright Law*, 9 FORDHAM INT'L. L.J. 191 (1986).

For the extreme liberality of the United Kingdom in admitting low-authorship literary productions, see W. R. CORNISH, *INTELLECTUAL PROPERTY: PATENTS, COPYRIGHT, TRADE MARKS AND ALLIED RIGHTS* 268-69 (2d ed. 1989). However, the criterion of eligibility in the United Kingdom required mere skill, judgment and labor, see *id.* at 269, as distinct from the "personal intellectual creation" of foreign law or the "original work of authorship" that United States law has required since 1976. See 17 U.S.C. § 102(a) (1988); Reichman, *Realist's Approach*, *supra* note 16, at 950-54 (citing authorities that suggest a convergence between U.S. and foreign law in this regard). The United Kingdom now appears virtually alone in applying the "skill, judgment and labor" criterion. See, e.g., Geller, *supra* note 16.

34. See *supra* notes 24-27 and accompanying text. A significant exception to the consensus against copyright protection for industrial art was France. For the French "unity of art" doctrine, which still confers broad copyright protection on commercial designs, see generally Gaubiac, *supra* note 26.

35. See, e.g., 17 U.S.C. §§ 101 (definition of compilations), 103 (compilations as subject matter) (1988); *supra* note 33 and accompanying text (foreign law); Berne Convention, *supra* note 22, Art. 2(5). However, the status of "small-change" compilations under the Berne Convention is far from clear. Although Art. 2(1) purports to cast "literary and artistic productions" in broad terms that specifically include "scientific" works, Art. 2(5) speaks only of "collections of literary or artistic works such as encyclopedias and anthologies," whose eligibility depends on a "selection and arrangement . . . constitut[ing] intellectual creations." The Convention thus required an "element of creativity" even before the advent of electronic information processing, and there is no consensus about the nature of that requirement. See, e.g., WIPO GUIDE, *supra* note 30, at 20; Gotzen, *supra* note 33, at 94-97. Other difficulties arise from the failure of the Convention text to distinguish "collective works" or "collections" from "compilations" in the English sense, and also from the fact that Art. 2(5) did not mandate any protection of compilations that select or arrange noncopyrightable subject matter, such as "the names and addresses in a telephone directory, the brief descriptions of items in a catalogue, and the headings, sub-headings and individual entries in a sporting programme or radio-guide." RICKETSON, *supra* note 22, at 298-303. For these and other reasons, the Commission of the European Communities has proposed to protect noncopyrightable compilations, notably data bases, under a sui generis or neighboring rights regime. See Commission of the European Communities, Proposal for a Council Directive on the Legal Protection of Databases, Jan. 29, 1992 [hereinafter EC Proposed Directive].

36. See *supra* note 33.

37. See, e.g., Geller, *supra* note 16 (comparing merger doctrine and its variants in foreign law); Katzenberger, *supra* note 28, at 323-26. Katzenberger criticizes the "remarkable degree of inconsistency" in German case law, which required only a "low-level of intellectual achievement" for address and telephone books, mathematical tables, and legal or business forms (on which the legislature had conferred tacit subject-matter recognition), while demanding a more than routine creative contribution for engineering projects and computer programs. *Id.*, at 324 (citing authori-

limit the scope of protection for borderline literary productions to slavish imitation.<sup>38</sup> In the United States, for example, the "thin copyright" doctrine enunciated in *Feist Publications, Inc. v. Rural Telephone Service Co.*<sup>39</sup> merely confirmed, with respect to factual works, what one astute district court had earlier discovered to be an "open secret" with respect to functional works.<sup>40</sup>

In retrospect, the admission of small-change literary productions to copyright law was a make-weight solution<sup>41</sup> that harboured serious flaws. The advent of computer programs, which entered copyright law

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ties). According to Katzenberger, both computer programs and compilations of data should be subject to the same eligibility requirements applicable to "adaptations and maps." *Id.*, at 325-26.

38. During the 1950s, United States courts shifted away from excluding functional works on subject-matter and eligibility grounds (a practice that was prominent at the time of *Baker v. Selden*, 101 U.S. 99 (1879)), and concentrated on narrowing the scope of protection at the infringement stage. This shift was perfected in *Continental Casualty Co. v. Beardsley*, 253 F.2d 702 (2d Cir.), *cert. denied*, 358 U.S. 816 (1958) (business form copyrightable because it conveyed explanatory matter not entirely dictated by function, but defendant's noninfringing form was "sufficiently different"). The need to change methodologies followed from the Supreme Court's rejection of end-use or purpose tests of eligibility in *Mazer v. Stein*, 347 U.S. 201 (1954) (dancing figures used as lamp designs remained copyrightable works of art). See generally 2 GOLDSTEIN, *supra* note 10, §§ 8.4, 8.5; Reichman, *Realist's Approach*, *supra* note 16, at 970-73.

For the narrow scope of protection some courts afforded factual works after the Copyright Act of 1976, see *id.*, at 966-70; cases cited *infra* note 89. In recent years, however, some courts deviated from this tradition by investing the copyright in borderline factual works with strong protection against derivative uses of the facts assembled. See, e.g., *Illinois Bell. Tel. Co. v. Haines & Co.*, 905 F.2d 1081 (7th Cir. 1990) (compiler's copyright extends to other uses of directories by third parties, such as rearranging data by address rather than by name); *United Tel. Co. of Mo. v. Johnson Publishing Co.*, 855 F.2d 604 (8th Cir. 1988) (competitor infringed by using white pages of telephone directory as initial reference for updating its own directory); *Rural Tel. Serv. Co. v. Feist Publications, Inc.*, 663 F. Supp. 214 (D. Kan. 1987) (use of white pages to prepare directory without independent canvass held infringing use), *aff'd*, 916 F.2d 718 (10th Cir. 1990) (unpublished), *rev'd*, 111 S. Ct. 1282 (1991). See also *West Publishing Co. v. Mead Data Central, Inc.*, 799 F.2d 1219 (8th Cir. 1986), *cert. denied*, 479 U.S. 1070 (1987). Whether the Supreme Court's *Feist* decision has altogether checked the budding expansionist treatment of derivative factual works remains to be seen. See *infra* note 113 and accompanying text.

39. 111 S. Ct. 1282, 1289 (1991) (thin protection of factual works); see, e.g., Geller, *supra* note 16.

40. See *Kepner-Tregoe, Inc. v. Carabio*, 203 U.S.P.Q. (BNA) 124, 130 (E.D. Mich. 1979); 1 GOLDSTEIN, *supra* note 10, at 197 (stating that functional works obtain only a "thin array of rights").

41. Courts that limit infringement to slavish imitation may consciously enable the *infringer's methodology* retroactively to transform a factual compilation devoid of creative authorship into quasi-artistic property. See, e.g., *Eckes v. Card Prices Update*, 736 F.2d 859, 862 (2d Cir. 1984) ("the sweat of a researcher's brow does not merit copyright protection absent, perhaps, wholesale appropriation"); see also *Financial Info., Inc. v. Moody's Investor's Serv., Inc.*, 808 F.2d 204 (2d Cir. 1986), *cert. denied*, 484 U.S. 820 (1987). On this approach, eligibility depends on "the extensiveness of the defendant's copying; true sloth and great greed . . . will confer copyright upon . . . otherwise unprotectible labor." Ginsburg, *supra* note 1, at 1897. As a result, the compiler is not protected from harm because of his copyright, but is found to possess a copyright because of *form*. *Patterson & Joyce*, *supra* note 18, at 729.

on analogy to both scientific works and the small-change,<sup>42</sup> eventually enabled publishers to embody "two-dimensional" compilations of instructions or data in chips and microelectronic processors that made computers perform functional tasks.<sup>43</sup> The disembodied sets of instructions that initially attract copyright protection as writings thus become embodied in products that compete on the market for specialized machine tools. This hybrid subcategory of industrial literature presents all the problems associated with industrial art, including the "two-market conundrum" that was presumed to be inapplicable to small-change literary productions.<sup>44</sup>

Even without these complicating developments, decisions favoring copyright protection of low-authorship literary productions always underestimated the utilitarian and industrial applications to which packaged information was being put. Although one may have technically conveyed information in the manner of a literary work, the body of information thus conveyed often constituted a highly utilitarian business tool not unlike other tools that third parties need to use in connection with myriad products and processes.<sup>45</sup> The protection of tool designs, however, turned historically on the altogether different legal logic of industrial property law and not on the generous modalities of the copyright paradigm.

### B. *The Tool Design in Comparative Industrial Property Law*

At the opposite pole from copyright protection of small-change literary productions lies the full patent paradigm, which in principle cov-

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42. See, e.g., NATIONAL COMMISSION ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS. FINAL REPORT 19-21 (1979) (released July 31, 1978). [hereinafter CONTU REPORT] (relying on the *Continental Casualty* case, 253 F.2d at 702, to assuage fears of overprotection and citing *Baker v. Selden*); Eugen Ulmer and Gert Kolle, *Copyright Protection of Computer Programs*, 14 I.I.C. 159 (1983).

43. See, e.g., Pamela Samuelson, *CONTU Revisited: The Case Against Copyright Protection for Computer Programs in Machine Readable Form*, 1984 DUKE L.J. 663 [hereinafter *CONTU Revisited*]; 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) [hereinafter *Lessons of the Chip Law*].

44. Accord Samuelson, *supra* note 14, at 1128-29; see *supra* notes 24-27 and accompanying text.

45. See, e.g., *Baker v. Selden*, 101 U.S. 99 (1879) (double-entry bookkeeping system); *Bibbero Systems, Inc. v. Colwell Systems, Inc.*, 893 F.2d 1104, 1107 (9th Cir. 1990) (noncopyrightable billing forms that doctors use for patients' insurance claims conveyed some information, but the purpose was to record information; hence, rule against blank forms applied). Cf. Pamela Samuelson, *Computer Programs, User Interfaces, and Section 102(b) of the Copyright Act of 1976: Rethinking Lotus v. Paperback*, 55 LAW & CONTEMP. PROBS. 281 (1992) [hereinafter *Rethinking Lotus*].

ers any novel and sufficiently inventive information tool<sup>46</sup> but excludes technical writings as such.<sup>47</sup> Disregarding this exclusion, the threshold requirement of nonobviousness constitutes the primary obstacle to the patenting of any new tool.<sup>48</sup> Most tool designs, like most ornamental designs of useful articles, partake of incremental innovation almost by definition. Yet, the nonobviousness requirement disqualifies innovation that fails to make a major advance beyond the prior art.<sup>49</sup> To overcome this and other obstacles, comparative industrial property law reveals a number of hybrid legal institutions that, in one form or another, afford some degree of protection to what one is tempted to call the "small change" of patent law.<sup>50</sup> Of particular interest in this regard are the utility model laws enacted in Germany, Italy, and Japan, which initially protected the external configurations of certain handtools and other everyday implements.<sup>51</sup>

If patents for inventions require a true inventive step, usually determined by a board of qualified patent examiners, then utility model laws constituted an early and significant deviation from the norm. They

46. See, e.g., Ronald S. Laurie, *The Patentability of Artificial Intelligence Under U.S. Law*, in WIPO WORLDWIDE SYMPOSIUM ON THE INTELLECTUAL PROPERTY ASPECTS OF ARTIFICIAL INTELLIGENCE 121-50 (1991) [hereinafter WIPO SYMPOSIUM]; Richard H. Stern, *Tales from The Algorithm War: Benson to Iwahashi, It's Deja Vu All Over Again*, 18 AIPLA L.J. 371 (1991); Donald S. Chisum, *The Patentability of Algorithms*, 47 U. PITT. L. REV. 959 (1986); see also Henri W. Hanneman, *Patentability of Computer Programs in Europe*, in THE LAW OF INFORMATION TECHNOLOGY IN EUROPE 1992 — A COMPARISON WITH THE USA 69-86 [A. P. Meijboom & C. Prins eds. 1991]. But see Samuelson, *supra* note 14; Simpson L. Garfinkel, Richard M. Stallman & Mitchell D. Kapor, *Why Patents Are Bad for Software*, 8 ISSUES IN SCIENCE AND TECHNOLOGY 50-55 (1991).

47. See *supra* note 14.

48. See 35 U.S.C. § 103 (1988) (stating that a "patent may not be obtained . . . if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains").

49. See, e.g., *Graham v. John Deere Co.*, 383 U.S. 1 (1966); Edmund Kitch, *Graham v. John Deere Co.: New Standards for Patents*, 1966 SUP. CT. REV. 303; Kingston, *supra* note 6, at 31 (regretting difficulty of protecting incremental innovation under "inventive step" (i.e., nonobviousness) criterion of all advanced industrialized countries). See generally Reichman, *supra* note 5, at 656-62 ("Incremental Innovation Bearing Know-How on Its Face").

50. See generally J. H. Reichman, *Legal Hybrids Between the Patent and Copyright Paradigms*, paper presented to the Conference on Information Law Toward the 21st Century, University of Amsterdam, The Netherlands, June 12-16, 1991 and to the Tenth Annual Meeting of the Association for the Advancement of Teaching and Research in Intellectual Property (ATRIP), Salamanca, Spain, October 7-9, 1991 [hereinafter *Legal Hybrids*].

