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UNCTAD/ICTSD Capacity Building Project on

*Intellectual Property Rights and
Sustainable Development*

Development in the Information Age:

**Issues in the Regulation of Intellectual Property Rights,
Computer Software and Electronic Commerce**

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Explanatory Note

This case study by Prof. Ruth Okediji has been prepared in the context of the Project on TRIPS and Development Capacity Building sponsored by the Department of International Development (DFID UK). The Project is being implemented by the secretariat of the United Nations Conference on Trade and Development (UNCTAD) (Project Number INT/OT/1BH) and the International Centre for Trade and Sustainable Development (ICTSD). The broad aim is to improve the understanding of TRIPS-related issues among developing countries and to assist them in building their capacity for ongoing as well as future negotiations on intellectual property rights (IPRs).

The Project produces a series of documents through a participatory process involving trade negotiators, national policy makers, as well as eminent experts in the field, NGOs, international organizations, and institutions in the North and the South dealing with IPRs and development. The published outputs are not intended to be academic exercises, but instruments that, in their final forms, will be the result of a thorough process of consultation. This will be achieved by rapid development of working drafts and circulation of these to experts and to the intended audiences for their comments. These documents include:

- **A Policy Discussion Paper** intended to be a clear, jargon-free synthesis of the main issues to help policy makers, stakeholders and the public in developing and developed countries to understand the varying perspectives surrounding different IPRs, their known or possible impact on sustainable livelihoods and development, and different policy positions over TRIPS.
- **The Resource Book on TRIPS and Development** conceived as a guide that will provide background and technical information on the main issues under discussion in TRIPS.
- **Case studies** on various IPRs issues to supplement the Resource Book and the Discussion Paper. This will allow concrete evidence to emerge and shed light on the impact and relevance of IPRs in developing countries. Including non-voluntary licensing, these studies cover other issues such as geographical indications, technology transfer, nutrition.

In addition, the Project produces background material on Indicators of the Relative Importance of IPRs in Developing Countries and a Review of Activities being carried out by other organizations and institutions on TRIPS related questions and a Review of Literature. For details on the activities of the Project and available material, see <http://www.ictsd.org/unctad-ictsd>.

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1. Introduction

There is an established consensus that the information age offers significant potential for growth in all countries. The benefits of communications networks, principally reduced transaction costs and the ability to overcome impediments to productivity, are especially important in considerations of how developing countries might more fully participate in the global economy.

Despite the acknowledged potential of the information age for economic growth, most developing countries have yet to significantly benefit from the vast resources and opportunities made possible by information technology. There remains considerable uncertainty about the specific ways information technology can be applied to development goals and to promote identified objectives. Determining critical elements of a regulatory environment conducive for growth and development is particularly challenging given the sectoral and context-specific nature of the benefits of information technologies for productive economic and social activity. Importantly, the pervasive role of intellectual property rights in regulating almost all aspects of the digital economy has been insufficiently analyzed as part of a broad development agenda for the digital economy. Patents, particularly pharmaceutical patents, have long been the subject of concerns about the role of intellectual property in development. This has occasioned neglect of other intellectual property rights such as copyright and trademarks. Yet, copyright law is essential to the viability of the Internet as a development tool. Virtually all aspects of the digital economy are affected by copyright or recent quasi-copyright systems that provide rights for technological protections of digital content. Copyrights, trademarks and patents each, and in some cases jointly, impact prospects for electronic commerce, access to computer software, the possibility of marketing cultural goods, the availability of educational content and much more. In short, intellectual property regulation permeates all aspects of the development opportunities occasioned by the commercialization of information technology.

This paper analyzes the ways in which intellectual property rights affect options and prospects for development, particularly in implementing new business models, exploiting new markets and exploring new avenues of economic growth. It is not an exhaustive legal analysis of all the intellectual property issues that affect developing countries with respect to digital technologies. The primary objective is to present and analyze the significant role of intellectual property rights in advancing *and* constraining development objectives in the specific context of the advantages offered by information technology. Consequently, the paper emphasizes and highlights areas that are generally treated as distinct problems or opportunities for developing countries, and argues that intellectual property regulation is fundamental to how effectively development goals can be pursued in the information era. Owner's rights established by multilateral treaties do not adequately, if at all, account for public welfare concerns that are important for development goals. On the other hand, owner's rights are important to the capacity of developing countries to leverage cultural goods in the global market place. Devising national policies that manage the tensions inherent in intellectual property rights for the digital age is a challenge for all countries. For developing countries in particular, this challenge has fundamental implications for the attainment of basic economic goals. Controversial issues such as database protection, emerging issues such as the appropriateness of business method patents, alternative proprietary models such as the Open Source movement, and the prospects of copyright as a tool for penetrating global markets in cultural goods are just some of the topics considered by this paper. Each represents an integral part of the legal fabric of the information age with attendant ramifications for development strategies.

Part I of the paper is an overview of the technological, legal and economic framework of the information age. It highlights of policy considerations for developing countries, with a brief discussion of characteristics of the digital economy and the computer networks that create and support new economic opportunities.

Part II discusses the importance of e-commerce as a means of stimulating economic growth. Since e-commerce activity depends largely on access to the Internet, this part of the paper also examines

various forms of the digital divide between developed and developing countries and corresponding levels of e-commerce activity. Additionally, it provides a brief history of the Internet and emphasizes the regulatory conditions that facilitated development of the fundamental technologies of the information age.

Part III of the paper analyzes the regulation of computer software in the United States and the European Union, emphasizing the implications of business method patents for e-commerce. This part also discusses the implementation of international intellectual property agreements, as well as the development of domestic regimes in the United States and the European Union as they relate to business method patents and database protection. It offers some considerations of database protection and business method patents from a development perspective.

Part IV of the paper examines specific areas where developing countries can actively benefit and exploit comparative advantages. Several case studies on cultural industries offer important evidence about the value of copyright and computer networks for developing countries. The section focuses on the music sector as an important area for development prospects, and provides an outline of pertinent rights afforded by international copyright agreements. Another important development issue affected by copyright regulation concerns access to educational materials and the possibility of distance education. Copyright law will largely shape how developing countries can take advantage of computer networks for educational purposes and this issue is briefly discussed.

Part V outlines emerging considerations such as the Open Source movement, and discusses elements of a framework necessary to facilitate appropriation of the benefits of the information age for developing countries. The paper concludes by highlighting issues that require specific attention by policy makers, as well as repeating a few suggestions for policy considerations.

2. An Overview of the Technological, Legal and Economic Framework of the Information Age

2.1 Some Policy Considerations

There is no question that the information age, propelled by ongoing innovation in the development and use of information technologies, provides an unprecedented opportunity to transform existing patterns of global production and the corresponding disproportionate diffusion of technical knowledge, wealth and inequality among nations and peoples. The profound opportunities presented by the information revolution have been recognized by international agencies, governmental organizations, nongovernmental organizations and the public as a whole. In March 2003, OECD Directorates, in conjunction with the World Bank and UN Agencies organized a Forum on “Integrating ICT in Development Programmes.”¹ This Forum built on an earlier one that focused on using information technology to effect poverty reduction.² Both these Forums responded to calls by members of the international community, including developing countries, to integrate information technologies within mainstream development aid programs.³

One of profound effects of the Internet is the connectivity that is possible for millions of users worldwide. In terms of supply, the Internet offers access to services, products and information that otherwise would be unavailable without the physical movement of persons. Internet applications offer an unprecedented possibility for access and delivery of important socioeconomic inputs such as education, medical information, and, in a more limited fashion, health care and associated services. It

¹ See http://www.oecd.org/document/30/0,2340,en_2649_37409_2495390_1_1_1_37409,00.html.

² Global Forum on Exploiting the Digital Opportunities for Poverty Reduction. See www.oecd.org/dac/digitalforum

³ For a full report of the main conclusions of the Forum, see http://www.oecd.org/document/11/0,2340,en_2649_37409_2506955_1_1_1_37409,00.html

also offers opportunities for domestic cultural industries to penetrate global markets. Given the fact that inadequate or ill-functioning infrastructure constitute principal barriers to access and delivery of social goods, the potential of the Internet to overcome these difficulties in developing countries is singularly important. To effectively participate and enjoy the benefits of the information economy, however, developing countries will need to make investments in the “soft” infrastructure of their domestic economies by adopting policies to deal with illiteracy, promote tertiary education, and investments in R&D. The success of development strategies and the attainment of development goals require attention to these foundational requisites for accessing, utilizing, and facilitating productivity in the information economy. The following points summarize important factors that policy makers should keep in mind in formulating information policies with a development focus.

1. Exploiting the potential of the Internet to facilitate development objectives requires access to hardware (computers), software and content. Competition and deregulation in the telecommunications industry will enhance the opportunities for access to digital content by citizens.
2. Cooperation among various industries and enterprises is an indispensable aspect of successful technology platforms. It is important to encourage the use of computer networks in identified sectors in order to experience net gains and to facilitate integration into the global supply chain. Countries must evaluate areas of comparative advantage and determine how information technology can enhance such advantage while improving competitive advantage in other areas.
3. Institutions of higher learning are an important aspect of developing a strong technology base in any society. This includes training software developers, mathematicians and telecommunications experts. Education should occupy a central place in development strategies for the information age. This will require implementation of copyright treaties in a way that ensures that proprietary rights are balanced with public policy limitations that permit use and access for educational purposes.
4. Economic growth in the information age has a strong correlation with medium to highly skilled labor. With respect to investments in education, the cost of educational materials has been significant. Given the wealth of information available on the Internet, dissemination of educational content over computer networks is an invaluable opportunity for improving access to, and the quality of, education in developing countries.
5. The cumulative effects of expansive proprietary rights must be carefully weighed in order to develop policies that can effectively encourage domestic creativity while simultaneously facilitating access to existing content online. In this regard, countries must carefully determine the relative costs and benefits of accession to multilateral copyright agreements. More specifically, the method of domestic implementation of these agreements is critically important for fashioning the appropriate domestic environment needed to ensure sustained access to informational works. Developing countries should resist the incorporation of these treaties into the TRIPS Agreement as this may limit the range of policy options available to promote domestic objectives, while also subjecting these countries to the WTO dispute settlement system.
6. Given high population numbers in the developing world, the gradual introduction of information technology may cause initial worker dislocation. Any use of information technology must therefore consider labor implications.⁴
7. Social, economic and legal institutions must function well in order to support economic growth in the information age. In leading developing countries such as India, Korea, China, and Brazil, the existence of macroeconomic stability has greatly facilitated the opportunities for economic development utilizing information products and information technology. While other indicators

⁴ Dale W. Jorgenson & Kevin J. Stiroh, *Information Technology and Growth* (1999).

such as use of technology and technology penetration are important indices of the potential for development progress in the information age, the experience of some developing countries suggest that there are ways to capitalize on existing strengths to build up domestic firms' opportunities to service the information economy. For example, the software sector of the Indian economy is developing its own technology and content for export and domestic use.⁵ In other words, this industry is dynamically pursuing opportunities for growth that are not dependent solely on outsourcing. Even the nature of the outsourced products has changed to reflect greater sophistication.⁶

8. Despite the emphasis in many studies on the need for a strong telecommunications infrastructure for greater physical access to the Internet,⁷ the development of third generation Internet technologies through satellite suggests that eventually, this major barrier may not be as significant for access to the Internet, particular in rural areas. An important task, then, is to develop guidelines as to how much developing country resources should be invested in adapting to the current technological state of art, given the on-going rate of innovation. These are issues that require careful and sustained empirical analysis to ensure that developing countries are not persistently left behind in the information age.

2.2. Characteristics and Challenges of the Digital Economy

In the new global economy, information is simultaneously an intrinsic characteristic of markets as well as a product for sale in markets.⁸ Intellectual property subjects such as copyrights, trademarks, and patents, as well as new subjects of proprietary protection such as databases, are all paradigmatic examples of information products. At the same time, the Internet has made information about comparative prices for goods and services readily and easily available through software agents that aggregate data from various Internet sites.⁹ Indeed, orthodox price setting and price distribution theories¹⁰ require reconsideration given the comparative ease with which product prices can be compared on the Internet. Efficient price comparisons represent one example of how the Internet has affected markets through reduced transaction costs.¹¹ Further, in this new economy, markets can straddle both the digital environment of the Internet and "real time" markets when the relationship between on-line or "electronic" commerce and traditional commerce is simply a continuum with producers converting certain aspects of business transactions (*e.g.*, selection and payment) to the Internet, while retaining labor for other aspects such as customer service. Alternatively, some markets

⁵ James Tooley, *If India Can, Why Can't We?* NEW STATESMAN, Sept. 10, 2001 (describing success of India's software industry).

⁶ Jaikumar Vijayan, *India Inc., Still Going Strong*, COMPUTERWORLD, Sept. 15, 2003, at 30.

⁷ Mike Jensen, Bridging the Digital Opportunities Divide, UNDP Global Meeting on ICT for Development, July 9-11, 2003.

⁸ For a review of insights from information economics and market behavior, see Joseph E. Stiglitz, *Information and the Change in the Paradigm in Economics*, 92 AMERICAN ECONOMIC REVIEW 460 (2002). Professor Stiglitz affirms the important insight from his earlier works that the competitive model does not work well for markets where knowledge acquisition is an important component of economic growth. He notes that for developing countries, this requires state intervention in the market in order to close the knowledge gap between them and developed countries. *Id.* at 438. See also, Ruth L. Okediji, *Trading Posts in Cyberspace: Information Markets and the Construction of Proprietary Rights*, 44 BOSTON UNIV. L. REV. 545 (2003).

⁹ See *e.g.*, eBay, Inc. v. Bidder's Edge, Inc., 100 F. Supp.2d 1058 (N.D. Cal 2000) (finding Bidder's Edge liable for use of intelligence software to collect data from eBay's server under the common law theory of trespass to chattel).

¹⁰ George J. Stigler, *The Economics of Information*, LXIX JOURNAL OF POLITICAL ECONOMY, 215 (1961) (analyzing the importance and implications of search costs in the market due to the dispersion of buyers and sellers); Sanford J. Grossman and Joseph E. Stiglitz, *Information and Competitive Price Systems*, 66 AMERICAN ECONOMIC REVIEW, 246 (1976) (discussing costs and strategies of acquiring information about price).

¹¹ Michael Spence, *Signaling in Retrospect and the Informational Structure of Markets*, 92 AMERICAN ECONOMIC REVIEW, 434, 454-455 (2002). Of course, any measurement of reduced transaction costs must also be discounted for search costs which still exist on the Internet. However, there appears to be a general consensus that transaction cost reductions are a prominent benefit of computer networks.

in services may exist solely online such as data management and electronic share trading,¹² while other markets capitalize fully on the savings in labor, space and time enabled by information technology.¹³ Electronic commerce encompasses all these different markets and uses of technology for economic and commercial purposes.¹⁴ At the very least, electronic commerce implies the use of digital information technology to transform existing business models and practices, and to improve, replace, renew or recreate products and services utilizing computer networks.¹⁵

The potential for economic growth that is made possible by information technology has also engendered new challenges over what rules are necessary to govern the information market. For example, there is an unremitting demand for legal rules that will introduce limits on how consumers access and use digital content,¹⁶ and how producers collect and use personal data.¹⁷ The range and diversity of new products, new services, and new production, distribution and pricing strategies occasioned by the information age engenders regulatory concerns ranging from access to the Internet, the effects of broader and stronger intellectual property rights, to jurisdiction over disputes that arise from interaction on the Internet, the significant costs of “treating” viruses that damage and destroy technology infrastructure, the security of personal information, and many more challenges.

