EMPOWERING DIGITALLY INTEGRATED SCIENTIFIC RESEARCH: THE PIVOTAL ROLE OF COPYRIGHT LAW'S LIMITATIONS AND EXCEPTIONS

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I. INTRODUCTION

The free flow of ideas and associated private investments in the creative enterprise has long been linked to the grant of proprietary rights in knowledge goods as a principal mechanism by which economic returns can be appropriated from domestic and foreign markets.[1] While these private rights are granted to enable creators and innovators to recoup front-end costs and turn a profit from commercial exploitation of their contributions,[2] the indisputable overall objective of intellectual property (IP) laws has been to preserve and enhance the public good characteristics of both scientific and cultural creations.[3] Today, the economic importance of "knowledge as a global public good"[4] has been elucidated with greater clarity and insight than in the past;[5] and the advent of online digital technologies makes it possible to perfect these public good payoffs.[6] At the same time, these very technologies have unsettled established business models and led to pressures on legislators to strengthen private rights in the new technical environment,[7] with little regard for the needs of both science and culture to constantly enrich themselves through "massive and rapid feedback of … creations online."[8] As a result, mounting tensions between

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[1] *See, e.g.*, KEITH E. MASKUS, INTELLECTUAL PROPERTY RIGHTS IN THE GLOBAL ECONOMY 109-42 (Institute for International Economics, 2000).
[2] *See, e.g.*, W. Landes & R. Posner, *An Economic Analysis of Copyright Law*, 18 J. LEGAL STUD. 325 (1989); *see also* W. LANDES & R. POSNER, THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW 9-10 (Harvard Univ. Press, 2003) (with less emphasis on incentives as such than on encouraging exchange through licensing).
[3] *See* Paul E. Geller, *Beyond the Copyright Crisis: Principles for Change*, 55 J. COPYRIGHT SOC'Y U.S.A. 165 (2008); Paul A. David, *Koyaanisqatsi in Cyberspace: The Economics of an "Out-of-Balance" Regime of Private Property Rights in Data and Information*, *in* INTERNATIONAL PUBLIC GOODS AND TRANSFER OF TECHNOLOGY UNDER A GLOBALIZED INTELLECTUAL PROPERTY REGIME (Keith E. Maskus & Jerome H. Reichman eds., Cambridge Univ. Press, 2005).
[4] *See* J.E. Stiglitz, *Knowledge as a Global Public Good*, *in* GLOBAL PUBLIC GOODS: INTERNATIONAL COOPERATION IN THE 21ST CENTURY 308 (Inge Kaul et al. eds., 1999).
[5] *See, e.g.*, Christopher S. Yoo, *Copyright and Public Good Economics: A Misunderstood Relation*, 155 U. PA. L. REV. 635 (2007); Brett M. Frischmann, *An Economic Theory of Infrastructure and Commons Management*, 89 MINN. L. REV. 917 (2005).
[6] *See, e.g.*, JAMES BOYLE, THE PUBLIC DOMAIN: ENCLOSING THE COMMONS OF THE MIND 122-159 (Yale Univ. Press, 2008); YOCHAI BENKLER, THE WEALTH OF NETWORKS: HOW SOCIAL PRODUCTION TRANSFORMS MARKETS AND FREEDOM (Yale Univ. Press, 2006). *See also* Geller, *supra* note 3, at 172.
[7] *See, e.g.*, JESSICA LITMAN, DIGITAL COPYRIGHT (Prometheus Books, 2001); *see also generally* Keith E. Maskus & Jerome H. Reichman, *The Globalization of Private Knowledge Goods and the Privatization of Global Public Goods*, *in* Maskus & Reichman, *supra* note 3.
[8] *See* Geller, *supra* note 3, at 172.

private rights and public needs have led some to perceive a "crisis for copyright"[9] that, if left unresolved, threatens to stifle some of the most promising new opportunities for science.[10]

Against this background, the European Commission, in 2008, issued a Green Paper on Copyright in the Knowledge Economy[11] with a view to fostering "a debate on how knowledge for research, science, and education can best be disseminated in the online environment."[12] With this Paper, the Commission intends to launch a consultation on "general issues regarding exceptions to exclusive rights introduced in the main piece of European copyright legislation"[13] it had adopted in a 2001 Directive on Copyright in the Information Society (Infosoc Directive),[14] and on "specific issues related to the limitations and exceptions (L&Es) which are most relevant for the dissemination of knowledge and whether these exceptions should evolve in the era of digital dissemination."[15] While the Commission had earlier analyzed its 1996 Directive on the Legal Protection of Databases (Database Directive)[16] in a separate report,[17] the Green Paper expressly recognizes that aspects of that Directive were relevant to its current enquiry.[18]

While highlighting "the need to promote free movement of knowledge and innovation" as the 'Fifth Freedom' in the single market, the Green Paper focuses on "how research, science and educational materials are disseminated to the public and whether knowledge is freely circulating in the internal market [of the European Union]."[19] In so doing, it posits the basic assumption that "a high level of copyright protection is crucial to intellectual creations," and with that the growth of trade, innovation and knowledge.

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[9] *Id*.

[10] *See, e.g.*, Reto Hilty, *Copyright Law and Scientific Research*, in COPYRIGHT LAW – A HANDBOOK OF CONTEMPORARY RESEARCH (Paul Torremans ed., Edward Elgar, 2007); Reto Hilty, *Five Lessons about Copyright in the Information Society: Reaction of the Scientific Community to Over-Protection and What Policy Makers Should Learn*, 53 J. COPYRIGHT SOC'Y U.S.A. 103 (2006); Pamela Samuelson, *Anticircumvention Rules: Threat to Science*, 293 SCI. MAG. 2028 (2001), *available at* http://www.sciencemag.org/cgi/content/abstract/293/5537/2028 (last visited Apr. 29, 2009); Jerome H. Reichman & Paul F. Uhlir, *A Contractually Reconstructed Research Commons for Scientific Data in a Highly Protectionist Intellectual Property Environment*, 66 LAW & CONTEMP. PROBS. 315 (2003). *See also* part III of this article, *infra* pg. 18.

[11] COM (2008) 466/3, *available at* http://ec.europa.eu/internal_market/copyright/docs/copyright-infso/greenpaper_en.pdf (last visited Apr. 29, 2009) [*hereinafter* EC Green Paper].

[12] *Id*, at 3.

[13] *Id*.

[14] Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society, art. 5, 2001 O.J. (L 167), 10 [*hereinafter* EC Infosoc Directive].

[15] EC Green Paper, *supra* note 11, at 3.

[16] Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases, 1996 O.J. (L 77), 20 [*hereinafter* EC Database Directive].

[17] *See* Commission of the European Communities, First Evaluation of Directive 96/9/EC on the Legal Protection of Databases, DG Internal Market and Services Working Paper, 12 Dec. 2005, *available at* http://ec.europa.eu/internal_market/copyright/docs/databases/evaluation_report_en.pdf (last visited Apr. 29, 2009).

[18] EC Green Paper, *supra* note 11, at 3.

[19] *Id*. The other Four Freedoms associated with the Treaty of Rome are: 1) the free movement of goods; 2) the free movement of persons; 3) the free movement of services; and 4) the free movement of capital. *See* Commission of the European Communities, A Single Market for 21st Century Europe, COM 2007 724 final, Nov. 20, 2007, *available at* http://eur-lex.europa.eu/LexUriServ/site/en/com/2007/com2007_0724en01.pdf (last visited Apr. 29, 2009) [*hereinafter* European Commission, A Single Market].

An early version of this article[20] responded to that assumption and more generally to some of the queries set out in the Green Paper with a specific focus on science. It was our belief that copyright and related laws, as they stood in both the EU and US, posed a serious impediment to scientific progress in the digital age and that this phenomenon represents a fundamental challenge for any reform proposals. Consonant with this approach, the submission by the Max Planck Institute to the Commission Green Paper similarly focused on the threat to science.[21] The present article accordingly expands on our initial thesis and takes into account both the Max Planck's important proposals and other studies of the need for a robust scientific commons that are underway.[22]

We further emphasize governments' responsibility to facilitate and promote the production of science and the dissemination of its results as a key premise that must be reconciled with the interests of existing owners of intellectual property rights (IPRs). The public research dimension funds and supports upstream research, and it both directly and indirectly provides the framework that is essential to the benefits that the private sector will later reap from downstream applications.[23] Any gains in trade stemming from the comparative advantages that IPRs defend at the international level will accordingly depend on an appropriate mix of public and private goods within any given national system of innovation.[24]

We thus use the prism of science to explore ways in which innovation policy and overall social welfare can remain twin objectives of the innovation system. The goal is not to undermine copyright law, but to find ways to adjust it so as to most truly empower its public good functions, while stimulating more and better scientific outputs and more economic benefits for both investigators and end users of scientific research. Central to this goal is a proper evaluation of

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[20] *See* Jerome H. Reichman & Ruth L. Okediji, Sustainable Innovation in the Digital Environment: The Crucial of Copyright Law's Limitations and Exceptions, Nov. 28, 2008 (on file with authors).

[21] *See* Max Planck Institute for Intellectual Property, Competition and Tax Law, Declaration: A Balanced Interpretation of the "Three-Step Test" in Copyright Law (2008), *available at* http://www.ip.mpg.de/shared/data/pdf/declaration_three_step_test_final_english.pdf (last visited Apr. 29, 2009) [*hereinafter* Max Planck Declaration on the Three-Step Test].

[22] *See, e.g.*, ; Reichman & Uhlir, *supra* note 10; Peter Lee, *Public Norms and Private Ordering: The Contractual Creation of a Biomedical Research Commons*, EMORY L.J. (forthcoming 2009); *see also generally* Jerome H. Reichman, Tom Dedeurwaerdere & Paul F. Uhlir, *Designing the Microbial Research Commons: Strategies for Accessing, Managing and Using Essential Public Knowledge Assets* (draft version 2009) (on file with authors).

[23] *See, e.g.*, P.A. David, *The Economic Logic of 'Open Science' and the Balance between Private Property Rights and the Public Domain in Scientific Data and Information: A Primer*, *in* NATIONAL RESEARCH COUNCIL ON THE ROLE OF THE PUBLIC DOMAIN IN SCIENCE (P.Uhlir & J. Esanu eds., National Academy Press, 2003); *cf., e.g.*, Anthony D. So et al., *Is Bayh-Dole Good for Developing Countries? Lessons from the US Experience*, PLOS BIOL. 6(10): e262 doi:10.1371/journal.pbio.0060262 (2008), available at http://biology.plosjournals.org/ (last visited Apr. 27, 2009). Also relevant is the growing recognition of the role of fundamental rights and extra-IP regimes such as competition law and consumer law that also limit the freedom of publishers to impose restrictions on access and use that might otherwise be legal. *See, e.g.*, Natali Helberger & P. Bernt Hugenholtz, *No Place Like Home for Making a Copy: Private Copying in European Copyright Law and Consumer Law*, 22 BERKELEY TECH. L.J., 1087 (2007); P. Drahos, *Intellectual Property and Human Rights*, 3 I.P.Q. 349, 367 (1999); Ruth L. Okediji, *Securing Intellectual Property Objectives: New Approaches to Human Rights Considerations*, *in* CASTING THE NET WIDER: HUMAN RIGHTS, DEVELOPMENT AND NEW DUTY-BEARERS (Margot E. Salomon, Arne Tostensen & Wouter Vandenhole eds., Intersentia, 2007).

[24] *See, e.g.*, Maskus & Reichman, *supra* note 7, at 16-27 ("Legal and Organizational Impediments to the Protection and Diffusion of Knowledge Goods").

the role that L&Es to exclusive rights should play in a properly functioning, modern copyright law.

Any such evaluation, however, necessarily depends in part on the investigators' theoretical outlook on the nature of L&Es as such. If, for example, one stresses the controversial notion that copyright is a form of property like any other, there is a tendency to over-emphasize the need for narrow exceptions largely rooted in theories of market failure.[25] Over-emphasis on the incentive rationale also favors the same preconception.[26] If, instead, one views L&Es as delimiting a zone of creative activities that were inherently carved out of legislative grants of exclusive rights, there is logically a greater deference to what are increasingly defined as "users' rights,"[27] and a correspondingly greater burden on authors and rights holders to justify efforts to circumscribe the larger public interests these exceptions defend.[28]

While sympathetic to the latter approach, we are acutely aware of the inability of established copyright theories to coherently account for the realities of modern copyright legislation, and we think such laws are today better understood as a complex body of trade regulations that must adjust and design the relations between competing interests.[29] Within this regulatory framework, we stress the different policy variables applicable to, say, the entertainment industry and the sciences, and the need to clarify these differences when formulating policy options, without succumbing to illusory "unified field" postulates altogether lacking in empirical support.[30]

Departing from these premises, we urge the Commission and policymakers worldwide to find and restore that balance between private and public rights that would maximize the creation and diffusion of future knowledge goods and thereby avoid the tendency to encumber the

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[25] *See generally* ROBERT BURRELL & ALLISON COLEMAN, COPYRIGHT EXCEPTIONS – THE DIGITAL IMPACT 168-73 (Cambridge Univ. Press, 2005) (citing authorities); *see also* Wendy Gordon, *Fair Use as Market Failure: A Structural and Economic Analysis of the Betamax Case and its Predecessors*, 82 COLUM. L. REV. 1600 (1982); G. Lunney, *Fair Use and Market Failure*: *Sony Revisited*, 82 B.U. L. REV. 975 (2002).

[26] The EC Green Paper appears to subscribe to this predisposition:

> Copyright ensures the maintenance and development of creativity in the interests of authors, producers, consumers and the public at large. A rigorous and effective system for the protection of copyright and related rights is necessary to provide authors and producers with a reward for their creative efforts and to encourage producers and publishers to invest in creative works… The publishing sector makes an important contribution to the European economy… Copyright is also a policy in line with the imperative to foster progress and innovation.

EC Green Paper, *supra* note 11, at 4.

[27] *See* BURRELL & COLEMAN, *supra* note 25.

[28] *Id*., at 173 (stressing "non-monetisable interests," such as "free speech, privacy, access to information, and the preservation and extension cultural resources.").

[29] We are acutely aware of the ambiguities inherent in the notion of "balancing" incentives against limitations and exceptions (L&Es), and the tendency to accept the economic status quo that often results from such exercises. *See, e.g.*, JAMES BOYLE, SHAMANS, SOFTWARE AND SPLEENS 39 (Harvard Univ. Press, 1996); BURRELL & COLEMAN, *supra* note 25, at 178-180, 187-190. Hence, we stress the need to design the regulatory framework so as to maximize upstream basic scientific outputs that will become inputs to an expanding set of commercially valuable applications that properly attract intellectual property rights (IPRs). Any use of the term "balance" in this article is accordingly subject to this fundamental gloss.

[30] *Cf.* BURRELL & COLEMAN, *supra* note 25, at 191.

production of such goods by undermining access to essential inputs. With this goal in mind, we shall explore specific modes of attaining such balance with respect to the needs of basic scientific research. At the same time, we concede that L&Es are not ends in themselves. At some point, sound legal policy and science policy may diverge as the scientific community increasingly responds to the challenge of managing and controlling its own upstream knowledge assets, with a view to preserving open access to such assets without compromising downstream commercial applications.[31]

To this end, part II of this article depicts the growing tendencies to privatize the scientific research commons. In particular, it contrasts the unlimited scientific opportunities that automated knowledge tools now generate in the digital environment with the increasingly hostile IP regimes that impede these same opportunities. In part III, we then elaborate our proposals for reforming the legal infrastructure to support the production and diffusion of scientific information and data. Here we explore different measures to accommodate L&Es to the needs of science in both the print model and the online environment. We also discuss the need to reconcile the fair use approach of US law with the three-step test that has emerged from the international conventions. We also discuss the need to promote open access initiatives that could eventually insulate basic scientific research from many of these tensions. Part IV concludes with a brief summary of our conclusions and recommendations.

II. PRIVATIZING THE SCIENTIFIC RESEARCH COMMONS

Scientific discoveries depend upon access to a robust public domain, in which pre-existing discoveries become the building blocks of future investigations[32] and existing information and data become inputs to future knowledge assets that cannot be generated without them.[33] However, the recent tendency to elevate standards of IPRs at both the national and international levels has been motivated largely by interests seeking to protect existing knowledge goods, with little regard for the social costs and burdens imposed on future creation and innovation, and with a corresponding bevy of new problems that hinder such creation and innovation.[34] Among the growing complex of problems are thickets of rights spawned by patents and copyrights; high transaction costs; high litigation costs; receding access to the public domain; growing anticommons effects; and as will be seen, the stifling of privileged uses by means of Technological Protection Measures (TPMs) and Digital Rights Management (DRM) in the online environment.[35]

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[31] *See, e.g.*, Reichman & Uhlir, *supra* note 10; Lee, *supra* note 22.
[32] *See, e.g.*, BOYLE, *supra* note 6, at 160-178; David, *supra* note 23; David Lange, *Recognizing the Public Domain*, 44 LAW & CONTEMP. PROBS. 147 (1981).
[33] *See* Reichman & Uhlir, *supra* note 10.
[34] *See, e.g.*, RICHARD R. NELSON (ed.), NATIONAL INNOVATION SYSTEMS: A COMPARATIVE ANALYSIS (Oxford Univ. Press, 1993); David, *supra* note 23; *see also generally* Maskus & Reichman, *supra* note 7.
[35] *See* MICHAEL HELLER, GRIDLOCK ECONOMY 1-22 (Basic Books, 2008); Jerome H. Reichman & Rochelle Cooper Dreyfuss, *Harmonization without Consensus: Critical Reflections on the Substantive Patent Law Harmonization Treaty*, 57 DUKE L.J. 1 (2007); Jessica Litman; Jerome H. Reichman, Graeme B. Dinwoodie & Pamela Samuelson, *A Reverse Notice and Takedown Regime to Enable Public Interest Uses of Technically Protected Copyrighted Works*, 22 BERKELEY TECH. L.J. 981 (2007). *See also* Geller, *supra* note 3, at 166 ("copyright law is in crisis… [I]t has become more and more complicated and less and less reliable, while losing legitimacy.").

In retrospect, it is ironic that just when new technologies were producing significant breakthroughs in research and science, and as new models of collaborative investigation were empowered by digitally networked sites and other digital technologies,[36] innovation policies that should embrace such developments are instead relying on IPRs to control or, in some cases, impede these promising developments.[37] The successive use of public and private law to preclude access to basic knowledge, as well as knowledge-based goods, has increased the political and social burden of an IP regime that, in theory, remains dedicated to the public interest of society at large. To this end, the innovation systems of post-industrial economies, such as the US and the EU, explicitly reference innovation and dissemination as the core objectives of the IP system, while increasingly limiting the opportunities for both innovation and dissemination.[38]

In practice, we will show that contradictory measures in copyright law in particular have increasingly impeded upstream scientific investigation and complicated the exploitation of downstream productions. In particular, by over-emphasizing the protection of existing creations, copyright laws (and other IPRs) have made it harder for all creators to build, rework and further elaborate the creations of others and to harness the creative potential of digital technologies to their fullest extent.