51. See, e.g., LADAS, *supra* note 1, at 949-56; TERUO DOI, THE INTELLECTUAL PROPERTY LAW OF JAPAN 68-70 (1980); Rudolf Krasser, *Die Entwicklung Des Gebrauchsmusterrechts in Gewerblicher Rechtsschutz und Urheberrecht in Deutschland — Festschrift 617-89* (F.-K. Beier et al., eds. 1991); see also FRANÇOIS PERRET, L'AUTONOMIE DU REGIME DE PROTECTION DES DESSINS ET MODELES 188-233 (1974). For summaries of the relevant laws, see DESIGNS AND UTILITY MODELS THROUGHOUT THE WORLD (Anne Marie Green and Alan J. Jacobs, eds.,  
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confer immediate patent-like protection on three-dimensional functional designs without requiring an examination of the prior art and without imposing a strict standard of nonobviousness.<sup>52</sup> The pristine purpose of such laws was to prevent third parties from duplicating the external configurations of certain handtools and other everyday implements whose creative contribution fell chronically short of the inventive height that the mature patent paradigm required.<sup>53</sup> Because of their historical emphasis on functional improvements attained by means of three-dimensional shapes, utility model laws could not protect processes and did not apply to most electronic circuit designs.<sup>54</sup>

Like ornamental designs of useful articles, functional handtool designs were embodied in products sold on the open market, which made their protection in trade secret law impracticable.<sup>55</sup> Legislative decisions to protect utility models thus implicitly recognized that nonaesthetic handtool designs remained as vulnerable to appropriation by third parties as ornamental designs of useful articles, which some countries protected under *sui generis* design laws.<sup>56</sup> Both functional and appearance designs evolve through incremental innovation, while in either case the physical support bears the product of the designer's skilled efforts on its face. Because most ornamental design laws exclude func-

52. See, e.g., F.-K. Beier, *Introduction, in GERMAN INDUSTRIAL PROPERTY, COPYRIGHT AND ANTITRUST LAWS* 9-10 (F.-K. Beier, G. Schrickler, & W. Fikentscher, eds., 2nd rev. ed. 1989) [hereinafter *GERMAN INDUSTRIAL PROPERTY LAWS*]; E. Häusser, *Utility Models: The Experience of the Federal Republic of Germany*, 26 *INDUS. PROP.* 314 (1987); J.H. Reichman, *Design Protection in Domestic and Foreign Copyright Law: From the Berne Revision of 1948 to the Copyright Act of 1976*, 1983 *DUKE L. J.* 1143, 1217-21 (discussing Italian utility model law) [hereinafter *Designs Before 1976*]. See generally LADAS, *supra* note 1, at 949-62; G. SENA, I DIRITTI SULLE INVENZIONI E SUI MODELLI INDUSTRIALI 515-549 (2nd ed. 1984); Emerson Stringham, *Gebrauchsmuster, in PATENTS AND GEBRAUCHSMUSTER IN INTERNATIONAL LAW* 234-67 (Emerson Stringham, ed., 1935) [hereinafter *PATENTS AND GEBRAUCHSMUSTER*].

53. See, e.g., Beier, *supra* note 52, at 9 (characterizing utility models as technical inventions pertaining to "working tools or other useful commodities"; stressing that the "inventive concept must be embodied in a three-dimensional form"; and stating that the utility model law of 1891 answered the need for "short-term, simple and inexpensive protection for smaller technical inventions"); Reichman, *supra* note 52, at 1216-20 (discussing Italian utility model law). Functional improvements in early handtool design, including agricultural implements, often entailed elements of form or shape that lacked the inventive height needed for eligibility in patent law. Their protection under utility model laws was of a predominantly local character. See, e.g., LADAS, *supra* note 1, at 949; PERRET, *supra* note 51, at 191-94; see also Stringham, *supra* note 52, at 254-55.

54. See LADAS, *supra* note 1, at 952-53; Stringham, *supra* note 52, at 254; Häusser, *supra* note 52. Amendments to the German utility model law in 1986 expanded subject-matter protection to electrical circuits for the first time, but continued to require their incorporation into a three-dimensional form. Beier, *supra* note 52, at 9.

55. See *supra* notes 3-10, 25-27 and accompanying text.

56. See, e.g., LADAS, *supra* note 1, at 949-50 (tracing evolution of petty patent principle from inventions of "tools, implements and objects of practical use" and stressing the now less valid proposition that utility models "must fulfill a technical utility function . . . by means of a specific shape"). For the *sui generis* design laws, see *supra* notes 25-27 and accompanying text.

tionally determined designs,<sup>57</sup> utility model laws were devised to plug a gap in the intellectual property universe<sup>58</sup> that has widened inordinately with the advent of important new technologies.<sup>59</sup>

Utility model laws require a qualitatively significant degree of innovation in exchange for a relatively short-term immunity from competition.<sup>60</sup> Although most statutes impose eligibility criteria akin to those of patent law, courts tend to apply a softer, more subjective standard than that of true nonobviousness,<sup>61</sup> and the novelty standard appears less absolute than that of European patent laws generally.<sup>62</sup> Moreover, judicial validation of eligibility in the course of infringement actions tends to favor secondary considerations such as commercial success and copying.<sup>63</sup> Utility model laws thus operate with a stricter discipline

57. See, e.g., Reichman, *supra* note 10, at 38. *But see id.* at 38-39, 147-50 (discussing the United Kingdom's unregistered design right, enacted in 1988, which confers copyright-like protection on both functional and aesthetic designs, and the United States Semiconductor Chip Protection Act of 1984, 17 U.S.C. §§ 901-914 (1989), which confers copyright-like protection on one class of functional designs).

58. See, e.g., Beier, *supra* note 52, at 7 (stressing effort "to close a gap between the protection of registered designs (*Geschmacksmuster*) protecting the outer appearance but not the technical function of an article, and the long-term, expensive and not easily obtainable patent protection for more important inventions"); see also Stringham, *supra* note 52, at 252.

59. See, e.g., Takaharu Higashima & Kenji Ushiku, *A New Means of International Protection of Computer Programs Through the Paris Convention — A New Concept of Utility Model*, 7 *COMPUTER L.J.* 1, 15-22 (1986); Robert P. Sabath, Note, *Petty Patents in the Federal Republic of Germany: A Solution to the Problem of Computer Software Protection?*, 8 *Sw. U. L. REV.* 888-909 (1976); cf. Reichman, *supra* note 5, at 656-62.

60. See, e.g., Beier, *supra* note 52, at 9-10 (discussing standards of eligibility and noting extension of duration from a maximum of six years to a maximum of eight years in the 1986 amendments to German law); Reichman, *supra* note 10, at 38 (citing authorities, but also noting modern trend to lower the threshold of eligibility for the protection of functional designs generally).

61. See, e.g., Stringham, *supra* note 52, at 254 ("Quantum of [inventive] novelty required for *Gebrauchsmuster* is lower than that required for long-term patents"); Hermann Isay, *Gebrauchsmuster*, in *PATENTS AND GEBRAUCHSMUSTER* *supra* note 52, at 268, 289 (standard of invention is "milder, but not entirely eliminated"); *supra* note 53.

62. See, e.g., Beier, *supra* note 52, at 10 (noting that, while the bar against prior publications is formally absolute, "only prior uses within the country have to be considered, and the inventor enjoys a general grace period of six months with regard to his own publications"). This deviated from the absolute novelty standard of German patent law, which admitted no such derogations. *Id.* The novelty standard under German utility model law thus resembled the novelty standard under United States patent law, which remains less absolute than that of foreign law. Cf. 35 U.S.C. § 102 (1988).

63. See, e.g., Isay, *supra* note 61, at 290 (discussing "judgment of values" that is "more or less a matter of sensation"); *infra* note 66; cf. Reichman, *supra* note 10, at 31-37 (discussing role of secondary factors in U.S. design patent law). Recent amendments to the German utility model law have codified a softer standard of eligibility by requiring mere "inventive activity" rather than a true inventive step. See, e.g., Häusser, *supra* note 52; Beier, *supra* note 52, at 10 (distinguishing utility model standard of *erfinderische Schritt* from patent standard of *erfinderische Tätigkeit* and characterizing the former as "somewhat lower"). See generally Krasser, *supra* note 51, at 658-60. Published by Commons 1991. Utilities do not test the utility model for substantive validity when

than that of the sui generis design laws, a phenomenon usually ascribed to the functionality of the designs they protect.<sup>64</sup> At the same time, while these laws nominally confer a bundle of exclusive rights comparable to that of patent law,<sup>65</sup> they provide a narrow scope of protection in keeping with the immediate availability of protection once registration occurs<sup>66</sup> and with "the limited character of the invention."<sup>67</sup>

Utility model laws follow the principle of exhaustion that is characteristic of most developed patent systems.<sup>68</sup> Once a protected handtool was sold on the open market, manufacturers normally lost control over the uses to which their innovative functional designs could be put.<sup>69</sup> Utility model laws thus required innovative toolmakers to exact the reward for their products in the monopoly prices applicable at the time of first sale. By the same token, these laws normally precluded manufacturers from asserting any claim to the value added to other products by those who purchased and used the tools that embodied protected functional designs. The legal protection of handtool designs implicitly recognized that users of the tools add significant value to their own products, an enterprise in which toolmakers contribute little beyond the efficiencies that entitled them to protection in the first instance.<sup>70</sup>

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registered, even though the right to protection arises immediately and lasts for an initial term of three years. See *Beier*, *supra* note 52, at 10; *infra* note 66 and accompanying text.

64. See, e.g., *LADAS*, *supra* note 1, at 952-54; *supra* notes 57, 58 & 60 and accompanying text.

65. See, e.g., *Beier*, *supra* note 52, at 10 ("same exclusive rights as a patent").

66. See *supra* note 63. The validity of a utility model is tested either during an infringement action or in opposition proceedings before the Patent Office. In either case, they are enforceable against infringers immediately after filing and registration, unlike patents, which require years to issue. *Beier*, *supra* note 52, at 10. Many inventors accordingly file for both patents and utility models concurrently, in order to fall back upon the utility model right while the patent application is being examined. *Id.* Regardless of whether a patent issues or not, the utility model right affords protection of "short-lived but commercially successful products which can easily be imitated." *Id.*

67. *LADAS*, *supra* note 1, at 955; see also *Krasser*, *supra* note 51, at 661-62; *Isay*, *supra* note 61, at 289-90. Their narrow range of equivalents at the margin of the patent system arguably "favor[ed] a competitive environment for improvements rather than an environment dominated by the pioneer firm," in keeping with the economic prescription that Professors Merges and Nelson developed — without reference to utility models — in 1990. See Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 843-44 (1990). However, ambiguities concerning the extent to which an equivalent *technical result* could be freely reached by means of a different, nonprotected *shape* allow courts to enlarge the range of protected equivalents in particular cases. See *PERRET*, *supra* note 51, at 225-31.

68. See, e.g., *CORNISH*, *supra* note 33, at 199-201.

69. *Cf. id.* at 200. "Most patent systems . . . have given the patentee no right to control the use or resale of goods which he has placed on the domestic market or has allowed a licensee to market there." *Id.*

70. *Cf. Samuelson*, *supra* note 19, at 1185, 1192 (case for users' rights in computer-generated works).

Over the years, utility model laws have degenerated into petty patent laws that are less strictly tied to three-dimensional functional shapes,<sup>71</sup> and they remain of particular interest to single inventors and to small- and medium-sized firms.<sup>72</sup> Commentators criticize this regime because it undermines the integrity of the patent system and indirectly weakens the free-market principles that patent law reinforces.<sup>73</sup> Viewed in relation to later marginal cases that challenge the systemic integrity of world intellectual property law,<sup>74</sup> however, the true defect of these laws is that they arbitrarily enabled only certain categories of industrial designers to protect functional product configurations while ignoring the more general need to protect unpatentable, noncopyrightable embodiments of know-how that could not otherwise qualify for trade secret protection.<sup>75</sup> In other words, utility model laws are hard to justify in terms of classical intellectual property theory,<sup>76</sup> and efforts to mitigate the strict substantive and formal prerequisites of patent law are symptomatic of a larger malaise that fully revealed itself only in the last quarter of the twentieth century.<sup>77</sup>

Although it is fair to say that utility model laws are not the cure for the family of problems generated by the drive to protect important new technologies,<sup>78</sup> this venerable legal institution nonetheless contains valuable lessons for those seeking to resolve the current impasse. From

71. See, e.g., Beier, *supra* note 52, at 9 ("Notwithstanding the term 'utility model' and the restriction to inventions in three-dimensional form, the utility model is in substance a 'petty patent'"). See generally PERRET, *supra* note 51, at 225-33 (criticizing untenable distinction between innovative form and innovative technical idea, and arguing that, over time, utility model laws necessarily protect static technical embodiments of natural forces under the guise of innovations in form); see also *supra* note 67. Recent amendments to the German utility model law stop just short of ratifying the "petty patent" concept while facilitating the protection of some electronic circuit designs. See, e.g., Häusser, *supra* note 52; Beier, *supra* note 52, at 9.

72. See, e.g., Beier, *supra* note 52, at 10. Utility models laws are also of considerable interest to the developing countries. See, e.g., William Lessér, *An Overview of Intellectual Property Systems*, in STRENGTHENING PROTECTION OF INTELLECTUAL PROPERTY IN DEVELOPING COUNTRIES—A SURVEY OF THE LITERATURE 5, 7-8 (W. E. Siebeck, ed. 1990) [hereinafter STRENGTHENING INTELLECTUAL PROPERTY]; Robert E. Evenson, *Survey of Empirical Studies*, in STRENGTHENING INTELLECTUAL PROPERTY, *supra*, at 33, 41-42.