It is clear that the global reach of the Internet requires a multilateral approach to these continuously evolving complex issues.¹⁸ However, as developed countries seek to create new rules, or to adapt old rules to the new economy, most developing and least developed countries remain at the periphery of this new era both in terms of access to the technological tools as well as participation in setting the global agenda. In sum, the current geo-political and economic trends of the information economy reflect those that characterized the international division of labor after the industrial revolution in that labor intensive phases of production were relocated to regions with surplus low-cost labor.¹⁹ Similarly in the information age, major developing countries have participated in the technological environment primarily by serving as important harbors for outsourcing. While this has resulted in important gains

¹² Louis A. Lefebvre and Elizabeth Lefebvre, *E-Commerce and Virtual Enterprises: Issues and Challenges for Transition Economies*, 22 *TECHNOVATION* 313, 314-316 (2002) (describing characteristics of virtual enterprises).

¹³ Internet auction sites are a classic example. So also are markets for digital goods such as music consumption and audiovisual entertainment, banking services, travel, tourism and data collection.

¹⁴ For a comprehensive overview of definitions of e-commerce, see <http://www.oecd.org/dsti/sti/it/ec/act/sacher.htm>. See also, United Nations Conference on Trade and Development, Building Confidence: Electronic Commerce and Development, UNCTAD/SDTE/MISC.11 (2000).

¹⁵ For a discussion of characteristics and modes of e-commerce, see ANDREA GOLDSTEIN AND DAVID O'CONNOR, *ELECTRONIC COMMERCE FOR DEVELOPMENT*, 74 -75 OECD (2002).

¹⁶ This is largely subject to copyright rules. Two treaties sponsored by the World Intellectual Property Organization (WIPO) are specifically directed to protect digital content. See WIPO Copyright Treaty (WCT), Dec. 20, 1996 S. Treaty Doc. No. 105-17, 36 I.L.M. 65 and the WIPO Performances and Phonograms Treaty (WPPT), Dec. 20, 1996, S. Treaty Doc. No. 105-17, 36 I.L.M. 76.

¹⁷ Adam Clymer, *Threats and Responses: Privacy Concerns; Canadian and Dutch Officials Warn of Security's Side Effects*, N.Y. Times, Feb. 28, 2003, at A14 (noting privacy objections to U.S. policies); Adam Clymer, *Threats and Responses: Electronic Surveillance; Congress Agrees to Bar Pentagon From Terror Watch of Americans*, N.Y. Times, Feb 12, 2003, at A1; Adam Clymer, *Threats and Responses: Surveillance; Pentagon Forms 2 Panels To Allay Fears on Spying*, N.Y. Times, Feb. 8, 2003, at A10 (noting public and political opposition to privacy threats).

¹⁸ The OECD has stated that successful development of e-commerce depends “to a large extent on transborder solutions based on policy co-ordination between countries and between stakeholder constituencies.” See http://www.oecd.org/about/0,2337,en_2649_37441_1921035_1_1_1_37441,00.html. There is a consensus shared by policy makers and scholars that the inherently global nature of the infrastructure requires a multilateral approach to the complex issues affecting e-commerce regulation. There has also been an emphasis that e-commerce regulation is squarely within the domain of the WTO. See Catherine L. Mann and Sarah Cleland Knight, *Electronic Commerce in the WTO*, in *THE WTO AFTER SEATTLE* 253 (Ed. Jeffrey J. Schott 2000); Catherine L.Mann, Sue E. Eckert, and Sarah Cleland Knight, *GLOBAL ELECTRONIC COMMERCE: A POLICY PRIMER* (2000).

¹⁹ See generally, F. FROBEL, J. HEINRICHS AND O. KREYE, *THE NEW INTERNATIONAL DIVISION OF LABOR* (1981). Some scholars and commentators argue that the influential forces of Internet regulation are similar to those that shaped the industrial era. Consequently, the infrastructure of the Internet will reinforce and strengthen existing transnational patterns of production, ownership and capital distribution. See e.g., DAN SCHILLER, *DIGITAL CAPITALISM: NETWORKING THE GLOBAL MARKET SYSTEM* (1999).

for such countries, particularly India and China, the pertinent question is whether a model based mainly on servicing foreign markets can sustain long-term economic growth.²⁰

For *developed* countries, empirical studies²¹ have explored trends and policies, and suggested guidelines²² to encourage the continued growth of productivity through electronic commerce and associated information communication technologies. The results of these studies confirm the importance of investments in information technology as a key factor of domestic growth.²³ Macroeconomic conditions necessary for sustained growth in this new environment in developed countries are equally applicable to developing countries with the exception of intellectual property regulation. In this regard, the current strategies of some developed countries are in tension with the open regulatory approach that engendered the initial technologies of the information age. Constructing a balanced regime for the competing interests and concerns of owners, users and creators nationally is difficult and costly; doing so globally is a daunting challenge. At the minimum, it will require a reconsideration of some core assumptions and inherent tensions in existing global regulatory frameworks ranging from free trade, antitrust, international communications standards as well as intellectual property rights.

Despite increasing domestic and global concern about the effects of expansive intellectual property rights on the competition and innovation environments,²⁴ efforts by owners to strengthen intellectual property rights have continued unabated. Emerging impediments to development goals in the specific context of new information technologies are evident in various regional and multilateral negotiations over intellectual property rights that require developing countries to adopt strong rights with minimum attention to countervailing access mechanisms for consumers. Efforts from academic and policy quarters of some developed countries emphasizing the importance of encouraging the broadest possible exploitation of information goods are an important factor in this regard.²⁵ Developing countries have much to gain by harnessing this public concern in the context of multilateral and bilateral negotiations over intellectual property rights.

²⁰ There is a significant amount of economic literature on the causes of economic growth. The pioneering work on growth theory is Robert M. Solow, *A Contribution to the Theory of Economic Growth*, 70 *QUARTERLY JOURNAL OF ECONOMICS* 65 (1956) (emphasizing technological progress as the source of economic growth). Endogenous growth theorists emphasize human and physical capital as the primary engine of economic growth. For important works on endogenous growth theory, see e.g., Paul M. Romer, *Increasing Returns and Longrun Growth*, 94 *JOURNAL OF POLITICAL ECONOMY* 1002 (1987); Robert E. Lucas, *On the Mechanics of Economic Development*, 22 *JOURNAL OF MONETARY ECONOMICS* 3 (1988). Robust evaluations of prospects for development in the information age require analyses of these contributions from major schools of economic growth theory.

²¹ See, e.g., 2001 OECD Ministerial Report, *The New Economy: Beyond the Hype*, The OECD Growth Project (2001) [hereinafter, *The New Economy*]; *A New Economy?: The Changing Role of Innovation and Information Technology in Growth*, OECD (2003); *ICT and Economic Growth: Evidence from OECD Countries, Industries and Firms*, OECD (2003).

²² See, e.g., OECD Guidelines for Protecting Consumers from Fraudulent and Deceptive Commercial Practices Across Borders (2003); OECD Guidelines for the Security of Information Systems and Networks: Towards a Culture of Security (2002).

²³ See *supra*, note 21. See also, *The New "New Economy,"* THE ECONOMIST, September 13, 2003.

²⁴ See, e.g., the recent report of the United States Federal Trade Commission, *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy*, Executive Summary, available at <http://www.ftc.gov/os/2003/10/innovationrptssummary.pdf>. See also, Letter from the Balanced Copyright Coalition to the Standing Committee on Canadian Heritage (urging Canada to adopt balanced copyright norms and to avoid the U.S. approach) Sept. 15, 2003 (copy on file with author).

²⁵ As many scholars have noted, a regulatory approach to technological innovation that encourages balance between the interests of primary and secondary innovators, and between owners and users, is also important for developed countries. See e.g., Jane C. Ginsburg, *Copyright and Control over New Technologies of Dissemination*, 101 *COLUM. L. REV.* 1613, 1635-36 (2001) (noting need to balance incentives for innovation against competing social interests when enforcing the DMCA); Jason Sheets, *Copyright Misused: The Impact of the DMCA Anti-Circumvention Measures on Fair & Innovative Markets*, 23 *HASTINGS COMM/ENT L.J.* 1, 4 (2000) (noting the importance of balance and the DMCA's threat to that balance).

3. Development in the Information Age: E-Commerce and the Access to the Internet

3.1 Development Prospects and the Challenge of Access in the Information Economy

There has been a significant amount of academic and public commentary about disproportionate levels of access to the Internet between developed and developing countries and the implications of this “digital divide” for economic development. Undoubtedly, access to the foundational infrastructure of the information age is indispensable for exploiting the prospects of new technologies for development.²⁶ Thus far, analyses of the digital divide reflect an evolutionary trend. In initial evaluations by scholars and policy makers, the challenge of “access” focused primarily on the relative lack of access to computers.²⁷ This aspect of the digital divide was also noted as a significant problem in developed countries as evidenced by disproportionate access rates in urban and rural areas, and along social, ethnic and gender distinctions.²⁸ However, as Moore’s law²⁹ has taken effect, access to computers and related complementary goods has significantly improved in the developed world.³⁰ Commentators suggest that developing countries will also benefit from decreasing prices of computer technology.³¹ The available evidence suggests that there is already some improvement at the margins in higher-income developing countries.³² It seems clear, however, that continued growth in access to computers will require innovative organizational models³³ in addition to strategies to increase overall income so that the vast majority of citizens are empowered to purchase the necessary hardware and software.

²⁶ There is widespread consensus on this point. For a general discussion, see Patrizia Fariselli, *E-Commerce for Development: A General Framework*, in ANDREA GOLDSTEIN AND DAVID O’CONNOR, ELECTRONIC COMMERCE FOR DEVELOPMENT, 36-39, OECD (2002).

²⁷ See, e.g., Allen S. Hammond, *The Telecommunications Act of 1996: Codifying the Digital divide*, 50 FED. COMM. L.J. 179, 196 (1997) (noting that the high price of computers prevents low-income households from owning them).

²⁸ National Telecomms. & Info. Admin., U.S. Department of Commerce, *Falling through the Net II: New Data on the Digital Divide* (1998), available at <http://www.ntia.doc.gov/ntiahome/net2/falling.html> (reporting significantly lower rates of access in rural communities); PIPPA NORRIS, DIGITAL DIVIDE 10-12, 68-92 (2001) (showing significantly lower rates of access for members of racial and ethnic minorities, and those with low incomes); Amanda Lenhart, Pew Internet & American Life Project, *Who’s Not Online: 57% of Those Without Internet Access Say They Do Not Plan to Log On* (2001), at <http://www.pewinternet.org/reports/toc.asp?Report=21> (reporting lower rates of access for women).

²⁹ Named after the founder of Intel Corporation, Moore’s law states that the number of transistors on a chip doubles every 18 to 24 months. This would result in an expected \$10 billion cost reduction in the first half-century of the computer age. The result is simply is that costs to consumers are very low and will continue to decrease. Gordon Moore, *Cramming More Components On to Integrated Circuits*, ELECTRONICS, Apr. 19, 1965, at 114.

³⁰ See David O’Connor, *E-Commerce for Development: Between Scylla and Charybdis*, in ANDREA GOLDSTEIN AND DAVID O’CONNOR, ELECTRONIC COMMERCE FOR DEVELOPMENT 55, 55-56 (2002) (noting the declining costs of telecommunications and internet costs and suggesting that under these conditions, “prospects have never been so good for poor countries to acquire advanced technologies relatively early in their diffusion phase. Rather than widening the technology gap, rapid technological innovation at the frontier can actually hasten diffusion by inexorably driving down costs of computer power and communications”). *Id.* at 56. Nonetheless, a divide is persistent between racial and gender lines, as well as between urban and rural areas in all countries. See Joel Rothstein Wolfson, *Social And Ethical Issues in Nanotechnology: Lessons From Biotechnology And Other High Technologies*, 22 BIOTECHNOLOGY L. REP. 376, 379 n. 8 (2003) (“For example, our most recent [U.S.] data show that divides still exist between those with different levels of income and education, different racial and ethnic groups, old and young, single and dual-parent families, and those with and without disabilities.”) Other countries mirror the U.S. divide. See Susanna Frederick Fischer, *The Global Digital Divide: Focusing on Children*, 24 HASTINGS COMM. & ENT L.J. 477, 484-90 (2002) (discussing the United Kingdom, France, and Australia).

³¹ O’Connor, *id.*

³² See Appendices A, B, C and D.

³³ For example, Internet Cafes have become very popular avenues of Internet access in many developing countries despite problems with telecommunications infrastructure. Other important sources of access are institutions of higher education.

Next, concerns about the digital divide directed focus to the telecommunications substructure of the Internet and the need to enhance competition in this industry. In most countries, the complex relationship between telephone service providers, cable service providers and the rise of Internet Service Providers (ISPs) has given rise to a variety of pricing models to sustain differences in the market structure.³⁴ Pricing strategies permeate and fundamentally affect the problem of access.³⁵ To the extent that cost remains an integral part of the access conundrum, competition in the market for services that are related to Internet use is important. Consider, for example, that in 2001, the top ten ISPs in the United States accounted for over 66% of the total market share; the top four companies accounted for just over half the market.³⁶ National ISPs generate roughly 44% of total revenues in the industry.³⁷ As technologies interface and combine features of old services and new functions (such as voiceover Internet protocol), distinctly regulated services converge thus creating opportunities for monopolistic organizations to emerge.³⁸ The pricing implications of inadequate competition in the adjacent technologies to Internet functionality constitute another important aspect of access limitations to the information economy.³⁹

A third level of the digital divide involves increasingly high barriers to content available on the Internet. Expansive intellectual property laws increasingly enclose⁴⁰ the vast amounts of information placed on the Internet through the deployment of copyright laws, as well as technologically through digital rights management schemes that are protected by quasi-copyright regimes such as the infamous Digital Millennium Copyright Act (DMCA) in the United States.⁴¹ The seemingly inevitable protection of nonoriginal information databases through *sui generis* proprietary rights further portends a future where access to the most fundamental tools of the information economy will be increasingly problematic as well as economically costly. The enclosure of basic tools required for meaningful access is evident both in the scientific arena as well as in traditional copyright and cultural industries.⁴²

The cumulative cost for each level of access--hardware, inadequate competition and content-- requires simultaneous, multi-faceted and strategic policies aimed at addressing the rules that create and sustain the access problem. As is now more appropriately appreciated, the digital divide is a dynamic

³⁴ See, e.g., Martin Cave and Robin Mason, *The Economics of the Internet: Infrastructure and Regulation*, 17 OXFORD REVIEW OF ECONOMIC POLICY, 188 (2001).

³⁵ *Id.*

³⁶ Denise Pappalardo, *The ISP Top Dogs*, NETWORK WORLD INTERNET SERVICES NEWSLETTER, MAY 30, 2001, available at <http://www.nwfusion.com/newsletters/isp/2001/00846039.html>. Another report suggests that in the year 2000, the big six providers (America Online, NetZero, EarthLink, CompuServe, MSN Internet Access and AT&T World Net, accounted for over 73% of the market. See, *Report Shows Internet Approaching Oligopoly*, available at http://www.isp-planet.com/research/census_q12k.html.

³⁷ Pappalardo, *id.*

³⁸ Consider for example, the MCI and WorldCom merger in 1998 or the Time-Warner/AOL merger in January 2000. The Federal Trade Commission noted possible anti-competitive effects of the MCI/Worldcom merger in *In re Application of WorldCom, Inc. and MCI Communications Corporation for Transfer of Control of MCI Communications to WorldCom, Inc.*, Memorandum Opinion and Order, 13 FCC Record 18025, 18103-18115, paras. 149-150 (1998). Commentators raised similar concerns about the AOL/Time Warner merger. See also, Sarah G. Lopez, Note, *Evaluation of the AOL Time Warner Consent Decree's Ability to Prevent Antitrust Harm in the Cable Broadband Isp Market*, 17 ST. JOHN'S J. LEGAL COMMENT. 127, 147-149 (2003) (noting possible anti-competitive harms).