A. An Increasingly Hostile Legal Environment

The digital revolution that created such promising opportunities for scientific research also generated intense fears that hard copy publishers would become vulnerable to massive infringements online and to other threats of market failure. In response, publishers pushed legislatures to recast and restructure copyright law in the online environment so as to preserve business models built around the print media.[39] In so doing, they managed to curb pre-existing L&Es in the online environment, including those favorable to science;[40] to embed pay-per-use machinery into electronic fences surrounding online transmissions even of scientific articles;[41] and, particularly in the EU and increasingly elsewhere, to add new sui generis data protection disciplines that restrict access to the very facts, data, and information that are the lifeblood of basic scientific research.[42]

1. Global Trends to Restrict Access to and Use of Scientific Information and Data

In 1994, the World Trade Organization (WTO) Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement)[43] introduced minimum mandatory standards of

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[37] *See supra* note 34.

[38] So et al., *supra* note 23; NELSON, *supra* note 34.

[39] *See* Pamela Samuelson, *The U.S. Digital Agenda at WIPO*, 37 VA. J. INT'L L. 369 (1997).

[40] *See* Reichman & Uhlir, *supra* note 10, at 371-373.

[41] *Id*., at 371-396.

[42] *Id. See also generally* Jerome H. Reichman & Pamela Samuelson, *Intellectual Property Rights in Data?*, 50 VAND. L. REV. 52 (1997).

[43] Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 299; 33 I.L.M. 1197 (1994) [*hereinafter* TRIPS Agreement].

global IP protection that were ostensibly designed to stimulate innovation across disparate economies at different stages of development.[44] In practice, however, these elevated standards sought to preserve the developed countries' long-standing comparative advantage in the production of knowledge goods.[45] Since then, numerous other treaties have been concluded at the regional and multilateral levels to secure and, in many cases, expand through private law means, the number and scope of rights to which IP owners can legally resort to exclude access to protected subject matter.[46]

The negative effects on science of this high-protectionist agenda have been exacerbated by three other developments. The first was the expansion of IPRs upstream into areas never before protected, such as research tools and data collections, with a growing privatization of knowledge heretofore treated as global public goods.[47] This trend has made upstream knowledge—basic inputs—ever costlier and more difficult to obtain, and it has burdened basic research, especially as universities themselves engage in commercial exploitation of research outputs.[48]

A second development was the continued subordination of IPRs to the trade paradigm, which has given rise to a negotiating framework in which protection of IPRs is exchanged for concessions in other areas. This framework, as actually implemented, freezes out the public good component of IP discourse, which traditionally enters into the negotiating picture at domestic levels, where governments must provide such public goods as health, environmental safety, education, food security, and scientific research. Instead, public considerations seldom figure into the multilateral and especially the bilateral discourse, and essential inputs into the state's duties to provide public goods and basic infrastructure have become progressively encumbered by IPRs.[49] Besides creating well known problems for public health and education, this process has undermined the production and diffusion of knowledge itself as a global public good, which if left unchecked, could hinder and impoverish the very "incipient transnational system of innovation" that the WTO/TRIPS brought into being.[50]

Third, the development of digital information technologies, including automated knowledge tools, has generated new models of creating, disseminating, and reworking the products of both

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[44] *See* Jerome H. Reichman, *Universal Minimum Standards of Intellectual Property Protection under the TRIPS Component of the WTO Agreement*, *in* INTELLECTUAL PROPERTY AND INTERNATIONAL TRADE – THE TRIPS AGREEMENT 21 (Carlos M. Correa & Afdulqawi A. Yusuf eds., 1998).

[45] *See, e.g.*, Frederick M. Abbott, *Protecting First World Assets in the Third World: Intellectual Property Negotiations in the GATT Multilateral Framework*, 22 VAND. J. TRANSNAT'L L. 689 (1989). The TRIPS standards were exchanged for greater market access in developed countries for traditional products of developing countries, including textiles and some agriculture products. *See* DANIEL GERVAIS, THE TRIPS AGREEMENT - DRAFTING HISTORY AND ANALYSIS (2nd ed., Sweet & Maxwell, 2003).

[46] *See, e.g.*, World Intellectual Property Organization [WIPO] Copyright Treaty, Dec. 20, 1996, S. TREATY DOC. NO. 105-17, 36 I.L.M. 65 (1997) [*hereinafter* WCT]; WIPO Performances and Phonograms Treaty, Dec. 20, 1996, 36 I.L.M. 76.

[47] *See generally* Reichman & Uhlir, *supra* note 10.

[48] *See* So et al., *supra* note 23.

[49] *See, e.g.*, Ruth L. Okediji, *Sustainable Access to Copyrighted Digital Information Works in Developing Countries*, *in* Maskus & Reichman, *supra* note 3; Frederick M. Abbott, and Jerome H. Reichmann, *The Doha Round's Public Health Legacy: Strategies for the Production and Diffusion of Essential Medicines under the Amended TRIPS Provisions*, 10 J. INT'L ECON. L. 921 (2007); Peter M. Gerhart, *Distributive Values and Institutional Design in the Provision of Global Public Goods*, *in* Maskus & Reichman, *supra* note 3.

[50] Maskus & Reichman, *supra* note 7; *see also generally* Stiglitz, *supra* note 4.

science and culture.[51] The more that these technological advances tend to perfect the public good characteristics of knowledge goods, however, the more have industry fears of possible market failures elicited legislation that shackles these very technological advances in order to make digital networks safe for existing creations and business models.[52] This "one-way ratchet" of rights has precipitated a "crisis in copyright law," with the risk that, as it increasingly complicates and impedes both scientific and cultural production, copyright law appears to lose its legitimacy.[53]

2. The Shrinking Realm of Scientific Users' Rights in Domestic Laws

Under traditional assumptions, copyright protection of scientific works struck a relatively benign balance between authors' interests and the needs of the larger scientific community. When, for example, scientific researchers would publish their results in peer-reviewed journals, both their findings and the supporting data entered the public domain as noncopyrightable ideas and facts.[54] Other scientists remained free, in principle, to use these facts and findings in articles of their own, provided that they independently expressed them in their own words, with due attribution of the source in keeping with both legal and scientific norms. There was also a tendency of courts in the US to limit copyright protection of so-called factual works to wholesale duplication. This practice enabled third parties to use the disparate facts in any given compilation under the Supreme Court's "thin copyright" doctrine.[55]

a. Increasing Protection of Scientific Information and Data as Such[56]

Recently, however, some federal appellate courts in the US have been tempted to manipulate the eligibility criteria so as indirectly to protect the facts themselves as incorporated into an allegedly creative selection and arrangement.[57] Spurious theories of so-called "soft" (and therefore allegedly protectable) ideas have enabled these courts to protect the underlying methods or algorithms that structure a given factual compilation itself. These approaches, in effect, broaden the derivative work rights in borderline factual works precisely at the point where the Supreme Court's "thin copyright" doctrine was designed to curb the derivative work right and enable value-adding uses of the disparate facts.[58]

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[51] *See infra* notes 97-105 and accompanying text.
[52] *See, e.g.*, James Boyle, *The Second Enclosure Movement and the Construction of the Public Domain*, 66 LAW & CONTEMP. PROBS. 33 (2003); Reichman, Dinwoodie & Samuelson, *supra* note 35; Julie E. Cohen, *Lochner in Cyberspace: The New Economic Orthodoxy of "Rights Management,"* 97 MICH. L. REV. 462 (1999).
[53] *See, e.g.*, Paul Geller, *supra* note 3, at 166; Jane C. Ginsburg, *From Having Copies to Experiencing Works: The Development of an Access Right in US Copyright* Law, 50 J. COPYRIGHT SOC'Y U.S.A. 113 (2003).
[54] *See* Reichman & Uhlir, *supra* note 10, at 320-21.
[55] *See, e.g.*, Feist Pubs., Inc. v. Rural Tel. Svc. Co., Inc., 499 U.S. 340 (1991).
[56] This section is based on Reichman & Uhlir, *supra* note 10.
[57] *See, e.g.*, CCC Info. Servs. v. MacLean Hunter Mkt. Reports, 44 F.3d 61 (2nd Cir. 1994).
[58] *See Feist Pubs.*, 499 U.S. at 349-50.

At the same time, many decisions in the period 1980-2000 cut back on the US "fair use" doctrine, on which researchers traditionally depended.[59] This trend was sometimes justified on the grounds that past market failures had been cured by the establishment of collection societies and by the possibility of electronic fencing, which make pay-per-use solutions feasible.[60] In the EU, where there is no corresponding fair use doctrine to facilitate case-by-case uses of protected matter for research purposes, copyright law has no safety net for dealing with situations not clearly covered by the exceptions set out in the Infosoc Directive. The absence of such a safety net is, in itself, a weight on all scientific research.

Moreover, the long-established private use doctrine in European copyright law, which to some extent, overlaps with fair use, has been implicitly cut back in article 5(2)(b) of the Directive by an obligation to make equitable compensation—for what has traditionally been free uses—to rights holders.[61] In both the EU and the US, photocopying of copyrighted scientific articles is increasingly subject to compulsory licensing and payments to collection societies on the grounds that such societies eliminate pre-existing market failures.[62] This practice shifts government funds for research from scientists and educators to publishers.

In both the EU and the US, moreover, the three-step test imposed on all L&Es by article 13 of the TRIPS Agreement, by article 10 of the WCT, and by article 5(5) of the Infosoc Directive has become a further source of uncertainty for the scientific community.[63] This "outer edge" can allow research practices formerly thought to be safe under pre-existing exceptions to be called into question in different jurisdictions for failing to satisfy any of the three prongs codified in the three-step test.[64]

Above all, the EC Database Directive directly hinders scientific research by establishing an exclusive right in the very collections of data that traditional copyright laws had left freely available from the public domain.[65] There is no mandatory exception for scientific research in this Directive; and the optional exception seems to enable only extractions for purposes of illustration but not for reutilization of scientific data or information in other collections, which is the normal scientific practice.[66]

The European Court of Justice (ECJ) has introduced an illusive distinction between substantial investment for purposes of collecting data (presumably ineligible), and expenditures

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[59] *See, e.g.*, American Geophysical Union v. Texaco Inc., 37 F.3d 881 (2nd Cir. 1994). Evidence suggests that fair use has become more expansive, and thus potentially more favorable to science, in recent years. *See, e.g.*, Perfect 10, Inc. v. Amazon.com, Inc., 508 F.3d 1146 (9th Cir. 2007); *see also infra* text accompanying note 314.

[60] *See, e.g.*, Glynn S. Lunney, Jr., *The Death of Copyright: Digital Technology, Private Copying, and the Digital Millennium Copyright Act*, 87 VA. L. REV. 813 (2001).

[61] *See, e.g.*, BURRELL & COLEMAN, *supra* note 25, at 249-275 (rejecting a fair use approach). *But see infra* text accompanying notes __.

[62] *See* BURRELL & COLEMAN, *supra* note 25, at 113-120, 288-297. *But see* CCH Canadian v. Law Society of Upper Canada, [2004] 1 S.C.R. 339, 2004 SCC 13.

[63] *See, e.g.*, BURRELL & COLEMAN, *supra* note 25, at 128-130; *American Geophysical Union*, 37 F.3d at 881.

[64] *See, e.g.*, Report of the Panel, US – Section 110(5) Copyright Act, Jun. 15, 2000, WTO Doc. WT/DS160/R [*hereinafter* US – Section 110(5) Report].

[65] *See* EC Database Directive, *supra* note 16, arts. 1-11.

[66] *See, e.g.*, ESTELLE DERCLAYE, THE LEGAL PROTECTION OF DATABASES: A COMPARATIVE ANALYSIS (Edward Elgar Publishing, 2008); *see also* Reichman & Samuelson, *supra* note 42.

for purposes of developing and maintaining collections of data as such, which presumably qualify for protection.[67] This elusive distinction might conceivably reduce the total number of databases, particularly sole-source databases, eligible for protection.[68] However, there is reason to believe that most collections of scientific data and information can be made to fit within these judicially defined eligibility requirements by one means or another.[69] If so, any collection of scientific data or information that does qualify will obtain broad and virtually endless protection against value-adding components of an existing collection.[70]

How the Directive will actually affect science in any given country will thus depend on a number of uncertain variables. Nevertheless, we can say that this regime radically breaks with the historical limits of traditional IP laws by protecting aggregates of data and information as such, potentially forever, without requiring any significant level of creative contribution.[71] It affects most areas of research by establishing a potential monopolistic barrier to the flow of upstream information, which has typically been a free input into the information economy.[72]

Moreover, the Database Directive complicates and to some extent impedes the diffusion of cross-border collections of scientific data that are increasingly subject to actual or potential IP restrictions in a growing number of countries. In other words, just as the technological means of aggregating data from different countries in physical or virtual archives available to scientists everywhere are being perfected, the amount of data potentially subject to IP restrictions has exploded.[73]

Finally, these database protection laws could further disproportionately affect scientists' access to and use of factual data historically in the public domain, because they allow the scientist or the university to publish articles and still retain ownership and strong control of the data after publication. A database right even makes it possible for scientists or universities to apply for patents and disclose the supporting data in patent applications, but still retain exclusive rights in those data collections even after the patents expire.[74]

b. Abuse of Technical Protection Measures in Copyright Law

Scientists concerned about access and use of articles published in subscription journals must face the fact that virtually none of the pro-science premises of traditional copyright law outlined earlier necessarily applies to works made available through digital networks. In the online

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[67] *See* Reichman & Uhlir, *supra* note 10, at __.
[68] *See* Reichman & Samuelson, *supra* note 42.
[69] *See, e.g.*, __. More recent cases emphasize strict liability at the infringement stage. *See, e.g.*, __.
[70] DERCLAYE, *supra* note 66, at __.
[71] *See* J. H. Reichman & Paul F. Uhlir, *Identifying and Addressing Global Trends to Restrict Access to Scientific Data from Government Funded Research, in* THE GLOBAL FLOW OF INFORMATION (Jack M. Balkin & Eddan Katz eds., Yale Univ. Press, 2008).
[72] *See* David, *supra* note 23; Paul A. David, *The Digital Technology Boomerang: New Intellectual Property Rights Threaten Global Science*, Stanford Dep't of Econ. Working Paper No. 00-006 (2000), *available at* http://ideas.repec.org/p/wpa/wuwpdc/0502012.html (last visited Apr. 29, 2009).
[73] *See* Jerome H. Reichman, *Database Protection in a Global Economy*, 2002 REVUE INTERNATIONALE DE DROIT ECONOMIQUE 455 (2002).
[74] *See* Reichman & Uhlir, *supra* note 71.

environment, indeed, some or many of the traditional exceptions may have been limited by law, and even the most fundamental postulates of so-called users' rights, such as the idea-expression dichotomy or fair use in the US, may be entirely overridden by a combination of TPMs, statutory cutbacks, and contractually imposed restrictions, rooted in these provisions. [75]

This radical change of the legal infrastructure was not a direct product of the WIPO Copyright Treaty of 1996,[76] which established new rules covering digital transmissions of copyrighted works for some 150 signatory countries (67 of which have thus far ratified the treaty). On the contrary, the WCT reflects a relatively balanced compromise that resulted from the negotiations of equally powerful stakeholder coalitions on both the publishers and users' sides. However, the WCT gives no guidance about how states should implement its anti-circumvention norms so as to defend public interest privileges and immunities. When the treaty was translated into the domestic laws of the US and EU, powerful publisher interests persuaded the respective legislatures largely to ignore or override the safeguard provisions built into the WCT.[77]

When enacting the Digital Millennium Copyright Act of 1998 (DMCA),[78] for example, Congress in effect conditioned the ability of third party users to invoke public-interest privileges and exceptions, such as the idea-expression dichotomy or fair use, on their having first gained lawful access to the work being transmitted online.[79] Because the would-be user cannot invoke these traditional defenses unless he or she has obtained permitted access to the work, the DMCA arguably created a new exclusive "right of access" subject to virtually no pre-existing privileges or immunities of interest to scientific users whatsoever.[80] Worse yet, the moment a would-be user seeks to gain lawful access to the copyrighted work transmitted online, he or she will normally encounter one-sided contracts of adhesion that strip away most or all of the public interest user rights nominally available from traditional copyright law.[81]

A similar state of affairs (with different nuances in different jurisdictions) arises in the EU. The Infosoc Directive of 2001 indirectly enables domestic legislators to permit technical protection measures to curtail or override the pre-existing L&Es otherwise available in the hard copy format without giving any legal basis for implementing them in article 6(4).[82] Given this state of affairs, affected communities, including the scientific community, have mounted

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[75] This section is based on Reichman, Dinwoodie & Samuelson, *supra* note 35.
[76] WCT, *supra* note 46.
[77] *See* Reichman, Dinwoodie & Samuelson, *supra* note 35 at 983-985 (citing authorities).
[78] Digital Millennium Copyright Act (DMCA), Pub. L. No. 105-304, 112 Stat. 2860 (1998).
[79] 17 U.S.C. §1201 (1999); *see also* Timothy K. Armstrong, *Digital Rights Management and the Process of Fair Use*, 20 HARV. J. L. & TECH. 49 (2006); Dan L. Burk & Julie E. Cohen, *Fair Use Infrastructure for Rights Management Systems*, 15 HARV. J. L. & TECH. 41 (2001)..
[80] *See, e.g.*, Ginsburg, *supra* note 53; Pamela Samuelson, *Intellectual Property and the Digital Economy: Why the Anti-Circumvention Regulations Need to be Revised*, 14 BERKELEY TECH. L.J. 519 (1999). However, some recent cases have looked askance at this result and Profs. Reichman, Dinwoodie and Samuelson have demonstrated how these recent precedents could lead courts to a more balanced solution in the future. *See* Reichman, Dinwoodie & Samuelson, *supra* note 35.
[81] *See* J. H. Reichman & Jonathan A. Franklin, *Privately Legislated Intellectual Property Rights: Reconciling Freedom of Contract with Public Good Uses of Information,* 147 U. PA. L. REV. 875 (1999); Dan L. Burk, *Anticircumvention Misuse*, 50 UCLA L. REV. 1095 (2003).
[82] Reichman, Dinwoodie & Samuelson, *supra* note 35, at 1039-1045.

campaigns in various fora seeking to reestablish the balanced provisions of the WCT in new domestic or international legislation that, in one form or another, would recognize and codify so-called "users' rights."[83] These initiatives are still a long way from reaching their goals but should be carefully examined by the Commission.

c. Tightening the Electronic Fences

Apart from IPRs, digital technology itself enables publishers of scientific articles and collections of data to restrict access to their contents tightly, even as it also makes it possible to share as never before. Here we refer to technological fencing devices and to one-sided electronic contracts, known respectively as TPMs and DRM. With these measures in place, publishers automatically protect both data and information delivered through online networks without gaps in enforcement and without any traditional exceptions for science.[84]

This result occurs when a technological fence forces the would-be user through an electronic gateway, where a one-sided electronic contract of adhesion imposes a waiver of all or most user rights and privileges that copyright law or other laws might have permitted. In effect, the contract becomes a privately legislated IP right,[85] which recognizes no exceptions for science. When these technological fences and electronic contracts are supported by exclusive property rights—especially the EC database right—and by anti-circumvention measures, the publisher's power becomes virtually absolute and potentially perpetual.

d. Legal Uncertainty Impeding Use of Data and Information Embedded in Scientific Articles

Even in the absence of technological fences, uncertainties in copyright law with respect to both eligibility requirements and user's rights may prevent scientists from extracting data and information from published scientific articles, with a view to establishing digitally linked user communities and to facilitating their use of automated research tools. Here, moreover, the problems are aggravated by the different impacts of copyright laws in different countries.