73. See, e.g., PERRET, *supra* note 51, at 188-95, 231-33; Marie-Angèle Pérot-Morel, *L'ambiguïté du concept de modèle d'utilité*, in ETUDES EN L'HONNEUR DE R. FRANCESCELLI 425 (1983); *supra* note 71.

74. See generally Reichman, *supra* note 5, at 662-67.

75. See generally *id.*, at 648-662; *supra* text accompanying notes 3-20; *infra* text accompanying notes 218-228.

76. See *supra* note 73 and accompanying text. In developing countries, however, utility models are, to some extent, a throwback to patents of importation, and they make particular economic sense in early stages of industrial development. See, e.g., Evenson, *supra* note 72.

77. See *infra* text accompanying notes 218-23.

78. See generally Reichman, *Legal Hybrids*, *supra* note 50 (Part III). Evidence suggests that new technologies in general, and electronic information processing in particular, would benefit more in the long run from an approach that supplied a limited degree of artificial lead time than



this perspective, utility model laws represent a form of intellectual property protection specifically devised for innovative tool designs that seems to have indirectly allowed the market to determine value without discouraging competitors from making further improvements and without entitling innovators to the values that users add on their own. The thrust of these laws, which cover “the small change of patent law,” thus contrasts dramatically with recent developments affecting “the small change of copyright law,” a category that has paradoxically expanded to include electronic information tools.

### C. *Electronic Information Tools*

The specialized market for literary and artistic works operates with a peculiar legal and economic logic that, to varying degrees in different countries, deliberately subordinates the price-setting function of the market to broader cultural policies.<sup>79</sup> Copyright law thus occupies a privileged position among the laws that regulate trade in that its generous protective modalities need not strictly correlate with the demands of economic efficiency as measured in terms of utilitarian incentives to create.<sup>80</sup> At the same time, courts and legislators took pains to ensure that the liberal treatment afforded artistic works would not undermine competition on the general products market, whose operations are governed by the much stricter requirements of patent law.<sup>81</sup> The extension of copyright protection to computer programs and other electronic information tools in the 1980s broke with this tradition, and the resulting uncertainties cast doubt upon the continuing ability of copy-

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from the modified patent approach institutionalized in utility model laws. *See infra* text and authorities accompanying notes 226-28.

79. *See, e.g.*, FREDERIC POLLAUD-DULIAN, *LE DROIT DE DESTINATION* 106-07 (1989) (concluding that, while industrial property law aims to stimulate commercial and industrial activity, copyright law promotes the creator's individual personality and the culture at large).

80. *See, e.g.*, 1 STEPHEN P. LADAS, *THE INTERNATIONAL PROTECTION OF LITERARY AND ARTISTIC PROPERTY* 1-12 (1938) (surveying different theories of copyright law and finding none of them able to account for the range of existing doctrines). For example, incentive theory cannot account for the moral rights. Nor will it adequately explain such paternalistic measures in American copyright law as the right to terminate transfers, *see* 17 U.S.C. §§ 203, 304(c) (1988), or even the long period of protection, which enables living authors and their immediate heirs to partake of revenues generated many years after the creation of their works. *See, e.g.*, Theodore Limperg, *Duration of Copyright Protection*, 103 R.I.D.A. 53, 68-69, 72-77 (1980). For critiques of the incentive rationale in United States copyright law from three different perspectives, *see* Gordon, *supra* note 11; Hughes, *supra* note 16; Alfred C. Yen, *Restoring the Natural Law: Copyright as Labor and Possession*, 51 OHIO ST. L.J. 517, 524-46 (1990).

81. *See, e.g.*, 17 U.S.C. § 101 (1988) (definitions of useful articles and of pictorial graphic and sculptural works, which exclude most commercial designs of useful articles), 102(b) (exclusion of ideas), § 113(b) (exclusion of useful articles portrayed in two-dimensional form), § 301 (pre-emption of common-law misappropriation not rooted in anti-competitive conduct); *supra*

right law satisfactorily to mediate between public and private interests.<sup>82</sup> In this context, particular tensions arise when the exclusive right to prepare derivative works is uncritically applied to digitalized productions of every kind.

### 1. The Derivative Work at Odds with Information Technologies

Viewed as literary works, low-authorship factual and functional productions are entitled to all the exclusive rights of copyright law, including the right to prepare derivative works. This right enables an author to recoup revenues generated from different uses of his or her work on each of the market segments where its expressive features are commercially exploited either in original or adapted form.<sup>83</sup> Protecting derivative rights helps to allay risk aversion by encouraging the orderly development of adaptations without harming the author's market interest in the underlying work<sup>84</sup> and without unduly reducing the incentives to produce it.<sup>85</sup> It is worth adding that the recent expansion of derivative work rights in United States law has helped to align the "copyright" countries and the "authors' rights" countries without necessarily sacrificing the utilitarian ethos to which the former subscribe.<sup>86</sup>

Almost by definition, low-authorship factual and functional productions contain little or no personal expression, which negates the classical justification for a strong adaptation right.<sup>87</sup> This factor, plus the public interest in encouraging free use of the underlying facts or ideas that comprise the bulk of these productions,<sup>88</sup> traditionally induced leading United States federal courts to limit their protection to

82. See, e.g., Samuelson, *CONTU Revisited*, *supra* note 43, at 727-54; Patterson & Joyce, *supra* note 18, at 792-813; Peter S. Menell, *An Analysis of the Scope of Copyright Protection for Application Programs*, 41 STAN. L. REV. 1045 (1989). See generally COMPUTER SCIENCE AND TELECOMMUNICATIONS BOARD, NATIONAL RESEARCH COUNCIL, NATIONAL ACADEMY OF SCIENCES, INTELLECTUAL PROPERTY ISSUES IN SOFTWARE 43-93 (1991) [hereinafter INTELLECTUAL PROPERTY ISSUES IN SOFTWARE]; *LaST Frontier Conference Report on Copyright Protection of Computer Software*, 30 JURIMETRICS J. 15 (1989) (consensus statement by ten law professors) [hereinafter cited as *Conference Report*].

83. See 17 U.S.C. §§ 101, 103, 106(2) (1988); 2 GOLDSTEIN, *supra* note 10, at 32-37.

84. See, e.g., David Ladd, *The Harm of the Concept of Harm in Copyright*, 30 J. COPYRIGHT SOC'Y 421, 431 (1983); Landes & Posner, *supra* note 11, at 325, 354-55.

85. See, e.g., Ginsburg, *supra* note 1, at 1912-13; see also Reichman, *Realist's Approach*, *supra* note 16, at 946-47 (citing authorities for and against the role of copyright law in reducing high risk aversion incurred by those whose livelihood depends on the dissemination of cultural products).

86. See, e.g., RICKETSON, *supra* note 22, at 286-87, 293-95, 398-400; WIPO GUIDE, *supra* note 30, at 76-77; 2 GOLDSTEIN, *supra* note 10, §§ 7.1.2, 7.3.2.

87. See, e.g., Hughes, *supra* note 16; Ginsberg, *supra* note 1, at 1881-93 (acknowledging and criticizing the classical rationale); *supra* note 16.

88. See, e.g., Paul Goldstein, *Infringement of Copyright in Computer Programs*, 47 U. PITT. L. REV. 1119 (1986); Jessica Litman, *The Public Domain*, 39 EMORY L.J. 965, 989-92 (1992) (noting judicial reluctance in cases concerning directories); *supra* note 28 and accompa-

literal copying only.<sup>89</sup> The judicial treatment of electronic information processing should logically have conformed to these precedents. In reality, some recent decisions concerning maps, telephone directories, business lists, and commercial data bases actually prevented competitors from using preexisting compilations as starting points to save time, money, and effort, or from exploiting disparate factual contents of pre-existing works in creating different and sometimes noncompeting works.<sup>90</sup> Similarly, other recent decisions concerning computer programs may indirectly have protected ideas, processes, systems, and other ineligible matter<sup>91</sup> by grafting a broad reading of the exclusive reproduction rights, especially the right to prepare derivative works, onto the siblylline definition of computer programs added to section 101 of the Copyright Act in 1980.<sup>92</sup>

Section 101 defines computer programs as a "set of statements or instructions to be used directly or indirectly in a computer in order to

nying text; see also L. Ray Patterson, *Free Speech, Copyright, and Fair Use*, 40 VAND. L. REV. 1 (1987).

89. See, e.g., *Feist Publications, Inc. v. Rural Tel. Serv. Co.*, 111 S. Ct. 1282, 1289-90 (1991); *Harper & Row, Publishers v. Nation Enters.*, 471 U.S. 539 (1985); *Cooling Sys. & Flexibles, Inc. v. Stuart Radiator, Inc.*, 777 F.2d 485, 491-92 (9th Cir. 1985) (narrow range of protectible expression in factual works); *Financial Info. Inc. v. Moody's Investors Serv., Inc.*, 751 F.2d 501, 504-05 (2d Cir. 1984); *Landsberg v. Scrabble Crossword Game Players, Inc.*, 736 F.2d 485, 488-89 (9th Cir.) (similarity of expression must be nearly verbatim to infringe copyright in factual works), *cert. denied*, 469 U.S. 1037 (1984); *Continental Casualty Co. v. Beardsley*, 253 F.2d 702 (2d Cir.), *cert. denied*, 358 U.S. 816 (1958). See also H.R. REP. NO. 1476, 94th Cong., 2d Sess. 56-57 (1976), *reprinted in* 1976 U.S.C.C.A.N. 5659, 5670-71 (Copyright law "does not preclude others from using the ideas or information revealed by the author's work").

90. See *supra* note 38 (citing selected cases favoring broader protection of factual works); see generally Ginsburg, *supra* note 1, at 1903-07 (citing authorities prior to *Feist* and ascribing "broader scope of protection for gathered facts" to "the ease with which computers may copy and reorganize information, . . . [which] deprives the compiler of a meaningful incentive to production"). In principle, *Feist* should have halted this trend, partly by disallowing copyright protection for noncreative compilations, mainly by adopting the "thin" copyright doctrine. *Feist*, 111 S. Ct. at 1289-95. See *infra* note 113.

91. See, e.g., *Whelan Assocs., Inc. v. Jaslow Dental Labs, Inc.*, 797 F.2d 1222 (3d Cir. 1986) (broad copyright protection for elements of structure, sequence, and organization), *cert. denied*, 479 U.S. 1031 (1987); *Apple Computer, Inc. v. Franklin Computer Corp.*, 714 F.2d 1240 (3d Cir. 1983); *Lotus Dev. Corp. v. Paperback Software Int'l*, 740 F. Supp. 37 (D. Mass. 1990) (protecting menu command structure of computer spreadsheet program, including the choice of command terms, the structure and order of these terms, and long prompts, despite evidence of standardization and functional efficiencies); *Manufacturing Technologies Inc. v. Cams, Inc.*, 706 F. Supp. 984 (D. Conn. 1989); *Digital Communications Assocs., Inc. v. Softklone Distrib. Corp.*, 659 F. Supp. 449 (N.D. Ga. 1987). *But see* *Plains Cotton Cooperative Assoc. v. Goodpasture Computer Service, Inc.*, 807 F.2d 1256 (5th Cir.), *cert. denied*, 108 S. Ct. 80 (1987) (sequence and organization not protectible when largely determined by market factors).

92. See 17 U.S.C. §§ 101 (definitions of computer programs and derivative works), 103, 106(2) (1988); Software Protection Act of 1980, Pub. L. No. 96-517, § 10(b), '94 Stat. 3015, 3028 (codified as amended at 17 U.S.C. §§ 101, 117 (1988)); see also 17 U.S.C. § 102(b) (excluding ideas, systems, processes, discoveries, and the like).

bring about a certain result."<sup>93</sup> The same section defines a compilation as "a work formed by the collection and assembling of preexisting materials or of data that are selected, coordinated, or arranged in such a way that the resulting work as a whole constitutes an original work of authorship."<sup>94</sup> Most computer programs and many computerized data bases evolve through revision, adaptation, and transformation into an array of applications that are functionally "derived" from the data and instructions embodied in the programmer's and/or compiler's initial solution.<sup>95</sup> By persuading courts to overextend the exclusive right to prepare derivative works, copyright owners can assert proprietary claims to any subsequent innovations that exploit recognizable aggregates of the original data and instruction sets, even though the matter claimed to have been infringed contains virtually no personal expression and fulfills purely functional objectives.<sup>96</sup>

When courts further implement this protectionist version of the adaptation right by relying on the impressionistic tests of copyright infringement used in some jurisdictions, they may extend protection beyond the modest quantum of "originality" that sections 102(a) and 103 require and directly invest first comers with colorable claims to nonprotectible matter.<sup>97</sup> Whatever purpose the "total concept and feel" test serves in cases adjudicating the unauthorized reproduction of personalized literary and artistic expression,<sup>98</sup> it becomes a contradiction in terms when applied to low-authorship factual and functional productions whose market value depends primarily on their informational contents or their utilitarian behavior.<sup>99</sup> Undue judicial reliance on this and

93. 17 U.S.C. § 101 (1988).

94. *Id.*; see also 17 U.S.C. § 103 (1988).

95. See, e.g., Jaap H. Spoor, *Expert Systems and Copyright*, in *ADVANCED TOPICS OF LAW AND INFORMATION TECHNOLOGY* 93, 101-03 (G.P.V. VANDENBERGHE ed., 1989); Michael Gemignani, *Copyright Protection: Computer-Related Dependent Works*, 15 *RUTGERS COMPUTER & TECH. L.J.* 383, 383-87 (1989).