³⁹ For analyses of issues relating to the market structure for the Internet, see, e.g., R.A. Mason, *Simple Competitive Internet Pricing*, 44 EUROPEAN ECONOMIC REVIEW, 1045 (2000); P. Rey and J. Tirole, *Connectivity in the Commercial Internet*, 48 JOURNAL OF INDUSTRIAL ECONOMICS, 433 (2000). See also, Cave and Mason, *supra* note 34.

⁴⁰ James Boyle has adroitly termed this "the second enclosure." See James Boyle, *The Second Enclosure Movement and the Construction of the Public Domain*, 66 LAW AND CONTEMPORARY PROBLEMS, 33 (2003).

⁴¹ Digital Millennium Copyright Act of 1998 (DMCA), 17 U.S.C. §§ 1201-1203 (2000).

⁴² See, e.g., J.H. Reichman and Paul F. Uhler, *A Contractually Reconstructed Research Commons for Scientific Data in a Highly Protectionist Intellectual Property Environment*, 66 LAW AND CONTEMPORARY PROBLEMS 315 (2003); Charlotte Hess and Elinor Ostrom, *Ideas, Artifacts, and Facilities: Information as a Common Pool Resource*, 66 LAW AND CONTEMPORARY PROBLEMS 111 (2003).

phenomenon. The various manifestations of the digital divide suggest something incredibly important for public policy initiatives—the divide is a self-sustaining negative externality that will not be constrained or eliminated unless the justifications behind the regulatory policies that influence access on the various levels are restructured to accommodate public welfare interests, including the need for competitive balance in innovation regulation.

3.2 How Economically Significant is the Internet for Developing Countries?

There is currently no general consensus about the economic significance of the Internet with respect to productive activity. Some economists suggest that the Internet is not as revolutionary as other historical technological breakthroughs such as the radio or television.⁴³ Others argue that information technologies and the ubiquitousness of the network have created an unprecedented opportunity to create wealth and to fundamentally transform old economic paradigms.⁴⁴ This debate is likely to continue for some time and only in hindsight can the ongoing impact of the Internet be assessed more accurately. As with most things, it is likely that the truth of the matter is a dynamic located between both extremes. Conventional markets are unlikely to disappear entirely, and there can be beneficial synergies as well as efficiency tradeoffs between electronic and conventional commerce.⁴⁵

Nonetheless, the following examples of noticeable economic effects of the Internet for new markets have been offered: (i) dramatic reduction in transaction costs; (ii) improved performance of markets; (iii) the creation of markets too difficult and expensive to create without technology; (iv) less costly coordination of economic activity both within firms and in larger economic settings.⁴⁶ The impact of these factors has been felt in peer to peer (P2P) interactions, business to business (B2B) interactions and business to consumer (B2C) interactions. There is considerable evidence that the strong economic growth of the late 1990s in the United States and other OECD countries can be attributed to improved productivity gains in the information technology sector⁴⁷ as well as increased and innovative use of information goods and services.⁴⁸ All this took place in a framework of deregulation, private sector leadership, open publication and sharing of technical information and knowledge, and an impressive collaboration between scientists in different countries.

⁴³ See e.g., Robert J. Gordon, *Does the “New Economy” Measure up to the Great Inventions of the Past?* J. OF ECON. PERSP. 49 (2002); J. Bradford Long, *What ‘New’ Economy?* THE WILSON QUARTERLY, 14 (Autumn 1998). But see Robert J. Gordon, *Five Puzzles in the Behavior of Productivity, Investment, and Innovation*, available at <http://faculty-web.at.northwestern.edu/economics/gordon/researchhome.html> (modifying his earlier conclusions).

⁴⁴ See generally, Symposium on E-Commerce, *Journal of Economic Perspectives*, (2002). See also, BRIE-IGCC, TRACKING A TRANSFORMATION: E-COMMERCE AND THE TERMS OF COMPETITION IN INDUSTRIES (BROOKINGS, 2001).

⁴⁵ See generally, E. BRYNJOLFSSON AND B. KAHIN, (EDS.) UNDERSTANDING THE DIGITAL ECONOMY (1999).

⁴⁶ Michael Spence, *Signaling in Retrospect and the Informational Structure of Markets*, AMERICAN ECONOMIC REV. (2002).

⁴⁷ Stephen D. Oliner & Daniel E. Sichel, *The Resurgence of Growth in the Late 1990’s: Is Information Technology the Story?* J. OF ECON. PERSP. 3 (Fall 2000); David Lucking-Reiley & Daniel Spulber, *Business-to-Business Electronic Commerce*, J. OF ECON. PERSP., 5 (Fall 2001)

⁴⁸ Severin Borenstein and Garth Saloner, *Economics and Electronic Commerce*, J. OF ECON. PERSP., 3 (Winter 2001); Erik Brynjolfsson & Lorin M.Hitt, *Beyond Computation: Information Technology, Organizational Transformation and Business Performance*, J. OF ECON. PERSP., 23 (Fall 2000).

POSSIBLE E-COMMERCE AND INFORMATION SHARING RELATIONSHIPS⁴⁹

	Government	Business	Consumer	Employee
Government	G2G	G2B	G2C	G2E
Business	B2G	B2B	B2C	B2E
Consumer	C2G	C2B	C2C (peer to peer)	C2E
Employee	E2G	E2B	E2C	E2E

Undoubtedly, information technologies leveraging the Internet and the proliferation of personal computers have ushered in new market structures, new models of competition, and new products in developed countries. The initial commercial uses of the Internet involved merely a transfer of “brick and mortar” services or products to the network and it was unclear whether profits could be sustained with this strategy.⁵⁰ However, for developing countries, simple applications such as email, websites or providing information on-line to customers would have an extraordinary effect in the market. At a minimum, these applications will inevitably up-grade quality and efficiency in the provision of services. Enhanced communications facilitate efficient decision making processes, promote time-savings and streamline the production process.⁵¹ Initial empirical evidence from some developing countries suggests that there are measurable gains even from the simplest applications of information technologies with significant returns to domestic firms. In South Africa, for example, some firms in the automotive components sector initially used the Internet to process orders, manage inventory, marketing and other inter-firm functions.⁵² While not entirely innovative, this sort of “transfer utility” effectively takes advantage of the transaction cost reductions that characterize economic activity on the Internet.⁵³ These uses require the most minimal capital investment, mainly in hardware and network access, but promises net returns to domestic firms.⁵⁴ A firm’s use of the Internet, for example, can heighten demand by facilitating growth of a larger customer base through advertising and marketing via the company website. There is added value if the website is enhanced to facilitate customer service and other exogenous business development such as automated transactions. It is important to note, however, that there is a difference between using the Internet to create value and the ability to capture such value. The latter may well depend on macroeconomic conditions that include the presence of well functioning institutions and a functioning telecommunications industry.

In developing countries where entrepreneurial activity has been considerably stymied by inadequate communications infrastructure, application of information technologies will affect domestic investors even if only minimally. The nature of the Internet allows firms to access and utilize technology (host computers) in developed countries for some applications (*e.g.*, websites).⁵⁵ This circumvents, somewhat, the infrastructure barriers in developing countries. However, more meaningful access to telecommunications cannot be avoided in order to fully exploit the potential of the information

⁴⁹ This chart, with slight changes, is from Sagren Moodley, *The Prospects and Challenges of E-Business for the South African Automotive Components Sector: Preliminary Findings from Two Benchmarking Clubs*, in ANDREA GOLDSTEIN AND DAVID O’CONNOR, *ELECTRONIC COMMERCE FOR DEVELOPMENT* 75, OECD (2002).

⁵⁰ Borenstein and Saloner, *supra*, note 48, at 3-4.

⁵¹ *Id.* at 4-9 (summarizing how the Internet creates supply and demand side value).

⁵² Sagren Moodley, *The Prospects and Challenges of E-Business for the South African Automotive Components Sector: Preliminary Findings from Two Benchmarking Clubs*, in ANDREA GOLDSTEIN AND DAVID O’CONNOR, *ELECTRONIC COMMERCE FOR DEVELOPMENT* 75, OECD (2002).

⁵³ See generally, Michael D. Smith, Joseph Bailey, Erik Brynjolfsson, *Understanding Digital Markets: Review and Assessment*, in ERIK BRYNJOLFSSON AND BRIAN KAHIN, *UNDERSTANDING THE DIGITAL ECONOMY* (2000).

⁵⁴ How significant these returns might be appears to depend at least partially on the product in question. A recent study found that in nine least developed countries with some e-commerce activity, sales were slow. The author attributes this partly to the fact that products being sold were those more likely to be at the bottom of the value curve. See William Wresch, *Initial e-commerce Efforts in Nine Least Developed Countries: A Review of National Infrastructure, Business Approaches and Product Selection*, 11 *JOURNAL OF GLOBAL INFORMATION MANAGEMENT*, 67 (April-June 2003).

⁵⁵ See Wresch, *id.*, (describing websites in Ghana, Kenya, Mozambique, Nepal, Nicaragua, Pakistan, Senegal, Sudan and Tanzania and finding a significant use of hosting services in other countries, particularly the United States).

economy. Studies have shown that better telecommunications infrastructure is both an outcome of economic growth but also an input as well. The causal relationship between the Internet and economic growth appears well established.⁵⁶ It should be noted, however, that synergistic benefits and dynamic welfare effects of information technologies in the domestic market is highly dependent on the existence of a critical mass of *users* of information technology in a sector or industry. In terms of the value of the network, a single firm's investment in information technology can be a dead weight loss where the rate of connectivity in the relevant sector is low. Further, participation in global value chains requires effective integration of information technologies in local firms.⁵⁷ Export oriented firms in developing countries are particularly imperiled in this new economy if they lack access to networks. As sectors in developed countries experiment with new business models based on the Internet, the reorganization of the global supply chain in response to technological innovation will inexorably require firms in developing countries to integrate information technologies in domestic operations, even if just to avoid the very real threat of becoming irrelevant. Thus, what is important is for firms and countries to evaluate sectors where information technologies offer opportunities to enhance comparative advantage, add value to existing products and services, and in other ways facilitating participation in the global value chain.⁵⁸

With respect to the global value chain, the importance of e-commerce to economies in the developed world is reflected by data about the proportionate share of GDP attributable to growth of the information technology sector in OECD countries.⁵⁹ According to the United States Census Bureau, retail e-commerce sales in the first quarter of 2003 were US\$11.9 billion, accounting for 1.5% of total sales.⁶⁰ This is a 25.9% increase from the first quarter of the previous year. By 2004, e-commerce revenues in the United States are expected to reach US\$1.01 trillion.⁶¹ As of 2001, total e-commerce revenues in the EU were reported as \$172 billion Euros.⁶² E-commerce statistics are difficult to compile in developing countries. However, in some leading developing countries such as Brazil, e-commerce revenues were expected to reach US\$ 255 million.⁶³ For Chile, the B2B transactions were expected to rise significantly from US\$ 1.5 billion in 2001.⁶⁴ In South Africa, B2C sales were

⁵⁶ The Networking Revolution: Opportunities and Challenges for Developing Countries, InfoDev Working Paper, World Bank (2000) available at <http://www.infodev.org/library/working.htm>. See also, Duncan Campbell, *Can the Digital Divide Be Contained*, 140 INT. LABOUR REV. 119 (2001).

⁵⁷ Andrea Goldstein, *Local Entrepreneurship in the Era of E-business: Early Evidence from the Indian Automobile Industry*, in ANDREA GOLDSTEIN AND DAVID O'CONNOR, ELECTRONIC COMMERCE FOR DEVELOPMENT 93, 109 OECD (2002) (providing a case study of Fiat India).

⁵⁸ There is an emerging body of literature on sector-specific benefits of the Internet in developing countries. For some case studies, see ANDREA GOLDSTEIN AND DAVID O'CONNOR, ELECTRONIC COMMERCE FOR DEVELOPMENT, OECD (2002). Similar work is also being done for developed countries. See e.g., BRIE-IGCC, TRACKING A TRANSFORMATION: E-COMMERCE AND THE TERMS OF COMPETITION IN INDUSTRIES (2001). Most of the existing reports, however, ignore the role and impact of the multilateral framework for intellectual property on these countries.

⁵⁹ See *The New Economy*, supra note 21, at 20-21. See also, *Measuring the Information Economy*, 9-11, OECD (2002).

⁶⁰ <http://www.census.gov/estats>.

⁶¹ Nua Internet Surveys, *eMarketer: Worldwide B2B revenues to pass one trillion*, Apr. 1, 2003, at http://www.nua.com/surveys/index.cgi?f=VS&art_id=905358753&rel=true

⁶² See *E-Commerce in Europe: Results of the pilot surveys carried out in 2001*, Eurostat (2001).

⁶³ Business News Americas, Oct. 29, 2002. It is important to note, however, that while there is a reported 30% rise in Brazilian companies online in 2002, only ten companies are said to be responsible for the 80% increase in the e-commerce figures for 2002.

⁶⁴ Some figures for Chile put the 2002 e-commerce figures at USD 3 billion. See Business News Americas, *B2B Transactions to Double in Chile* (Aug. 22, 2002), at http://www.nua.ie/surveys/index.cgi?f=VS&art_id=905358566&rel=true. B2B transactions account for the vast majority of Brazil's e-commerce activity, representing \$5.3 billion in 2001, a figure that eMarketer predicts will jump to \$34.7 billion by 2004. Forrester predicts even stronger growth, projecting B2B revenues to reach \$59.4 billion by 2004. [Emphasis added]. See, Narry Singh, *Brazil: Untapped Potential*, iQ Magazine, September/October 2002, http://business.cisco.com/prod/tree.taf%3Fasset_id=88035&ID=85948&public_view=true&kbns=1.html

expected to total US\$ 27.9 million in 2002, up from US\$ 16.7 million in 2001.⁶⁵

For all other countries, particularly the least developed countries (LDCs), ecommerce rates are negligible as these are directly related to the availability of computers, internet access points and the presence of “soft” infrastructure such as education, language skills, *etc.*

Indeed, as of 1999 one report indicated only one Internet user for every 250 persons in Africa.⁶⁶ The global ratio then was estimated as one user for every 35 persons while in the United States and European Union, the ratio was one user per three persons. By 2002, other reports suggested a further decline in comparative use rates: 1 user for every 250-400 persons in Africa compared to a world average of 1 user for every 15 persons, and in the United States and EU 1 user per 2 persons.⁶⁷ However, major countries such as Egypt, Nigeria, and South Africa have boosted regional numbers of use and access in recent years.⁶⁸

E-Commerce Sales in 2004 by Region	
United States	\$3.2 trillion
Asia-Pacific	\$1.6 trillion
Western Europe	\$1.5 trillion
Eastern Europe, Africa, Middle East	\$68.6 billion
Latin America	\$82 billion
Source: Forrester Research	

Telecommunications availability is clearly a critical factor in evaluating prospects for using information technology to facilitate economic goals in the digital age.⁶⁹ Despite the emergence of new technologies for Internet access, the fact still remains that most individuals access the Internet through telephone networks.⁷⁰ Interestingly, one report of ICT trends in Africa indicate that mobile phone adoption has surpassed fixed line use for communication.⁷¹ As mobile technology evolves, important possibilities for developing countries in overcoming the significant problem of Internet access will likely emerge.⁷² There is already some evidence of the importance of mobile phones in economic and social empowerment in rural communities in South Asia.⁷³ If mobile phone use in developing countries surpasses access and use of traditional telephones

An analyst with the same group (Forrester Research) predicts Brazil's 2004 figure:

"E-commerce in Latin America will thrive in the coming years thanks to a rollback of protectionist policies, innovative uses of mobile technology, and pressure from Internet-sophisticated global trading partners," said Matthew Sanders, associate analyst. "Brazil will lead this region by trading \$64 billion online by 2004. MERCOSUR neighbor and principal trading partner Argentina will follow with more than \$10 billion in online sales." See Michael Pastore, Latin American E-Commerce Showing Signs of Growth, April 26, 2000, http://cyberatlas.internet.com/big_picture/geographics/article/0,1323,5911_348161,00.html

⁶⁵ All Africa, South African B2C Revenues to Rise (Nov. 15, 2002), at http://www.nua.ie/surveys/index.cgi?f=VS&art_id=905358566&rel=true.