For example, in Switzerland "descriptions of species" apparently do not qualify as copyrightable "works," and fall outside of copyright legislation whereas case law in the US seems to apply copyright law to the American Medical Association's coding systems for billing medical procedures, and might protect even taxonomic descriptions, not protectable in Switzerland as original selections and arrangements of data and facts.[86] Indeed, US copyright

[83] *See, e.g.*, Amy Kapczynski, *The Access to Knowledge Mobilization and the New Politics of Intellectual Property Law*, 117 YALE L.J. 804 (2008); *see also* WIPO General Assembly, Proposal by Argentina and Brazil for the Establishment of a Development Agenda for WIPO, August 27, 2004, WIPO Doc. WO/GA/31/11**,** *available at* http://www.wipo.int/edocs/mdocs/govbody/en/wo_ga_31/wo_ga_31_11.pdf (last visited Apr. 27, 2009) [*hereinafter* WIPO Development Agenda Proposal].

[84] *See, e.g.*, Miriam Bitton, *A New Outlook on the Economic Dimension of the Database Protection Debate*, 47 IDEA 93, 141-44, 150-53 (2006); Lunney, *supra* note 60.

[85] *See* Reichman & Franklin, *supra* note 81.

[86] This section is drawn from Reichman, Dedeurwaerdere & Uhlir, *supra* note 22.

law—on a bad day—could protect such data collections against syntheses of more than one source.[87]

Even if one found no copyrightable interest to bar access to the unprotectible technical data or information in the raw state, and even if no database protection right existed to fill the gap, a proprietor could create a fig leaf copyright by describing how a given collection of unprotectible items was designed.[88] By attaching this clearly copyrightable description to the noncopyrightable data, facts, and information, the proprietor would obtain a "collective work," which could then be surrounded by an electronic fence (TPMs) under the DMCA and the EC Infosoc Directive.[89]

There would then be an electronic gateway, with the possibility of one-sided e-contracts posted over the doorway. Anyone entering the doorway to gain lawful access to the collection may be asked to waive or surrender all his or her rights under copyright law to extract and use the data, information or facts to which access had been gained. If, instead, the would-be user does not enter the gate, then the DMCA and the Directive will prevent them from hacking through the fence to obtain the uncopyrightable matter by means of anticircumvention provisions set out in the WIPO Copyright Treaty of 1996.[90]

Finally, in the EU, all the matter discussed above—taxonomic descriptions, data, scientific information—might be independently protectable as collections of data under the EC Database Directive.[91] In that case, the data and information could not be reused or redistributed even if access to the literature or the articles or the website was otherwise legally obtained.[92] In the EU, the noncopyrightable matter could thus be subjected to two or more layers of protection. Current copyright laws and, in the EU, database protection laws, are thus on a collision course with some of the most promising scientific movements in history.[93]

The existing system affords only two unsatisfactory models for making available the basic building blocks of science as embedded in scientific articles and collections of data. The first is based on the premise that commercial and restrictive practices must be adopted to generate revenues to support scientific publications and related activities. In reality, this commercializing trend will increase the costs of publicly funded research, which depends on relatively unrestricted access to general purpose research tools and information. It will also severely restrict, if not make entirely impossible the exploitation of the automated knowledge generation possibilities through a proliferation of private quality standards and restrictive licensing conditions.[94]

The second model attempts to build an alternative open access infrastructure, which could generate important payoffs in terms of enabling cumulative public research, developing public

[87] *See, e.g.*, *CCC Info. Servs.*, 44 F.3d at 61.
[88] *See* Ginsburg, *supra* note 53.
[89] *See* Reichman, Dinwoodie & Samuelson, *supra* note 35.
[90] *See id.*
[91] *See* EC Database Directive, *supra* note 16, art. 3(1).
[92] *See id.*, art. 7.
[93] *See infra* text accompanying notes 97-106.
[94] *See infra* text accompanying notes __.

quality standards and increasing the scope of available research inputs. However, a lack of coordination with respect to IP provisions, so as to maximize these different expected payoffs hampers the further development of any alternative open access infrastructure.[95]

3. Impediments Imposed by Publishing Intermediaries

The traditional practice with regard to scientific articles is that authors assign their copyrights to publishers, who are either commercial entities or learned societies and other nonprofit scientific organizations. As a result, it is publishers rather than authors, that initially determine the conditions for access to these articles and for reuse of the information and data they contain. Because subscription based publishers (including the learned societies) seek to profit from their publications, they tend to impose greater restrictions on access and use than authors or the scientific community more generally would deem desirable, given that the latter are primarily motivated by the reputation benefits that may accrue from unhindered diffusion.[96] At the same time, authors benefit from the peer-review mechanisms many of these publishers manage, which makes them reluctant to publish outside traditional, well-established outlets, when they have the choice.

B. Unlimited Scientific Opportunities in the Digital Environment

Against this background of privatizing legal constraints, one must be aware of the extent to which information technology and related scientific tools, especially bioinformatics, are transforming traditional scientific fields, such as molecular biology, and spawning new fields, such as genomics and proteonomics. The combination of massive storage capacity, powerful data manipulation techniques and graphic capabilities has revolutionized both how research is conducted and how the resulting knowledge is preserved and disseminated.[97] Effective exploitation of these new opportunities, however, requires integration of information and data scattered over a broad range of articles and databases that may or may not be available online and extensive computational research on these information resources.[98]

The use of computational methodologies, such as bioinformatics, in the building of global collections of articles and data and in the integration of relevant research results makes it possible to build accumulative, field specific knowledge repositories that capture reams of relevant scientific and technical information and data and to develop general data-mining tools for automated knowledge discovery in the chosen environment.[99] Added value to users is further potentiated when automated knowledge-discovery tools can be readily applied to the relevant

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[95] *See infra* text accompanying notes __.

[96] *See, e.g.*, Hilty, *Copyright Law and Scientific Research*, *supra* note 10; Hilty, *Five Lessons about Copyright in the Information Society*, *supra* note 10.

[97] *See, e.g.*, SCOTT STERN, BIOLOGICAL RESOURCE CENTERS: KNOWLEDGE HUBS FOR THE LIFE SCIENCES 24 (Brookings Institution Press, 2004).

[98] *See, e.g.*, Nancy L. Maron & K. Kirby Smith, Current Models of Digital Scholarly Communication: Results of an Investigation Conducted by Ithaka for the Association of Research Libraries 27 (November 2008), *available at* http://www.arl.org/bm~doc/current-models-report.pdf (last visited Apr. 27, 2009).

[99] *See* P. Dawyndt, M. Vancannety, H. de Meyer & J. Swings, *Knowledge Accumulation and Resolution of Data Inconsistencies During the Integration of Microbial Sources*, 17(8) IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING 1111 (2005).

scientific literature. To this end, the digitization of scientific information offers formidable opportunities for enhanced speed of dissemination of publicly funded research, for the development of high performing research engines that diminish the search time for publications, and for automated cross-linking and text mining based on standardized metadata. The goal of the digital infrastructure should be to develop these opportunities for public research institutes and universities, while maintaining the classical functions of certification and diffusion of research results of the pre-digital print markets.[100]

At the same time, communication channels built into the graphical user interface of bioportals, coupled with interactive communication among a growing community of users and collaborators, helps to spawn social networks of active contributors around dynamic knowledge networks.[101] Collaborative action thus steers computational applications in potentially more fruitful directions and fills virtual libraries with new data and information. One example is the vast, multi-dimensional "information space" built up over many years by the genomic research community and coordinated today by the European Bioinformatics Institute (EBI).[102] Another example is the comprehensive biorepository and clinical data management systems for promoting personalized medicine at the Harvard and Coriell biorepositories.[103]

The main advantages of publicly certified, all-inclusive collections of data and information in a given domain are related to their scope and to the fact that they operate under the rules of public science; that is, under publicly testable quality procedures open to scrutiny by the global research community.[104] All-inclusive public or semi-public repositories then extend the possibilities for comparing large amounts of information and data by virtue of being open to all available comparable sources. They establish the preconditions for global collaboration in the further development of relevant information infrastructures by adopting public rules for, say, data quality and robustness. They support cumulative scientific research by promoting standardized quality norms in the certification of data. Finally, by making most data and information available under open access conditions, they also expand the possibilities for further extraction and integration of matter otherwise only available in disparate sources and repositories. In particular, data mining techniques may be used to extract data from all available sources, with the resulting commons digitally available for still more refined mining and combinatorial manipulation later on.[105]

Given these premises, the goal is not to further fragment and balkanize the research environment in order to better protect private rights holders and publishers. Correctly perceived,

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[100] *See* Reichman, Dedeurwaerdere & Uhlir, *supra* note 22.

[101] *Cf.* BENKLER, *supra* note 6; Frischmann, *supra* note 5. *See also* Peter Lee, *Contracting to Preserve Open Science: The Privatization of Public Policy in Patent Law*, 57 EMORY L.J. (forthcoming 2009).

[102] *See* David, *supra* note 23, at 107.

[103] The Harvard-Partners Center for Genomics and Genetics (HPCGG) and the Coriell Institute for Medical Research. For a technical overview of the dynamic collective research tools (including the proposed Science Commons SPARQL Protocol), cf. Chris Kronenthal**,** ***Banking on Personalized Medicine***, BIOIT-WORLD, May 12, 2008, *available at* http://www.bio-itworld.com/issues/2008/may/biobanking-personalized-medicine.html (last visited Apr. 27, 2009).

[104] *See* Mark Harvey & Andrew McMeekin, Public or Private Economies of Knowledge: The Economics of Diffusion and Appropriation of Bioinformatic Tools, paper presented to the Microbial Commons Conference, Ghent, Belgium, Jun. 12-13, 2008.

[105] *See* Reichman, Dedeurwaerdere & Uhlir, *supra* note 22, at 28.

the real issues are how to align the L&Es in copyright and database protection laws to facilitate the payoffs from these new technological tools. More generally, efforts are being made to promote the formation of contractually reconstructed research commons (or semicommons) that can flourish in an otherwise highly protectionist IP environment and generate a steady stream of downstream research products and socially beneficial commercial applications that do respond positively to the incentives of IPRs.[106]

Policymakers should accordingly take pains to ensure that copyright and database protection laws do not continue to undermine or impede these most promising opportunities, which are critical for addressing the most pressing social and environmental challenges of our time. Impeding these opportunities would perversely channel more power to rights holders outside the European Union precisely at a time when the EU (like the US) risks becoming a net importer of technology. Yet, unless enlightened reforms are made, that is exactly what the existing legal infrastructure tends to do.

III. REFORMING THE LEGAL INFRASTRUCTURE TO SUPPORT THE PRODUCTION AND DIFFUSION OF SCIENTIFIC INFORMATION AND DATA

Given the new opportunities that digital networks and automated knowledge tools make possible, the logical goal for the European Commission—if it truly endeavors to support the Fifth Freedom—is to alleviate obstacles that the existing legal infrastructure poses for twenty-first century scientific endeavor. A fundamental change of attitudes would then become necessary. A top priority would be to avoid generating a legally established fiefdom, in which a few private rights holders combined all scientific literature into an enormous database where access and use were totally restricted and controlled from the top down and the commodified inputs of science were distributed on a pay-per-use basis.[107] That outcome would otherwise strangle upstream European science and limit its capacity for technological innovation precisely at the time when the EU faces stiff challenges from the growing scientific and technological capacities of the emerging economies.[108]

What both the EU and US require, instead, is a long-term policy perspective that discriminates between the needs of the scientific community, operating within a broadening research commons that is increasingly capable of managing and integrating its own supplies of data and information,[109] and the needs of the downstream technology sectors, which depend on the incentives of IPRs to translate scientific discoveries into commercial applications.[110] The object here is to avoid pushing those downstream incentives into the realm of basic science,

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[106] *See id.*; Reichman & Uhlir, *supra* note 10.
[107] *See generally* Reichman, Dedeurwaerdere & Uhlir, *supra* note 22.
[108] *See, e.g.*, Peter Yu, *Sino Trade Agreements and China's Global Intellectual Property Strategy*, *in* IP ASPECTS OF FREE TRADE AGREEMENTS IN THE ASIA PACIFIC REGION (Christoph Antons & Reto M. Hilty eds., Kluwer Law International, forthcoming 2009).
[109] *See* Reichman & Uhlir, *supra* note 10; *see also* Lee, *supra* note 22.
[110] *Cf.* Colin Crossman, Arti K. Rai, Jerome H. Reichman & Paul F. Uhlir, *Pathways Across the Valley of Death: Novel Intellectual Property Strategies for Accelerated Drug Discovery*, 8 YALE J. HEALTH POL'Y L. & ETHICS 1 (2008).

where they will fracture and balkanize the research commons.[111] The Commission should, accordingly, adopt measures that broaden the research commons and enable it to smoothly operate its computational tools in integrated, field-specific communities that span the world, without disruption from domestic toll collectors waiving IP stop signs.

This project will require more than tinkering at the edges of copyright law. It will require an overall vision, a willingness to remove obstacles to modern research, and a determination as well to fund the necessary operations. Reforms of this scope entail more than a recognition of "users' rights,"[112] which denote important cultural interests and the enrichment that ensues from access to literary and artistic works in general. Where science is concerned, information and data function as inputs to the process of discovery and thereby constitute an essential ingredient of future scientific progress.

From this perspective, the worldwide copyright system as it has lately evolved can hardly be said to benefit scientists *qua* "authors." On the contrary, authors of scientific works, including relevant collections of data, are increasingly obliged to surrender their outputs to publishers from whom they must buy back the very information and data they supplied (often at government expense, at least in the US). Rather than opening new vistas for creators—as occurred after the printing press was invented and at regular intervals of technological change—copyright law in the digital network environment seems bent on closing off new horizons[113] in order to defend old business models for which publishers have sought few alternatives. Making the internet safe for publishers of print media should no longer justify impeding the global aggregation of scientific information and data, or the uses of automated knowledge tools capable of analyzing them.

In what follows, we examine a number of possible reforms that policymakers in both developed and developing countries may wish to consider in rethinking some core assumptions evidenced in the European Commission's Green Paper.[114] That Paper rather indiscriminately combined the treatment of exceptions for consumers of entertainment goods and for elemosinary purposes with exceptions devised to enhance value-adding uses, transformative uses, and the creative process in general. In this part of our article we will focus on the creative process, with particular regard to science, in the belief that many of our proposals apply beyond scientific endeavors. Specifically, we shall briefly look at needed reforms to existing copyright law, including its cyberspace provisions; needed reforms of the database protection regime; and finally measures to support the open access movement in order to establish the European Scientific Commons on a properly funded, institutionally solid foundation.

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[111] *See, e.g.*, Charlotte Hess & Elinor Ostrom, *Introduction: An Overview of the Knowledge Commons* and *A Framework for Analyzing the Knowledge Commons*, *in* UNDERSTANDING KNOWLEDGE AS A COMMONS – FROM THEORY TO PRACTICE 3-26, 41-82 (C. Hess & E. Ostrom eds., Cambridge Univ. Press, 2007).

[112] *See, e.g.*, R. Cooper Dreyfuss, *TRIPS – Round II: Should Users Strike Back?*, 71 U. CHI. L. REV. 21 (2004).

[113] *See, e.g.*, Max Planck Institute for Intellectual Property, Competition and Tax Law, European Commission – Green Paper: Copyright in the Knowledge Economy – Comments by the Max Planck Institute for Intellectual Property, Competition and Tax Law, Max Planck Institute for Intellectual Property, Competition & Tax Law Research Paper Series No. 08-05, Dec. 3, 2008, *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1317730 (last visited Apr. 29, 2009) [*hereinafter* Max Planck Response to EC Green Paper]; Victoria Stodden, *Enabling Reproducible Research: Open Licensing for Scientific Innovation*, INT'L J. COMM. L. & POL'Y (forthcoming 2009), *available at* http://ssrn.com/abstract/=1362040 (last visited Apr. 27, 2009).

[114] *See* EC Green Paper, *supra* note 11; *see also supra* note 26 and accompanying text.

A. Misplaced Reliance on Publishing Intermediaries

When approaching this topic, we are struck by the weight of customary practice under which the scientific community relies on external publishing intermediaries even though, at least in the developed countries, the value added by such intermediaries has reached diminishing returns,[115] and the bulk of published scientific research will have been government funded. In other words, science policy traditionally relies on the private sector to supply a public good. and that supplier in turn relies on copyright law and related rights to provide incentives to invest and to recoup its investment.