96. See *supra* notes 90-92; Samuelson, *supra* note 19; Patterson & Joyce, *supra* note 18, at 775-76; see also Paul Goldstein, *General Report: Computer-Assisted and Computer-Generated Creation of Literary and Artistic Works*, in *INFORMATIQUE ET LE DROIT D'AUTEUR* 439, 442-43 (1990) (proceedings of the ALAI Congress, Quebec, Canada, Sept. 26-30, 1989) [hereinafter *General Report*].

97. For the different tests of copyright infringement that U.S. courts currently apply, see Reichman, *Realist's Approach*, *supra* note 16, at 957-58, 957 nn.94 & 95. For a thorough and accurate explanation of these tests and how they should be applied, see generally 2 GOLDSTEIN, *supra* note 10, at 3-38.

98. See, e.g., *Shaw v. Lindheim*, 919 F.2d 1353, 1358-60 (9th Cir. 1990); *Sid & Marty Kroft Television Prods., Inc. v. McDonald's Corp.*, 562 F.2d 1157 (9th Cir. 1977); *Roth Greeting Cards v. United Card Co.*, 429 F.2d 1106 (9th Cir. 1970). The "total concept and feel" test "bears more directly on consumer reactions to two competing works and should be inquired into only after a threshold judgment has been made on similarities in protected subject matter." 2 GOLDSTEIN, *supra* note 10, at 68 n.15.

Published by Section on Copyright, *supra* note 82, at 18-23, 27-28.

other impressionistic criteria in a nonaesthetic milieu<sup>100</sup> proves especially harmful when the “sets of instructions” or the “collections of data” at issue pertain to functionally efficient or standardized solutions that prudent second comers will prefer to work around in order to forestall actions for infringement.<sup>101</sup> Carried to an extreme, the very process of standardization needed for the progress of artificial intelligence<sup>102</sup> could enable early generations of programmers and systems analysts to lodge derivative work claims against those who use the unpatented prior art as components or building blocks in later, more advanced achievements.<sup>103</sup>

In contrast, when electronic information bundles are viewed as intangible tools, the broad reproduction and adaptation rights of copyright law conflict with the traditional rights of both competitors and users under basic principles of industrial property law. As previously demonstrated, unpatentable handtool designs were relegated to either free competition or utility model laws that operated on patent principles, including the principle of exhaustion.<sup>104</sup> Once manufacturers sold protected handtools on the open market, they normally retained no further control over the uses to which their innovative functional designs were put, and third parties who improved upon these designs were almost never viewed as infringers. In this way, the legal protection of handtool designs historically bestowed no more than a minimum amount of lead time on innovators, and it deliberately fostered “se-

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100. “As with the analysis of copyright protection for nonliteral elements of program code . . . the use of terms such as ‘structure, sequence, and organization,’ ‘look and feel,’ or ‘total concept and feel’ obscures rather than assists in the application of copyright principles to software interfaces.” *Conference Report*, *supra* note 82, at 27.

101. *See, e.g.*, Menell, *supra* note 82, at 1082 (concluding that “the *Whelan* rule makes it difficult for others wishing to market programs performing the same task as the first comer to perform it as effectively” and thus “enables first comers to ‘lock up’ basic programming techniques”); Samuelson, *supra* note 45. *See also* Dennis S. Karjala, *Copyright, Computer Software, and the New Protectionism*, 28 *JURIMETRICS J.* 33, 34-36, 62-96 (1987).

102. *See* THE COMPUTER SCIENCE AND TELECOMMUNICATIONS BOARD, COMMISSION ON PHYSICAL SCIENCES, MATHEMATICS, AND APPLICATIONS, KEEPING THE U.S. COMPUTER INDUSTRY COMPETITIVE: SYSTEMS INTEGRATION 62-67 (1992) [hereinafter *SYSTEMS INTEGRATION*].

103. *Cf.* L. Thorne McCarty, *Artificial Intelligence and Intellectual Property Law: Some Problematical Examples*, in *WIPO SYMPOSIUM*, *supra* note 46, at 31, 33-36; Andy Johnson-Laird, *Main Categories of Artificial Intelligence and Their Intellectual Property Aspects*, in *WIPO SYMPOSIUM*, *supra*, note 46 at 45-53; Randall Davis, *Intellectual Property and Software: The Assumptions Are Broken*, in *WIPO SYMPOSIUM*, *supra*, note 46 at 101-20. *See also* Jaap H. Spoor, *Protecting Expert Systems*, in *Particular Expert System Knowledge: A Challenge for Lawyers*, in *WIPO SYMPOSIUM*, *supra*, note 46, at 77-84; Thomas K. Dreier, *Intellectual Property Aspects of Artificial Intelligence*, in *WIPO SYMPOSIUM*, *supra* note 46, at 151-67.

104. *See supra* text accompanying notes 68-70; *see also* CORNISH, *supra* note 33, at 199-200. <https://commons.udayton.edu/udlr/vol17/iss3/8>

quential and cumulative improvements" by virtue of its much narrower doctrine of equivalents.<sup>105</sup>

It does not necessarily follow that utility model laws, or even a modified patent approach, offer a satisfactory solution to present-day problems of protecting electronic information tools, although some commentators take this position.<sup>106</sup> On the contrary, there is reason to believe that new technologies in general, and electronic information processing in particular, would benefit most from a new approach whose primary purpose was simply to provide innovators with artificial lead time in which to recoup their investments.<sup>107</sup> Nevertheless, the historical perspective suggests that a need to provide creators of electronic information tools with adequate investment incentives does not necessarily entail recognition of derivative ownership rights in posterior innovation that users develop with the aid of such tools. Nor should legal incentives to innovate unduly impair the ability of second comers to enhance the efficiency of these same tools. Although the modalities for compensating electronic toolmakers for their innovative contributions may have to be adapted to fit particular applications, the properties of digitalization facilitate such adjustments. None of the foreseeable remuneration problems justifies any derogation from the goal of compensating the toolmaker for the behavioral impact of the tool itself rather than for putative "adaptations" of its constituent parts that result from using the tool for its intended purpose.<sup>108</sup>

At present, those who exploit the dual nature of most factual and functional productions take great pains to obscure the utilitarian character of these so-called "literary works."<sup>109</sup> This breeds considerable tension with the pristine goals of literary and artistic property law. Un-

105. See Karjala, *supra* note 101, at 39; *supra* notes 65-67 and accompanying text (narrow range of equivalents under utility model regimes).

106. See, e.g., Higashima & Ushiku, *supra* note 59; Sabbath, *supra* note 59; see generally Kingston, *supra* note 6, at 35-86 (discussing his proposed modified patent regime and that of Kronz). Utility models are firmly established in international industrial property law. See Paris Convention, *supra* note 22, arts. 1(2), 4, 5.

107. See Reichman, *Legal Hybrids*, *supra* note 50, part III; see also *infra* notes 224-26 and accompanying text.

108. See Davis, *supra* note 103, at 113-17. Cf. L. RAY PATTERSON & STANLEY W. LINDBERG, *THE NATURE OF COPYRIGHT—A LAW OF USERS' RIGHTS* 191-94 (1991) (criticizing publishers' pressures to restrict users' rights even as to literary and artistic works traditionally covered by copyright law); Peter Jaszi, *Toward a Theory of Copyright: The Metamorphosis of "Authorship,"* 1991 DUKE L.J. 455, 493-96 (criticizing judicial tendency to romanticize the "authorship" of derivative rights owners at the expense of those "who merely rework prior art — no matter how ably").

109. See, e.g., Anthony L. Clapes, Patrick Lynch & Mark R. Steinberg, *Silicon Epics and Binary Bards: Determining the Proper Scope of Copyright Protection for Computer Programs*, 34 UCLA L. REV. 1493 (1987); Morton David Goldberg, *Copyright Protection for Artificial Intelligence*, 1991 COMM. ON INFO. SUPPLIES, *supra* note 46, at 55-75; see also Arthur R. Miller, *Com-*

like patent law, which allows second comers freely to use all unpatented innovations, the amorphous nature of copyright protection and the powerful reproduction rights it triggers encourage any information engineer whose nominal quantum of "authorship" overlaps that of others working in the same field to lodge complaints about "copying" that look tenable and are costly to defend.<sup>110</sup> Whether the United States Supreme Court's recent decisions in *Feist*<sup>111</sup> and *Bonito Boats*<sup>112</sup> will curb this trend toward overprotection remains to be seen. Properly interpreted, these precedents suggest that copyright law should never afford borderline factual and functional works more than "thin" protection against wholesale appropriation of surface expression.<sup>113</sup> Moreover, there is no conflict with the copyright owner's market interest in derivative works so long as users apply the original works to the purposes for which they were purchased or second comers take unprotectible information or utilitarian features without duplicating that same surface expression.<sup>114</sup>

The federal judiciary's willingness to heed the message implicit in these two Supreme Court decisions cannot be taken for granted. The

*puters and Authorship: The Copyrightability of Computer-Generated Works*, in WIPO SYMPOSIUM, *supra* note 46, at 241-70.

110. Cf. Dennis S. Karjala, *United States Adherence to the Berne Convention and Copyright Protection of Information-Based Technologies*, 28 JURIMETRICS J. 147, 149-50 (1988) (stating that advances in software design are always similar to prior works); Peter S. Menell, *Tailoring Legal Protection for Computer Software*, 39 STAN. L. REV. 1329, 1339-46 (1987) (stressing dangers of legal protection for product standards).

111. *Feist Publications v. Rural Tel. Serv. Co.*, 111 S. Ct. 1282 (1991).

112. *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 159-64 (1989) (appearing to invest a competitor's right to reverse engineer unpatented, noncopyrightable products with constitutional underpinnings).

113. See, e.g., GOLDSTEIN, *supra* note 10, at 197 (citing pre-*Feist* authorities to the same effect). For evidence that the message of *Feist* has been heard, see, e.g., Key Publications v. Chinatown Today Publishing Enters., 945 F.2d 509 (2d Cir. 1991); Sem-Torq, Inc. v. K Mart Corp., 936 F.2d 851 (6th Cir. 1991); Victor Lalli Enters. v. Big Red Apple, Inc., 936 F.2d 671 (2d Cir. 1991). However, subtle and ingenious efforts to circumscribe *Feist* and broaden the scope of copyright protection for computerized data bases are also evident. See, e.g., Bellsouth Advertising & Publishing v. Donnelley Info. Publishing, 933 F.2d 952 (11th Cir. 1991) (yellow pages protectible and infringed by licensee who used plaintiff's data to develop own directory; court emphasizes appropriation of "format" and "coordinated" data); Kregos v. The Associated Press, 937 F.2d 700, 707-09 (2d Cir. 1991) (finding sufficient creativity in selection of categories for baseball pitching form and implying that competitors could not copy that same format even if based on outcome predictive statistical selection); see also *United States Payphones, Inc. v. Executives Unlimited of Durham, Inc.*, 18 U.S.P.Q. 2d (BNA) 2049 (4th Cir. 1991) (unpublished).

114. See generally MELVILLE B. NIMMER & DAVID NIMMER, 3 NIMMER ON COPYRIGHT § 13.03 (rev. ed. 1990); Reichman, *supra* note 5, at 693, 693 n.288 (clarifying and interpreting

quantum of creative authorship that *Feist* requires remains modest,<sup>115</sup> while the Court's disinclination to allow a modestly creative selection and arrangement to pervade the assembled data has yet to be tested.<sup>116</sup> Given the current judicial preoccupation with setting innovation policy above the application of statutory and traditional copyright principles,<sup>117</sup> one cannot assume that courts adjudicating future actions for the infringement of functional works will more readily absorb the teachings of the factual works cases than in the past.<sup>118</sup>

To the extent that both *Feist* and *Bonito Boats* fail to halt a reckless protectionist trend, manufacturers of electronic information tools stand to obtain patent-like protection on soft conditions for a very long period of time, even though innovation in information science occurs through "sequential and cumulative improvements."<sup>119</sup> If these restraints on trade, which cannot be squared with the traditional justifications for an intellectual property system, are carried over to computer-generated productions and to the outputs of artificial intelligence machines, it will compound the resulting social disutilities.<sup>120</sup> In the long run, overprotection on this scale will suffocate the very incremental innovation that copyright law was summoned to promote,<sup>121</sup> and it will harm even the oligopolistic firms that have lobbied so hard to procure it.

115. See *Feist*, 111 S. Ct. at 1287 ("the requisite level of creativity is extremely low; even a slight amount will suffice"), 1296 (stressing nonmechanical or nonroutine selection and arrangement).

116. For indications that some federal appellate courts may resist the "thin" copyright logic in response to subjective and poorly articulated notions of piracy, see *supra* note 113.

117. Courts following the *Whelan* line of decisions feel impelled to set innovation policy above the application of statutory and traditional copyright principles. See, e.g., *Conference Report*, *supra* note 82 (criticizing *Whelan* and applying traditional copyright principles to computer programs). In contrast, the Supreme Court in *Feist* deliberately avoided questions concerning the socially desirable level of competition for factual compilations. 111 S. Ct. at 1289-90 ("It may seem unfair that much of the fruit of the compiler's labor may be used by others without compensation . . . [but] this is . . . 'the essence of copyright' . . . and a constitutional requirement"); see also *id.*, at 1292, n\* (stating that the Supreme Court's misappropriation decision in *International News Service v. Associated Press*, 248 U.S. 215 (1918) was "not relevant here"); *Patterson & Joyce*, *supra* note 18, at 757-81.