⁶⁶ Source: UN Economic Commission for Africa.

⁶⁷ The 2001 UNDP World Development Report lists figures for other developing country regions as follows: 1 in 30 for Latin America and the Caribbean; 1 in 250 for South Asia; 1 in 43 for East Asia, 1 in 166 for the Arab States. See <http://www.undp.org>.

⁶⁸ See generally, <http://www3.wn.apc.org/Africa/afstat.htm>.

⁶⁹ See generally, READINESS FOR NETWORKED WORLD: A GUIDE FOR DEVELOPING COUNTRIES: INFORMATION TECHNOLOGIES GROUP, Center for International Development, Harvard University, Cambridge, Massachusetts (2000). See also, Paulo Bastos Tigre and David O'Connor, *Policies and Institutions for E-Commerce Readiness: What Can Developing Countries Learn from OECD Experience*, April 2002. Georg Caspary and David O'Connor, *Providing Low-Cost Information Technology Access to Rural Communities in Developing Countries: What Works? What Pays?* OECD (2003).

⁷⁰ Cave and Mason, *supra* note 34 at 191-196 (describing the various regulatory issues associated with the technology used to access the Internet).

⁷¹ Mike Jensen, *Bridging the Digital Opportunities Divide*, UNDP Global Meeting on ICT for Development, July 9-11, (2003).

⁷² See Jeffrey L. Funk, *The Mobile Internet Market: Lessons from Japan's i-Mode System*, in BRIE-IGCC, TRACKING A TRANSFORMATION: E-COMMERCE AND THE TERMS OF COMPETITION IN INDUSTRIES 369 (BROOKINGS, 2001) (noting that the parallel growth of the Internet and mobile phones has led to a belief that the two will converge and mobile phones will become a “major tool for accessing the Internet.”)

⁷³ Salahuddin M. Aminuzzaman, *Cellular Phones in Rural Bangladesh: A Study of the Village Pay Phone of Grameen Bank*, in ANDREA GOLDSTEIN AND DAVID O'CONNOR, ELECTRONIC COMMERCE FOR DEVELOPMENT 75, OECD (2002).

and wireless application protocols, it would seem that the possibility of mobile Internet access is a more promising prospect for enhanced Internet use in developing and least developed countries. As technology evolves, there is no doubt that Internet access through a variety of means, mobile, cable, telephone, satellite and wireless,⁷⁴ will be of great importance in facilitating access to the information economy for developing and least developed countries. Indeed, competition between these services will be vital for ensuring pricing options that are feasible for consumers in these countries.

Despite data about Internet penetration rates in developing countries that may suggest that short-term prospects for developing countries are bleak, the fact is that economic opportunities in the information economy extends to activities beyond those empowered by information technology. Developing countries such as India have experienced significant information technology-related economic growth despite low Internet penetration. In the year 2000, the Indian information technology industry was reportedly a US\$10 billion industry comprising hardware and software.⁷⁵ By 2001/02, exports of software and services had experienced incredible double-digit growth, and India now constitutes almost 80% of the outsourcing market.⁷⁶ India's notable experience with information technology provides important insights into why traditional barriers to economic growth and development, such as inadequate physical infrastructure and lack of technology, may not inevitably constitute insurmountable barriers to the potential for developing countries to benefit from the information age.⁷⁷ However, it is also important to note that the viability of supply side value added components to the global value chain in software cannot sustain widespread economic growth.⁷⁸ Two key factors are worth considering. First, exploitation of cheap but highly skilled labor is highly dependent on domestic regulation in *developed* countries. The current regulatory environment for outsourcing is vulnerable to protectionist pressures particularly in the current economic downturn in countries such as the United States.⁷⁹ Second, total factor productivity,⁸⁰ a robust measurement of economic growth, is likely to be significant in developing countries chiefly via meaningful diffusion and access to technology for domestic industries. Although there is evidence of some positive externalities in India's success in the outsourcing business⁸¹ the point still remains that sustained, dynamic growth will require fundamental shifts in the productive capacity of the country.⁸² Thus, Internet access, use

⁷⁴ Wireless subscription is not yet a major share of the Internet market in any country.

⁷⁵ See "India's IT Revenues top \$10 billion in 2000-01", <http://www.tat.com/tatasons/media/20010716.htm>. One source forecasts that the Indian IT industry will reach a total turnover of \$80 billion. See Buu Ha, *Nine Steps to a Thriving Software Sector*, Vietnam Investment Rev, Apr. 23, 2003.

⁷⁶ See "India Moves to Quality," Computer Weekly, p. 28, July 25 (2002). Some forecasts expect India's IT market to grow to \$87 billion by 2008. See Grant Johnson, India: Another IT Frontier to Watch, <http://www.ecnmag.com> (December 2002). For an analysis of India's success in IT, see Devash Kapur, The Causes and Consequences of India's IT Boom, Vol.1, no.2, India Review, 91 -110 (April 2002). See also, Nirvikar Singh, *Information Technology as Engine of Broad-Based Growth in India* (April 2001), available at http://econ.ucsc.edu/~boxjenk/IT_India_2002.pdf

⁷⁷ See generally, VIBHA PINGLE, RETHINKING THE DEVELOPMENTAL STATE: INDIA'S INDUSTRY IN COMPARATIVE PERSPECTIVE, 122-157 (1999) (providing an analysis of the success of the Indian software industry). The author identifies critical elements of India's success including bureaucratic autonomy, strong industry associations, political encouragement and a flexible policy environment. See *id.* at 169-172.

⁷⁸ See, e.g., A. Arora and S. Athreye, *The Software Industry and India's Economic Development*, 14 INFORMATION ECONOMICS AND POLICY 253 (2002); D. Kapur, *The Causes and Consequences of India's IT Boom*, 1 INDIA REVIEW 91 (2002). D.W. Jorgenson, *Information Technology and the US Economy*, 91 AMERICAN ECONOMIC REVIEW 1 (2001); Nirvikar Singh, *India's Information Technology Sector: What Contribution to Broader Economic Development?* OECD (2003).

⁷⁹ There is already evidence of protectionist fervor against outsourcing. See e.g., Michael Schroeder and Timothy Aeppl, *Skilled Workers Sway Politicians with Fervor Against Free Trade*, WALL ST. J, Oct. 10, 2003, at A1 (2003) (describing rising domestic opposition to outsourcing to India and China); Scott Morrison, *White-collar protests signal outrage over outsourcing*, FINANCIAL TIMES, September 24, 2003 at p.14.

⁸⁰ Total factor productivity is defined as the ratio of an index of outputs to an index of inputs. It is a more robust measurement of economic growth. See PRODUCTIVITY MEASUREMENT IN REGULATED INDUSTRIES, ch. 2 (THOMAS G. COWING & RODNEY E. STEVENSON EDs., 1981).

⁸¹ See *supra* note 76.

⁸² D.W. Jorgenson, *Information Technology and the US Economy*, 91 AMERICAN ECONOMIC REVIEW 1 (2001);

and the development of local content and content providers remain important regulatory issues for countries committed to pursuing development opportunities.

To conclude, it is no surprise that Internet growth and access rates in developed countries are significantly larger than in developing countries. The significant disparities have led some commentators to suggest that developing countries can benefit only limitedly from the information economy. This view assumes a static view of Internet penetration in developing countries as well as a narrow perspective of what different applications of information technology can offer developing countries. The overall data reflects *some* growth in Internet access and use in developing countries, suggesting that the Internet and its associated information technologies can offer important economic development opportunities in the current environment notwithstanding comparatively low levels of access.

Table 1

INTERNET WORLD USAGE STATISTICS ⁸³
(Usage and Population by Countries and Regions)

World Regions	Population (2003)	Usage, (Year 2000)	Usage, Latest Data	(%) Table	Growth (2000-2003)	% Population (Penetration)
Africa	879,855,500	4,514,400	8,073,500	1.2 %	78.8 %	0.9 %
America	864,854,400	126,164,800	228,775,858	35.1 %	81.3 %	26.5 %
Asia	3,590,196,700	114,303,000	200,319,063	30.7 %	75.3 %	5.6 %
Europe	722,509,070	103,075,900	190,297,994	29.2 %	84.6 %	26.3 %
Middle East	259,318,000	5,272,300	12,019,600	1.8 %	128.0 %	4.6 %
Oceania	31,528,840	7,619,500	13,058,832	2.0 %	71.3 %	41.4 %
WORLD TOTAL	6,348,262,510	360,949,900	652,544,847	100.0 %	80.8 %	10.3 %

Table 2⁸⁴

1.1.1.1.1.1 Total Number of People Age 2 and Older with Internet Access via Home PC

	Number of People with Internet Access (in Millions)	% of World's Internet Population
US	168.1	29
Europe	135.3	23
Asia & Pacific	75.5	13

Nirvikar Singh, *India's Information Technology Sector: What Contribution to Broader Economic Development?* OECD (2003).

⁸³ Source: InternetWorld Stats.com last visited, July 2003. See also Appendices A, B, C and D for country by country breakdowns of Internet usage rates.

⁸⁴ Source: Nielsen/NetRatings Global Internet Trends Q4 2002, available at <http://www.netratings.com>.

Latin America	14.3	2
Rest of World	186.8	33
Total	580	100

3.3. A Brief History of the Development of the Internet and What it Tells Us about the Role of The Regulatory Environment in Innovation and Technology Diffusion

In addition to constituting a unique marketplace where buyers and sellers interact,⁸⁵ there are two possible categories of economic activity attributable to the Internet: (1) business activity related to the development of complementary hardware and associated tools that facilitate access and use of the network; (2) business activity associated with the development of new goods and services. These can be generally referred to respectively as “complementary markets” and “innovation markets.” Ideally, innovation markets create multiple secondary markets that, after consolidation, establish the foundation for subsequent generations of innovation. The Internet confirms this process of technological evolution and its spillover effects.

There are many existing accounts of the history and development of the Internet. This section briefly summarizes the significant moments of this history, emphasizing the regulatory and technological environment that facilitated the growth of the network system and ensured its establishment as the engine of the information age. It is important to note at the outset that there can be no “finished” account of the development of the Internet. The Internet continues to benefit from ongoing technological innovation and adaptation. Nonetheless, there is an important technological genesis of the information revolution and briefly identifying the historical framework provides an important context in which current regulatory initiatives can be evaluated.

The origins of the interactive system of linked computer networks now commonly known as the “Internet” dates back to the 1960’s in the United States when a decentralized computer communications network was developed to facilitate electronic communication and cooperation among a group of scientists, government defense contractors, and universities.⁸⁶ This initial endeavor was enlarged over the years by the development and adoption of the Transmission Control Protocol/Internet Protocol (TCP/IP) as the dominant standard of the network system.⁸⁷ Open access to the specifications of Internet protocols has been identified as a key factor in the rapid growth of the Internet. The TCP/IP specifications were put in the public domain by the authors in 1974.⁸⁸ Other ideas essential for creating networks were also widely shared among network scientists and researchers, first via regular mail and then, as technology developed, through online delivery.⁸⁹

From a primarily government sponsored project of the 1960s, the phenomenon of inter-computer communications, and the network it engendered, was broadened during the 1980s by the development of regional and local networks facilitated by NSFnet, a network sponsored by the National Science

⁸⁵ The Internet is recognized as both a marketplace as well as a tool for creating new markets and products. For one analysis of the impact of the Internet on traditional market structure, see Francois Bar, *The Construction of Marketplace Architecture*, in BRIE-IGCC, TRACKING A TRANSFORMATION: E-COMMERCE AND THE TERMS OF COMPETITION IN INDUSTRIES 27 (2001).

⁸⁶ This prototype network was known as the ARPANET. See generally, Rita Tehan, *Spinning the Web: The History and Infrastructure of the Internet*, CRS Report for Congress, Aug. 12, 1999; ROBERT H. REID, ARCHITECTS OF THE WEB: 1,000 DAYS THAT BUILT THE FUTURE OF BUSINESS (1997).

⁸⁷ TCP/IP is a technical communication standard for inter-computer communication.

⁸⁸ See Vinton G. Cerf & Robert E. Kahn, *A Protocol for Packet Network Intercommunication*, 22 IEEE TRANSACTIONS ON COMM. 637 (1974).

⁸⁹ Andrew Jablon, Note, “God Mail”: Authentication and Admissibility of Electronic Mail in Federal Courts, 34 AM. CRIM. L. REV. 1387, 1390 (1997) (discussing early adoption of electronic mail as means of sharing information among scientists).

Foundation (NSF) to facilitate academic research, collaboration and exchange.⁹⁰ This academic vision extended to universities and research agencies well beyond the United States. Indeed, networks using the same “packet switching” technology had been deployed for civilian use in some parts of Europe around the same time as the initial defense funded network in the United States. Available evidence suggests that funding difficulties stymied these early European networks.⁹¹

Academic use in the United States, however, could not be limited to formal institutions. In particular, use of the network for communication by e-mail became dominant as students moved from universities to the employment arena.⁹² By the 1990s, corporate use of the Internet proliferated and commercial users and applications began to consume much of the capacity of NSFnet.⁹³ As the open network architecture of the Internet continued to develop through the collaborative work of scientists in Europe and the United States, the open system adopted by researchers very early in the development of the technology facilitated the world wide growth of networks.⁹⁴ According to some accounts, by the mid-1990s, the Internet had grown to consist of about 50,000 networks spanning all seven continents.⁹⁵ To facilitate the increase in communications traffic, alternative sources of connectivity to the Internet were developed by commercial entities who eventually became major Internet Service Providers (ISPs).⁹⁶ By 1995, commercial and social uses of the Internet dominated the network; its initial character as a government or academic phenomenon had been completely transformed.⁹⁷

The invention of the World Wide Web (Web) further radically propelled the growth of Internet relevance and use in the broader society. Simply defined, the Web is a set of software document format and retrieval protocols with multimedia properties that facilitate inclusion of graphics into the text of documents.⁹⁸ Fundamentally, the Web is an access tool that tremendously magnified the value of the network to all users by facilitating placement, search, and access to the vast amount of material on the Internet. This particular technological development catalyzed the commercialization of the Internet particularly with the introduction of the Netscape browser in 1994.⁹⁹ At the time, the strong economy in the United States channeled equity funds to new firms investing in information technology of almost any type, resulting in a macroeconomic environment that heavily emphasized commercial activities made possible or better by the development of software and hardware that would complement and/or leverage the technical infrastructure of the Internet. Other important features associated with this particular period include the deregulation of the telecommunications industry and the related use of antitrust policy to engender competition in the provision of network access and

⁹⁰ David C. Mowery & Timothy Simcoe, *Is the Internet a US Invention? – An Economic and Technological History of Computer Networking*, 31 RESEARCH POLICY 1371, 1375-1377 (2002); Barry M. Leiner, et al, *The Past and Future History of the Internet*, Communications of the ACM, Feb. 1997, vol.40, No.2, at 105-106.