Historically, the logic behind this custom was the need to defray high front-end publishing costs and to perform laborious tasks such as typesetting, formatting, and the like, which academic institutions eschewed with respect to journals.[116] A second factor was the tendency of scientific communities to entrust learned societies with the publication task, which in turn became a primary source of revenue for the societies whether they performed the publishing service, or more likely today, outsourced it to a commercial publisher in return for a share of the proceeds. Over time, the possibilities for profit have increasingly enticed commercial publishers buy out the learned societies, although continuing payments are often made.[117]

In recent years, the logic of this custom has become increasingly open to question. The costly front-end publishing function has been reduced to desktop publishing and formatting[118] while the peer-review function, of great reputational importance, is performed gratis by scientists who themselves gain both power, reputation and advanced access to new developments.[119] This built-in *quid pro quo* within the scientific community has perpetuated the dominance of the intermediaries. The supervisory or editorial role of the learned societies, with some exceptions, has diminished over time (unless an editorial subsidiary such as JAMA is used), while the dependence of such societies on income from publishing seems ironically to have increased. Meanwhile, universities have themselves massively entered the book publishing trade to overcome market failure attributable to commercial presses, while oddly remaining aloof from the publication of scientific journals, with rare exceptions.[120]

This web of traditional practices and interests has then been transposed into the digital age, even though digital networks break with the limits of the print model and make whole new dimensions of publishing possible. The rules of copyright law have simultaneously been extended to the digital environment and the protections available have been enormously strengthened in order to make the on-line environment safe for the print model. Because scientific publishing has drifted along with this tide, the full possibilities of digitally manipulating scientific research results for new scientific discovery are hamstrung by the layers of protection inherited from these decidedly unfriendly developments. Hence the unprecedented

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[115] *See, e.g.*, Hilty, *Copyright Law and Scientific Research*, *supra* note 10.
[116] *See, e.g.*, *id*. However, university presses absorbed these functions with respect to specialized books subject to market failure in the normal book trade. *See* Reichman, Dedeurwaerdere & Uhlir, *supra* note 22.
[117] *See* Reichman, Dedeurwaerdere & Uhlir, *supra* note 22.
[118] *See, e.g.*, Hilty, *Copyright Law and Scientific Research*, *supra* note 10.
[119] *See* Reichman, Dedeurwaerdere & Uhlir, *supra* note 22, ch. __.
[120] *See id.*, at __.

need for the E.C. to address the state of L&Es to copyright law, once cries of alarm from numerous directions had been raised about the resulting harm to science.

B. Limiting the Harm from Distribution by Private or Quasi-Private Intermediaries

In addressing prospective reforms, one is nonetheless limited by the prospects for changing the underlying customary traditions that have led us to the present quandary. The continuing practice of distributing published scientific research results through commercial or semi-commercial publishing outlets, i.e., reliance on the private sector to supply a public good, forces us to take copyright law and other applicable laws as they are for starters. It also obliges us to deal with the private sector's needs to recoup their investments and turn a profit, a problem we shall first address in part III.B.2 below. We shall then ask if more fruitful solutions are not likely to emerge from a change of paradigm, in which the outsourced intermediaries were abandoned and the publishing function were absorbed into a digitally integrated academic research environment.[121]

1. Funders' Ability to Contractually Regulate Access, Use and Re-Use of Scientific Articles

Within the existing paradigm, one salient factor dominates, namely, most results from scientific research, at least in OECD countries, would have been largely funded by governments. As principal funders, governments and government agencies have the power to contractually impose the conditions of use and re-use of research results that are necessary for the relevant scientific communities to manage and control access to and reuse of the basic knowledge assets indispensable to a broad upstream research commons.[122] For example, they can dedicate government-generated work to the public domain, as occurs in the US,[123] and they can mandate the deposit of resulting publications in open access journals or, at least, in open access repositories.[124] They can also impose analogs to fair use and other L&Es by contract,[125] which both publishers and individual scientists, as grantees, would have to respect, especially if they wished to qualify for future grants.

The effective limits on the funders' regulatory ability are the potential unwillingness of intermediaries or grantees to accept such contractual templates. With respect to grantees for example, a requirement to publish only in open access journals or only under Creative Commons or Science Commons licenses could prevent publication in high prestige peer-reviewed journals and breed resistance from the scientific community. By the same token, aggressively open access licensing conditions imposed by funders could, but not necessarily would, persuade

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[121] *See infra text* accompanying notes 337-348; *see also generally* Reichman, Dedeurwaerdere & Uhlir, *supra* note 22, ch. __.

[122] *See* Reichman, Dedeurwaerdere & Uhlir, *supra* note 22; Reichman & Uhlir, *supra* note 10.

[123] 17 U.S.C. §105 (2004).

[124] *See, e.g.*, Michael W. Carroll, *Complying with the National Institutes of Health Public Access Policy: Copyright Considerations and Options*, SPARC/SCIENCE COMMONS/A-RL White Paper (Feb. 2008), *available at* http://www.arl.org/sparc/bm~doc/NIH_Copyright_v1.pdf (last visited Apr. 27, 2009); Stodden, *supra* note 113; Reichman & Uhlir, *supra* note 10; Lee, *supra* note 22.

[125] *See, e.g.*, Stodden, *supra* note 113, at 36-53 (proposing a Reproducible Research Standard to ensure attribution and facilitate the sharing of scientific works); M. Carroll *supra* note 124, at 10-16 (discussing Science Commons licenses).

private publishers to abandon the field. It could also press them to adjust and change their business models as, for example, when commercial publishers, such as Springer, increasingly allow scientists to purchase open access rights and even make a profitable business out of selling such rights at about the same costs as publishing in an open access journal as such.[126]

Funders could also deal with such other matters as 1) requiring deposit in open access repositories, 2) helping to regulate grey literature (not formally published, such as proceedings), and by 3) supporting self-archiving practices. Of course, the funders' open access conditions could become so severe as to threaten the intermediaries' prospects for recouping investment and thus lead to the withdrawal of their services. In that case, science policy could realistically assess the gains to be made from reintegrating the publishing function into an open access integrated knowledge environment, as one study underway now advocates.[127]

We shall return to this theme later on. For now, it suffices to note that many of the restrictions on use and re-use of scientific articles, such as those considered below, could be removed contractually by funding agencies, if they so resolved. Moreover, the problem of compensating intermediaries might similarly disappear if funders decided to integrate publishing into the academic or research communities and to fund the relevant cost.

2. Accommodating Limitations and Exceptions in Copyright Laws to the Needs of Science

Despite the broad regulatory powers we think funders could exert and their growing awareness of the need for public repositories that operate on an open access basis, most scientific articles are still published by intermediaries who operate largely free of government constraints and subject only to self-interest. In this context, the default rules remain those of copyright law, database protection law and other relevant legal regimes including unfair competition law and antitrust laws. As a practical matter, how much these existing legislative defaults can be changed, improved or adjusted remains an open question.

As a general principle, we nonetheless posit that, once a scientist has published his or her research results in an article, or otherwise made them available to the public, that *author*[128] should retain very few rights, if any, to control further uses of the end product. In our view, the possibility that these results may be eventually used for commercial objectives should have virtually no bearing on this general principle. Rather, published scientific research results should be seen as an upstream public good, available to follow-on investigators in virtually any format.

a. The Print Model

[126] *See* Reichman, Dedeurwaerdere & Uhlir, *supra* note 22, at __ (citing authorities).
[127] *See id.*
[128] Here, we endorse the distinction between the scientific author's rights and needs and those of the publishing intermediaries as put forward by Professor Hilty. *See* Hilty, *Copyright Law and Scientific Research*, *supra* note 10.

In the print media, copyright laws do not restrict use as such, only certain enumerated uses.[129] Our general principle set out above would, accordingly, require publishers (as intermediaries) to recoup their investment from the first sale in hard copies,[130] but they should not otherwise be entitled to extract value from downstream investigational uses of published research results. In reality, that principle is imperfectly expressed under existing L&Es.[131]

In some countries, especially the US, the idea-expression dichotomy pulls heavily in this direction by freeing up large amounts of published facts and research results that third parties may use without permission and without serious risk of infringing the authors' copyrights.[132] While commentators in the US often point to "fair use" as a symbol or emblem of a number of privileged uses and immunities in copyright law, that practice should not obscure the fundamental importance of the idea-expression distinction, and the exclusion of facts as such that is derived from it. These distinctions are understood to cushion the extent to which copyright law conflicts with fundamental rights of free speech recognized in the US Constitution[133] and that are increasingly recognized, in EU human rights decisions as well.[134] No doctrine has proved more dispositive in the judicial treatment of copyright infringement cases in the US than this one, and no single doctrine so traditionally defends access to published research results as well.[135]

There is reason to doubt that the idea-expression doctrine, often stated as a form-content distinction in European copyright law[136] carries the same weight as in US law, and it clearly varies from country to country.[137] In the UK, for example, it seems that the "most fundamental problem with the argument that the idea/expression dichotomy prevents copyright from burdening freedom of expression is that this claim rests on a narrow [judicial] understanding of freedom of expression."[138] Nevertheless, there is remarkably no mention of the centrality of this doctrine in the Infosoc Directive, nor even in the Green Paper, notwithstanding the fact that the idea-expression doctrine—like the three-step test—has now been embodied at the multilateral level in both article 9.2 of the TRIPS Agreement and in article 10 of the WCT.[139]

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[129] *See, e.g.*, 17 U.S.C. §106 (2004); *Cf.* Berne Convention for the Protection of Literary and Artistic Works, arts. *6bis*, 8, 9, 11, 11*bis*, 11*ter*, 12, 14, 14*ter*, Sept. 9, 1886, as revised at Paris on July 24, 1971, and amended on Sept. 29, 1979, 25 U.S.T. 1341, 828 U.N.T.S. 221 [*hereinafter* Berne Convention].

[130] *See, e.g.*, 17 U.S.C. §109(a) (first sale doctrine); *see also* Bobbs-Merrill Co. v. Straus, 210 U.S. 339 (1908); Quality King Distributors Inc., v. L'anza Research International Inc. 523 U.S. 135 (1998).

[131] *See, e.g.*, EC Infosoc Directive, *supra* note 14, art. 5(2)(b) (distinguishing copies for commercial uses from non-commercial private use and requiring equitable compensation); *id*., art. 3(a) (allowing "use for the sole purpose of illustration for teaching or scientific research" to the "extent justified by the non-commercial purpose to be achieved"). *See also* BURRELL & COLEMAN, *supra* note 25, at 42-43, 113-124, 290-297.

[132] *See* 17 U.S.C. §102(b) (1990).

[133] *See* DAVID L. LANGE & H. JEFFERSON POWELL, NO LAW: INTELLECTUAL PROPERTY IN THE IMAGE OF AN ABSOLUTE FIRST AMENDMENT (Stanford Univ. Press, 2009).

[134] *See* Laurence R. Helfer, *The New Innovation Frontier? Intellectual Property and the European Court of Human Rights*, 49 HARV. INT'L L.J. 1 (2008). *See also* Laurence R. Helfer, *Toward a Human Rights Framework for Intellectual Property*, 40 U.C. DAVIS L. REV. 971 (2007).

[135] *See, e.g.*, Baker v. Selden, 101 U.S. 99 (1879); Mazer v. Stein, 347 U.S. 201, 217 (1954); Harper & Row Publishers, Inc. v. Nation Enters., 471 U.S. 539, 556 (1985).

[136] *See, e.g.*, Hilty, *Copyright Law and Scientific Research*, *supra* note 10.

[137] *See, e.g.*, BURRELL & COLEMAN, *supra* note 25, at 20-21 (citing authorities).

[138] *Id*., at 21.

[139] *See* TRIPS Agreement, *supra* note 43, art. 9.2; WCT, *supra* note 46, art. 10.

Any serious reform effort should accordingly start with a codification of the idea-expression dichotomy as a central subject matter exception at the Federal level. It should be followed up with more detailed provisions specifically directed, at scientific and educational literature. Similarly, international law now mandates a limited form of copyright protection for compilations of information, based on an original selection and arrangement,[140] which is of great importance to science, and it too, should be codified and enforced everywhere.[141]

1) Designated Exceptions in EU Law

Beyond these preliminary subject matter exclusions, there are two basic approaches to designing L&Es in the print media at the present time. One is embodied in US-style legislation, which combines a set of highly specific exceptions to the exclusive rights of authors with a general fair use provision that carves out additional space for non-infringing activity, usually transpiring within specified normative guidelines.[142] A second general approach is that embodied in the EC's Infosoc Directive, which sets out an enumerated list of L&Es, with the understanding that activities falling within these categories are deemed permissible. Correspondingly, activities not covered by any of the listed exceptions are presumptively proscribed, even if they appear to be natural extensions of an existing exception.[143]

Despite the different approaches to the design of L&Es in domestic laws, the larger multilateral framework recognizes more flexibility than the EU approach might suggest. While the Berne Convention[144] expressly recognizes specific L&Es,[145] for example, state practice treats that Convention as a general framework within which member states can legitimately craft additional L&Es, and there are still other L&Es that member states have discretion to enact only if they are linked to adequate compensation to the rights holders.[146] Given the range, variation and scope of L&Es existing in the EU's domestic laws, it can rightly be said that there is no stable consensus as regards the design of L&Es that member states must adopt.[147]

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[140] *See, e.g.*, TRIPS Agreement, *supra* note 43, art. 10.2.
[141] We recognize this is accomplished to some extend in Part I of the EC Database Directive, *supra* note 16, while it is totally undermined by the protection of data as such in Part II of the Directive.
[142] *See* 17 U.S.C. §§106-122 (2006); *see also* William W. Fisher III, *Reconstructing the Fair Use Doctrine*, 101 HARV. L. REV. 1659 (1988); Rebecca Tushnet, *User-generated Discontent: Transformation in Practice*, 31 COLUM. J.L. & ARTS 497 (2008); Pamela Samuelson, *Unbundling Fair Uses*, FORDHAM L. REV. (forthcoming 2009), *available at* http://papers.ssrn.com (last visited Apr. 29, 2009); Ruth L. Okediji, *Toward an International Fair Use Doctrine*, 39 COLUM. J. TRANSNAT'L L. 75 (2000).
[143] *See* P. Bernt Hugenholtz & Ruth L. Okediji, Conceiving an International Instrument on Limitations and Exceptions to Copyright – Final Report, a study sponsored by the Open Society Institute (March 6, 2008), *available at* http://www.ivir.nl/publicaties/hugenholtz/finalreport2008.pdf (last visited Apr. 27, 2009); *see also* BURRELL & COLEMAN, *supra* note 25, at 249-51 (contrasting UK approach with "Commonwealth Approach").
[144] Berne Convention, *supra* note 129.
[145] *See, e.g., id*., arts. 10 and 10*bis*.
[146] *See, e.g., id*., art. 11*bis*. *See also* Ruth L. Okediji, The International Copyright System: Limitations, Exceptions and Public Interest Considerations for Developing Countries, UNCTAD-ICTSD Project on IPRs and Sustainable Development T 13-14 (March, 2006), *available at* http://www.unctad.org/en/docs/iteipc200610_en.pdf (last visited Apr. 27, 2009).
[147] The extent to which the EC Infosoc Directive tends to restrict or expand this consensus remains controversial. *See, e.g.*, P. Bernt Hugenholtz, *Why the Copyright Directive Is Unimportant, and Possibly Invalid*, 11 E.I.P.R. 501 (2000), *available at* http://www.ivir.nl/publications/hugenholtz/opinion-EIPR.html (last visited Apr. 27, 2009).

Several non-EU states have accordingly adopted a US-styled fair use doctrine,[148] even in the face of suggestions from some quarters that such a doctrine violates the three-step test of the Berne Convention.[149] Moreover, as demonstrated below, post-TRIPS copyright treaties have acknowledged the discretion of states to recognize, promote, and develop L&Es necessary to facilitate the public welfare objectives of IP laws.[150]

Where scientific research is concerned, the EU relies primarily on an exception for teaching and research which is grudging and exceptionally narrow even in the print media.[151] Literally stated, "illustration for purposes of teaching and research" is hardly transparent, in contrast with the corresponding phrase in the Rome Convention,[152] for example, which simply permits "use solely for the purposes of teaching or scientific research."[153] Moreover, this exception is subject to a "non-commercial purpose" constraint,[154] which makes it unworkable in practice and risky to boot, given that all academic research can be put to commercial ends that financially benefit their respective universities.[155]

This research and teaching right is then further circumscribed by provisions regulating copies for private noncommercial use if compensation is paid;[156] copies made for libraries and educational establishments,[157] and quotations for purposes such as criticism or review "in accordance with fair practice, and to the extent required by the specific purpose."[158] No guidance to impel member states to promote unconstrained scientific research appears in the Infosoc Directive itself, while the Byzantine snares of the domestic law implementations are amply visible in Burrell and Coleman's survey of relevant UK laws in their recent book.[159]

Two preliminary conclusions seem logically to follow. The approach embodied in the Infosoc Directive appears inconsistent with the Preamble to the WCT, and article 7 of the TRIPS Agreement, which both emphasize the need for a balance that particularly favors the public interest in "education, research and access to information."[160] Second, the accumulated costs and risks of these convoluted "exceptions" are so great that basic scientific research in Europe

[148] The fair use doctrine has been adopted by Canada and Israel and its adoption is pending in Japan.
[149] In particular, several scholars have raised the issue whether the fair use doctrine complies with the first and third steps of the test. *See, e.g.*, WIPO Standing Committee on Copyright and Related Rights, WIPO Study on Limitations and Exceptions of Copyright and Related Rights in the Digital Environment, at 68-70, 9th Session, June 23-27, 2003, WIPO Doc. SCCR/9/7 (Apr. 5, 2003); M. SENFTLEBEN, COPYRIGHT, LIMITATIONS AND THE THREE-STEP TEST 162 (Kluwer Law International, 2004); Okediji, *supra* note 142, at 148.
[150] *See infra* notes 225-227 and accompanying text.
[151] *See* EC Infosoc Directive, *supra* note 14, art. 5(3)(a).
[152] International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations, Oct. 26, 1961, 496 U.N.T.S. 43.
[153] *Id*., art. 15.1(d).
[154] *See* EC Infosoc Directive, *supra* note 14, art. 5(3)(a).
[155] *Cf.* Madey v. Duke University, 307 F.3d 1351 (Fed. Cir. 2002).
[156] *See* EC Infosoc Directive, *supra* note 14, art. 5(2)(b).
[157] *See id.*, art. 5(2)(c).
[158] *See id.*, art. 5(3)(d).
[159] *See* BURRELL & COLEMAN, *supra* note 25, part I.
[160] *See* WCT, *supra* note 46, pmbl.; TRIPS Agreement, *supra* note 43, art. 7.

succeeds only because scientists and universities systematically ignore them to the extent they can.[161]

2) Strengths and Weaknesses of a Fair Use Exception

Part of the problem stems from the custom of codifying specific L&Es, drawn from the past, without allowing any play in the joints for unexpected and fact-specific situations of the kind that a "fair use" doctrine might otherwise handle.[162] This flexibility creates a buffer zone when, for example, the line between idea/expression is not clear and some expression may be taken in a subsequent scientific use. The normative criteria built into the fair use doctrine will usually ensure that such uses are permitted for scientific research,[163] and this tradition supports customary research practices in the US, at least until contradictory judicial decisions are actually handed down.[164] Even then, subsequent jurisprudence—especially in the appellate courts—may correct aberrant decisions[165] and may considerably expand the potential range for "fair uses," as seems to be occurring in the US at the present time.[166] For this and other reasons, EU law as regards science, at least, would benefit from such a doctrine.