118. Until *Feist*, courts responsible for the maxi-protectionist trend in the computer program cases, such as *Whelan Assocs., Inc. v. Jaslow Dental Labs, Inc.*, 797 F.2d 1222 (3rd Cir. 1986), *cert. denied*, 497 U.S. 1031 (1987), took pains to ignore both the "thin copyright" tradition of the functional works milieu and the "narrow range of protection" tradition of the factual works cases. See generally Reichman, *Realist's Approach*, *supra* note 16, at 966-76.

119. Karjala, *supra* note 110; see generally Reichman, *supra* note 5, at 683-89 ("'Originality' and the Burdens of Overlapping Claims").

120. See *infra* text accompanying notes 190-217.

121. Because it is difficult to separate basic from applied research in this field, the exercise of overly broad and exclusive reproduction rights at the application phase can fuel claims of infringement having serious repercussions at a more theoretical level. See further Reichman, *supra*



Applying the logic of utility model laws to electronic information processing thus helps to explain why application of the full copyright paradigm to technological innovation eventually becomes a self-defeating proposition. The tool concept of industrial property law also sheds considerable light on the uncertain status of small change literary productions even in the pre-digital world of copyright law.<sup>122</sup> A benign tolerance of these "works" in that halcyon period violated cardinal principles of artistic property law by protecting functional tools masquerading as literary works. In this respect, copyright protection of computer programs as literary works merely converted yesterday's "small change" anomalies into the "big bucks" anomalies of today. The difference is that electronic information processing constitutes the engine of twenty-first century economic development, and powerful lobbies are no longer satisfied with the "thin" protection meted out in the past.

## 2. The Public Interest at Odds with the Two-Party Deal

If the invention of the printing press created a market for literary and artistic works that could be reproduced in copies, it also ended the ability of authors and publishers to control the utilization of their published works by means of two-party contractual agreements.<sup>123</sup> In effect, copyright law established a surrogate form of ownership by instituting a system of portable fences, valid against the world and backed by the power of the state, that accompany an author's creation on its journey from mind to mind.<sup>124</sup> Even though third parties legitimately exercise dominion over artifacts that embody original intellectual creations, these fictitious portable fences neutralize essential attributes of property that possession would ordinarily confer. The exclusive right to reproduce thus mandates a consensual relation between creator and would-be exploiters that prevents the latter from using the former's contribution in specified ways without paying for the privilege.<sup>125</sup> This right constitutes the essential element of intellectual property law, and

122. See *supra* text accompanying notes 22-32.

123. See, e.g., STEPHEN SAXBY, *THE AGE OF INFORMATION* 1-34 (1990); POLLAUD-DULIAN, *supra* note 79, at 43-57, 106-08; Patterson & Joyce, *supra* note 18, at 791 n.240 ("Before the invention of the printing press, the concept of a public domain would have made no sense").

124. J.H. Reichman, *Intellectual Property in International Trade: Opportunities and Risks of a GATT Connection*, 22 *VAND. J. TRANSNAT'L L.* 747, 800-05 (1989) ("Portable Fences for an Ubiquitous Estate") [hereinafter *GATT Connection*]. But see Palmer, *supra* note 11, at 288-302 (emphasizing alternatives to property rights, including "technological fences").

125. See, e.g., BENKO, *supra* note 7, at 17-18; Paul Roubier, *Unité et synthèse des droits de propriété industrielle*, in *ETUDES SUR LA PROPRIÉTÉ INDUSTRIELLE LITTÉRAIRE ARTISTIQUE: MÉ-*

it gives intellectual creations the quality of "goods" in both the legal and economic sense of the term.<sup>126</sup>

To this day, the market for literary and artistic works has been able to develop and organize itself with a relative degree of efficiency<sup>127</sup> because states continue to "substitute . . . a statutory period of artificial lead time for the brief or negligible period of natural lead time that competition in intellectual achievements otherwise tends to produce."<sup>128</sup> State intervention is not, however, without its costs. On the contrary, authors' rights in particular are freighted with limitations and exceptions in the public interest that seriously undermine the specific efficiencies one expects property rights to produce. If, on one theory or another, the nineteenth century vindicated the creators' rights to compensation for inventions and original works of authorship, the twentieth century has witnessed the maturation of offsetting conditions that define and fortify the larger public interest.<sup>129</sup>

The fair use exception codified in United States copyright law<sup>130</sup> is a prime manifestation of this trend, although other Berne Union countries appear to define it less broadly than in domestic law.<sup>131</sup> Fair use disculpates certain unauthorized but socially beneficial uses either because transaction costs might otherwise stand in the way of negotiated licenses<sup>132</sup> or because the resulting public benefit is thought to outweigh the loss of private gain.<sup>133</sup> Moreover, the fair use exception perfects a broader legislative denial of any exclusive right *to use* the copyrighted work. In the United States, as in most Berne Union countries, the exclusive reproduction rights do not allow authors to control the end use

126. See, e.g., Roubier, *supra* note 125, at 164-65; Michael Lehmann, *The Theory of Property Rights and the Protection of Intellectual and Industrial Property*, 16 I.I.C. 525, 540 (1985).

127. See, e.g., Michael Lehmann, *Property and Intellectual Property: Property Rights as Restrictions on Competition in Furtherance of Competition*, 20 I.I.C. 1, 10-11 (1989); Landes & Posner, *supra* note 11, at 88; cf. Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J. LAW & ECON. 265 (1977). However, the protection of the author's personality interest and the promotion of cultural policies often override considerations of efficiency, which is only a relative, not an absolute goal of copyright law. See *supra* notes 16 & 79-80 and accompanying text.

128. Reichman, *GATT Connection*, *supra* note 124, at 803.

129. See, e.g., RICKETSON, *supra* note 22, 477-548 (limitations on artistic property rights under Berne Convention); PATTERSON & LINDBERG, *supra* note 108, at 132-33. See also Jean Foyer, *Problèmes internationaux contemporains des brevets d'invention*, in 171 DE L'ACADÉMIE DE DROIT INTERNATIONAL. RECUEIL DES COURS 340, 390-94 (1981) (public interest exceptions recognized under the patent systems of all countries).

130. 17 U.S.C. § 107 (1988).

131. Compare, e.g., RICKETSON, *supra* note 22, at 479-89 with WILLIAM F. PATRY, *THE FAIR USE PRIVILEGE IN COPYRIGHT LAW* (1985).

132. See generally Wendy J. Gordon, *Fair Use as Market Failure: A Structural and Economic Analysis of the Betamax Case and Its Predecessors*, 31 J. COPYRIGHT SOC'Y 601 (1984).

133. See 2 GOLDSTEIN, *supra* note 10, § 10.1.

of their copyrighted works.<sup>134</sup> The first-sale doctrine, which limits the exclusive distribution right in United States law, expressly authorizes those who purchase copies of protected works to use and dispose of these copies without interference from the copyright owners.<sup>135</sup>

From a different angle, one could argue that the idea-expression doctrine constitutes the most fundamental exception of them all.<sup>136</sup> Apart from its role as a guarantor of free speech,<sup>137</sup> this doctrine ensures an adequate level of competition through a built-in process of "reverse engineering" that permits third-parties freely to use the facts and ideas underlying clusters of related expression. In addition, both domestic and international law recognize numerous exemptions and immunities for educational and social purposes,<sup>138</sup> including the imposition of compulsory licenses for recorded musical works and broadcasts.<sup>139</sup> Still other limitations arise from the state's general exercise of its police powers and from abuses of the statutory monopoly, whether or not rising to the level of antitrust violations.<sup>140</sup> In a few countries, even the protection of moral rights assumes a public-interest character by enabling state authorities to preserve the integrity of cultural goods beyond the lifetime of their creators or, in the case of folklore, in the absence of specifically identifiable authors.<sup>141</sup>

134. See, e.g., Brown, *supra* note 11, at 588-89. Professor Brown states: "The right to control the use of a work, although granted to inventors, has never been part of copyright except as performance may be considered 'use.' Indeed, the absence of a 'use right' helps to justify the relatively casual approach to granting copyright as opposed to the more searching tests for patentability." See generally POLLAUD-DULIAN, *supra* note 79, 279-399 (noting subtle variations from one national system to another).

135. See 17 U.S.C. §§ 109(a), 202 (1988). See generally John M. Kernochan, *The Distribution Right in the United States of America: Review and Reflections*, 42 VAND. L. REV. 1407 (1989). But see 17 U.S.C. § 109(b) (rental rights reserved to owners of copyrighted sound recordings and computer programs); POLLAUD-DULIAN, *supra* note 79, 495-507 (advocating generalized right to control end use of copyrighted works). See also 17 U.S.C. § 106A (Pub. L. 101-650, 104 Stat. 5128 (1990)) (moral rights of visual artists).

136. 17 U.S.C. § 102(b) (1988); see, e.g., Litman, *supra* note 88, at 977, 1015, 1023; Brown, *supra* note 11, at 601-05.

137. See 1 NIMMER & NIMMER, *supra* note 114, § 1.10.

138. See, e.g., 17 U.S.C. §§ 108-120 (1988); Berne Convention, *supra* note 22, Arts. 2bis(2), 9(2), 10, 10bis, 11bis(2), 13; RICKETSON, *supra* note 22, at 532-42 (implied exceptions concerning public performance, broadcasting, recording, cinematographic, and translation rights).

139. See 17 U.S.C. §§ 110, 111, 115 (1988); Berne Convention, *supra* note 22, Arts. 11bis(2), 13.

140. See Berne Convention, *supra* note 22, art. 17; RICKETSON, *supra* note 22, at 542-48. Cf. Raskind, *supra* note 12 (discussing bases in unfair competition law, misappropriation branch, that condition a state's ability to prevent competitors from unfairly using a creator's intangible production).

141. See, e.g., Berne Convention, *supra* note 22, arts. 6bis(2), 15; RICKETSON, *supra* note 22, at 313-15; but see Jaszi, *supra* note 108, at 496-500 (viewing moral rights as a form of private censorship). See also Edward J. Damich, *The Right of Personality: A Common Law Basis for the Protection of the Moral Rights of Authors*, 73 CALIF. L. REV. 1 (1988); Wendy J. Gordon, *Toward*

The growing importance of electronic information tools, however, threatens to undermine the balance of public and private interests achieved in the past by restoring the publishers' power to subordinate even the use of disseminated information to the terms of two-party contractual agreements. For example, to the extent that publishers supply on-line information to a network of licensed subscribers from computerized and constantly updated data bases kept on their own premises, they avoid the kind of dissemination in hard copies that made intellectual creations vulnerable to third-party appropriation in the past.<sup>142</sup> By the same token, publishers may also attempt to avoid the legal and practical constraints that have hitherto combined to safeguard users' interests.

The first-sale doctrine protects only a user who lawfully acquires hard copies.<sup>143</sup> Because subscribers entering any given data base must log in and out, the proprietors' physical control over the data may enable them to charge for each and every use of electronically processed information, even though the copyright law itself grants no exclusive right to control either end use in general<sup>144</sup> or the use of disparate facts in particular.<sup>145</sup> Even when dissemination occurs in hard copy form, such as a CD ROM, digital technology facilitates the control of end use by enabling intermediate providers, such as libraries, to monitor actual usage and by permitting originators to charge, directly or indirectly, for all uses.<sup>146</sup>

These heightened powers of control enable publishers to monitor and charge even for uses analogous to those customarily regarded as

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*a Jurisprudence of Benefits: The Norms of Copyright and the Problem of Private Censorship*, 57 U. CHI. L. REV. 1009 (1990).

142. See *supra* text accompanying notes 9-13; cf. Patterson & Joyce, *supra* note 18, at 782 ("The vital question today is whether the copyright law developed for the printing press remains appropriate in an age of new and radically different communications technologies, such as the computer"). Although dissemination in CD ROMS presumably remains subject to the first-sale doctrine, assuming copyrightability, see 17 U.S.C. §§ 102(a), 109(a) (1988), the need for updates may impel users to accept the originator's licensing restrictions all the same.

143. See *supra* notes 135 & 142.

144. See *supra* notes 134-35 and accompanying text.

145. *Feist Publications v. Rural Tel. Serv. Co.*, 111 S. Ct. 1282, 1289-90 (1991). Cf. Ginsburg, *supra* note 1, at 1916 (arguing that copyright incentives to compilers of data bases should not include control over posterior recombinations of the data compiled, because "vesting this control in a single compiler would cut off public access to new informational works that could be generated from the data . . . but that the compiler declines to license.").

146. See Ginsburg, *supra* note 1, at 1619 n.209 (describing traditional collection practices of The Copyright Clearance Center (CCC) and experimental technology of university microfilms, known as BART (Billing and Royalty Tracking). Until refined monitoring techniques are perfected, however, surveillance of those who use libraries remains difficult, and there is a substantial risk of downloading for commercial or competitive purposes. *Id.*, at 1919-22. Users dependent on

privileged under a regime of hard copy dissemination, such as the making of copies for personal use or for research purposes.<sup>147</sup> If the data base in question satisfied the post-*Feist* requirements for copyright protection,<sup>148</sup> the traditional reluctance of both domestic and foreign law to recognize fair use in unpublished works could subtly reinforce such practices.<sup>149</sup> To the extent that electronic information publishers still need public and private libraries to broaden the diffusion of their products, moreover, whether on-line or in CD-ROMS, the publishers' natural monopoly enables them to impose and enforce harsh contractual conditions more readily than when the same information appears in publicly distributed printed copies. Licensing agreements may consequently require librarians to waive privileges that the copyright law otherwise affords<sup>150</sup> and to limit users' access to copyrighted matter beyond what their own understanding of the fair use doctrine would require.<sup>151</sup> Aggressive licensing of electronic information tools could thus distort the public service mission of libraries by making them involuntary collection agents for publishers.