Tehan, *supra* note 86, at 3-4.

⁹¹ Mowery & Simcoe, *id.* at 1373.

⁹² REID, *supra* note 86, at xxi.

⁹³ See generally, Vinton Cerf, “*Computer Networking: Global Infrastructure for the 21st Century*,” available at <http://www.cs.washington.edu/homes/lazowska/cra/networks.html>; Mowery & Simcoe, *supra* note 90 at 1376;

⁹⁴ It is interesting to note that the French Minitel, a precursor to the commercial Internet we know today was based on proprietary technology which was a limitation on its growth as it made the development of applications difficult. Consequently, commercial developers were less enthusiastic about the Minitel and its success did not extend much beyond France.

⁹⁵ Leiner et. al, *supra* note 90 at 105.

⁹⁶ These were UUNET Technologies, PSInet, NETCOM On-line Communications, BBN Planet and MCI.

⁹⁷ See Cerf, *supra* note 93 at 66.

⁹⁸ http://www.webopedia.com/TERM/W/World_Wide_Web.html

⁹⁹ See *New York v. Microsoft*, 231 F. Supp. 2d 203, 213 n. 11 (D.D.C. 2002) “[t]he first widely-popular graphical browser distributed for profit, called Navigator, was brought to the market by the Netscape Communications Corporation (“Netscape”) in December 1994”. See also, Shane Greenstein, “*Commercialization of the Internet*,” available at <http://www.kellogg.nwu.edu/faculty/greenstein/images/htm/Research/Internet-nberpolicy.pdf>. See also, Don Clark, *Canceled Programs*, Wall St. J., July 21, 1999, at 1 (stating that “the Internet is fueling a fundamental shift in software development”)

services.¹⁰⁰

In sum, four important developments made possible the rapid adoption of the network for commercial transactions and a wide range of social activity:

- The nonproprietary approach to innovation and information;
- The standardization of the Internet networking computer protocol;
- The privatization of the network as deregulation made it possible for independent telecommunications companies to provide connectivity;
- The introduction of the World Wide Web.

The increasing availability and use of personal computers in the United States ensured a synergy between the underlying infrastructure of the Internet, and software applications for a number of different uses. Additionally, a system emerged for organizing “domains” of specific activity on host computers.¹⁰¹ Domain names typically denote the nature of activity of a particular Internet user. By most accounts, the commercial domain (“dotcom”) has been the fastest growing segment of the Internet since 1995. One source states that by 1996, the commercial domains had almost twice as many hosts as the educational domain, and by the year 2000, Internet businesses and the commercial domains accounted for more than six times as many hosts as the educational domain.¹⁰²

With respect to the nature of commercial activity on the Internet, it is interesting to note the industries most affected by innovations in communication technologies. These industries are associated primarily with data processing such as in insurance, financial markets, health care management, electronic shopping, auction systems, and business cryptography. As will be discussed later, these are the same areas in which business method patent applications predominate. Proprietary protection of databases will also have an impact in these markets. Further, as noted earlier, forms of commercial activity at initial stages of electronic business and commerce are typified less by innovative strategies than by the use of automated systems and technology to enhance existing business models, products and services.¹⁰³ Analysts and scholars do, however, anticipate the emergence of transformative

¹⁰⁰ Larry E. Ribstein, Seventh Annual Frankel Lecture, *Bubble Laws*, 40 HOUS. L. REV. 77 (2003) (noting telecommunications deregulation beginning in the mid-1990s); Richard D. Cudahy, *Whither Deregulation: A Look at the Portents*, 58 N.Y.U. ANN. SURV. AM. L. 155, 163-65 (2001) (describing deregulation and antitrust enforcement in U.S. telecommunications industry); Robert M. Frieden, *The Telecommunications Act of 1996: Predicting the Winners and Losers*, 20 HASTINGS COMMENT L. J. 11, 15-16 (1997) (analyzing the effect of federal law intended to increase competition in the telecommunications industry); Martin Cave and Robin Mason, *The Economics of the Internet: Infrastructure and Regulation*, 17 OXFORD REVIEW OF ECONOMIC POLICY, 191-195 (2001) (discussing competition issues related to access to the Internet).

¹⁰¹ Andy Johnson-Laird, *Looking Forward, Legislating Backward?* 4 J. SMALL & EMERGING BUS. L. 95, (2000) (defining “host computer,” or “server,” as “a computer system that provides responses or services to one or more client computers”). He adds that “this definition is not exhaustive: there can be several different host computers in any given configuration, and any one of those computers can simultaneously be both a host for certain services and a client either for the same services or for other services.”

¹⁰² Mowery & Simcoe, *supra*, note 90 at 1379. See also, Business Week Online, July 13, 1999. These numbers can be somewhat misleading as a “dotcom” domain is certainly not necessarily an indicator of commercial/entrepreneurial or productive activity. Nonetheless, it is fairly well established that commercial activity constitutes a significant proportion of Internet traffic in the United States. The number of dot.com hosts rose from 332, 647 in 1996 to 40,555,072 in 2003. Internet Software Consortium, *Host Distribution by Top-Level Domain Name*, July 1996, <http://www.isc.org/ds/WWW-9607/dist-byname.html> (332,647 dot.com hosts); Internet Software Consortium, *Distribution by Top-Level Domain Name by Name*, Jan. 2003, <http://www.isc.org/ds/WWW-200301/dist-byname.html>. The increase in dot.com registrations greatly exceeded increases in other domain names, such as .edu and .org. See data in Zooknic Internet Intelligence, *History of gTLD Domain Name Growth* <http://www.zooknic.com/Domains/counts.html> (last visited Oct. 22, 2003).

¹⁰³ Experts and analysts believe that this situation will change. There is also general consensus that organizational

applications of information technologies to generate new forms of businesses and entrepreneurial activity. One of the most active commercial applications of the Internet involves auction systems/other electronic shopping activities and financial services.¹⁰⁴

The regulatory, policy, and macroeconomic environment that facilitated the initial adoption/adaptation of the Internet for commercial and social use is depicted in the following table:

THE DEVELOPMENT OF THE INTERNET AT A GLANCE

Stages	Funding and Technology Environment	Innovation Environment	Critical Technologies or Applications	Regulatory Framework
<i>Initiation and Development</i>	<ul style="list-style-type: none"> - Defense related funding (DoD) -Public funding (NSF) 	<ul style="list-style-type: none"> - Established R&D infrastructure consisting of a network of trained researchers; ARPANET - documentation through RFC's; open access specifications of protocols 	<ul style="list-style-type: none"> - hardware research (transistors) - Packet-switching -computer program languages (e.g., Assembly, C and FORTRAN) - theoretical foundations for TCP/IP File Transfer Protocol (FTP) E-mail 	<ul style="list-style-type: none"> - Collaborative relationships between academic, government and industrial researchers - Strong computer hardware and software industries with some reliance on intellectual property laws (trade secrets, copyrights and patents)
<i>Standardization and Privatization</i>	<ul style="list-style-type: none"> - Private funding -Financial investments by educational institutions 	<ul style="list-style-type: none"> Rise of standard setting bodies/trade associations such as IEEE, ACM, W3C. 	<ul style="list-style-type: none"> -UNIX -development and adoption of TCP/IP -E-mail (Simple Mail Transfer Protocol) -Telnet - Ethernet technology - World Wide Web (Hypertext transfer protocol; Hypertext Markup Language) - Mosaic browser (visual interface) -Java 	<ul style="list-style-type: none"> - Designation of Network Access Points (NAPs) for interconnectivity by commercial backbone operators. - Antitrust and regulatory policies facilitated emergence of domestic ISPs. These policies had the effect of weakening the market power of telecommunications companies.
<i>Commercialization</i>	<ul style="list-style-type: none"> Private funding Public/private partnerships 	<ul style="list-style-type: none"> Open Source movement 	<ul style="list-style-type: none"> - Windows - Netscape -Database applications (e.g., Oracle, SQL) -Linux - embedded technology/firmware (e.g., PDA's, cell phones and other real 	<ul style="list-style-type: none"> -Use of antitrust to ensure competition, however still highly concentrated industry for cable and phone lines; multilateral cooperation in regional and international bodies such as OECD -Open Source General Public License (GPL) putting pressure on

changes are significant even in the use of the Internet for functions such as customer service, communication and marketing.

¹⁰⁴ Jürgen Bischoff, Director, Asian and Pacific Centre for Transfer of Technology (APCTT), *Human Resources Development Needs for E-Commerce* 103, 108, http://www.unescap.org/tid/publication/chap4_2138.pdf (financial services); Shane Greenstein, *Understanding the Evolving Structure of Commercial Internet Markets* 6 (1999), <http://www.kellogg.nwu.edu/faculty/greenstein/images/htm/Research/understanding.pdf> (listing most successful types of commercial internet applications)

			time systems) -broadband (high speed internet)	proprietary systems. Increasing adoption of open source by governments and businesses.
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3.4 Regulatory and Legal Issues: A Summary

The interdependence of national economies occasioned by free trade agreements has been deepened through the agency of technological networks that even more closely integrate economic processes. Developing countries did not play a significant role in the technical architecture of the Internet; however, they must play a role in determining how access to the Internet, in all its various permutations, will enhance their capacity and opportunity for effective improvement of the quality of life for their citizens. In this regard, multilateral negotiations to establish global regulatory norms are a pivotal forum to advance principles that encourage competition in the Internet through balanced intellectual property rights. It is thus important to understand how intellectual property rights affect behavior, practices and opportunities on the Internet.¹⁰⁵

As the preceding discussion suggests, macroeconomic factors are of critical importance to facilitate sustained economic growth in developing countries. Important regulatory and legal rules facilitated the transformation and development of the Internet into a viable and secure environment for a variety of economic and social activities. Although the rules governing behavior on the Internet remain fluid, several important topics have been the subject of government attention.

1. *Telecommunications*: The Internet integrates features of the telephone, radio, television and personal computers. Consequently, regulatory principles dealing with competition in the telecommunications industry had to be established as traditional lines between these products became blurred. In 1996, the U.S. Congress passed the Telecommunications Act¹⁰⁶ which sought to balance competition between providers of these hitherto disparate products who were pursuing ways to upgrade their services to the new information age. The deregulation of the telecommunications infrastructure and antitrust oversight of new mergers between traditional media companies and information technology companies has been an important feature of the regulatory environment of the information age in most developed countries.¹⁰⁷
2. *Copyright*: The ability of millions of users to move vast amounts of data over fiber optic lines or even conventional telephone lines, and thus to exchange literary and artistic works without restrictions imposed by time, geography or reduced quality, has had a profound effect on copyright law. Copyright owners quickly realized the vulnerability of works to widespread infringement through the dissemination capacity of the Internet. Consequently, negotiations at the World Intellectual Property Organization (WIPO) led to two international agreements designed to address the digital age. The WIPO Copyright Treaty (WCT) and the WIPO Performers and Phonograms Treaty (WPPT) both entered into effect in 2002.¹⁰⁸ Implementation of the WIPO Internet treaties in the United States was effectuated through the Digital Millennium Copyright Act (DMCA),¹⁰⁹ arguably a much more restrictive approach to copyright in the digital information

¹⁰⁵ See Okediji, *supra* note 8 (exploring implications of intellectual property rights on e-commerce); see also, Maureen A. O'Rourke, *What the Future Holds: Policy Choices in the Global E-Marketplace*, 7 ROGER WILLIAMS UNIV. L. REV. 151, 159-166 (2001) (noting a variety of intellectual property problems affecting ecommerce). See also generally, Maureen A. O'Rourke, *Fencing Cyberspace: Drawing Borders in a Virtual World*, 82 MINNESOTA LAW REVIEW 609 (1998).

¹⁰⁶ Pub. L. No. 104-104, 110 Stat. 56 (codified in various sections of 47 U.S.C.).

¹⁰⁷ *The New Economy*, *supra* note 21, at 29-34 (discussing the importance of increased regulation flowing from deregulation of telecommunications industry in OECD countries).

¹⁰⁸ See www.wipo.org for details of accession and list of countries that have ratified the two treaties.

¹⁰⁹ 17 U.S.C. §1201 (Supp. IV 1998).

age than what is required by the treaties.¹¹⁰ Nonetheless, this highly controversial model is fast becoming a global standard through the instrumentality of regional free trade agreements and bilateral accords.¹¹¹ Changes in this area of law have been significant and controversial on a global scale. Interestingly, it has also transformed the traditional divide between developed and developing countries by aggregating public interest concerns on a global scale to oppose unjustifiable expansions of copyright.¹¹²

3. *File-swapping software, new formats and related issues:* The use of file-swapping software that facilitates access to songs, movies and other digital content directly from servers and computer hard drives, and new media formats such as MP3 files, has raised important questions about the responsibility and liability of ISPs to clients and copyright owners. As ISPs are caught between owners and users, privacy rights are also implicated as rights owners aggressively seek to enforce their rights in a digital environment.¹¹³
4. *Business Method Patents:* In addition to technology enabled processes to create new products and markets, the Internet has also occasioned new strategies by which transactions may take place. Consumers can enjoy the benefits of financial services online, including the ability to purchase goods electronically, and businesses can use computer-aided design to facilitate production and reduce inefficiencies and costs by replacing human capital with automated systems. Recently, computer implemented business methods have been patented, thus giving exclusive rights to a particular method of doing business.¹¹⁴ Notable examples are Amazon.com's infamous "one-click" method of online purchasing,¹¹⁵ Priceline.com's patent on reverse auctioning,¹¹⁶ and E-Bay's patent for an apparatus and method for organizing and presenting information for its trading environment.¹¹⁷ Business method patents have proven very controversial, with proponents arguing that such patents encourage investments in innovation in the information age and opponents countering that such patents discourage productivity and stifle innovation.¹¹⁸ Unbridled extensions of proprietary rights to new organizational strategies or business models have implications for inter-firm competition online. In some cases, it will also affect how consumers can access content on the Internet.
5. *Other regulatory areas:* In addition to complex intellectual property issues, there remain a number of regulatory concerns that will affect technology-enabled development goals. From a global perspective, an important topic is antitrust regulation of dominant information technology

¹¹⁰ See Pamela Samuelson, *Intellectual Property and the Digital Economy: Why the Anticircumvention Regulations Need to be Revised*, 14 BERKELEY TECH. L.J. 519 (1999); Julie Cohen, *WIPO Treaty Implementation in the United States: Will Fair Use Survive?* 21 *Eur. Intell. Prop. Rev.* 236 (1999). See also, CIPR Report (2002).

¹¹¹ See Ruth L. Okediji, *Back to Bilateralism? Pendulum Swings in International Intellectual Property Law and Its Implications* __ UNI. OF OTTAWA JOURNAL OF LAW AND TECHNOLOGY __ (forthcoming 2004). See also, David Vivas-Eugui, *Regional and Bilateral Agreements and a TRIPS-Plus World: The Free Trade Area of the Americas (FTAA)*, QUNO Publications (2003) available at <http://www.geneva.quno.info>; Michael Geist, *Why we must stand guard over copyright*, Toronto Star, Oct. 22, 2003.

¹¹² For a discussion of the alliance between user groups in developed countries and developing countries during the WIPO negotiations, see Pamela Samuelson, *The U.S. Digital Agenda at WIPO*, 37 VA. J. INT'L L. 369 (1997). See also, John Browning, *Africa 1, Hollywood 0*, Wired 5.03, Mar. 1997, at 61.