One additional function of fair use is that it serves as a buffer against the need to invoke fundamental rights. In the EU, absent fair use, courts and commentators have increasingly latched on to fundamental rights, especially free speech, to override unduly narrow exceptions in copyright law.[167] This trend will, and should continue, although the tensions it generates would likely be tempered by recourse in copyright cases to fair use and argues for its adoption. Nevertheless, the pressures of copyright expansion in the last decade have clearly elicited a growing challenge from first amendment scholars,[168] and unless corrective action is taken under the Green Paper or similar initiatives, this trend could boomerang against both publishers and authors.

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[161] For obvious reasons, we provide no citations for this phenomenon, which, however, is frequently mentioned at academic conferences and symposia. *Cf.* Wesley M. Cohen & John P. Walsh, *Real Impediments to Academic Biomedical Research*, 8 INNOVATION POL'Y & ECON. 1 (2008).

[162] *See* Samuelson, *supra* note 142.

[163] *See* 17 U.S.C. §107 (2006); *see also* Williams & Wilkins Co. v. United States, 487 F.2d 1345 (Ct. Cl. 1973).

[164] *See, e.g.*, *American Geophysical Union*, 37 F.3d at 881; Princeton Univ. Press v. Michigan Document Servs., 99 F.3d 1381 (6th Cir. 1996).

[165] *See, e.g.*, U.S.; *see also CCH Canadian*, [2004] 1 S.C.R. at 339.

[166] *See, e.g.*, *Perfect 10*, 508 F.3d at 1146; *see also infra* text accompanying note 314.

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[168] *See, e.g.*, LANGE & POWELL, *supra* note 133; Neil Weinstock Netanel, *Locating Copyright within the First Amendment Skein*, 54 STAN. L. REV. 1, 7 (2001) ("Copyright's speech encumbrance cuts a wide swath, chilling core political speech such as news reporting and political commentary, as well as church dissent, historical scholarship, cultural critique, artistic expression, and quotidian entertainment.") (footnotes omitted); Neil Weinstock Netanel, *Asserting Copyright's Democratic Principles in the Global Arena*, 51 VAND. L. REV. 217, 220 & passim (1998) (arguing that "copyright law serves fundamentally to underwrite a democratic culture"); Eric Allen Engle, *When Is Fair Use Fair?: A Comparison of E.U. and U.S. Intellectual Property Law*, 15 TRANSNAT'L LAW. 187, 209 (2002) (describing tension between First Amendment to the US Constitution and copyright law); Melville Nimmer, *Does Copyright Abridge the First Amendment Guarantees of Free Speech and Press?*, 17 UCLA L. REV. 1180 (1970) (same).

Despite the potential benefits of a fair use buffer zone, objections are frequently voiced that US-style fair use produces too much uncertainty,[169] although recent research suggests otherwise.[170] At least two commentators who dislike fair use have expressed appreciation for a "public interest" criterion instead.[171] Yet, while that criterion harbors a considerable degree of ambiguity all its own (given that copyright law itself expresses one facet of the public interest),[172] as a practical matter federal appellate courts in the US almost invariably invoke an uncodified public interest concern when evaluating the express normative criteria set out in section 107 of the 1976 Copyright Act.[173] Where science is concerned, moreover, both the "public interest" criteria and the normative criteria of section 107 should normally favor use and reuse of research results in close cases.

Another, more telling objection is that US-style fair use is an all or nothing proposition, which leads some courts to vacillating decisions depending on how they evaluate the appearance of free riding.[174] In this respect, the three-step test first adopted in the Berne Convention and later extended to all exclusive rights under the TRIPS Agreement and the WCT,[175] has something to teach US law. The three-step test, as interpreted by a World Trade Organization (WTO) panel, may allow equitable compensation—a take and pay rule—to resolve hard cases where more than a little is taken for a particularly valid public purpose.[176] Thus, US fair use law needs to accommodate this flexibility, even as EU law needs the flexibility of fair use, a topic to which we shall return below.[177]

This said, however, one should remain skeptical of the need for equitable compensation for scientific uses in the print media. So long as we disregard the role of publishing intermediaries, as Professor Hilty suggests,[178] we may ask when, if ever, should one individual scientist be obliged to pay another individual scientist for the use or reuse of his or her published scientific results. We can see virtually no justification whatsoever for requiring such payments for the use of published research results, let alone government-funded research results.

In our view, the empirically unmanageable and largely imaginary distinction embodied in the Infosoc Directive[179] between commercial and non-commercial scientific research should be eliminated for the reasons stated above, namely, that we are dealing with a pure public good at this upstream level of the supply chain.[180] At this level, the fact that the scientists involved hope

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[169] See most recently BURRELL & COLEMAN, *supra* note 25, at 249-253 (citing authorities and stressing the risk of hostile judicial attitudes). *See also* Okediji, *supra* note 142, at 148.
[170] *See* Samuelson, *supra* note 142.
[171] *See* BURRELL & COLEMAN, *supra* note 25, at 80-111, 249-274, 287-288.
[172] U.S. case.
[173] Sometimes this can be carried far. *See, e.g.*, Sony Corp. of America v. Universal City Studios, Inc., 464 U.S. 417 (1984) (time-shifting of commercial television programs promoted the public interest); *see also* Gordon, *supra* note 25.
[174] Cite contradictory music cases, incl. [?]
[175] *See* Berne Convention, *supra* note 129, art. 9.2; TRIPS Agreement, *supra* note 43, art. 13; WCT, *supra* note 46, art. 10.
[176] *See* US – Section 110(5) Report, *supra* note 64.
[177] *See infra* text accompanying notes 322-323.
[178] *See* Hilty, *Copyright Law and Scientific Research*, *supra* note 10.
[179] *See* EC Infosoc Directive, *supra* note 14, art. 5(3)(a).
[180] *But see* Max Planck Response to EC Green Paper, *supra* note 113.

to make money in the end does not change the fact that they are building new discoveries upon prior research results, which, when published, contribute new inputs to future discoveries.[181]

3) What Computational Science Really Needs

The use of automated knowledge tools in general, and computational science in particular, require scientists to reproduce entire articles from scientific journals; to extract excerpts of varying lengths from them; and to incorporate large extracts of data into their digital research tools for data mining, virtual experiments; and other forms of digital manipulation.[182] The extent of copying thus required is due in part to the capacity of electronic tools to rapidly process vast amounts of information and data and in part to the ever more crucial need for computational scientists to verify published research results, eliminate cumulative errors, and then build upon the verifiable digitally integrated foundation.[183] Yet, the foregoing survey of existing IP laws shows just how forcefully they impede these critical scientific operations. The vast amount of copying needed for digitally empowered research will violate the prior authors' exclusive reproduction rights.[184] The vast amounts of data extracted, used and reused for these purposes will violate any prior authors' copyrights in the original selection and arrangement of the compiled data[185] and, in the EU, they will independently violate the database protection rights that operate alongside the domestic copyright laws.[186] The growing need for computational science to include verbatim extracts of previous works in new works will violate both the reproduction and derivative work rights in both copyright and database protection laws.[187] In all these cases, the research in question could not, in principle, be undertaken in the first place without the permission of the relevant authors, unless existing L&Es excused them.

In the US, fair use law might possibly excuse many or most of these copyright violations, and, of course, Congress has so far declined to enact a separate database protection regime. However, the US fair use cases are very fact-specific, and the four normative criteria set out in section 107 of the Copyright Act could play out differently when tested before different judicial panels. In particular, the amount of material taken for digital research and, increasingly, included in new research results could make courts fearful of undermining the derivative work right, even though strong derivative work rights make economic sense only in the entertainment sector.

Much would depend on the federal courts continued willingness to defend the transformative uses of science in the name of an overriding normative public interest. Even then, some decisions—though often criticized—tend to introduce into US fair use law the same untenable distinction between so-called commercial and non-commercial research[188] that EU law has

[181] This said, publishers who charge for online distribution servers may be allowed to charge higher fees to commercial laboratories. *See infra* text accompanying notes 193-199.
[182] *See, e.g.*, Stodden, *supra* note 113, at 24-25 (citing authorities).
[183] *Id.*, at 24.
[184] *See* Berne Convention, *supra* note 129, art. 9.
[185] *See supra* text accompanying notes 57-60.
[186] *See supra* text accompanying notes 65-66.
[187] *See, e.g.*, Stodden, *supra* note 113, at 49-53.
[188] *See, e.g., American Geophysical Union*, 37 F.3d at 881.

codified in its basic science exception to the reproduction rights.[189] Because, moreover, we believe that US fair use law will have to take the internationally mandated three-step test more fully into account as time goes on[190] (at least where foreign authors' rights are at stake[191]), there is reason to fear a chilling effect on scientific research stemming from the uncertain application of the fair use doctrine to digital and computational science.[192]

To obviate this uncertainty in US law, Paul David has proposed codifying an "automatic fair use exemption" for these purposes.[193] Such a codified exception could operate in tandem with voluntary private contractual waivers, like those of Creative Commons and Science Commons,[194] although some clearing house arrangements might nonetheless become necessary for purposes of guaranteeing reputational benefits through proper scientific attribution.[195] At the same time, a codified automatic fair use provision, or at least a strong normative guideline to the same end, would not be inconsistent with the publishers' ability to price discriminate its initial subscriptions in keeping with the subscribers capacities to pay. Here, indeed, is where the hard copy publisher (as well as the online publisher discussed below) can legitimately extract more revenue from commercial entities than from public science institutes under the first sale doctrine, as we indicate above. But IP laws should not permit these same publishers to further control uses or reuses of their authors' published scientific research results.

Where, instead, no fair use regime exists, as under the EC's Infosoc Directive, digital use and reuse of published research results depends on the vagaries and minutiae of codified domestic laws that implement the narrow, ambiguous and grudging general principle of art. 5(3)(a).[196] In principle, the reproductions, extractions, and reuses described above, which are an inherent function of digital and computational science, could fit into the detailed provisions set out in the domestic laws dealing with exceptions for the purposes of criticism, review and related exceptions;[197] exceptions applicable to education, research and private study;[198] and certain library and archive provision or related exceptions.[199]

In practice, these provisions—written by lawyers for lawyers—have nothing to do with science and could not be understood or used by scientists (or at least not without devoting huge amounts of scarce research resources to covering unacceptably high transaction costs). Nor would any so-called reform proposals, built around "fairer" adaptation of existing laws, provide computational science with the user-friendly regime it needs to flourish. On the contrary, such proposals[200] would more likely further chill digital and computational science by entangling

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[189] *See supra* text accompanying notes 151-155.
[190] *See infra* part __.
[191] *See, e.g.*, Stodden, *supra* note 113.
[192] *See id.*, at 49-53.
[193] *See* David, *supra* note 23. *See also* Stodden, *supra* note 113, at 50; Anselm Kamperman Sanders, *Limits to Database Protection: Fair Use and Scientific Research Exemption*, 35 RESEARCH POL'Y 854 (2006).
[194] *See* Stodden, *supra* note 113 (proposing a more comprehensive form of private ordering for computational science, known as Scientific Reproducibility Standards).
[195] *See id.*, at 45-48.
[196] *See supra* notes 151-159 and accompanying text.
[197] *See, e.g.*, BURRELL & COLEMAN, *supra* note 25, at 42-79.
[198] *See, e.g.*, *id*., at 113-35.
[199] *See, e.g.*, *id*., at 136-62.
[200] *See, e.g.*, *id*., at 276-98.

them in the coils of more intricate, legalistic provisions largely derived from experience in the entertainment sectors. Precisely because these so-called reforms would be deemed "science friendly" in name, they could mire modern science even more deeply in the need to make unpalatable choices between obeying overly complex, inherently obsolete provisions or ignoring them altogether.

The only workable solution is to adopt a broad and sweeping exemption for scientific uses that requires no gloss, no fine print, and no elaborately contrived L&Es to a grudgingly acknowledged limitation or exception.[201] To this end, the Max Planck Institute's response to the Green Paper proposes that such a broad and general statement allowing use and reuse of published scientific materials for virtually any scientific purpose should expressly legitimize storage, archiving, data extraction, linking and the like.[202] While this proposal makes a good start, we think more may be needed. In particular, scientists must be free to subject any published article (and, as we shall see later, any article made publicly available online[203]) to data mining procedures, data manipulation by automated knowledge tools, including virtual scientific experimentation, without any constraint other than attribution under the norms of science.[204]

Such a regime should be applied directly, and in harmonized express terms, in every EU member state, without any allowance for detailed provisions that are currently thought necessary for "a workable system of users' rights,"[205] meaning in practice a workable system of publishers constraints on science. Until a truly transnational science funding entity can be established in the EU, the Commission's own science funding divisions should oversee enforcement of such a broad science research provision, subject to appeals to the ECJ.

Clearly, such a broad exemption must expressly clarify its application to so-called "derivative works," a concept that has virtually no meaning in upstream scientific research as currently practiced, beyond the scientific norms of attribution. As between scientists, the derivative work right—properly understood—should rarely apply to restrict future work. One who applies Darwin's theory to genetics or some new microbe is not a derivative author, even though his or her ideas necessarily apply those of Darwin. So long as prior research results are incorporated in new scientific work with clear and appropriate attribution, there is no need for permission, which, in effect, operates as a de facto prior restraint on scientific speech.

Nor, as we said earlier, is there any reason for one scientist to pay another for such uses or reuses of published scientific articles, so long as the initial, reasonably priced subscription charges were paid.[206] No commercial/non-commercial distinction should accordingly be embedded in the basic research exemption, for the primary reason stated earlier, that upstream scientific research results are to be treated as a public, not a private good.[207]

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[201] *See, e.g.*, Max Planck Response to EC Green Paper, *supra* note 113.
[202] *Id*.
[203] *See infra* notes __ and accompanying text.
[204] As to attribution and its problems, see, e.g., Stodden, *supra* note 113.
[205] BURRELL & COLEMAN, *supra* note 25.
[206] While beyond the scope of this article, the concentration in the scientific publishing industry warrants careful monitoring of its pricing policies, especially when taxpayer moneys are at stake.
[207] *Cf.* Jerome H. Reichman, *Of Green Tulips and Legal Kudzu: Repackaging Rights in Subpatentable Innovation,* 53 VAND. L. REV. 1743 (2000).

If it nonetheless proved politically impossible to avoid the commercial/non-commercial distinction that has already been embodied in the Infosoc Directive,[208] the only acceptable fall-back solution would be an automatic liability rule—i.e., a "take and pay" rule—for any supposed "commercial" uses of published scientific information.[209] In such a case, there would be no prior restraint on access, use or reuse of published scientific information and data for scientific research purposes. Nor would there be a "compulsory license," in the traditional sense, i.e., an ex post modification of an author's anticipated ex ante exclusive rights.[210] On the contrary, such a liability rule should be conceived as an ex ante entitlement to compensation for certain so-called commercial uses, accompanied by an equally clear ex ante third party entitlement to make such uses subject to a duty to pay reasonable compensation for them.[211]

In our view, such a scheme is only appropriate for downstream commercial applications of data to specific (and usually patentable) end products, such as microarrays or diagnostic tools.[212] When used (improperly in our view) to regulate upstream relations among scientists, charges managed by collection societies must be kept very low (to avoid the per page photocopying syndrome of past EU practice). This follows because the public will normally have subsidized scientific research in the first place, and it should not be required to further subsidize intermediaries for additional upstream research activities.

Faced with the complexity of these policy decisions, and the countervailing pressures of a powerful publishers' lobby, one can readily understand why some Commission officials have begun to talk up the merits of "doing nothing," i.e. of leaving L&Es to copyright law where they stand under the Infosoc Directive. Where science is concerned, few decisions could be so fraught with the risk of unintended harmful consequences. Simply stated, doing nothing in the face of the challenges portrayed above means that digital and computational science in Europe will progressively fall into the swamp of "copyright thickets," which, in patent law, had threatened to undermine information science and such frontier sciences as synthetic biology, [213] until the US Supreme Court intervened to readjust the most fundamental design principles of pre-

[208] *See, e.g.*, Max Planck Response to EC Green Paper, *supra* note 113 (which attempts such a distinction).
[209] *See* Robert P. Merges, *Contracting into Liability Rules*: *Intellectual Property Rights and Collective Rights Organizations*, 84 CAL. L. REV. 1293 (1996).
[210] *See* Mark A. Lemley, *Ex Ante Versus Ex Post Justifications for Intellectual Property*, 71 U. CHI. L. REV. 129 (2004).
[211] *Cf.* Reichman, *supra* note 207; Reichman, *supra* note 73; *cf. also* Jerome H. Reichman, *Rethinking the Role of Clinical Trial Data in International Intellectual Property Law: The Case for a Public Goods Approach*, 13(1) MARQ. INTELL. PROP. L. REV. 1 (2009). Note that we are talking about relations between scientific authors, nor relations between one commercial publisher and another. In the latter case, US law relies on a "thin copyright doctrine," which truncates the first comer's derivative work rights and frees up lots of unprotectible facts and data for the second comer's use. *See Feist Pubs.*, 499 U.S. at 349-50. However, this doctrine can fail to regulate free-riding excesses by a commercial second comer, which in turn can result in infringement actions that deprive the public of value-adding uses. Hence, unfair competition law may be required in the EU, although we believe that a properly designed liability rule described in the text would provide the optimum result, especially for data, as between commercial entities. *See* Reichman, *Rethinking the Role of Clinical Trial Data*, *supra* note 211.
[212] *See, e.g.*, Stodden, *supra* note 113, at 13 (citing authorities).
[213] *See, e.g.*, Arti K. Rai & James Boyle, *Synthetic Biology: Caught Between Property Rights, the Public Domain, and the Commons*, 5 PLOS BIOL. e58 (March 2007); Arti K. Rai & Sapna Kumar, *Synthetic Biology: The Intellectual Property Puzzle*, 85 TEX. L. REV. 1745 (2007).

existing patent law itself.[214] Left untended, in other words, the much vaunted comparative advantages that E.C. spokespersons publicly associate with maximalist levels of IP protection[215] will give way to private sector-strangleholds on the most promising avenues of upstream digital research, with the predictable result of killing the goose that lays the golden eggs.[216]

b. The Online Environment

It becomes logical to ask whether the advent of digital networks and related information technology changes the picture sketched above in reference to the print environment. To answer that question correctly, one must take pains to avoid a major conceptual misstep from the outset. The object of the inquiry is not how to make the online environment safe for scientific publications arising in the print media. That was the line that publishers successfully advanced in the 1990's.[217] It is rather, how to enable the scientific community to fully realize the power of automated knowledge tools in a digital environment still largely ensnared by copyright rules designed for the print media.