Even without the involvement of libraries, widespread recourse to the two-party deal creates tension between the providers' efforts to control each and every use of the electronically processed information and the public's ability to foster certain socially beneficial uses of that same information at acceptable costs.<sup>152</sup> To the extent that fair use rests on a market-failure rationale, as some commentators contend,<sup>153</sup> electronic information tools will reduce the kinds of transaction costs that have traditionally justified much privileged use in the past.<sup>154</sup> While new transaction costs may nonetheless arise, especially if low-authorship data bases are routinely denied any form of intellectual property pro-

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147. See, e.g., 17 U.S.C. § 107 (1988); PATTERSON & LINDBERG, *supra* note 108, at 193-213 (distinguishing personal use from fair use); RICKETSON, *supra* note 22, at 477-78.

148. See *supra* note 115 and accompanying text.

149. See, e.g., *Harper & Row Publishers, Inc. v. Nation Enters.*, 471 U.S. 539 (1988); *New Era Publications Int'l v. Henry Holt & Co.*, 873 F.2d 576 (2d Cir. 1989), *cert. denied*, 110 S. Ct. 1168 (1990); *Salinger v. Random House, Inc.*, 811 F.2d 90 (2d Cir. 1987); see most recently *Sega Enterprises Ltd. v. Accolade, Inc.*, 785 F. Supp. 1392 (N.D. Cal. 1992). See also RICKETSON, *supra* note 22, at 488 (interpreting Berne Convention, *supra* note 22, art. 9(2)); Lloyd L. Weinreb, *Fair's Fair: A Comment on the Fair Use Doctrine*, 103 HARV. L. REV. 1137 (1990).

150. See, e.g., 17 U.S.C. § 108 (1988).

151. Cf. PATTERSON & LINDBERG, *supra* note 108, at 159, 181-90.

152. Cf., e.g., *Narell v. Freeman*, 872 F.2d 907, 914 (9th Cir. 1989) ("The scope of permissible fair use is greater with an informational work than a creative work."); *Vault Corp. v. Quaid Software Ltd.*, 847 F.2d 255, 268-70 (5th Cir. 1988) (pre-empting "shrink wrap license" prohibiting copying or modification of computer programs by dint of 17 U.S.C. §§ 117, 301 (1988)).

153. See *supra* notes 132-33 and accompanying text.

tection whatsoever,<sup>155</sup> digital technology enhances the providers' opportunities for contractually extracting these costs from selected, identifiable users. Indeed, by facilitating implementation of the pay-per-use principle on a scale hitherto unthinkable, computerization tends to reduce the need for the blanket licenses and collection agencies that other copyright industries employ.<sup>156</sup> In effect, the electronic information publisher becomes increasingly capable of serving as his own collection society, subject to no consent decrees, no membership controls, and no external regulation other than the threat of litigation for abuse of copyright.<sup>157</sup>

The counterargument, of course, is that electronic monitoring merely enables providers to put information to its most valuable uses while eliminating hidden subsidies that distort the price-setting function of the market.<sup>158</sup> This reasoning, however, downplays the extent to which the state's initial willingness to enforce fictitious sets of portable fences in regard to intangible intellectual creations was itself conditioned upon perpetual guarantees concerning access to the copyrighted culture.<sup>159</sup> It also ignores that both facts and ideas constitute cultural building blocks that cannot be withdrawn from circulation or overly taxed without impinging upon the future development of that same culture.<sup>160</sup>

It remains to be seen whether courts will enforce contractual provisions that unduly circumscribe users' rights and privileges that are either rooted in the copyright statute or in analogous public policy considerations.<sup>161</sup> In this regard, recent attempts to maximize the protection of undisclosed source codes for computer programs by combining federal copyright protection with state trade secret laws constitute a dangerous precedent.<sup>162</sup> By the same token, judicial resistance to

155. See, e.g., Ginsburg, *supra* note 1, at 1918-22 (fearing that publishers who cannot adequately track unauthorized third-party uses of their data will escalate the prices of authorized uses to offset these losses plus the cost of self-help measures and/or collection agencies).

156. See *supra* note 146 and accompanying text.

157. Cf. e.g., PATTERSON & LINDBERG, *supra* note 108, at 182-86, 237.

158. Cf., e.g., Palmer, *supra* note 11; Breyer, *supra* note 11.

159. See *supra* notes 124-29 and accompanying text.

160. See *supra* notes 136-38 and accompanying text; see also David Lange, *Recognizing the Public Domain*, 44 LAW & CONTEMP. PROBS. 147, 171-73 (1981).

161. Although courts do not lack authority to limit contractual provisions perceived to harm the public interest, especially under the Second Restatement of Contracts, a judicial willingness to take such steps often depends on the existence of statutes that express the relevant public policy goals. See RESTATEMENT (SECOND) OF CONTRACTS, §§ 178-79 (1981). Cf. *id.* §§ 181, 186.

162. See, e.g., Roger M. Milgrim, *Trade Secret Law to Protect Computer Programs*, paper presented to the Conference on Significant Developments in Computer Law (1991), University of Dayton (Ohio) School of Law, June 6, 1991; David Bender, *Protection of Computer Programs: The Copyright/Trade Secret Interface*, 47 U. PITT L. REV. 907 (1986); see also John R. Harris, *A Market-Oriented Approach to the Use of Trade Secret or Copyright Protection (or Both?) for*

"shrink wrap" licensing of computer programs<sup>163</sup> may help to stimulate the search for public policy constraints favoring libraries and, perhaps, users of both factual and functional works in general. The *Feist* and *Bonito Boats* decisions, taken together, could also reinforce users' appeals to the public policy exception in contracts law and to the doctrine of abuse in intellectual property law.<sup>164</sup>

Much depends on whether the reasoning of *Feist* will persuade the federal courts to apply its "thin" copyright doctrine to computer programs, in keeping with the judicial treatment of functional works in the past.<sup>165</sup> At present, one dares not presume that courts will uphold the right of third parties to reproduce a computer program for purposes of analyzing its unprotectible, technical ideas, even though this result is mandated by the pristine teachings of *Baker v. Selden*,<sup>166</sup> by the doctrine of fair use as codified in section 107, and by the Supreme Court's emphasis on reverse engineering in *Bonito Boats*.<sup>167</sup> To the extent that the federal judiciary fails to vindicate analytical use of nonprotectible *functional* matter,<sup>168</sup> it will indirectly abet the contractually imposed destruction of public interest safeguards concerning *factual* matter that electronic information tools make increasingly feasible.

Even if the federal appellate courts decided to resist encroachment upon the public interest more strenuously in cases concerning copyrighted factual works than they have in recent cases testing the scope

*Software*, 25 JURIMETRICS J. 147, 156-64 (1985); Stanislaw J. Soltysinski, *Legal Protection for Computer Programs, Public Access to Information and Freedom of Competitive Research and Development Activities*, 16 RUTGERS COMPUTER & TECH. L. J. 447, 448-50, 464-65 (1990).

163. See, e.g., *Vault Corp. v. Quaid Software Ltd.*, 847 F.2d 255, 268-70 (5th Cir. 1988); David W. Maher, *The Shrink-Wrap License: Old Problems in a New Wrapper*, 34 J. COPYRIGHT SOC'Y, 292 (1987). Cf. Ginsburg, *supra* note 1, at 1920 ("A 'shrink wrap license' equivalent for a CD Rom may not, absent a validating state statute, constitute an enforceable contract").

164. Cf. *Lasercomb Am., Inc. v. Reynolds*, 911 F.2d 970, 979 (4th Cir. 1990) (finding that anticompetitive clauses in standard licensing agreement constituted misuse of copyright); 2 GOLDSTEIN, *supra* note 10, § 9.6.1 (suggesting that factual and functional works are likely candidates for application of the misuse doctrine); 4 DONALD S. CHISUM, PATENTS § 19.04 (1991) (discussing better established doctrine of misuse in patent law). However, to the extent that the license agreements under attack covered matter left uncopyrightable by § 102(b) of the Copyright Act or by *Feist* itself, there would be no copyright to misuse and the success of comparable arguments could hinge on the public policy exception to contract enforcement. See *supra* note 161 and accompanying text; see also Maher, *supra* note 162, at 294-97 (discussing equitable servitude doctrine).

165. See *supra* notes 38 & 89 and accompanying text.

166. See 17 U.S.C. § 102(b) (1988); *Baker v. Selden*, 101 U.S. 99 (1879) (use of bookkeeping system set out in copyrighted literary work held not to infringe); see generally Reichman, *supra* note 5, at 693 & n.288.

167. See *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 159-64 (1989); 17 U.S.C. § 107 (1988); GOLDSTEIN, *supra* note 10, § 5.2.1.4, at 85-91 (Supp. 1992); see also Reichman, *Realist's Approach*, *supra* note 16, at 960 n.110, 970-73.

168. See, e.g., *Sega Enterprises, Ltd. v. Accolade, Inc.*, 785 F. Supp. 1392 (N.D. Cal. 1992) (https://www.copyright.com/publicdomain/v1/1992/usresp.html) (compatibility were not fair use).

of protection for computer programs,<sup>169</sup> the United States Supreme Court's decision in *Feist* could inadvertently undermine the potential strength of this resistance. By placing low-authorship compilations of data that fail to meet a constitutionally imposed standard of creativity outside the statutory framework,<sup>170</sup> this decision ostensibly frees publishers of such productions from the public-interest exceptions copyright law otherwise mandates.

The *Feist* decision could thus aggravate a dilemma that already plagues policymakers concerned about the legal protection of electronic information tools. On the one hand, *Feist* raises legitimate fears that compilers who disseminate information in hard copies may suffer from a chronic state of underprotection that discourages investment. These fears follow from the compiler's inability to prevent third parties from freely exploiting data contained in those compilations that remain copyrightable,<sup>171</sup> as well as from the originator's inability to obtain any copyright protection at all for data bases that lack the requisite quantum of creativity. This risk of underprotection, in turn, invites legislative tinkering that could either further distort the carefully balanced mechanisms of the mature copyright paradigm<sup>172</sup> or add another ad hoc solution to an already overcrowded intellectual property scaffold.<sup>173</sup>

On the other hand, the *Feist* decision may paradoxically heighten the power of those electronic publishers who remain relatively immune from third-party appropriation to maintain real fences around the information they gather without having to invoke the imaginary portable fences of intellectual property law.<sup>174</sup> In this context, nonprotectible information will not simply escheat to the public domain in keeping with the Supreme Court's tacit assumption about unpatented innovation in *Bonito Boats*.<sup>175</sup> Rather, noncopyrightable information could become the object of contractually imposed forms of overprotection that are

169. See *supra* notes 91-92 and accompanying text.

170. *Feist Publications, Inc. v. Rural Tel. Serv. Co.*, 111 S. Ct. 1282, 1287-90 (1991).

171. See generally OTA REPORT, *supra* note 2, at 74-77; Denicola, *supra* note 18.

172. See, e.g., Ginsburg, *supra* note 1, at 1924-36 (advocating the expansion of copyright subject matter and scope in favor of low authorship factual works, in order to avoid underprotection; but also advocating compulsory collective licensing to avoid overprotection); see also Colin Tapper, *An Aspect of Copyright in Data Bases*, 14 N. KY. L. REV. 169, 209-10 (1987) (arguing that changes in copyright law to accommodate the quirks of electronic information processing distort the careful balance copyright law has developed for more traditional works of authorship).

173. See generally J. H. Reichman, *Proprietary Rights in the New Landscape of Intellectual Property Law: An Anglo-American Perspective*,—COLUM. VLA J.L. & ARTS—(forthcoming 1992) [hereinafter *Proprietary Rights*].

174. See *supra* notes 123-26 and accompanying text; cf. Palmer, *supra* note 11, at 288-89 (arguing that proprietary rights reduce incentives to the development of technological fencing mechanisms that would impede free-riding with less distortion to free trade).



potentially more insidious in the long run than chronic states of under-protection stemming from the compilers' inability to appropriate the fruits of their own labors.<sup>176</sup>

This dilemma has kindled interest in early efforts by the Nordic countries to protect low-authorship compilations under a sui generis approach.<sup>177</sup> The Nordic "catalogue rule," as it is known, provides short-term copyright-like protection for compilations that fail to satisfy the normal threshold requirements of copyright law.<sup>178</sup> It prohibits slavish reproduction, in whole or in part, of "catalogues, tables and similar compilations in which a large number of particulars have been summarized" for a period of ten years from the date of first publication.<sup>179</sup> The Nordic catalogue rule, however, adopted prior to the digital revolution, reportedly fails to prevent competitors from reusing or remanipulating the compiler's factual contents as such.<sup>180</sup> In contrast, the Commission of the European Communities has proposed a modified version of the Nordic catalogue rule that provides stronger protection for derivative works.<sup>181</sup>

Many Berne Union Countries already regulate the contractual provisions that publishers may impose upon authors generally, with a view toward bolstering the latter's characteristic lack of bargaining

176. Cf. OTA REPORT, *supra* note 2, at 163 (stressing increased transaction costs of distributing information that are likely to flow from either technical or contractual fence building); Ginsburg, *supra* note 1, at 1922-24 (noting potential for high prices and undesirable transaction costs if compilers obtain full copyright protection); Patterson & Joyce, *supra* note 18, at 792 (stressing need to "enhance access to the public domain for users of computerized research tools").