¹¹³ See generally, Declan McCullagh, *RIAA Wins battle to ID Kazaa User*, cpnet news.com, Jan. 21, 2003; Declan McCullagh, *Verizon appeals RIAA subpoena win*, cpnet news.com, Jan. 30, 2003; Daphne Eviatar, *Behind RIAA's Subpoena Splurge: Music Industry Takes aggressive Tactic in Fight Against Internet Downloaders, and Ends up at D.C. Circuit*, LEGAL TIMES, vol. 26, Sept. 15, 2003.

¹¹⁴ See, e.g., Margo A. Bagley, *Internet Business Model Patents: Obvious by Analogy*, 7 MICH. TELECOMM. & TECH. L. REV. 253, 257, n.18 (2001); Robert P. Merges, *As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform*, 14 BERKELEY TECH. L.J. 577, 580 (1999).

¹¹⁵ U.S. Patent No. 5,960,411.

¹¹⁶ U.S. Patent No. 5,794,207.

¹¹⁷ U.S. Patent No. 6,058,417.

¹¹⁸ See generally Rochelle Cooper Dreyfuss, *Are Business Method Patents Bad for Business?*, 16 SANTA CLARA COMPUTER & HIGH TECH. L.J. 263 (2000).

companies. Antitrust concerns were made prominent by the U.S. Justice Department's lawsuit against software giant Microsoft.¹¹⁹ Recently, the EU also indicated displeasure with this global software powerhouse,¹²⁰ while a group of Asian countries have proposed developing a competing technological platform to Microsoft's operating system based on Open Source.¹²¹ Other regulatory concerns include: security and privacy for commercial transactions; the protection of personal data; the use and legality of electronic signatures for e-commerce transactions; encryption regulation; technical standards and the process of standard setting; taxation of digitized products; and the ubiquitous problem of legal jurisdiction for activity that takes place on-line. There have been some developments at national and multilateral fora on some of these topics.¹²²

3. Computer Software Protection, Computer Databases and E-Commerce

3.1 Patents on Business Methods: Is this the Way?

Traditionally, patent law in most developed countries has focused on industrial inventions and devices. Methods of doing business, explicitly excluded from patentability in the EPC, were not statutorily precluded from patent protection under United States law but were perceived to be patent-ineligible under a judicially derived "business method exception" to patentability.¹²³ However, in 1998, the United States Court of Appeals for the Federal Circuit, in dicta, laid the business method exception to rest and declared such subject matter to be patent-eligible on the same basis as any other process.¹²⁴ Shortly before this decision, the United States Patent and Trademark Office (USPTO) issued its "Examination Guidelines for Computer-Related Inventions" and relaxed its opposition to business-method patents.¹²⁵ Earlier versions of the Guidelines precluded patent examiners from accepting claims directed to methods of doing business although, at the time, it explicitly recognized there was no legal basis for such rejections.¹²⁶ It thus appears that the USPTO's original position was to preserve business methods for the public domain. In the wake of the change in direction by the courts and the USPTO, there was a dramatic surge in patent applications for business methods. An OECD report states that patents related to information technologies grew at a 10% rate during the 1990's and by 1998, such patents represented 16% of the total OECD patent applications.¹²⁷ The increase in the annual growth rates of these patents was concentrated primarily in the United States and Europe.¹²⁸ These observations should be qualified by the fact that not all patents that issue in the information

¹¹⁹ Book Review, *Antitrust Goes Global*, 8 COLUM. J. EUR. L. 141, 143 (2002) (describing Microsoft investigation as "most-publicized" antitrust case).

¹²⁰ See, *EU gives Microsoft One More Chance*, available at <http://www.cnn.com/2003/BUSINESS/08/06/eu.microsoft/index.html>

¹²¹ See "Sun Sees China's Window of Opportunity," Reuters, September 8, 2003, available at http://www.msn.com/2100-1104_2-5072462.html

¹²² See, e.g., Electronic Signatures in Global and National Commerce Act (ESIGN) (2000), 15 U.S.C. §7001-06 (a U.S. federal law regulating electronic contracts); Children's Online Privacy Protection Act (COPPA), 15 USC §§ 6501-05 (U.S. federal legislation regulating the collection of personal information from minors); Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995, 1995 O.J. (L 281) 31. See also generally, Susanna Frederick Fischer, *Saving Rosencrantz and Guildenstern in a Virtual World? A Comparative Look at Recent Global Electronic Signature Legislation*, 7 B.U. J. OF SCIENCE AND TECHNOLOGY LAW 229 (2001).

¹²³ In Ex Parte Murray, 9 U.S.P.Q.2d 1819, 1820 (PTO Bd. Pat. App. & Int.1988).

¹²⁴ State Street Bank & Trust Co. v. Signature Financial Group, Inc., 149 F.3d 1368 (Fed. Cir. 1998). See also AT&T Corp. v. Excel Communications, Inc., 172 F.3d 1352 (Fed. Cir. 1999).

¹²⁵ 61 Fed. Reg. 7478-92 (1996); Manual of Patent Examining Procedure, Sec. 2106 (7th ed. 1998).

¹²⁶ Training Materials Directed to Business, Artificial Intelligence and Mathematical Processing Applications, available at <http://www.uspto.gov/web/offices/pac/comexam/comguide.html>

¹²⁷ *Measuring the Information Economy*, supra note 59, at 14.

¹²⁸ *Id.* For purposes of the study, the OECD report identifies 3 classes of patents as constituting "information communications technology" patents. These are 1) computing, calculating and counting (G06); 2) information storage (G11); 3) electronic communication technique (H04).

technology category are necessarily “business method” patents, although a great deal of such patents will affect business methods generally. Consequently, it is important to note for policy purposes, that while business method patents represent an immediate concern for development interests, the broader class of patents that involve the information technology sector can also negatively affect access to the benefits of computer networks.

Business method patents can be described using three categories.¹²⁹ First, there is the computer business method category which includes patent claims that are associated with using computers to perform traditional business functions which were previously done without computers. A second category is the e-commerce category, which deals with patent claims that involve Internet applications and e-commerce, such as a patent granted for reverse auctioning on-line,¹³⁰ or the one-click order patent owned by Amazon.com.¹³¹ A third category is simply other new business methods outside of software or the Internet areas. These include non-technical fields such as coupon distribution, advertising, insurance, accounting and a number of other such fields where the patent system has not historically played a major role. Indeed, until the recent change of direction which affirmed patents for business methods, the business community did not really consider patents as a significant factor in the development and accumulation of capital. This is particularly true of small and medium enterprises (SMEs).¹³²

The extension of patents to business methods has proven very controversial in the United States. Congress intervened with amending legislation in an attempt to clarify the scope of business method patents.¹³³ Most important, there has been concern about the inhibiting effect such patents may have on the development of e-commerce and innovation in the on-line environment.¹³⁴ Statistics indicate that e-commerce related business method patents are the fastest growing category of business method patent applications and constitute a significant threat to the digital economy.¹³⁵ There are also practical considerations that must be weighed. The number of business method patent applications has added an enormous burden to the administration of the patent system in the United States. Several

¹²⁹ See Jeffrey A. Berkowitz, *Business-Method Patents: How to Protect Your Client's Interests*, 8-12 (2002).

¹³⁰ U.S. Patent No. 5,794,207.

¹³¹ U.S. Patent No. 5,960,411.

¹³² WIPO is currently engaged in a project specifically directed at enhancing SME use of intellectual property rights. See <http://www.wipo.org>. Despite evidence of uncertainty about the effects of patents in general, and business method patents in particular, there is some empirical evidence to suggest that SMEs in major developed countries hold the view that formal intellectual property rights, primarily patents, are less important for their economic activities. See Puay Tang and Dan Pare, *Gathering the Foam: Are Business Method Patents a Deterrent to Software Innovation and Commercialization?*, 17 INT'L REV. OF LAW, COMPUTERS AND TECHNOLOGY 127, 146-54 (2003). See also, Esteban Burrone, *Why Intellectual Property Matters*, available at <http://www.wipo.org/sme/en/documents/pdf/ipmatters.pdf>, at p. 2 (noting several studies concluding that SMEs place less emphasis on patent protection). Nevertheless, the author offers several strategies to enhance the value of intellectual property rights to SMEs. The author concludes that SMEs should devote greater attention to intellectual property rights but does not address the dynamic nature of small firm innovation that makes patent rights an inherently ineffective tool of protection for traditional SMEs, neither is the effect of patent protection on total welfare taken into account. Despite the important economic literature analyzing the role of patents in innovation and growth, the application of broad insights to the SME context requires nuanced analysis integrating macroeconomic concerns with firm-specific criteria before robust conclusions can be established.

¹³³ At a minimum, the legislation created a prior user right. See American Inventors Protection Act, Pub. L. No. 106-113 (1999) (codified in 35 U.S.C.)

¹³⁴ Okediji, *supra* note 8 (emphasizing the need for clear property rules on the Internet to prevent a chilling effect on small businesses and to reduce entry costs associated with uncertainty). In addition to intellectual property rights, common law doctrines have also been used to limit competition on the Internet. See *e.g.*, Ticketmaster Corp v. Tickets.com, Inc., 54 U.S.P.Q. 2d 1344 (C.D. Cal 2000); eBay, Inc. v. Bidder's Edge, Inc. 100 F. Supp. 2d 1058 (N.D. Cal 2000). See generally, Maureen A. O'Rourke, *Property Rights and Competition on the Internet: In Search of an Appropriate Analogy*, 16 BERKELEY TECH. L.J. 561 (2001); Maureen A. O'Rourke, *Shaping Competition on the Internet: Who Owns Product and Pricing Information?* 53 VAND. L. REV. 1965 (2000).

¹³⁵ See *The Knowledge Monopolies*, THE ECONOMIST, p. 76, April 8, 2000.

organizational changes have been made in order to respond to the increase in filings.¹³⁶ Additionally, several legislative amendments have been introduced to deal with the policy concerns about “glutting” the patent system and stifling innovation for e-commerce. Following the decision in *State Street*, statistics indicate that business method patents are much more likely to be litigated than any other category of patents.¹³⁷ Indeed, in the United States software patents have had higher litigation rates than non-software patents.¹³⁸

The requirements for general patentability impose some constraints on the practical grant of business method patents in the EU. Patents are available for inventions that are susceptible of industrial application, new and that involve an inventive step.¹³⁹ To satisfy the definition of “susceptible to industrial application,” the European Patent Convention (EPC) provides that an invention should be capable of being “made or used in any kind of industry, including agriculture.”¹⁴⁰ Explicitly excluded from consideration as an “invention” are the following: discoveries, scientific theories and mathematical methods; aesthetic creations; schemes, rules and methods for performing mental acts, playing games or doing business and programs for computers; presentations of information.¹⁴¹ These exclusions are applicable only to the extent a European patent application or European patent relates to such subject-matter or activities.¹⁴²

In addition to these exclusions, rules that require that claims be drafted in terms of an invention’s technical features *and* in terms that define a technical problem and its solution appear to impede the patentability of business method patents in the EPO.¹⁴³ However, there have been numerous patents granted for software-implemented inventions for business activities and other purposes where the claimed invention satisfies the criteria of being a technical contribution to the art.¹⁴⁴ A technical contribution to the art can be found in a number of things including: increased performance or productivity, a system which enables automated operations of functions that previously could only be done by physical labor, a system with reduced costs, and a system which simplifies the steps necessary to achieve a particular result. Such technical contribution will sustain the patentability of a business method innovation before the European Patent Office (EPO).¹⁴⁵ In one decision, the EPO Board of Appeal held that the technical contribution that informs the basis upon which a patent is granted may derive from the problem that is to be solved, the implementation of the solution, and the function or effects of the implementation.¹⁴⁶ This broad and flexible range of possible contributions has resulted in patents being granted by the EPO for innovations in software that have a direct effect on business management or operations (such as business management systems)¹⁴⁷ and those that have an indirect effect on business enterprises simply by enhancing the functioning of a computer system or the ease

¹³⁶See Automated Financial or Management Data Processing Methods (Business Methods) USPTO White Paper Executive Summary, available at <http://www.uspto.gov/web/menu/busmethp/>

¹³⁷ Roberta Morris, *Some Data About Patents in Class 705 (Alone and Compared to Other Classes)*, *Intellectual Property Today* 51 (May 2001).

¹³⁸ *Id.*

¹³⁹ See Article 52 (1) of the European Patent Convention; 35 U.S.C. § 101. See also Marrakesh Agreement Establishing the World Trade Organization, Annex 1C: Agreement on Trade-Related Aspects of Intellectual Property Rights, 15 April 1994, 33 I.L.M. 81 (1994) [hereinafter TRIPS Agreement]. Art. 27(1).

¹⁴⁰ EPC, Art. 57.

¹⁴¹ EPC, Art. 52(2).

¹⁴² EPC, Art. 52(3).

¹⁴³ See EPC, Rule 27 and Rule 29.

¹⁴⁴ See Patentability of Methods of Doing Business, EPO Press Release (2000), available at http://www.european-patent-office.org/news/pressrel/2000_08_18_e.htm.

¹⁴⁵ According to the EPO, “although methods for doing business, programs for computers, *etc.*, are *as such* explicitly excluded from patentability, a product or a method which is of a technical character may be patentable, even if the claimed subject-matter defines or at least involves a business method, a computer program, *etc.* . . . methods for doing business and computer programs are not always excluded from patentability” See Patentability of Methods of Doing Business, EPO Press Release (2000), available at http://www.european-patent-office.org/news/pressrel/2000_08_18_e.htm.

¹⁴⁶ EPO Board of Appeal Decision T 93/0605.

¹⁴⁷ Decision T 92/0769 Sohei.

with which individuals can perform specified functions.¹⁴⁸

Despite what appears to be a liberal approach by the EPO in the interpretation of the principles that affect the patentability of software as it relates to business methods or e-commerce, it is important to keep in mind that decisions about the patentability of business models are also made at the national level.¹⁴⁹ In this regard, the case law has been mixed, reflecting at best, ambivalence about the wisdom and appropriateness of granting business method patents on a large scale basis. It is likely that patent offices in developed countries will be cautious about the conditions under which such patents are issued. The United States, for example, has reportedly witnessed a decline in the grant of business method patents following organizational changes that established a second level of review of the class in which business method applications are predominant.¹⁵⁰ However, it should also be noted that there are current attempts in the EU to extend patent protection to computer software.¹⁵¹ This proposal was justified by reference to the contribution of software development to European GDP, and the importance of e-commerce in the information economy. The proposal, which recognizes that computer programs “as such” are ineligible for protection, would nevertheless have a liberalizing effect on business method patents although the proposal clearly goes further than this subject. The explanatory memorandum offered by the Commission makes explicit reference to the judicial endorsement of business method patents in the United States, thus clearly suggesting that business method patents are included in the scope of “computer-implemented inventions.” The proposal has been modified by the European Parliament, but the final outcome remains uncertain in light of the legislative stages that lie ahead of the current bill.

For developing countries, the protection of business method patents is not advisable for a number of important reasons.¹⁵² Empirical evidence does not establish that business method patents have a singularly positive effect on innovation. Indeed, the EU and countries such as Japan and Australia have all proceeded with notable caution in their respective policies about granting business method

¹⁴⁸ *Id.* See also, Decision EPO [T 1173/97](#).

¹⁴⁹ Keith Beresford, Patents, Copyrights, Trademarks, and Literary Property Course Handbook Series, *Business Method Patents: How to Protect Your Clients' Interests* 62 (2002) (noting relevance of national court decisions in EU patent law); Karen A. Spindler, Comment, *Current Patent Protection Granted for Genetically Modified Organisms under the European Patent Convention and the Scandal of EP 0695351*, 18 SANTA CLARA COMPUTER & HIGH TECH. L.J. 95, 114-15 (2001) (noting continued power of national courts in EU to interpret EU patent rules).