What really changes in the online environment is not the basic principles of scientific collaboration[218] on which the broad exceptions to copyright protection described above were designed. Rather, what changes is the role of publishing intermediaries in the sciences, who increasingly may never publish a hard copy at all. This growing tendency to rely on online distribution in the sciences undermines the first sale principle of traditional copyright law, because there are fewer hard copies from which revenues can be extracted and because the subscription price per copy may accordingly rise to prohibitive heights. More importantly, the publishing intermediaries' role in the online environment shifts radically, as they add less and less value to the authors' own research results[219] and become online service providers' whose primary contribution is convenience.

This characterization, shared by the Max Planck Institute, [220] among others, is of course hotly contested by publishers who see themselves as indispensable pillars of the scientific community that add immeasurable value to its research outputs.[221] In reality, not only have publishers sought to configure the online environment on the model of print media, they have also tried to subordinate the new class of intermediaries that digital technology has generated, the Internet

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[214] *See, e.g.*, KSR Intern. Co. v. Teleflex Inc., 550 U.S. 398 (2007); eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388 (2006).http://en.wikipedia.org/wiki/EBay_Inc._v._MercExchange,_L.L.C. - cite_note-0

[215] *See, e.g.*, presentations of Ms. F._____ D.C. Interval Market?, Fordham Conference (2009) Cambridge, UK, April ____ 2009.

[216] *See, e.g.*, the farsighted comments in this regard of Tillmin Luderer, Workshop on Creation and Innovation, Fordham Conference, Cambridge, U.S., April ___, 2009 (advocating urgent reforms of copyright law's limitations L&Es to meet needs of digital and computational science).

[217] *See, e.g.*, Samuelson, *supra* note 39.

[218] *See, e.g.*, Stodden, *supra* note 113; David, *supra* note 23.

[219] *See, e.g.*, Hilty, *Copyright Law and Scientific Research*, *supra* note 10; Hilty, *Five Lessons about Copyright in the Information Society*, *supra* note 10.

[220] *See* Max Planck Response to EC Green Paper, *supra* note 113.

[221] *See* the estimate of publishers reply to the green paper.

System Providers (ISPs), to their own ends, adding yet another layer of potential barriers and transaction costs to the diffusion of research results.[222]

Once the diminished importance of publishing intermediaries in the online environment is properly assessed, the need to free scientific research—especially digitally integrated research—from the narrow confines of existing L&Es becomes clear, as demonstrated above, as is the need to devise new ones suitable to the digital environment, exactly as the WCT provides.[223] In effect, science must construct, and database laws must support, a broad upstream digital commons in which published scientific research results may be freely manipulated for any valid scientific purpose.[224]

This goal is supported by provisions of the WCT of 1996, which was endorsed by the signatories to the TRIPS Agreement. Thus, for example, the Preamble insists on "the need to maintain a balance between the rights of authors and the larger public interest, particularly education, research and access to information."[225] Similarly, article 10 and its agreed statement permit Contracting Parties "to carry forward and appropriately extend into the digital environment" existing L&Es in their national laws and "to devise new exceptions that are appropriate to the digital network environment."[226] Finally, the very article 11 that imposed "obligations concerning technological [protection] measures" (TPMs), also expressly declared that such TPMs were not meant to "restrict acts in respect of [authors'] works, which are … *permitted by law*."[227]

Against these core principles, however, we encounter the reality of TPMs as erected on the back of the WCT while ignoring its pro-science language. Both the DMCA in the US, and the Infosoc Directive in the EU, so fully embrace the publishers' maximalist aspirations (despite the balancing provisions in the WCT), as to constitute a serious impediment to legitimate scientific inquiry in the digital environment. How to break the resulting stranglehold of digital locks thus becomes a crucial question for the progress of science.

1) Breaking the Digital Locks

As matters stand, publishing intermediaries can override virtually any existing or future L&Es by means of TPMs in combination with electronic contracts of adhesion. This proposition applies even to such fundamental subject matter exclusion as the idea-expression dichotomy, and it enables publishers to control pure public domain matter utterly beyond the scope of copyright law.[228]

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[222] *See, e.g.*, Ruth L. Okediji, *Givers, Takers and Other Kinds of Users: A Fair Use Doctrine for Cyberspace*, 53 FLA. L. REV. 170 (2001); Ruth L. Okediji, *The Regulation of Creativity under the WIPO Internet Treaties*, 77 FORDHAM L. REV. 2381 (2009).
[223] *See* WCT, *supra* note 46, agreed statement concerning article 10.
[224] *See, e.g.*, Reichman, Dedeurwaerdere & Uhlir, *supra* note 22; Reichman & Uhlir, *supra* note 10.
[225] WCT, *supra* note 46, pmbl. ¶ 5.
[226] *Id*., art. 10 and agreed statement concerning art. 10.
[227] *Id*., art. 11; *see also* Reichman, Dinwoodie & Samuelson, *supra* note 35, at 1059.
[228] *See, e.g.*, Reichman, Dinwoodie & Samuelson, *supra* note 35, at 1022-24.

The imposition of private IPRs by such means[229] necessarily raises profound conflicts with constitutional law in the US[230] and with fundamental rights in Europe.[231] Indeed, some courts in both spheres have begun to push back against these controversial digital locks,[232] and numerous proposals have been made for legislative solutions to pry them open.[233]

Any reforms along the lines of those outlined above for print media would thus remain ineffective if rights holders who make scientific works available through digital networks could simply enclose those works behind technological fences and then abolish all user-friendly provisions by contract. In other words, little will be gained by clarifying the idea-expression dichotomy, the scope for private and fair uses, and broadening exceptions for research and teaching unless the beneficiaries of these reforms effectively implement them in their daily creative endeavors. To attain this goal, the Commission must push beyond article 6(4) of the existing Infosoc Directive and endorse specific means of extracting privileged matter—including public domain matter—from the TPMs that surround them.[234]

Some have suggested a system of "electronic locks and keys," which, however, seems likely to trigger costly and burdensome administrative procedures that could indirectly exert a chilling effect on users' freedom to build on pre-existing scientific and technological data and information.[235] Still other proposals, while not without some merit, would generally entail a considerable amount of political and legislative momentum and, unless carefully implemented, could in some cases complicate rather than simplify routs around existing obstacles.[236] A more realistic and immediately accessible solution is the "reverse notice and take down" regime that professors Reichman, Dinwoodie and Samuelson recently put forward.[237]

Under this proposal, bona fide public interest users could avoid passing through the electronic gateway and, instead, hurl a "flaming arrow" over the electronic fence to catch the copyright proprietors' attention. This missile would signal that the user intended to obtain specified matter held by the proprietor in an online repository for purposes allowed under specified L&Es. It would give proprietors a period—say fourteen days—in which to accede to the request or deny it on specified grounds. In the latter event, both sides would know that a judicial test of the validity of the request under relevant exceptions would be the likely outcome, and the Commission could establish an expedited judicial or administrative procedure for this purpose.[238] Once the legitimacy of the request was established, the court would enable third parties, if necessary, to disarm or decrypt the technological measures in order to extract the

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[229] *See* Reichman & Franklin, *supra* note 81.

[230] *See, e.g.*, LANGE & POWELL, *supra* note 133; Netanel, *Locating Copyright within the First Amendment Skein*, *supra* note 168.

[231] *See, e.g.*, Helberger & Hugenholtz, *supra* note 23.

[232] *See, e.g.*, Lexmark Int'l. Inc. v. Static Control Components, Inc., 387 F.3d 522 (6th Cir. 2004); Chamberlin Group, Inc. v. Skylink Techs, Inc., 381 F.3d 1178 (Fed. Cir. 2004); Storage Tech. Corp. Custom Hardware, Engineering & Consulting, Inc., 421 F.3d 1307 (Fed. Cir. 2005).

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[234] art. 164

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[237] *See* Reichman, Dinwoodie & Samuelson, *supra* note 35, at 1032-38.

[238] *Cf.* Mark A. Lemley & R. Anthony Reese, *Reducing Digital Copyright Infringement Without Restricting Innovation*, 56 STAN. L. REV. 1345 (2004).

desired scientific material for the specified research purposes.[239] Publishers who needlessly barred the initial request and thereby necessitated a judicial inquiry should bear at least the cost and might be made subject to additional penalties.[240]

While a "reverse notice and takedown" regime would entail palpable transaction costs at the outset, it would likely give rise to a jurisprudence of exceptions that would over time facilitate use of the method.[241] We expect that foundations and nonprofit institutes would support test cases in order to clarify the relevant exceptions as applied to the online environment.

At the same time, publishers would retain a high degree of control over how the process was implemented. First, they must decide whether or not to risk a judicial decision on the merits of a specific request, with probable precedential value, as occurs routinely under US fair use practice today. Second, if publishers acquiesced in a valid request to avoid litigation, they would remain in a position to specify the precise uses for which the material was surrendered and to monitor the actual uses to which it was put.[242] Hence, users must adhere to a good faith implementation of their own proposals and be prepared to negotiate if they need to go farther.

Recent case law in the US has made judicial resort to reverse notice and takedown procedures more feasible even without enabling legislation. For example, two anti-lockout cases have provided various legal bases for overcoming TPMs that deny access to unprotected matter.[243] In addition, a recent district court case has obliged proprietors to take fair use factors into account before sending a request for notice and take down under the existing regime regulating secondary liability of ISPs.[244] Such an approach, if upheld at the appellate level, further suggests the impropriety of denying fair use by technical means when it is proprietors that must respond to the needs of scientists. In effect, absent some procedure like the reverse notice and take down regime for freeing up unprotectable scientific information, the TPMs become a means of inducing massive abuses of the copyright law[245] much as peer-to-peer file sharing can become an instrument for inducing massive infringements.[246]

To ensure its success, in the US nonetheless, a legislative endorsement of the "reverse notice and takedown" proposal would be desirable. Such an enactment should also establish judicial authority to break through the technological fence once a court sided with a public interest user against a recalcitrant right holder. In that event, it must immunize the public interest user from liability for breaking through the fence to extract privileged matter if the right holder refused to open the lock or ignored an injunction to do so.

A major benefit of this proposal in both the EU and the US is that it enables scientific users to avoid access controls and any resulting electronic contracts that impose waivers of statutory

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[239] *See* Reichman, Dinwoodie & Samuelson, *supra* note 35.
[240] *Cf.* Lenz v. Universal Music Corp., 572 F.Supp.2d 1150 (N.D.Cal. 2008) (requiring publishers who send notice and takedown requests under DMCA §512 to evaluate fair use considerations in advance).
[241] Reichman, Dinwoodie & Samuelson, *supra* note 35.
[242] *See id.*, at 1032-1037.
[243] *See Chamberlin*, 381 F.3d at 1178; *Storage Tech.*, 421 F.3d at 1307.
[244] *See Lenz*, 572 F.Supp.2d at 1150.
[245] *See* Burk, *supra* note 81.
[246] *See, e.g.*, Metro-Goldwyn-Mayer Studios Inc. v. Grokster Ltd., 545 U.S. 913 (2005).

L&Es or other harsh restrictions on use and reuse. This feature should make the reverse notice and take down proposal particularly attractive to the European Commission in that it would finally provide them with a practical means of fulfilling the obligation that article 6(4) of the Infosoc Directive already imposes on member states to ensure the availability of specified L&Es set out in article 5 when implementing the Directive itself. [247]

2) Disciplining Contractual Overrides

No set of L&Es, however the product of enlightened legislators, will achieve their goal so long as the proprietors of scientific publications can override them at will by unilaterally imposed contracts of adhesion. As pointed out above, this vulnerability becomes absolute in the digital environment, where existing rules under the DMCA and the Infosoc Directive require "lawful access."[248] In this manner, the scientific user becomes compelled to accept electronic contracts that waive all his or her rights and privileges under copyright law, without any realistic opportunity to bargain around them, on pain of a denial of "lawful access."[249]

For this reason, the Max Planck Institute rightly proposes that both new and existing L&Es must be made peremptory, mandatory and nonwaivable.[250] Short of this most logical proposal, other important, if less efficacious measures, remain available. For example, Professor Burk's principle of anticircumvention misuse could be adopted on both sides of the Atlantic.[251] Similarly, Reichman and Franklin's proposals for a "public interest unconscionability doctrine" in contracts law could be developed,[252] and it would fit well within certain existing European approaches to consumer protection and contract laws in general.[253] Professor Hilty also stresses the possibility of invoking European competition law, with its abuse of a dominant position concept, when proprietors leverage their power in the market for scientific articles as such to inhibit use and reuse of scientific contents by downstream investigators.[254]

What matters is that the European Commission should take a forthright position against contractual overrides of lawful and permitted uses in the online environment, in a manner that member states must observe in their implementing laws and decisions. But there is little reason to expect such an enlightened approach in the immediate future. On the contrary, there is the serious risk that newly proposed measures on enforcement, in their present form,[255] would

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[247] *See generally* Reichman, Dinwoodie & Samuelson, *supra* note 35, at 1039. Nevertheless, clause 4 of art. 6(4) would require an amendment or at least some clarifying interpretation to this end. *See* EC Infosoc Directive, *supra* note 14, art. 6(4) ¶4.

[248] *See, e.g.*, 17 U.S.C. §1201(a) (2006); Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market, 2000 OJ (L 178), 1.

[249] *See, e.g.*, Reichman, Dinwoodie & Samuelson, *supra* note 35 (citing authorities).

[250] *See* Max Planck Response to EC Green Paper, *supra* note 113.

[251] *See* Burk, *supra* note 81.

[252] *See* Reichman & Franklin, *supra* note 81.

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[254] *See* Hilty, *Copyright Law and Scientific Research*, *supra* note 10.

[255] *See, e.g.*, Proposal for a Directive of the European Parliament and of the Council on measures and procedures to ensure the enforcement of intellectual property rights, COM/2003/0046 final - COD 2003/0024, Jan. 30, 2003, *available at* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52003PC0046:EN:NOT (last visited Apr. 29, 2009); Office of the United States Trade Representative, The Anti-Counterfeiting Trade Agreement –

actually strengthen the proprietors' ability to impose privately legislated IPRs[256] on the scientific research community.

3) The Proper Role of Intermediaries

Until now, we have mainly focused on the rights of authors, as distinct from those of intermediaries, in keeping with Professor Hilty's perceptive comments about the diminished costs incurred by today's intermediaries, especially in the online environment, and about the shrinking amount of added value these intermediaries actually contribute under modern conditions.[257] In that context, we found no justification for payments to intermediaries for downstream scientific uses of hard copy embodiments of research results over and above amounts derived the costs of subscriptions under the first sale doctrine. The question becomes what, if any entitlements, these intermediaries should be allowed to claim in the online environment, and how they should be implemented.

At bottom, what scientific publishers provide in the online environment is primarily a degree of convenience and technical support, which the scientific community could, but does not typically provide for itself, perhaps because of inertia.[258] Here, we do not refer to the peer-review function, which, although of crucial importance for reputational benefits, is largely provided *gratis* by reputable scientists themselves. Rather, the intermediaries' utility stems from maintaining and updating electronic collections, possibly also from electronic indexing of these collections, and possibly but not certainly from the provision of technical services needed to make embedded data and information available on request.[259]

Publishers must necessarily charge for these services, in order to recoup their investment. At the same time, funding agencies should ensure that government funded research results remain freely available in public or private repositories, so that users unwilling to defray these costs can perform the needed technical services on their own.[260] Such a policy also serves to avoid the problems of sole source providers, which can pose unique challenges for science.[261]

Recognizing the need for publishers to charge for their technical services does not, and should not, extend to endowing them with exclusive rights to downstream uses or reuses of the scientific contents they make available. On the contrary, the pay-per-use restrictions that such

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Summary of Key Elements under Discussion, available at http://www.ustr.gov/assets/Document_Library/Fact_Sheets/2009/asset_upload_file917_15546.pdf?ht= (last visited Apr. 29, 2009); OECD enforcement directive.

[256] *See* Reichman & Franklin, *supra* note 81.

[257] *See* Hilty, *Copyright Law and Scientific Research*, *supra* note 10.

[258] *See* Reichman, Dedeurwaerdere & Uhlir, *supra* note 22.

[259] In effect, as providers of digital services. Publishing intermediaries increasingly resemble the Red Hat Corporation, which provides services to users of Linux Software but does not control rights to Linux as such.

[260] *See* US Dep't of Health & Human Servcs., The NIH Public Access Policy, March 2009, *available at* http://publicaccess.nih.gov/Public_Access_Brochure.pdf (last visited Apr. 29, 2009); Carroll, *supra* note 124; Stodden, *supra* note 113 (discussing NSF Guidelines, Creative Commons and Science Commons licensing and proposing a new standard contractual template of her own).

[261] *See* Jerome H. Reichman & Paul F. Uhlir, *Database Protection at the Crossroads*, 14 BERKELEY TECH. L.J. 793 (1999).

rights currently enable intermediaries to impose in the name of author's rights, without any authorial contribution whatsoever, must be swept away as inconsistent with both the needs of science and the principles of L&Es expounded above. In their place, intermediaries should at most obtain a liability rule, i.e., a take and pay rule, that enables scientists to make any and all needed research uses of published scientific articles, including full digital empowerment for uses of automated knowledge tools, computational tools, and the like without need for express permission. Any such charges should be built into the online subscription price, which may be tiered to reflect the commercial nature of the subscribing entity, but should not be calculated on a pay-per-use model. Intermediaries would thus be recognized for what they are, i.e., "information brokers," and their permissible charges must be subject to a condition of reasonableness based, for example, on the virtual market criteria proposed by the Max Planck Institute.[262]

Under such a "compensatory liability regime",[263] scientists would have a right to use digitally provided scientific contents for virtually any research purpose, subject to the above mentioned subscription charges to cover the costs of delivery and maintenance. Disputes over costs could not bar access to and use of the collection, but would have to be settled offline by mediation, arbitration or, as a last resort, litigation. While a statutory framework of pre-set fees is not necessary, in actual practice fees could be set via negotiations around the default liability rules between funding agencies, collection societies, where relevant, and intermediaries. All parties should understand that outer limits on fees are to be determined by reference to the fact that taxpayers largely support the entire enterprise, by the need to conserve scarce resources for scientific investigation as such; and by the potential threat that, if intermediaries demand excessive charges, the funders themselves could establish substitute arrangements.[264]

At the same time, intermediaries do require some protection against free-riding competitors who might otherwise horn in on these arrangements, with no comparable investments of their own. In this context, both copyright law and unfair competition law can prohibit wholesale duplication of an existing proprietary collection for such purposes. But these measures should not impede good faith competitors from accessing public repositories and starting up comparable endeavors of their own.

In general, care must be taken to avoid fostering sole source monopolies over unsubstitutable scientific materials[265] that cannot realistically be regenerated by independent creation or otherwise be readily obtained from public repositories.[266] To this end, would-be competitors who devise novel, value-adding techniques for improving existing collections should be allowed to borrow some essential materials from existing private repositories that are not otherwise available in return for reasonable royalties. Such a borrowing could be subject to a specified period of delay, during which the initial compiler could preserve a competitive edge by means of periodic updates and other technical refinements.