177. See, e.g., Gunnar Karnell, *The Nordic Catalogue Rule, in PROTECTING WORKS OF FACT 67-72* (E. J. Dommering & P. Bernt Hugenholtz, eds. 1991); Agne Henry Olsson & Karin Hokborg, *The Nordic Countries, in INTERNATIONAL COPYRIGHT AND NEIGHBORING RIGHTS 468, 475* (S. Stewart 2d ed. 1989).

178. Karnell, *supra* note 177, at 67 (quoting § 49 of the Swedish Copyright Act of 1960). According to Professor Karnell, the aim is "to protect enterprises that have spent capital and work on the production of a product of the kind from plagiarism and ensuing unfair competition by means of unwarranted reproductions". *Id.* at 70.

179. See Karnell, *supra* note 177, at 68, 70 (stating that, as a neighboring right, eligibility under the catalogue rule turns on the compiler's industrious effort and investment, rather than on the creativity manifested in personal expression; and conceding that this regime equates unauthorized duplication with a type of unfair competition). Cf. Leo J. Raskind, *The Continuing Process of Refining and Adapting Copyright Principles*, 14 COLUM.-VLA J. OF L. & ARTS 125 (1990) (arguing case for use of unfair competition law to protect information against slavish duplication).

180. See, e.g., Karnell, *supra* note 177, at 70-71; Ginsburg, *supra* note 1, at 1924 n.223 (citing the relevant provisions of the Nordic copyright laws that recognize this neighboring right; and criticizing these regimes, established in the 1950s and 1960s, because they do not appear to have anticipated electronic data bases, which permit "easy access to myriad data for copying or remanipulation").

181. See EC Proposed Directive, *supra* note 35, Arts. 2(5) (proposing a right "to prevent the unauthorized extraction or re-utilization, from that [protected] database, of its contents, in whole or substantial part, for commercial purpose"), 8(1) (compulsory license for extraction of contents when publisher is sole source).

power.<sup>182</sup> Moreover, the licensing of information as commercial and industrial know-how is subject to stringent legislative and administrative sanctions in the European Community<sup>183</sup> and to a combination of legislative and judicially contrived limitations in the United States.<sup>184</sup> It seems logical to predict that analogous legislative and judicial constraints will become a necessary adjunct of any short-term solution to the puzzle of factual works—whether sounding in copyright law or in a neighboring right—in order to define and defend the larger public interest in access to information.<sup>185</sup>

From a broader perspective, all the problems brought to light in the foregoing discussion underscore the need to conceptualize electronic information processing as a special kind of tool whose outputs fit imperfectly within the classical intellectual property system. The resulting systemic tensions will grow steadily more acute as distinctions between “data” and “computer program,”<sup>186</sup> or even between “theoretical” and “applied” science, further break down.<sup>187</sup> Under these conditions, an innovator’s ability to attract venture capital to cutting-edge technolo-

182. See, e.g., Dietz, *supra* note 29; Robert Plaisant, *France*, § 4[3] in INTERNATIONAL COPYRIGHT LAW AND PRACTICE (Paul E. Geller rev. ed. 1990); Mario Fabiani, *Italy*, § 4[3] in *id.* See also MARINA SANTILLI, IL DIRITTO D'AUTORE NELLA SOCIETA DELL'INFORMAZIONE 264-303 (1988).

183. See generally, J. PAGENBERG & B. GEISSLER, LIZENZ-VERTRAGE — LICENSE AGREEMENTS 1989 (setting out the Regulations of the EC Commission on the application of Art. 85(3) of the Treaty of Rome to know-how agreements (Appendix 3) plus relevant German law); Hans-Werner Moritz, *Assignment of Computer Software for Use on a Data Processing System and the Applicability of Know-How Licensing Rules*, 21 I.I.C. 799 (1990); see also H. Cohen Jehoram *et al.*, *The Law of the EEC and Copyright*, in INTERNATIONAL COPYRIGHT LAW AND PRACTICE (Paul E. Geller rev. ed. 1990); Japanese Fair Trade Commission, *Japan: Guidelines for the Regulation of Unfair Trade Practices with Respect to Patent and Know-How Licensing Agreements*, 21 I.I.C. 662 (1990).

184. See, e.g., 1 R. M. MILGRIM, MILGRIM ON TRADE SECRETS §§ 6.05, 10.01, 11.01[2] (1989).

185. Cf. EC Proposed Directive, *supra* note 35, Art. 8 (proposing compulsory license for extraction of data from sole-source data base in addition to exemption for the use of insubstantial portions thereof).

186. See, e.g., Allan Newell, *The Models Are Broken, The Models are Broken!*, 47 U. PITT. L. REV. 1023, 1033 (1986) (stating that “the boundary between data and program—that is, what is data and what is procedure—is very fluid. In fact, . . . there is no principled distinction in terms of form or representation of which is which.”).

187. See, e.g., Newell, *supra* note 186, at 1026, 1033 (stating that “[a]ll of computer science is directly related to use. There is essentially no gap, no matter how pure or basic the science is”); Rebecca Eisenberg, *Proprietary Rights and the Norms of Science in Biotechnology Research*, 97 YALE L.J. 177, 195 (1987) (stating that, in biotechnology, “the traditional dividing line between basic and applied research is blurred. Not only has the historical time lag between the two collapsed, but it has become difficult to characterize given research problems as belonging in

gies will require an integrated proprietary regime not yoked to pre-digital subject matter distinctions that have become empirically obsolete.<sup>188</sup>

The long-term solution to most of the problems plaguing the legal protection of electronic information processing resides in a law to protect know-how as such.<sup>189</sup> A complete discussion of this topic must await another occasion. In the meantime, scholars and policymakers concerned about the regulation of industrial literature in the broader context of innovation law should look beyond the short-term interests of sectoral lobbies seeking temporary competitive advantages. In so doing, they must not neglect to develop a set of appropriate public interest safeguards that two-party agreements to exploit electronic information tools cannot override.

### III. INFORMATION AS APPLIED SCIENTIFIC KNOW-HOW

The tool concept of industrial property law further clarifies certain proprietary issues that have emerged from widespread use of computer-aided design. It also provides a springboard for analyzing the intellectual property aspects of artificial intelligence systems, although a satisfactory resolution of these issues will require a more complex conceptual framework than the classical intellectual property system currently provides.

#### A. *Outputs of Computer-Aided Design*

The rapid diffusion of computer-aided design (CAD) throughout all manufacturing sectors<sup>190</sup> dramatically evidences the dual nature of electronic information processing.<sup>191</sup> It further shows the extent to which misapplications of copyright law to technical innovation can produce intolerable restraints on trade. If, for example, one characterizes the legal status of computer-aided design as a function of the underlying computer programs, then the logic of copyright protection for liter-

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188. See, e.g., Newell, *supra* note 186, at 1033 ("What counts is the total body of knowledge represented somehow in the assembled symbolic expressions. *This totality determines the ultimate behavior of the machine . . .*"); Davis, *supra* note 103, at 108-111 ("Software is a 'machine' whose medium of construction happens to be 'text'"); see also Pamela Samuelson, *Digital Media and the Changing Face of Intellectual Property Law*, 16 RUTGERS COMPUTER & TECH. L.J. 323 (1990).

189. See generally Reichman, *Legal Hybrids*, *supra* note 50; Reichman, *supra* note 5, at 656-67, 714-18; *infra* notes 218-25 and accompanying text.

190. See, e.g., SAXBY, *supra* note 123, at 185-92; D. O. UGHANWA & M. J. BAKER, THE ROLE OF DESIGN IN INTERNATIONAL COMPETITIVENESS 277-95 (1989) ("The Impact of Computers on Design"). Computer Aided Design (CAD) "provides a screen-based 'electronic' drawing board for designers to work with. Essentially, the user can produce a drawing on screen by instructing the computer to produce the lines and curves, either through keyboard entry or with the aid of a 'light pen' or 'mouse'." SAXBY, *supra* note 123, at 185.

191. See *supra* notes 28-44 & 109 and accompanying text.

ary works invites originators of the programs to lodge colorable proprietary claims to products developed with their aid. On this reasoning, the computer-generated design embodied in the end product could, to some extent, constitute a work derived from the instructions that comprise the program.<sup>192</sup> Claims that users and programmers jointly created the end product might also be advanced.<sup>193</sup>

If, instead, one assimilates computer-aided design to the legal protection of tools as historically conceived, then basic principles of industrial property law reviewed earlier in this article counteract the toolmaker's claims to proprietary rights in the user's end products.<sup>194</sup> From this perspective, copyright law governs only the specialized market for literary and artistic works. It should never distort the general products market ruled by the patent paradigm.<sup>195</sup>

What counts on the market for CAD technology is the potential value to be added by users who apply these tools to the task of making better products at more competitive prices.<sup>196</sup> No matter how refined the initial programmer's technical contribution may be, outputs flowing from the use of computer-aided design typically compete on the general products market. Moreover, a user's decision to purchase the relevant CAD technology will seldom depend on its embodiment of a programmer's personal expression. Nor will the industrial user normally expect computer-aided design to enhance the imprint of his own personality upon the end product.<sup>197</sup>

The toolmaker should accordingly derive his or her reward from the sale price of the tool or from licensing fees, but not from value-adding uses to which the innovative tool is put.<sup>198</sup> The outputs of computer-aided design, once allocated to the user of a tool and not to its maker, must then seek protection according to their variable natures under whatever intellectual property regimes happen to apply. The computer-aided design of a sweater, for example, may qualify for protection under the ornamental design laws of the Benelux countries or under the unregistered design right of the United Kingdom. It may

192. See *supra* text accompanying notes 83-96.

193. See 17 U.S.C. § 101 (1988) (definition of "joint work"); Samuelson, *supra* note 19.

194. See *supra* text accompanying notes 60-78.

195. See *supra* notes 24-27 and accompanying text; see also Reichman, *Legal Hybrids*, *supra* note 50 (Part I).

196. Cf. Samuelson, *supra* note 19, at 1205-09.

197. For the characteristic emphasis of copyright law on an author's personal expression, see *supra* note 23 and accompanying text.

198. The toolmaker may, of course, enhance his or her own reward if the tool embodies innovations that qualify for protection under patent laws, utility model laws, the Semiconductor Chip Protection Act of 1984 and its progeny in foreign law, or even a functional design law like the United Kingdom. See, e.g., CORNISH, *supra* note 33, at 384-91.

even qualify for protection under copyright law in France or under increasingly protectionist applications of section 43(a) of the United States Trademark Act to unregistered "appearance trade dress."<sup>199</sup> Courts should, however, resist proprietary theories that seek to link the outputs of computer-aided design with the inputs of electronic information tools so long as the tool manufacturers add comparatively little value to the users' end products in relation to that added by the users themselves.

### *B. Artificial Intelligence as Semi-Autonomous Know-How Machines*

Commercial applications of artificial intelligence systems already combine knowledge-based processing with task-oriented processing in structurally integrated blocks of computer programming.<sup>200</sup> While a thorough analysis of the intellectual property problems these systems raise is beyond the scope of this article,<sup>201</sup> it must be acknowledged that the tool concept sheds less light on their resolution than it did on questions concerning small-change literary works or the outputs of computer-aided design. This follows because artificial intelligence systems are, by definition, capable of semi-autonomous forms of discernment.<sup>202</sup> One can already envision applications in which both the maker and user keep adding inputs to achieve system-determined outputs that greatly exceed the individual contributions of either. At the limit, while both maker and user continue to input valuable information, the artificial intelligence device may itself add the bulk of any new or additional value to previously available outputs.<sup>203</sup>

The legal evaluation of these phenomena, complex at best, is greatly handicapped by the unsettled status of patents for computer program-related inventions and by the skewed empirical data this lack of consensus has produced.<sup>204</sup> Until the patent authorities adopt con-

199. See generally, Reichman, *supra* note 10, 12-19, 37-42, 81-123.

200. See, e.g., SAXBY, *supra* note 123, at 188-92; SYSTEMS INTEGRATION, *supra* note 102, at 16-39; Davis, *supra* note 103, at 104-07.

201. See generally WIPO SYMPOSIUM, *supra* note 46.

202. See, e.g., McCarty, *supra* note 103, at 32-36 (discussing Cappen and Susskind's *Latent Damage Law: The Expert System*; symbolic learning algorithms; and Noordewier's neural network that has been trained to identify DNA splice junctions); Davis, *supra* note 103, at 102-05 (discussing Harold Cohen's Aaron program); see also Johnson-Laird, *supra* note 103, at 48-52; Antonio Mille, *Intellectual Property Problems Related to Artificial Intelligence Systems*, in WIPO SYMPOSIUM, *supra* note 46, at 279, 281.

203. See, e.g., Timothy L. Butler, *Can a Computer Be An Author? Copyright Aspects of Artificial Intelligence*, 4 COMM. & ENT L.J. 707 (1982); Samuelson, *supra* note 19, at 1205-09; *supra* note 202.