¹⁵⁰ Class 705 (Modern Business Data Processing). This class definition states: “This is the generic class for apparatus and corresponding methods for performing data processing operations, in which there is a significant change in the data or for performing calculation operations wherein the apparatus or method is uniquely designed for or utilized in the practice, administration, or management of an enterprise, or in the processing of financial data. This class also provides for apparatus and corresponding methods for performing data processing or calculating operations in which a charge for goods or services is determined. See U.S. Patent Classification System - Classification Definitions as of June 30, 2000, available at <http://www.uspto.gov/web/offices/ac/ido/oeip/taf/def/705.htm>. According to the USPTO, there are four major groups of applications in this class. They are those that are related to business operations of : (1) Determining Who Your Customers Are, and The Products/Services They Need/Want (Operations Research - Market Analysis) (2) Informing Customers You Exist, Showing Them Your Products & Services, and Getting Them to Purchase (Advertising Management; Catalog Systems; Incentive Programs; Redemption of Coupons); (3) Exchanging Money and Credit Before, During, and After the Business Transaction (Credit and Loan Processing; Point of Sale Systems; Billing; Funds Transfer; Banking; Clearinghouses; Tax Processing; Investment Planning); (4) Tracking Resources, Money, And Products (Human Resource Management; Scheduling; Accounting; Inventory Monitoring). See USPTO White Paper, *supra*.

¹⁵¹ See Proposal of 20 February 2002 for a Directive of the European Parliament and of the Council on the patentability of computer-implemented inventions/*COM/2002/0092 final – Official Journal C151 E, 25/06/2002 p. 0129-0131.

¹⁵² India has an explicit rule prohibiting business method patents. This is an important legislative step for a country whose software industry is a significant player in world markets. See the 2002 Amendment to the Indian Patent Act (from <http://www.laws4india.com/intellectual/patent/patentg.pdf>) <http://www.laws4india.com/intellectual/int-patAct.asp>. The amendment is to section 3 of the 1970 Act.

patents.¹⁵³ As mentioned earlier, even in the United States, there has been important adverse public reaction to the grant of business method patents. In developing countries where resources to devote to intellectual property administration are already barely existent, and where there is limited availability of trained technical personnel to service patent offices, there is hardly any legitimate basis to recognize such patents. While the TRIPS Agreement prohibits discrimination against a field of technology, it is arguably the case that business methods do not satisfy the minimum requirements of Article 27.¹⁵⁴ National patent offices in developing countries, and regional patent offices that handle patent applications for developing and least developed countries, should strictly apply the minimum requirement of “capable of industrial application” in evaluating the legitimacy of an application for any process that essentially constitutes a business method. Even where this requirement is satisfied, it is important that claims be carefully scrutinized so that the scope of protection is limited to aspects of the innovation that fully satisfy all requirements for patentability. This will ensure that for those countries where macroeconomic conditions are conducive to commercial activity utilizing the Internet, domestic players are not stifled by proprietary interests that prohibit the adoption of certain business strategies simply because such strategies may be covered by a patent issued elsewhere.¹⁵⁵

3.2. Database Protection: Some Considerations for Development

Digital data and technologically enabled tools for aggregating, sorting and classifying such data constitutes one of the most significant areas of e-commerce.¹⁵⁶ Most service industries rely significantly on electronic compilations of data. Generally, unoriginal collections of data have fallen outside the purview of copyright protection.¹⁵⁷ In 1996, the EU passed the Directive on the Legal Protection of Databases (Database Directive)¹⁵⁸ which established a *sui generis* form of protection for the contents of databases.¹⁵⁹ Together with extant protection for compilations which the Directive also harmonized, and a controversial provision which extends protection of databases to nationals or habitual residents of non-EU countries, data protection under a proprietary regime has become an important part of the regulatory environment of the information age. Shortly after the EU Directive was passed, a bill directed at creating a similar *sui generis* regime for databases was introduced in the United States Congress.¹⁶⁰ The European model was opposed by several important constituents of the

¹⁵³ See generally, Brian P. Biddinger, *Limiting the Business Method Patent: A Comparison and Proposed Alignment of European, Japanese and United States Patent Law*, 69 *FORDHAM LAW REVIEW* 2523 (2000-2001).

¹⁵⁴ See Marrakesh Agreement Establishing the World Trade Organization, Annex 1C: Agreement on Trade-Related Aspects of Intellectual Property Rights, 15 April 1994, 33 *I.L.M.* 81 (1994) [hereinafter, TRIPS Agreement]. Article 27(1) provides: Subject to the provisions of paragraphs 2 and 3, patents shall be available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application.5 Subject to paragraph 4 of Article 65, paragraph 8 of Article 70 and paragraph 3 of this Article, patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology and whether products are imported or locally produced. See also John R. Thomas, *The Patenting of the Liberal Professions*, 40 *BOSTON C. L. REV.* 1139 (1999).

¹⁵⁵ Interestingly, eBay which owns business method patents for its online trading business was recently found liable for patent infringement for the “Buy it Now” function offered on its Internet auction site. The “Buy it Now” option offers fixed-price options on eBay's main auction site. See *Mercexchange v. eBay*, No. 2:01cv736, E.D. Va. (2003). Although the court did not issue an injunction against eBay, it ordered the company to pay \$29.5 million in damages for infringement of the plaintiff's business method patent.

¹⁵⁶ In 2000 and 2001, the EPO reported record filings with the largest applications related to electronic communications, medical technology, electrical components and data processing. In 2000, data processing applications grew by 28%. See http://www.european-patent-office.org/news/pressrel/2002_06_20_e.htm; http://www.european-patent-office.org/news/pressrel/2001_07_20_e.htm.

¹⁵⁷ See *Feist Publications, Inc. v. Rural Telephone Service Co.*, 499 U.S. 340 (1991). See generally, Daniel Gervais, *Feist Goes Global: A Comparative Analysis of the Notion of Originality in Copyright Law*, *J. OF THE COPYRIGHT. SOCIETY OF THE USA*, 949-981 (2002).

¹⁵⁸ Directive 96/9/EC on the legal protection of databases, March 11, 1996.

¹⁵⁹ See *id.*, Article 7.

¹⁶⁰ For a detailed discussion of negotiations for database protection the U.S., see J. H.Reichman and Paul F. Uhlir, *Database Protection at the Crossroads: Recent Developments and Their Impact on Science and Technology*, 14

public including scientific organizations, educational institutions and academic organizations. These groups cited the notable adverse effects of a property based model of protection on scientific research, scholarly activity and education.¹⁶¹ Internet based enterprises also opposed *sui generis* database protection on grounds that such protection will lead to even greater industry concentration and increase the costs of e-commerce by simultaneously lowering the utility and increasing the cost of search engines. The result would be reduced competition on the Internet due to heightened barriers of entry to e-markets and inhibiting second generation improvements to existing databases. A series of intense and prolonged negotiations commenced between affected interest groups but despite numerous iterations of the initial proposed legislation, no database protection bill has yet been passed by Congress. However, there are ongoing efforts to secure such legislation at some point in the future.¹⁶²

The possibility of an international agreement to protect databases was introduced under the auspices of the World Intellectual Property Organization (WIPO).¹⁶³ Developing countries, in concert with public interest groups in developed countries requested an in-depth study of the economic impact of database protection and generally opposed any international treaty on the subject until a full analysis of the economic impact of such protection could be thoroughly investigated. The results of the studies seem to have produced a political and intellectual impasse about the impact of a global treaty for database protection.¹⁶⁴ However, as the United States currently pursues domestic database legislation, it is certain that initiatives for a global agreement will arise in the future.

Despite the absence of a formal database law in the United States, and the absence of an international treaty for database protection, several different legal rules can and do provide a measure of protection for otherwise noncopyrightable content. The most prominent of these is the common law of unfair competition or tort of misappropriation¹⁶⁵ recognized in most common law jurisdictions including many developing and least developed countries. Additionally, database owners may utilize contractual agreements to preclude users of data from copying or otherwise distributing the data. Such contractual arrangements have been enforced by courts in the United States¹⁶⁶ Further, owners of databases may rely on technological protections legitimized by laws such as the DMCA and ostensibly sanctioned by the WCT, to preclude access to database content.

The DMCA prohibits the circumvention of technological measures used to prevent unauthorized

Berkeley Tech. L.J. 793 (1999)

¹⁶¹ Reichman & Uhler, *Id.* See also, *European Union Database Directive Sets Dangerous Precedent for Librarians Worldwide*, Association of Research Libraries, at <http://www.arl.org/info/frn/copy/iffl.html>; William Gardner and Joseph Rosenbaum, *Database Protection and Access to Information*, Science Magazine, available at <http://www.sciencemag.org/cgi/content/full/281/5378/786>. See generally, Anne Linn, *History of Database Protection: Legal Issues of Concern to the Scientific Community*, National Research Council, USA March 2000, available at http://www.codata.org/codata/data_access/linn.html

¹⁶² On October 8, 2003, several representatives to Congress introduced H.R. 3261, the Database and Collections of Information Misappropriation Act. H.R. 3261 is available from Thomas: Legislative Information on the Internet, <http://thomas.loc.gov>.

¹⁶³ In September 1997, WIPO convened an Information Meeting on Database Protection to discuss possible actions on a treaty to protect intellectual property rights in databases. No action was taken at this meeting and no treaty currently exists for international database protection. Some commissioned WIPO papers make the case that an international treaty on the protection of unoriginal databases provides advantages to all countries. See Yale Braunstein, *Economic Impact of Database Protection in Developing Countries and Countries in Transition*, Study prepared for the WIPO Standing Committee on Copyright and Related Rights, SCCR/7/2 April 4, 2002; Phiroz Vandrevalla, *A Study on Impact of Protection of Unoriginal Databases on Developing Countries: Indian Experience*, Study prepared for the WIPO Standing Committee on Copyright and Related Rights, SCCR/7/5, April 4, 2002. Resistance to a proprietary model of any proposed protection for databases remains strong in the academic and scientific community.

¹⁶⁴ In 2001, WIPO commissioned five papers to study the economic impact of nonoriginal databases in developing countries and countries in transition. The papers are available at www.wipo.org.

¹⁶⁵ See e.g., *National Basketball Association v. Motorola, Inc.*, 105 F.3d 841 (2d Cir. 1997).

¹⁶⁶ See e.g., *ProCD, Inc. v. Zeidenberg*, 86 F.3d 1447 (7th Cir. 1996); *Hill v. Gateway 2000, Inc.*, 105 F.3d 1147 (7th Cir. 1997).

access to or use of a protected work.¹⁶⁷ The DMCA also prohibits trafficking in tools that might be used to disable such copy protection.¹⁶⁸ These controversial provisions of the DMCA¹⁶⁹ have been heavily criticized as overprotective and lacking in any limitations to protect legitimate uses of content protected by technological means.¹⁷⁰ For example, the DMCA does not admit strong fair use exceptions or other limitations that arguably preserve the important balance between public and private interest in digital content.¹⁷¹ Important public welfare issues implicated by the DMCA model include: the ability of competitors to create software products for purposes of interoperability, encryption research and security testing,¹⁷² and control over complementary markets.¹⁷³ On the other hand, the EU model of the WCT contains room for flexibility for member states to consider enacting limitations and exceptions that are consistent with those provided by national law.¹⁷⁴

Notwithstanding the significant criticism of the DMCA, a series of bilateral trade agreements negotiated by the United States have included DMCA like provisions, and thus made these inordinately high standards a *de facto* model for global implementation of the WCT.¹⁷⁵ The combined effect of private law mechanisms such as torts and contract law, and public law regulation through copyright and other specialized regimes like the DMCA, will lead inevitably to increased difficulty in access to content. In a situation where access to hardware is already an important hindrance to developing countries, adding another layer of impediments, and inevitably raising costs, is problematic for the interests of developing countries in utilizing information technology. Ironically, the majority of countries who joined these WIPO Internet treaties, thus making it possible for them to enter into force, were developing countries.

DEVELOPING COUNTRIES AND THE WIPO INTERNET TREATIES: A MATRIX¹⁷⁶

Country	WPPT member	WCT member	Developing/Least Developed	TRIPS member	Internet Usage	Internet Penetration
Albania	Yes	No	Developing	Yes	10,000	0.3%
Argentina	Yes	Yes	Developing	Yes	4,100,000	11.1%
Belarus	Yes	Yes	Developing	No	808,700	8.1%
Bulgaria	Yes	Yes	Developing	Yes	605,000	7.6%
Burkina Faso	Yes	Yes	Least developed	Yes	19,000	0.2%

¹⁶⁷ See § 1201(a) (1) (A).

¹⁶⁸ See §1201 (a) 2, 1201 (b) (1).

¹⁶⁹ See Pamela Samuelson, *Intellectual Property and the Digital Economy: Why the Anti-Circumvention Regulations Need to be Revised*, 14 BERKELEY TECH. L.J. 519 (1999). For an overview of DMCA related disputes, see Electronic Frontier Foundation, *Unintended Consequences: Four Years under the DMCA*, <http://www.eff.org/IP/DMCA/>

¹⁷⁰Samuelson, *id.*; L. Ray Patterson, *The DMCA: A Modern Version of the Licensing Act of 1662*, 10 J. INTELL.PROP.L.33 (2002) (excoriating the DMCA's reach); Matt Jackson, *Using Technology to Circumvent the Law: The DMCA's Push to Privatize Copyright*, 23 HASTINGS COMM/ENT L.J. 607 (2001) (criticizing technological provisions of the DMCA); David Nimmer, *Riff on Fair Use in the Digital Millenium Copyright Act*, 148 U.P.A. L. REV. 673, 739-40 (2000).

¹⁷¹ See Samuelson, *supra* note 169; Anna Claveria Brannan, Comment, *Fair Use Doctrine and The Digital Millennium Copyright Act: Does Fair Use Exist on the Internet Under the DMCA?* 42 SANTA CLARA L.REV. 247 (2001) (criticizing lack of fair use protection in the DMCA).

¹⁷² See Edward Felton, *Reading Between the Lines: Lessons from the SDMI Challenge*, available at <http://www.usenix.org/publications/library/proceedings/sec01/craver.pdf>

¹⁷³ See *Lexmark International v. Static Control Components*, 253 F. Supp. 2d 943 (E.D. Ky. 2003).

¹⁷⁴ Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonization of certain aspects of copyright and related rights in the information society, 2001 O.J. (L 167) 10, art. 6(4). For a proposal for implementing the WCT that accounts for the competing interests of owners and users, and is consistent with the common law justifications for copyright policy, see Dan Burk and Julie E. Cohen, *Fair Use Infrastructure for Rights Management Systems*, 15 HARV. J. L. & TECH. 41 (2001).

¹⁷⁵ See Vivas-Eugui, *supra* note 111.

¹⁷⁶ Compiled by author. Internet penetration rates are from InternetStats.com. See Appendices A-D.