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[262] *See* Max Planck Response to EC Green Paper, *supra* note 113; Hilty, *Copyright Law and Scientific Research*, *supra* note 10.
[263] Reichman, *supra* note 207.
[264] *See infra* text accompanying notes 339-348.
[265] *See* Hilty, *Copyright Law and Scientific Research*, *supra* note 10; Max Planck Response to EC Green Paper, *supra* note 113.
[266] *See* NATIONAL RESEARCH COUNCIL, BITS OF POWER: ISSUES IN GLOBAL ACCESS TO SCIENTIFIC DATA (National Academy Press, 1997).

In sum, appropriately crafted liability rules may govern both the intermediaries' provision of services and the competitors' ability to borrow some of the former's material for purposes of new value-adding services of their own. In no case, however, should any legal obstacles be erected, or charges imposed, when second comers decide to compete with existing information brokers by resort to the public repositories that funding agencies make available from the start.

C. Consistency with International Law

The prevailing international minimum standards of IP protection are not necessarily in conflict with the proposals set out above. First, the standards themselves are broad and open to interpretation, as will be shown in more detail below, including the now universal three-step test to which all L&Es are normally subject under article 13 of the TRIPS Agreement and article 10 of the WIPO Copyright Treaty of 1996.[267] In our view, the extension of the three-step test to all of copyright law actually provides a tool—if properly reworked—that could help to deal with fact-specific cases, without undermining the force of general exceptions for research and education. We shall outline our thinking on this topic below, in conjunction with the Max Planck Institute's recent Declaration on the Three-Step Test.[268]

Second, the TRIPS Agreement, with which the WCT has in this respect sought a measure of harmonization, bears within itself a crucial deference provision that deliberately scopes out broad room to maneuver when states implement its international standards in a good faith effort to conform them with national needs and policy.[269] This deference norm has been given even greater weight in the WTO's most recent TRIPS decision bearing on copyright law in China.[270]

Third, when formulating the WCT, the TRIPS Members themselves added important new balancing provisions that have acquired growing recognition over time.[271] Fourth, the flexibility within the TRIPS and WCT standards applies in two directions. While it remains possible to flesh out the exclusive rights with more restrictive conditions, as has been done with the so-called TRIPS-plus provisions of the FTAs,[272] it remains equally possible to flesh out the L&Es and other balancing features, such as idea-expression, in a manner more favorable to the provision of public goods than has been the case in some OECD countries and in many developing countries as well.[273]

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[267] *See* TRIPS Agreement, *supra* note 43, art. 13; WCT, *supra* note 46, art. 10.
[268] *See* Max Planck Declaration on the Three-Step Test, *supra* note 21.
[269] *See* TRIPS Agreement, *supra* note 43, art. 1.1; *see also* Appellate Body Report, India – Patent Protection for Pharmaceutical and Agricultural Chemical Products, WTO Doc. WT/DS50/AB/R Dec. 19, 1997.
[270] *See* Report of the Panel, China – Measures Affecting the Protection and Enforcement of Intellectual Property Rights WTO Doc. WT/DS362/R, Jan. 26, 2009.
[271] *See supra* note 160 and accompanying text. *See also* Technology, Education, and Copyright Harmonization Act of 2002, Pub. L. No. 107-273, 116 Stat. 1910 (codified as amended in scattered section of 17 U.S.C.). [why this]
[272] *See, e.g.*, Okediji, *The Regulation of Creativity under the WIPO Internet Treaties*, *supra* note 222, at 2402-2403; B. Mercurio, *TRIPS-Plus Provisions in FTA's: Recent Trends, in* REGIONAL TRADE AGREEMENTS AND THE WTO LEGAL SYSTEM (L. Bartels & F. Ortino eds., Oxford Univ. Press, 2006)
[273] *See* WIPO Development Agenda Proposal, *supra* note 83; *see also* Hugenholtz & Okediji, *supra* note 143; Okediji, *The Regulation of Creativity under the WIPO Internet Treaties*, *supra* note 222.

For all these reasons, we are confident that the positive law mandates of the treaties do not stand in the way of the proposals so far advanced so much as the lack of political will and the collective action needed to stimulate it. In what follows, we devote particular attention to the three step test itself, which some consider a major obstacle.

1. Reconciling Fair Use and the Three-Step Test

To begin with, one should not suppose that either fair use or the three-step test are optimal or boundary solutions to the quest for appropriate L&Es. The design of copyright law has always encompassed at least two types of mechanisms, one that identifies specific needs and beneficiaries, and another that provides flexibility in situations that are unforeseen or in response to changing circumstances. The theme sounded in the Agreed Statement to article 10 of the WCT captures this bifurcated approach when it talks about the need "to carry forward and appropriately extend into the digital environment limitations and exceptions in their national laws which have been considered acceptable [and to] permit contracting parties to devise new exceptions and limitations that are appropriate to the digital network environment."[274]

a. The Problem of Normative Blinders

Nevertheless, long experience with fair use law in the US, and growing experience with the three-step test elsewhere, makes it worthwhile to consider them together here.[275] From this angle, one major problem with the three-step formulation is that it remains devoid of any intrinsic normative guidance. It thus fails to tell us what, if any, user pursuits are particularly worthy, from a policy perspective, of qualifying for L&Es under the test. Even the single WTO panel that applied the three-step test of copyright law, while recognizing that "normative considerations" should play a part at step two, and possibly at step three, declined to tell us what those considerations might be or how that normative impact should be weighed against rights holders' interests.[276]

Nor did the experts who gave us the original three-step test of limitations to the reproduction right in article 9.2 of the Berne Convention dwell at length on its normative content. Rather, they produced a single paragraph of explanation, embodied in the Rapporteur's Statement at Stockholm, which was re-examined by the WTO panel that decided the *U.S. Section 110(5)* case.[277] As the panel saw it, this statement largely boiled down to a homely proposition: a little unauthorized use was okay, a lot was not okay, and something in between could probably be cured by the payment of equitable compensation.[278]

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[274] WCT, *supra* note 46, agreed statement concerning art. 10.

[275] *Cf.* Okediji, *supra* note 142. Much of this section is based on that article and on Jerome H. Reichman, *Comment: Marching to a Three-Step Tune*, paper presented at the Cardozo Conference on Limitations and Exceptions to Copyright Law, Mar. 28, 2008.

[276] *See* US – Section 110(5) Report, *supra* note 64.

[277] *See id.*, ¶ 6.73.

[278] *But see* SENFTLEBEN, *supra* note 149 (for a more complex interpretation); Mihel Miscor, Paper delivered at Fordham (Cambridge, 2009) (with a still different interpretation); *see also* SAM RICKETSON & JANE GINSBURG, INTERNATIONAL COPYRIGHT AND NEIGHBORING RIGHTS: THE BERNE CONVENTION AND BEYOND (Oxford University Press, 2006) (on this issue).

The WTO panel may indeed have made this normative blindness even worse by assuring us that—reasoning from trade law—no public purpose was necessary to trigger application of the three-step test to any given case.[279] Apparently, in trade law, states are often tempted to couch would-be exceptions from the GATT's tariff bindings in terms of vague public interest justifications. The WTO tradition is to focus on the literal fact of violation, which could only be rescued by reference to a WTO or GATT Member's reserved powers under article XX or to other specified safeguard measures.[280]

However, the WTO panel's approach downplays the fact that the TRIPS Agreement basically deals with private rights.[281] Even though it constitutes a treaty among sovereign entities, private IP rights holders are, in effect, a kind of third party beneficiary, rather like residents of foreign enclaves whose ethnic, linguistic and educational rights were protected by certain bilateral and multilateral treaties in the past.[282] Without a public purpose justification for derogating from the private rights protected under TRIPS, limitations in domestic laws—like those condemned in the Section 110(5) case—could merely allow a state to take money from one private pocket and put it in another.[283]

If the original three step test embodied in article 9.2 of the Berne Convention[284] thus remains normatively blind, that blindness became even more opaque after its incorporation and expansion under TRIPS, article 13, all the more so because there is no express obligation even to take third party copyright interests into account, as there is in the corresponding patent law formulation embodied in article 30 of the TRIPS Agreement.[285] Worse yet, a WTO panel convened to consider that formulation in the patent context failed to take into consideration any of the rather evident public health effects of its decision in evaluating step one of the test.[286]

Because the formula appears normatively blind, it tends to give positive weight to acquired rights and to codified exceptions recognized in existing legislation, such as the list set out in the EC Infosoc Directive.[287] But this approach harbors a flawed methodology because such lists

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[279] *See* US – Section 110(5) Report, *supra* note 64, at 33-34.

[280] *See, e.g.*, The General Agreement on Tariffs and Trade, art. XX, 1867 U.N.T.S. 190, 33 I.L.M. 1125, 1154 (1994); Appellate Body Report, United States – Import Prohibition of Certain Shrimp and Shrimp Products, WTO Doc. WT/DS58/AB/R, Oct. 12, 1998.

[281] *See* TRIPS Agreement, *supra* note 43, pmbl. ¶ 3 ("Recognizing that intellectual property rights are private rights").

[282] ICJ cases.

[283] *See* Paul J. Heald & Suzanna Sherry, *Implied Limits on the Legislative Power: The Intellectual Property Clause as an Absolute Restraint on Congress*, 2000 U. ILL. L. REV. 1119 (2000).

[284] *See* Berne Convention, *supra* note 129, art. 9(2); TRIPS Agreement, *supra* note 43, art. 9.1 (incorporating arts. 1-21 of the Berne Convention, except for art. 6*bis*).

[285] *See* TRIPS Agreement, *supra* note 43, arts. 13 ("Members shall confine limitations or exceptions to exclusive rights to certain special cases which do not conflict with a normal exploitation of the work and do not unreasonably prejudice the legitimate interests of the right holder."), 30 ("Members may provide limited exceptions to the exclusive rights conferred by a patent, provided that such exceptions do not unreasonably conflict with a normal exploitation of the patent and do not unreasonably prejudice the legitimate interests of the patent owner, *taking account of the legitimate interests of third parties*.") [emphasis added].

[286] *See* Report of the Panel, Canada – Patent Protection of Pharmaceutical Products, WTO Doc. WT/DS114/R, Apr. 7, 2000; *see also* Robert Howse, *The Canadian Generic Medicines Panel - A Dangerous Precedent in Dangerous Times*, 3(4) J. WORLD INTELL. PROP. 493 (2000).

[287] *See* EC Infosoc Directive, *supra* note 14, art. 5.

only tell us the results of past legislative compromises. They do not provide a sound normative foundation on which to build, case by case in the future, which could put some play in the joints, and free domestic copyright laws from temporal rigidity.

Compared with article 9(2) of the Berne Convention (and by extension, article 13 of the TRIPS Agreement), a fair use provision like that of the US has been normatively more clear sighted. It identifies whole areas of public interest pursuits where fair uses might spring up, if only the courts would pay attention.[288] The language of section 106 itself, the foundation of all exclusive rights in the US Copyright Act of 1976, can be read to imply that "fair uses" are truly privileged uses, that they represent normatively freighted customary powers, or even "rights," not given to authors in the first place.[289] Moreover, courts applying section 107's fair use provision often engraft a hidden fifth factor onto the four specified factors in §107 itself, to the effect that a positive fair use outcome in the federal appellate courts is typically linked to a "public interest" or "public benefit" justification.[290]

Taken together, these variables left room for a high degree of user spontaneity in the past, at least until US courts began to succumb to a market failure rationale[291] while new technologies reduced market failure to the point where pay-per-use became technically available on demand.[292] Moreover, the possibility of cost-free copying on the internet emboldened publishers to claim a need for total control of artistic works in cyberspace,[293] with the result that normative factors were—for a while at least—increasingly squeezed out of the fair use equation. At least, that was the case until the recent rebirth of a so-called "transformative use" doctrine[294] and its extension to search engines and other automated knowledge tools.[295]

Meanwhile, at the international level, user communities in recent years have begun to push back against these trends by specifying normative grounds for rendering the three step test less blind.[296] The first success was the preambular declaration that the US National Academies inserted into the WIPO Copyright Treaty of 1996, viz,

> Recognizing the need to maintain a balance between the rights of authors and the larger public interest, particularly education, research and access to information as reflected in the Berne Convention.[297]

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[288] 17 U.S.C. §107 (2004) (identifying criticism, commentary, education, and research as specific public interest starting points for analysis of privileged uses).
[289] *See* 17 U.S.C. §106 (2002) ("*Subject to sections 107 through 122*, the owner of copyright under this title has the exclusive rights to do and to authorize any of the following: . . .") [emphasis added].
[290] *See, e.g.*, *Sony Corp. of America*, 464 U.S. at 417; *Perfect 10*, 508 F.3d at 1146. For the view that a "public interest" exception is superior to a fair use test, see BURRELL & COLEMAN, *supra* note 25, at 80-111, 267-275.
[291] *See* Gordon, *supra* note 25.
[292] *See, e.g.*, Ginsburg, *supra* note 53.
[293] *See, e.g.*, Boyle, *supra* note 52; *see also generally* BOYLE, *supra* note 6.
[294] *See* Campbell v. Acuff-Rose Music, Inc., 510 U.S. 569 (1994).
[295] *See* Kelly v. Arriba Soft Corp., 336 F.3d 811 (9th Cir. 2003) [newer cases].
[296] *See, e.g.*, WIPO Development Agenda Proposal, *supra* note 83; Margaret Chon, *Intellectual Property and the Development Divide*, 27 CARDOZO L. REV. 2821 (2006); Kapczynski, *supra* note 83.
[297] WCT, *supra* note 46, pmbl. ¶ 5.

Equally important was the Agreed Statement to article 10 of the WCT, which affirms that the three-step test as incorporated into the WCT will carry forward old exceptions and permit new ones in the digital network environment.[298] Among other things, this provision blocked arguments claiming that article 13 of the TRIPS Agreement had cut back upon pre-existing L&Es, including those set out in the Berne Convention of 1971.[299]

b. The Max Planck Institute's Declaration on the Three-Step Test

Since that beginning, further strides have been made.[300] Of particular interest are new Max Planck proposals for judges applying the three-step test that could induce them to perform a normative analysis.[301] That type of analysis is something European positivist courts are unaccustomed to doing,[302] and also something that American courts seemed to be turning away from, at least until recently.[303]

The Max Planck proposals deliberately build on the preamble to the WCT. In that vein they would:

- Mandate that courts applying the three-step test of article 13 in copyright cases take into account the interests of third parties, including individual and collective interests of the general public, and not just the interests of rights owners.
- Avoid prioritizing any one step, or requiring that the answer to all steps should be "yes," but would instead require a judicial balancing of the different prongs, as occurs under US fair use law.[304]
- Give particular weight to unauthorized uses that are underpinned by fundamental rights[305] and other "common interests," notably "in scientific progress and cultural or economic development."[306]

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[298] *See id.*, art. 10 and agreed statement concerning art. 10.

[299] The signatories to the WCT of 1996 were essentially the same as those adhering to the TRIPS Agreement of 1994, which arguably evidences state practice concerning the prior Agreement. *See* Vienna Convention on the Law of Treaties, art. 31(3), May 23, 1969, 1155 U.N.T.S. 331.

[300] *See* Hugenholtz & Okediji, *supra* note 143; WIPO Development Agenda Proposal, *supra* note 83; CPTech, Treaty on Access to Knowledge (Draft), May 9, 2005, *available at* http://www.cptech.org/a2k/a2k_treaty_may9.pdf (last visited Apr. 27, 2009).

[301] *See* Max Planck Declaration on the Three-Step Test, *supra* note 21.

[302] And should not do, according to some. *See, e.g.*, Figor, *supra* note

[303] *But see* Samuelson, *supra* note 142.

[304] *See* 17 U.S.C. § 107 (1976):

> . . . In determining whether the use made of a work in any particular case is a fair use the factors to be considered shall include—
> (1) the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
> (2) the nature of the copyrighted work;
> (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and
> (4) the effect of the use upon the potential market for or value of the copyrighted work.

But see Ficsor, *supra* note __ (arguing that the legislative history of the Berne Convention prohibits this approach).

[305] *Cf.* LANGE & POWELL, *supra* note 133 (stressing the First Amendment); Hugenholtz & Okediji, *supra* note 143; Helfer, *Toward a Human Rights Framework for Intellectual Property*, *supra* note 134.

- Seek to promote competition, especially on secondary markets, by a correct balancing of interests, but without making the three-step test a proxy for competition law.
- Expressly recognize that adequate compensation may be less than market pricing, where other public concerns are at stake, including third party interests or the general public interest.[307]

Obviously, the Max Planck Institute's carefully considered reforms would introduce a dose of legal realism into the traditional positivism surrounding European copyright jurisprudence. They would also undermine the European Commission's tendency to fall back on a market failure rationale for L&Es, a tendency from which US courts have increasingly retreated in recent important decisions bearing on fair use.[308] Such proposals have accordingly elicited a strong negative response from some quarters. It is worth noting, nonetheless, that at least one eminent authority, known for his high protectionist views, claims that the three-step test can be interpreted so as to yield the flexibility that the Max Planck Declaration seeks to attain even by more traditional means.[309]

Also promising in this regard is the Development Agenda recently established at WIPO, as informed by a major normative re-examination of L&Es, prepared by Professors Hugenholtz and Okediji.[310] If numerous WIPO members were to support this initiative, it could lead to, at least, a soft law declaration of normative content that could turn the three-step test into a pathway towards a proper "users' rights" formulation.[311] If, moreover, a regional group of, say, Latin American, Asian, or African countries decided to implement proposals emerging from these deliberations in their domestic laws,[312] it could trigger a movement for codification of users' rights at the international level.

2. Limits of the Fair Use Approach

While these proposed formulations could do much to reduce the existing normative blindness of the three-step test as currently codified,[313] US fair use law nonetheless retains a defect of its own that limits its ability to properly influence the rest of the world. Recently, as noted, US federal appellate courts have emphasized that so-called "transformative uses" are good

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[306] *Cf.* Chon, *supra* note 296.

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[308] *See* BURRELL & COLEMAN, *supra* note 25, at 167-87.

[309] *See* Ficsor, *supra* note ___

[310] *See* Hugenholtz & Okediji, *supra* note 143.

[311] *Cf.* Dreyfuss, *supra* note 112. In this connection, we would particularly welcome recognition from the WIPO process that government use of copyrights for, say, science and educational purposes, trumps all other legal or normative considerations. *See* Daniel Gervais, *Making Copyright Whole: A Principled Approach to Copyright Exceptions and Limitations*, OTTAWA L. & TECH. J. (forthcoming). *See also generally* Hugenholtz & Okediji, *supra* note 143.