204. Ineligibility may arise either because the computer-related innovation is viewed as non-patentable subject matter or because it fails to meet the threshold requirements, especially that of non-obviousness, under 35 U.S.C. § 103 (1988). For contrasting views in regard to patentability of computer-related inventions, see, e.g., *supra* note 103, at 104-07.

vincing and workable standards of subject-matter eligibility and of non-obviousness for computer-related inventions, the dangers said to inhere in the patenting of software remain speculative.<sup>205</sup> Nevertheless, the prospects that patentees might one day monopolize self-executing algorithms capable of discerning choices would only compound the public policy dilemmas already troubling the legal protection of computer programs.<sup>206</sup> To the extent that major adjustments of the patent law are needed to ensure that direct or indirect protection of algorithms will not hinder scientific progress,<sup>207</sup> the transaction costs of implementing an appropriate *sui generis* regime might be significantly lower in the end.<sup>208</sup>

This hypothesis is reinforced by fears that the adoption of a stringent nonobviousness standard to promote competition in the development of computer programs, as some experts recommend, could eventually produce a chronic state of underprotection that would discourage investment in commercial applications of artificial intelligence systems.<sup>209</sup> Over time, even the most astounding breakthroughs in artificial intelligence will give way to more routine applications of basic principles,<sup>210</sup> as occurred in biotechnology once the technical dimensions of the recombinant DNA breakthrough became better understood.<sup>211</sup> Progress in artificial intelligence, for example, will require

bility, compare Samuelson, *Benson Revisited*, *supra* note 14, and Garfinkel, Stallman & Kapor, *supra* note 46, with Chisum, *supra* note 46. For recent developments, see Stern, *supra* note 46; Laurie, *supra* note 46.

205. See, e.g., Laurie, *supra* note 46, at 136.

206. See, e.g., INTELLECTUAL PROPERTY ISSUES IN SOFTWARE, *supra* note 82, at 66; Samuelson, *Benson Revisited*, *supra* note 14, at 1122-33; see also ANDRE LUCAS, LA PROTECTION DES CREATIONS INDUSTRIELLES ABSTRAITES 174-81 (1975).

207. See, e.g., INTELLECTUAL PROPERTY ISSUES IN SOFTWARE, *supra* note 82, at 89-90.

208. See generally Samuelson, *Benson Revisited*, *supra* note 14, at 1140-54; Menell, *supra* note 110. See also LUCAS, *supra* note 206, at 269-91.

209. See, e.g., LUCAS, *supra* note 206, at 180-81 (stressing modest percentage of programs capable of qualifying as true inventions and emphasizing basic need to protect investment in program innovation); Spoor, *supra* note 103 at 77, 82; Reichman, *supra* note 5, at 652-55 ("New Technologies Without the Inventive Step"). See also Ejan Mackaay, *Economic Incentives in Markets for Information and Innovation*, 13 HARV. J.L. & PUB. POL'Y 867 (1990).

210. See, e.g., SYSTEMS INTEGRATION, *supra* note 102, at 62-72 ("The Next Tier: Building Systems of Systems"); SAXBY, *supra* note 123, at 188-91.

211. See, e.g., In re O'Farrell, 853 F.2d 894 (Fed. Cir. 1988); Johnson, *Patent Protection for the Protein Products of Recombinant DNA*, 4 HIGH TECH. L.J. 249, 250-52, 260-63 (1990). Of special concern are the "second generation" analog proteins that may vary from patented "first-generation" proteins by as little as a single amino acid, which creates difficulties in meeting the nonobviousness test of 35 U.S.C. § 103 (1988). See Johnson, *supra* at 260, 263; see also Dan L. Burk, *Biotechnology and Patent Law: Fitting Innovation to the Procrustean Bed*, 17 RUTGERS COMPUTER AND TECH. L.J. 1, 42-57 (1991); Harold C. Wegner, *Purified Protein Patents: 'A Legal Process Gone Berserk?'*, 6 E.I.P.R. 187, 190 (1990). Other problems include the difficulties  
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computer science to standardize programs for use as building blocks in larger, more powerful systems.<sup>212</sup> These components would presumably shed their novelty along the way, as would the design principles responsible for their productive integration. The progressive failure of commercially valuable components, including outputs, to meet the threshold standards of patent protection, despite subject-matter eligibility, would then elicit industry pressures to lower the threshold once again.

Stiff standards of patentability would further encourage misguided efforts to make copyright law the preferred vehicle for protecting artificial intelligence systems, despite the growing disarray that already surrounds copyright protection of ordinary computer programs. As Professor Randall Davis of M.I.T. recently observed, "software is a 'machine' whose medium of construction happens to be 'text,'" which means that most of the problems likely to afflict the legal protection of artificial intelligence are foreshadowed by the unsuccessful application of patent and copyright laws to computer programs.<sup>213</sup> At best, the traditional copyright paradigm covers only the static components of computer programs without reaching the dynamic configuration that accounts for the commercially valuable behavior of any given system.<sup>214</sup> If widespread recourse to patent law risks giving too much protection to too few program-related inventions, then copyright law as traditionally interpreted would give too little protection to too many trivial components. Meanwhile, copyright law as judicially interpreted in certain jurisdictions provides far too much protection to far too many program features for much too long a time.<sup>215</sup>

Unless the United States federal judiciary pulls back from early protectionist trends, past experience with copyright protection of functional designs in the United Kingdom suggests that the resulting state of chronic overprotection will ultimately impede progress in computer science more than patent law at its worst.<sup>216</sup> In either case, the applied

examination period, disclosure requirements, and the need for university professors to publish their research results. *See, generally*, Eisenberg, *supra* note 187; Burk, *supra*.

212. *See supra* note 210. For the problem of standardization generally, *see, e.g.*, Bill Curtis, *Engineering Computer "Look and Feel": User Interface Technology and Human Factors Engineering*, 30 JURIMETRICS J. 51, 63-75 (1989); Menell, *supra* note 82, at 1053-58, 1066-71 (discussing the need for second comers to use prior programming solutions in order to compete effectively on the relevant market segments).

213. *See* Davis, *supra* note 103, at 110, 110-19; *see also* Samuelson, *Benson Revisited*, *supra* note 14, at 1128-29 ("Programs are . . . too much of a mechanical process to fit comfortably in the copyright system and too much of a writing to fit comfortably in the patent system"); Garfinkel, Stallman & Kapor, *supra* note 46, at 51-53.

214. *See* Davis, *supra* note 103, at 113-16.

215. *See supra* notes 33-40, 87-92 and accompanying text.

216. *See generally* Christine Fellner, *The New United Kingdom Industrial Design Law*, 19

scientific know-how actually responsible for most of this progress could remain excessively vulnerable to appropriation by free-riders in both domestic and international markets, notwithstanding recent attempts to redefine international intellectual property law from the top down.<sup>217</sup>

### C. *Limits of the Patent and Copyright Models*

Previous studies have tried to show the extent to which the world's intellectual property system has been overwhelmed by new technologies that do not fit within the patent and copyright systems.<sup>218</sup> Problems arise mainly because the kinds of innovative know-how underlying important new technologies do not lend themselves to trade secret protection despite the great investment in research and development they usually entail.<sup>219</sup> Even the most valuable product of incremental innovation now tends to bear its know-how on its face, which makes technological innovation in the digital age often easier to duplicate than yesterday's typical engineering products.<sup>220</sup> Investors, therefore, lack natural lead time in which to recoup their investment and turn a profit.<sup>221</sup> Paradoxically, such products may obtain little or no protection from patent law, despite their impact on the public welfare, because the nonobviousness criterion excludes most technological innovations that represent merely incremental advances over the prior art.<sup>222</sup> Yet, because of their functional character, the new technologies are alien to the spirit of copyright law, which historically rewards works of art and literature without encroaching on the domain of industrial property law.<sup>223</sup>

The solution requires a law to protect applied scientific know-how, regardless of the medium of expression in which it is cast. Such a law should deter free riders without unduly impeding fair followers from developing incremental innovation of their own.<sup>224</sup> A work in progress, entitled *Legal Hybrids Between the Patent and Copyright Paradigms*,<sup>225</sup> documents and refines these insights, and little is served by further anticipating its findings here. For present purposes it suffices to emphasize that stuffing advanced electronic information tools into

217. See generally Reichman, *GATT Connection*, *supra* note 124, at 751-68.

218. See generally Reichman, *supra* note 5, at 648-67; Reichman, *supra* note 10, at 123-53; see also *infra* note 224 and accompanying text.

219. See *supra* notes 1-10 and accompanying text.

220. See, e.g., MAGNIN, *supra* note 7, at 15-16, 113-16; Elmer Galbi, *Proposal for New Legislation to Protect Computer Programming*, 17 BULL. COPYRIGHT SOC'Y 280, 291 (1969).

221. See generally Reichman, *supra* note 5, at 656-62 (citing authorities).

222. See, e.g., Kingston, *supra* note 6, at 31; Hermann Kronz, *Patent Protection for Innovations: A Model* (Pt. 1), 5 E.I.P.R. 178 (1983).

223. See, e.g., *Baker v. Selden*, 101 U.S. 99 (1879); *supra* notes 24-27 and accompanying text.

224. See generally Reichman, *supra* note 5, at 714-18 ("Redefining the Public Interest").

225. See *supra* note 30.



copyright law will only exacerbate the unsolved problems currently afflicting the legal protection of computer programs and data bases. Before these and related problems strain world intellectual property law to the breaking point, it would be desirable to have law-makers enact a proper know-how law that provided innovators with artificial lead time in which to recoup their investments, without, however, succumbing to the philosophical mystique of the mature copyright paradigm.<sup>226</sup>

The powerful reproduction rights and long term of protection that characterize the copyright model implement cultural policies largely irrelevant to the needs of a competitive market. A proper know-how law would protect the functional behavior achieved by means of certain aggregates of information and not the aggregates of information themselves. Under optimum conditions, such a law would reward both those who obtain functional improvements by a re-elaboration of pre-existing components and originators of those components.<sup>227</sup> It could also protect outputs of artificial intelligence machines without necessarily succumbing to pernicious extensions of either patent or copyright doctrines devised for an era in which the distinction between theoretical and applied science made greater sense.<sup>228</sup>

One must concede that even a well-crafted law to protect applied scientific know-how could fail to resolve all the intellectual property issues that artificial intelligence may pose in the future. As the tool model that worked fairly well in the context of computer-aided design<sup>229</sup> begins to break down, attempts to link producer inputs with user outputs in terms of values generated by their interactive processing of information could raise unique and daunting proprietary claims. The future importance of parallel processing based on standardized componentry (including standard data bases as well)<sup>230</sup> could eventually support the hypothesis that electronic information, embodied in the system (and perhaps even in its outputs), should one day become an object of legal protection in its own right.<sup>231</sup> In a world populated by artificial intelligence machines, adequate incentives for research and develop-

226. See generally Reichman, *supra* note 10, at 141-53.

227. See generally, Reichman, *Legal Hybrids*, *supra* note 50, part III.

228. See *supra* notes 186-87 and accompanying text.

229. See *supra* text accompanying notes 194-99.

230. See generally SYSTEMS INTEGRATION, *supra* note 102, at 74-89.

231. Cf., e.g., Davis, *supra* note 103, at 116-17. Professor Davis states: "The problems we face arise most centrally from the digital medium, i.e., any information in digital form. The problems arise . . . because information in digital form has a number of remarkable properties. . . . Simply put, for other forms of intellectual property, physical law tends to support intellectual property law. All of that is missing in the case of information in digital form. . . . The problem isn't [just] software, it's digital information." *Id.*

ment could depend upon a willingness to protect digital data structures as such and not just functional configurations representing the know-how responsible for particular systemic behavior.<sup>232</sup>

If and when the study of artificial intelligence begins to provide a stream of semi-autonomous decision making tools, in short, aggregates of electronic information may have to be viewed as a kind of tool in their own right. The possibility that data structures might one day constitute a marginal case beyond even the marginal case of applied scientific know-how should not, however, deflect attention away from the present need for a know-how law that could integrate a proliferating array of legal hybrids into a unified field of protection.<sup>233</sup> Until the intellectual property community is persuaded to set this goal and begins to elaborate the requisite technical machinery, one prefers not to contemplate additional protective schemes that could burden free research or encourage oligopolistic industries to foster new barriers to entry.

Meanwhile, electronic information tools pose a challenge to world intellectual property law that will not go away. Wherever one looks, one is struck by the extent to which domestic laws applicable to patents, copyrights, trade secrets, unfair competition, trade marks, and industrial design are increasingly destabilized by the need to deal with aspects of new technologies for which they are inherently unsuited. The predominant tendency is to disaggregate each new technology into its component parts and then to assimilate these parts to existing legal paradigms, with the excuse that international politics justifies the ensuing distortions to domestic market forces.<sup>234</sup> The more that these overlapping legal subcultures compete with each other, the harder it becomes to disentangle applied scientific know-how from their separate protective strands. Rather than facing up to the new problems likely to arise from a single *sui generis* regime to protect such know-how, the intellectual property community is currently experiencing the simultaneous evolution of six or more poorly designed *sui generis* laws, as each traditional regime mutates in unexpected ways under the pressure of events.

While some may continue to believe that cumulating inappropriate modes of protection benefits innovators, the evidence suggests that the legal process itself has slowed the pace of innovation, at least with respect to ordinary computer programs, and that it has especially harmed

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232. See *supra* notes 227, 231.

233. See *supra* notes 224-27.

234. See generally Reichman, *Proprietary Rights*, *supra* note 173; see also Soltysinski, *supra* note 162, at 448-49, 455-70.

the small and medium-sized firms that are (or were) its major exponents. Unless the urge to throw assorted legal regimes at a moving target is resisted in the interest of a more rational and constructive debate, the advent of still more difficult challenges in the form of computer-generated productions, computer-aided design, and artificial intelligence machines could bring the classical intellectual property system to its knees, with grave consequences for a domestic economy that increasingly depends on its comparative advantages in technological innovation.