[312] *Cf.* Helfer, Laurence Helfer, Karen Alter & Florencia Guerzovich, *Islands of Effective International Adjudication: Constructing an Intellectual Property Rule of Law in the Andean Community*, 103(1) AM. J. INT'L L. 1 (2009); *see also* Laurence Helfer & Karen Alter, From Luxembourg to Quito: Exporting the European Court of Justice to the Andean Community, Vanderbilt Center for the Americas Working Paper (forthcoming 2009).

[313] One should recall that the relevant WTO Panels do insist that the test has normative content, but without so far specifying its nature.

candidates for fair use, and a growing number of cases, building on this doctrine, have begun to expand what had become an incredibly shrinking fair use exception during the 1980s and 1990s.[314] Tensions arise, however, because the very concept of "transformative use" partakes of the very definition of a derivative work,[315] and US copyright law gives strong protection to derivative works.

Here is where the Max Planck proposal starts talking about anti-competitive effects on secondary markets.[316] Today, indeed, US courts have begun to distinguish "transformative markets" from "transformative uses," which captures the exquisite ambiguity of the underlying concept, and begins to wrap so-called "transformative uses" in the deadly foil of market failure analysis once again.[317]

In the leading Supreme Court decision on fair use, Justice Souter dropped a footnote identifying this very conflict.[318] He suggested that a judicially imposed license allowing a transformative use with equitable compensation to the derivative right holder could break out of the dilemma in close cases. To date, no US court has taken the hint, which is why US fair use decisions often zigzag between all-or-nothing outcomes in a path that sometimes defies logic or rationalization.[319] Perhaps, the recent decision by the US Supreme Court in *eBay v. MercExchange*[320] will focus copyright courts' attention on this possibility of using a liability rule, in place of an injunction, in appropriate cases.[321]

Here is where the three-step test may have a valuable lesson to teach US courts. A little unauthorized use may be okay, a lot may be too much, but something in between may be well worth encouraging if (1) there is a sound normative foundation rooted in the larger public interest and (2) equitable compensation could deservedly be paid from the proceeds of the unauthorized use, if any, to the authors whose support for valid normative concerns had been co-opted.[322] Once again, in close cases, *eBay v. MercExchange* may provide a useful new tool in this regard.[323]

It thus seems as if we might be moving toward some new synthesis that could combine the normative wisdom of US fair use law with the practical wisdom of those reticent drafters of the

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[314] *See, e.g.*, *Perfect 10*, 508 F.3d at 1146. [others]

[315] *See* 17 U.S.C. § 101 (2006) ("A 'derivative work' is a work based upon one or more preexisting works, such as a translation, musical arrangement, dramatization, fictionalization, motion picture version, sound recording, art reproduction, abridgment, condensation, or any other form in which a work may be recast, *transformed*, or adapted. A work consisting of editorial revisions, annotations, elaborations, or other modifications which, as a whole, represent an original work of authorship, is a 'derivative work'.") [emphasis added].

[316] *See* Max Planck Response to EC Green Paper, *supra* note 113. *See also* Geller, *supra* note 3.

[317] Cases.

[318] *See Campbell*, 510 U.S. at 569.

[319] *Compare, e.g.*, *I Love Sodom* with __.

[320] 547 U.S. 388 (2006).

[321] *See* Reichman, *supra* note 207 (advocating greater use of liability rules at all the boundaries of IP law); Reichman, Dedeurwaerdere & Uhlir, *supra* note 22. However, US copyright law can impose statutory damages or lost profits for infringement that must be factored into the equation in some cases. The outcome depends on how one views the court's equitable powers, and also on whether or not the court deems an infringement to have occurred.

[322] *Accord* Gervais, *supra* note 311. *See supra* notes 176-177 and accompanying text.

[323] *See eBay, Inc.*, 547 U.S. at 388.

gloss on article 9(2) of the Berne Convention. Any such synthesis would also have to take account of the privacy interests recognized in the EU's traditional exceptions for private use.[324]

In sum, limiting any inquiry as to prospects for the design of L&Es in a global knowledge economy to the confines of the three-step test of TRIPS article 13 would place a serious and unnecessary constraint on the robust policy debates and considerations of future action that should take place in the EU, with specific regard to developing a balanced IP regime for innovation and knowledge circulation in the Community. As demonstrated in this article, even if the three-step test were regarded as a true "benchmark for all copyright limitations,"[325] recent proposals to modify that test should be seriously evaluated before consigning the fate of the public interest to the vagaries of a historically controversial and normatively ambiguous legal compromise.

Lest one seem overly optimistic, however, we must emphasize the need to overcome the dreadful control fantasy embodied in the DMCA and in the EC Infosoc Directive, as they stand, which make every limitation and exception potentially irrelevant, once a work has been surrounded by a technological fence (TPMs) and by a plethora of one-sided electronic contracts posted over the gate.[326] We have discussed this problem and how to resolve it at length above.[327]

3. Aligning the Database Protection Laws with Limitations and Exceptions to Copyright Law

We agree with the basic Max Planck Institute's demand for such an alignment, and with its insistence that such measures must be preemptory, mandatory, and immune from contractual overrides and TPMs.[328] By focusing only on L&Es in copyright law, without addressing the related impact of the EC Database Directive, the Green Paper inadvertently allows the broadly drawn Directive to surround domestic copyright laws with a net of potentially endless protection for the very facts and data that the copyright paradigm ostensibly leaves free.[329] As a result, neither science nor culture can fully attain the payoffs that digital technologies make possible without ancillary adjustments of the Database Directive.

Given the limits of time and space, we shall merely list at least five fundamental changes that are needed to this end:

1) The most essential need is for a broad exemption that clearly allows scientists both to extract and reutilize data and information for scientific research.[330] This privilege must expressly empower the use of automated knowledge tools for this purpose. Express language must also ensure the rights of scientists to aggregate data and information in a research commons, to conduct data mining and similar techniques, and to extract data embedded in scientific articles for research purposes.

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[324] *See* EC Infosoc Directive, *supra* note 14, art. 5.2(b).
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[326] *See generally* Reichman, Dinwoodie & Samuelson, *supra* note 35.
[327] *See* part III.B, *supra* pg. 21.
[328] *See* Max Planck Response to EC Green Paper, *supra* note 113.
[329] *See* EC Database Directive, *supra* note 16, arts. 1, 3; Reichman & Samuelson, *supra* note 42.
[330] *See* Reichman & Uhlir, *supra* note 261.

2) Some requirements for equitable compensation (compensatory liability regime) under nonexclusive licenses for downstream commercial applications may be envisioned in appropriate cases, but exclusive property rights should not normally attach to uses of government-funded data.[331]

3) Compulsory licenses must be made available when the database is the sole source for the data in question.[332]

4) The potentially unlimited duration of database protection remains an untenable assault on basic principles of IP law. Provision must accordingly be made for the entrance of older data into the public domain after a specified period of expiry, even as new data added to the collection attract new rights to protection.[333]

5) The unlimited exclusive right to follow-on applications of protected data must give way to a qualified liability rule that would require commercial value-adding users, after a delay period, to pay the original compiler a reasonable royalty for value-adding uses for a specified period of time, subject to a cross-license the original compiler.[334]

6) Rights holders should not be allowed to override exceptions to database protection in the public interest, especially those defending public science.[335]

Unless such measures are taken, database protection law will surround scientific articles with an insuperable fence against which the L&Es of copyright law will prove ineffective. The information economy most likely to emerge from an unrestricted exclusive right in data would then "resemble models already familiar from the Middle Ages, when goods flowing down the Rhine River or goods moving from Milan to Genoa were subject to dozens, if not hundreds of gatekeepers demanding tribute."[336]

D. The Better Solution: Integrating the Intermediaries into the Digital Knowledge Environment

The time has come to question the continued need for external information brokers in a scientific world where it has become conceptually feasible to digitally link a given thematic communities' essential knowledge inputs, e.g., materials, information and data into a seamless integrated network open to all the contributors to any given research commons or semi-commons.[337] The scientific community, now rooted in a hostile IP environment, faces the challenge of organizing and managing these essential knowledge inputs with a view to establishing a broad upstream research environment in which its own contractually imposed rules

[331] *See, e.g.*, Reichman & Uhlir, *supra* note 10; Reichman, Dedeurwaerdere & Uhlir, *supra* note 22.
[332] *See* Reichman & Uhlir, *supra* note 261; *see also* DERCLAYE, *supra* note 66.
[333] *See* Reichman & Samuelson, *supra* note 42; Reichman & Uhlir, *supra* note 261.
[334] *See* Reichman, *supra* note 73; *see also generally* Reichman, *supra* note 207. *Accord* Max Planck Response to EC Green Paper, *supra* note 113.
[335] *See* Reichman & Uhlir, *supra* note 261; Reichman, *supra* note 73.
[336] Reichman, *supra* note 73, at 484. *See also* HELLER, *supra* note 35, at 3.
[337] *See, e.g.*, James Boyle, *Mertonianism Unbound? Imagining Freely Decentralized Access to Most Cultural and Scientific Material*, *in* Hess & Ostrom, *supra* note 111, at 123-144.

could apply without, however, compromising the possibilities for commercial exploitation of downstream applications of their research outputs.[338]

To this end, science policy could exert considerable pressure on publishing intermediaries to conform their practices to the needs of digital scientific research, with or without the aid of suitable L&Es in copyright law. As previously noted, for example, funding agencies can themselves require grantees to make subsidized research results publicly available,[339] and universities can lend their own weight to such initiatives.[340] By the same token, individual scientists can adopt existing Creative Commons and Science Commons licenses,[341] while innovative new proposals that go even farther, such as Victoria Stodden's proposed Reproducible Research Standard, are tested and perfected.[342]

Taken together, these and other initiatives can force publishing intermediaries either to accommodate the open access movement or leave the scientific publishing business. Already, for example, one major publisher—Springer—has increasingly allowed its authors to buy their way into an open access mode, at prices comparable to those charged by purely open access journals.[343] That Springer finds these options profitable suggests there is considerable space in which publishers genuinely interested in supporting the interests of science can maneuver without sacrificing the prospects for reasonable returns on their investments.

Looking to the future, moreover, it becomes increasingly clear that the historical role of external publishers, or even a more modern role of external information brokers, will not withstand logical or policy analysis. Besides contributing less and less added value at ever inflated prices over time, these intermediaries not only tend to block the unconstrained use and reuse of information in an open access environment, they positively stand in the way of converting those open access environments into integrated knowledge hubs that could enormously magnify the creative and educational powers of universities and other analogous research institutions.[344]

Consider, for example, that at an earlier stage, the universities overcame the risk of market failure in the trade distribution of serious academic books by developing their own academic presses to produce and distribute books of little interest to the trade. Over time, these academic presses have themselves become major players in the publishing field, albeit sometimes at the expense of imitating the restrictive tendencies of commercial publishers with respect to use and reuse of their works. Nevertheless, it seems both logical and desirable for the universities to

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[338] *See, e.g.*, Reichman, Dedeurwaerdere & Uhlir, *supra* note 22; Lee, *supra* note 22; Reichman & Uhlir, *supra* note 10.
[339] *See supra* text accompanying notes 122-127.
[340] *See, e.g.*, Stodden, *supra* note 113, at 48-49.
[341] *See* Mia Garlick, *A Review of Creative Commons and Science Commons*, 40(5) EDUCAUSE REV. 78 (September/October 2005). *See also* Niva Elkin-Koren, *Exploring Creative Commons: A Skeptical View of a Worthy Pursuit*, in THE FUTURE OF THE PUBLIC DOMAIN (P. Bernt Hugenholtz & Lucie Guibault eds., Kluwer Law International, 2006).
[342] *See* Stodden, *supra* note 113, at 36-42.
[343] *See* Reichman, Dedeurwaerdere & Uhlir, *supra* note 22.
[344] *See id.*

consider reintegrating scientific journals back into the fabric of universities themselves, but as part of a broader effort to create open access thematic knowledge hubs.[345]

From this perspective, one or more universities could jointly produce the journals in question, with direct support of the funding agencies. In so doing, they could integrate the skills and services of different departments, such as the relevant scientific groups, the computer and technical service departments, and especially library services, which could coordinate and manage editorial and publishing functions. Students and post-doctoral candidates could similarly be co-involved at all levels as part of their educational experience, a phenomenon that routinely occurs in US law schools.[346]

Once anchored in an academic setting and freed from the legal and commercial fetters of both the professional societies and the commercial publishers, the very object of the publishing exercise could dramatically change. No longer would it be bound by obsolete concepts of the print model, which treat each monthly output as a discrete legal and substantive unit. Rather, each collection of research results made available to the relevant thematic community could enrich and expand an ever growing, digitally integrated database of aggregate scientific results, fully open to data mining, manipulation and other automated knowledge machinery, with full respect for reputational benefits but without palpable legal or economic constraints.[347] Moreover, digitally organized portals could link the formally published literature with so called grey-area literature, proceedings, etc, and then further link this aggregate resource with other data and relevant information bearing on all aspects of the science, including data pertaining to research on relevant materials.[348]

While this is not the place to elaborate further on this vision, the astounding creative possibility of a fully integrated knowledge hub along these lines clearly dwarfs the gains that could be made from structural reforms of the IP system. While we believe that these or similar reforms are essential for both the progress of science and culture, the drive to achieve them should not distract the funding agencies—and the larger scientific community—from contemplating and supporting the edification of a different, digitally integrated approach to the dissemination of scientific research results along the lines we just indicated.

The European Commission should, accordingly, see its Green Paper as an opportunity to rebalance a legal domain that has become increasingly hostile to the needs of the scientific research community. Beyond avoiding further enclosure, the Commission should join with key foreign institutions, such as the US National Institutes of Health (NIH) and the National Science Foundation (NSF), in affirmatively promoting open access to scientific publications. To this end, the Commission should become a funder of first resort for scientific publications and for the institutional repositories and e-commons in which they can be collected. The Commission should likewise support the process of making government-funded research publications widely

[345] *See id.*
[346] *See id.*, at __.
[347] Obviously, much depends on the availability of funding. For the view that such funding would save considerable amounts of research dollars over the present system, see Reichman, Dedeurwaerdere & Uhlir, *supra* note 22.
[348] The end result much more than an open access repository could become what Reichman, Dedeurwaerdere and Uhlir have deemed "open knowledge environments." *See id.*

available through self-archiving and institutional archiving with the fewest possible restrictions on use or reuse of published results.

IV. CONCLUSIONS AND RECOMMENDATIONS

Because the European Commission's Green Paper emphasized the importance of "promoting the dissemination of knowledge and innovation," we have focused particular attention on the role of basic scientific research as provider of most of the essential inputs needed for commercial applications and for the production of downstream knowledge goods. The primary question is how to ensure that investments in basic research will continue to spawn the outputs on which creation, innovation and trade in knowledge goods ultimately depends. In this context, we contend that appropriately designed L&Es in domestic and international copyright law can help provide the indispensable foundations for future technological breakthroughs.

While a spate of international IP conventions, most notably the TRIPS Agreement of 1994, have disproportionately burdened developing countries with higher, more harmonized standards of protection, they have also spawned an "incipient worldwide transnational system of innovation" that could exert a profound stimulus on investments in innovation everywhere that could immeasurably benefit human welfare.[349] Much depends, however, in maintaining a proper mix of public and private goods. With particular regard to scientific research, optimal innovation will, in turn depend on a clear understanding of the "complementarities" between public science and private-sector applications.[350] Of equal or greater importance, measures to stimulate investment in commercial applications of basic research must not disrupt the Republic of Science,[351] with its own unique set of sharing norms and its ever more pressing need for digitally integrated research commons that know no territorial or other legal limitations.[352]

In this paper, we have explored a series of responses to new technologies in science with a view to assessing possible alternatives to the zero-sum game that appears to be unfolding at the regional and multilateral levels. We use the principal welfare objectives of the leading economic powers—the IP clause of the US Constitution and the "Fifth Freedom" of the Commission of the European Communities[353]—as the leitmotif against which current policy debates should unfold and future directions be outlined. Also relevant is the growing recognition of the role of fundamental rights[354] and of other regimes such as competition law and consumer law, that set limits to IP laws.[355]

The solution is not to denigrate copyright law or otherwise subvert its values. Rather, it is to make a concerted effort to adjust the historical values of copyright law to the modalities of a

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[349] *See* Maskus & Reichman, *supra* note 7.
[350] *See* David, *supra* note 23.
[351] *See* Michael Polanyi, *The Republic* of *Science: Its Political and Economic Theory*, 1 MINERVA 54 (1962); ROBERT K. MERTON, THE SOCIOLOGY OF SCIENCE: THEORETICAL AND EMPIRICAL INVESTIGATIONS (Norman Storer ed., Univ. of Chicago Press, 1973); *see also* So et al., *supra* note 23.
[352] *See*, *e.g.*, James Boyle, *supra* note 52.
[353] *See* European Commission, A Single Market, *supra* note 19.
[354] *See* LANGE & POWELL, *supra* note 133; Netanel, *Locating Copyright within the First Amendment Skein*, *supra* note 168.
[355] *Cf.*, *e.g.*, So et al., *supra* note 23.

digital age, in order to ensure that its goals and methodologies support and reinforce the needs of both scientific and cultural creators operating under twenty-first century conditions. The reality emerging in the post-TRIPS environment is precisely the need for a better balance of public and private interests, to ensure that knowledge, innovation and trade are suitably supplied and maintained.

In this context, copyright law's L&Es have an essential role to play. They are not some nuisance-like sideshow of demands that must be appeased as narrowly as possible. Rather, they should be viewed as a form of user's rights,[356] which help to supply the inputs of creation, innovation and trade, as indispensable to the production and dissemination of knowledge goods as private IPRs.

The time has thus come to pry open the artificially narrowed viewing box of the trade paradigm and return to the more balanced vision of traditional IP discourse, which properly understood, seeks to maintain a healthy competitive economic environment at both the national and multilateral levels. This insight was explicitly acknowledged at the margins of TRIPS, in the Preamble and in articles 7-8, which await further development.[357] One may hope that initiatives such as the European Commission's Green Paper, together with other related projects, such as the WIPO Development Agenda, may calm the increasingly troubled IP waters and lead to a less contentious, more thoughtful approach to stimulating "knowledge as a global public good."[358]

[356] *See, e.g.*, Hugenholtz & Okediji, *supra* note 143. *See also* Abraham Drassinower, *Authorship as Public Access: On the Specificity of Copyright vis-à-vis Patent and Trademark*, 2008 MICH. ST. L. REV. 199 (2008).
[357] *See* TRIPS Agreement, *supra* note 43, pmbl. ¶¶ 5-6, arts. 1.1, 7-8.
[358] *See* Stiglitz, *supra* note 4.