Chile	Yes	Yes	Developing	Yes	3,102,200	20.3%
Columbia	Yes	Yes	Developing	Yes	1,982,000	4.5%
Costa Rica	Yes	Yes	Developing	Yes	384,000	9.3%
Croatia	Yes	Yes	Developing	Yes	789,000	17.9%
Cyprus	No	Yes	Developing	Yes	210,000	22.5%
Ecuador	Yes	Yes	Developing	Yes	503,300	4.0%
El Salvador	Yes	Yes	Developing	Yes	300,000	4.9%
Gabon	Yes	Yes	Developing	Yes	25,000	1.9%
Georgia	Yes	Yes	Developing	Yes	73,500	1.4%
Guatemala	Yes	Yes	Developing	Yes	200,000	1.4%
Guinea	Yes	Yes	Least developed	Yes	15,000	0.2%
Honduras	Yes	Yes	Developing	Yes	200,000	3.0%
Jamaica	Yes	Yes	Developing	Yes	100,000	3.6%
Jordan ¹⁷⁷	No	No	Developing	Yes	432,000	4.2%
Kyrgyzstan	Yes	Yes	Developing	Yes	152,000	2.9%
Mali	Yes	Yes	Least developed	Yes	30,000	0.3%
Mongolia	Yes	Yes	Developing	Yes	40,000	1.6%
Nicaragua	Yes	Yes	Developing	Yes	200,000	3.0%
Panama	Yes	Yes	Developing	Yes	90,000	1.6%
Paraguay	Yes	Yes	Developing	Yes	100,000	1.7%
Peru	Yes	Yes	Developing	Yes	2,000,000	7.4%
Philippines	Yes	Yes	Developing	Yes	2,000,000	2.4%
St. Lucia	Yes	Yes	Developing	Yes	3,000	1.9%
Senegal	Yes	Yes	Developing	Yes	105,000	1.0%
Slovenia	Yes	Yes	Developing	Yes	800,000	41.0%
Togo	Yes	Yes	Least developed	Yes	200,000	3.9%

It is interesting to consider why so many developing countries, even those with no free trade agreements at stake, ratified the WIPO Internet Treaties. This is particularly intriguing since the “low” (in terms of users) and “slow” (in terms of dial up access) Internet connectivity rates in developing and least developed countries make it highly unlikely that widespread access to digital content in these countries is a significant threat to copyright owners.

One explanation could be the assumption that access in these countries will increase as new technologies overtake reliance on telephone lines which are weak or non-existent in many developing countries. Consequently, securing ratification of these treaties is a strategically preemptive move on the part of rights owners. Further, ratification by developing and least developed countries may serve to curtail the rise of peer to peer file sharing services whose location outside of the United States can raise jurisdictional difficulties for purposes of prosecution for copyright infringement.¹⁷⁸ In theory, a multilateral treaty that requires governments to enforce copyright interests on computer networks will create a legitimate lever for developed countries to pressure governments in developing and least developed countries to take domestic enforcement action. Another noteworthy point is that the minimal levels of use and users in these countries means that there is currently no identifiable “public” immediately affected by these treaties. Consequently, ratification by such countries is a politically and

¹⁷⁷ Agreed to join WCT and WPPT within two years after signing a free trade agreement with the United States.

¹⁷⁸ However, courts in the United States have not been hesitant to exercise jurisdiction over parties located outside of the United States. Recently, a federal court exercised its jurisdiction over Kazaa, an Internet online file-swapping service incorporated in the Pacific Island Nation of Vanuatu. See Declan McCullough, *Judge: Kazaa Can Be Sued in the US*, cpnet News.Com, January 10, 2003.

legally costless gesture.¹⁷⁹

However, recent proposals to integrate the WIPO Internet Treaties in the corpus of the TRIPS Agreement will alter this landscape significantly. At the very least, such integration will raise the costs of access indirectly by constraining policy spaces for developing countries to promote domestic policies that are consistent with their national interests as is currently the case under the TRIPS Agreement.¹⁸⁰ The specter of the WTO dispute settlement process may also occasion side-bargains by way of even more expansive protections not contemplated by the TRIPS Agreement or the WIPO Internet Treaties.¹⁸¹ Thus, for example, for countries in which bilateral trade agreements do not serve as a channel for introducing significant copyright protection, an expansion of TRIPS to encompass the WCT and WPPT could accomplish a worst case scenario by making the expansionist copyright model an enforceable global regime.

4. Development Opportunities and Strategies

Successful utilization of the benefits of the information age requires a dynamic balance between multiple policy elements including the regulatory environment, macroeconomic strategies in areas such as human capital development, and the effect of intellectual property rights on access to and use of digital content. As the history of the Internet illustrates, the regulatory environment is a critical component of both the physical infrastructure of the network that empowers applications of software for the information economy, as well as the macroeconomic environment in which the development, use and dissemination of products and services take place. Indeed, economic and empirical studies of the contributions of information technology to growth in some developed countries indicate that mere capital investment in the technological infrastructure is insufficient.¹⁸² Such investments must be accompanied by the willingness of firms to adjust organizational structures to new technology-empowered methods,¹⁸³ the willingness and possibility of introducing labor to new systems of production and management, the development of appropriate regulations regarding education, employee mobility, and competition between firms.¹⁸⁴ The limited gains from investments solely in Internet infrastructure point squarely to the relatively high importance of balance in the rules that govern productive and consumptive activity online. The chart below illustrates some linkages between intellectual property rights and technology enabled gains. As illustrated, if not carefully balanced by robust access rights, proprietary rights can erode important benefits made possible by investments in acquiring technology hardware.

INTELLECTUAL PROPERTY AND THE INTERNET: MAPPING A CRITICAL RELATIONSHIP

Internet-enabled gain	Intellectual Property Right	Implications/Policy Concerns
Wide spread, low cost access to distribution of information.	Copyright in literary works precludes unauthorized copies.	Without robust limitations, copyright may affect use of the

¹⁷⁹ Okediji, *Back to Bilateralism*, *supra* note 111.

¹⁸⁰ Okediji, *id*; Ruth L. Okediji, *A Cartography of WTO TRIPS Dispute Settlement and the Future of Domestic Intellectual Property Policy* (mimeo, 2001); Ruth L. Okediji, *The WTO and Public Welfare: Reconsidering the TRIPS Agreement*, 17 EMORY INTERNATIONAL LAW REVIEW (2003). *See also*, Ruth L. Okediji, *Toward an International Fair Use Doctrine*, 39 COLUMBIA JOURNAL OF TRANSNATIONAL LAW (2000).

¹⁸¹ For a discussion of how the TRIPS dispute settlement process may force side- payments, *see* Ruth Okediji, *Rules of Power in an Age of Law: Process Opportunism and TRIPS Dispute Settlement*, HANDBOOK OF INTERNATIONAL TRADE LAW (KWAN CHOI & JAMES HARTIGAN, EDS. 2004).

¹⁸² *The New Economy*, *supra* note 21.

¹⁸³ *See* Eric Brynjolfsson & Lorin M. Hitt, *Beyond Computation: Information Technology, Organizational Transformation and Business Performance*, J. ECON. PERSP. 30, Fall 2000.

¹⁸⁴ *See ICT and Economic Growth*, *supra* note 21.

New uses of technology, such as webcasting	derivative works, and distribution. On the Internet, multiple infringements of copyright can occur in simple acts such as uploading, downloading or forwarding documents. For musical and audiovisual works, copyright prohibits, <i>inter alia</i> , unauthorized performances, transmissions and broadcasts.	Internet for educational and other public purposes. Copyright constraints widest possible dissemination, or substantially raises the cost of such dissemination.
Ease of locating documents on-line through linking; reduced transaction costs	Trademark and Copyright interests have been asserted to preclude linking to other websites). Common law theories and contractual provisions have also been used to prevent access to websites and/or information.	Inhibits competition by raising transaction costs of locating and comparing information on-line.
Free access to unoriginal compilations of data	Database Protection	Raises cost of access and imposes cost on use. When combined with DMCA rights, may impede access completely.
New organizational structures/business models	Business Method Patents	Raises entry barriers; inhibits competition; raises uncertainty for would be entrants to e-markets and may reduce overall efficiency.

4.1 Broad Applications of Information Technology

Information technology has been applied to enhance four major categories of activities: governance, growth and supply/distribution of goods and services, adding value to existing services and the creation of new products and services. The range of activities that can benefit from information technology appears to be unlimited. Specifically however, the important issues for developing countries include how information technology can be used to overcome existing barriers in markets such as high transaction costs, inefficiencies in production, distribution and supply, while adding value to existing products and services and also creating new ones. Economists have noted that the failure of credit markets has been a major reason for underdevelopment.¹⁸⁵ The prospects for secure electronic funds transfer may open up opportunities for financing entrepreneurial activity, which is important to stimulate local investment in information products. Investment in physical capital is critical to facilitate the use of new technologies in the production process. Investment in software is also particularly important. In OECD countries, software investments in 2000 accounted for over 50% of the investment in information technology.¹⁸⁶ For local productivity to benefit from information technology, then, access to equity will be a vital component. Such access may be enhanced and facilitated by financial agreements through business to business (B2B) collaborations¹⁸⁷ or other forms

¹⁸⁵ George A. Akerlof, *Behavioral Macroeconomics and Macroeconomic Behavior*, 92 (3) AMERICAN ECONOMIC REVIEW (2002).

¹⁸⁶ *Measuring the Information Economy*, *supra* note 59 at 10.

¹⁸⁷ It is important to note that B2B e-commerce currently accounts for the largest percentage of e-commerce volume. See Andrea Goldstein and David O'Conner, *An Introduction to the Debate on Electronic Commerce and Development*, in ELECTRONIC COMMERCE FOR DEVELOPMENT, 9-10 OECD 2002.

of financing by financial services available through the Internet.

Another key factor for growth is the quality of local labor. In this regard, the vast amount of educational resources available on the Internet is a critical resource for developing countries, as well as by linkages to institutions in developed countries.¹⁸⁸ This extends beyond prospects for formal education. Specialized learning and ongoing informal education can take place through chat-rooms, listservs and other interactive forums enabled by the Internet. While the Internet cannot and should not replace structured educational systems, it is important to point out that the Internet has made it possible to access recent and up to date information about any number of subjects, and to improve the quality of materials currently available in developing and least developed countries. These uses can also have a hortatory effect on the quality of life in developing countries by improving the quality of general participation in civil society and ultimately, democratic governance¹⁸⁹ and delivery of government services.¹⁹⁰

Information technology can be used to address infrastructural barriers that have hindered traditional supply and distribution chains in developing countries. However, this benefit only goes to products or services that have no “real time/space” component. In reality, most e-commerce transactions still require physical infrastructure such as a dependable postal service, electricity, phone lines, etc., to function effectively. Only fully digital products are significantly insulated from the need for and dependence on the infrastructural capacity. With respect to developing countries then, it is important to identify how applications of information technology might contribute to economic growth, the particular sectors that would benefit particularly from information technology, and the legal rules that are most closely related to these sectors.

4.2 Identifying sectors that would benefit from information technology

There is no cognizable limitation on how information technology might enhance existing markets for products and services. For developing countries, however, important sectors with relative importance to development and growth that would benefit specifically because of information technology have been identified and studied in a variety of contexts.¹⁹¹ Specifically, music and education have received attention as areas that could profit tremendously from the benefits of the Internet.¹⁹² With regard to

¹⁸⁸ The International Network for the Availability of Scientific Publications (INASP), *Optimising Internet Bandwidth in Developing Country Higher Education* 1 (2003), http://www.worldbank.org/afr/teia/conf_0903/inasp.pdf (stating that educational institutions in developing countries are beginning to take advantage of Internet resources); Derek W. Keats et al., *Using The Internet To Enable Developing Country Universities To Meet The Challenges Of Globalization Through Collaborative Virtual Programmes*, *First Monday*, volume 8, number 10 (October 2003), http://firstmonday.org/issues/issue8_10/keats/index.html (describing effectiveness of partnerships between developed and developing countries' educational institutions and other organizations); Jürgen Bischoff, Director, Asian and Pacific Centre for Transfer of Technology (APCTT), *Human Resources Development Needs for E-Commerce* 98, 110 http://www.unescap.org/tid/publication/chap4_2138.pdf (describing demand for skilled workers).

¹⁸⁹ DOT-COM Alliance, *The Impact of ICTs on Democratization and Good Governance* (2003), http://www.dot-com-alliance.org/newsletter/ss_democracy.html (summarizing papers presented at conference on the Internet's effect on governance in developing countries).

¹⁹⁰ *Id.*

¹⁹¹ See OECD Policy Brief, *Opening up Trade in Services: Opportunities and Gains for Developing Countries*, August 2003 (identifying gains in developing countries in information technology related areas such as audiovisual services, software development, data processing, network operations and cultural services). *Electronic Commerce and Music Business Development in Jamaica: A Portal to the New Economy?*, UNCTAD/ITE/TEB/8 [hereinafter, *Music Business Development in Jamaica*].

¹⁹² *Music Business Development in Jamaica, id.* The potential effect of the Internet on education has been widely discussed as a global phenomenon. Other than infrastructural barriers, developed and developing countries share similar interests in how the Internet can be used to more effectively deliver educational opportunities to the public. The complicated structure of copyright in educational content also poses similar problems for both developed and developing countries. See generally, Jon. M. Garon, *The Electronic Jungle: The Application of Intellectual Property Law to Distance Education*, 4 VAND. J. ENT. L & PRAC. 146 (2002) (discussing the copyright scheme in educational

music particularly, the Internet provides an important tool for overcoming the historically significant problem faced by artists and producers in developing countries, namely penetrating the global market.¹⁹³

(1) Music:

The viability of the Internet as a marketing and distribution channel for cultural industries in developing countries has received increased attention by commentators. Much of the attention has been directed at the music industry where developing countries have some unrealized comparative advantage.¹⁹⁴ Despite the fact that the Internet and related technological developments have greatly disrupted established markets in the production, distribution and consumption of musical works, particularly in developed countries,¹⁹⁵ these same technologies hold promise for facilitating the development of local artistic talent and strengthening the domestic music industry. As the industry in developed countries engages in legal strategies to maintain control over existing business patterns that have generated significant revenue,¹⁹⁶ it is likely that artists in all countries will share common interests in how the Internet might alter the current industry paradigm that tilts the power balance generally in favor of producers, not creators, of music.¹⁹⁷

Popular music has been described as “the most global aspect of our ‘global village.’”¹⁹⁸ In 1994, as the TRIPS Agreement was being concluded, the production and sales of phonograms had a reported turnover of US\$33 billion worldwide.¹⁹⁹ The international market component of the music industry

content and use).

¹⁹³ Economic Potential of Music for LDFCs, Africa News Service, May 21, 2001 (noting that music, as well as other cultural goods can provide new production and trading opportunities for developing countries, but noting barriers caused by concentration of large multinational firms who control the global industry); Birgitte Andersen, Zeljka Kozul-Wright, Richard Kozul-Wright, *Copyrights, Competition and Development: The Case of the Music Industry*, UNCTAD/OSG/DP/145 (2000), at p. 10 (noting the “urgent need” to strengthen export opportunities for artists from developing countries). *See also*, ROBERT BURNETT, *THE GLOBAL JUKEBOX: THE INTERNATIONAL MUSIC INDUSTRY*, 3-4 (1995) (noting that “the music industry has also at least partially provided the foundation for many of today’s transnational, diversified communication conglomerates. Thus, despite the continuous introduction of new forms of entertainment and communications technology, the music industry remains an important component of the expanding information and entertainment sector. It is especially important to remember that popular music has developed as a commodity which is produced, distributed and consumed under market conditions that inevitably influence the types of phonograms made, who make them, and how they are distributed to the public”).

¹⁹⁴ Frank J. Penna, Coenraad J. Visser, *Cultural Industries and Intellectual Property Rights*, in *DEVELOPMENT, TRADE AND THE WTO: A HANDBOOK*, 390 (2002) (citing examples). *See also*, Brigitte Andersen, Zeljka Kozul-Wright, Richard Kozul-Wright, *id.* note 192.

¹⁹⁵ Lydia Pallas Loren, *Untangling the Web of Music Copyrights*, 53 *CASE W. RES. L. REV.* 673, 673 (2003) (stating that the music industry is “in crisis”); R. Anthony Reese, *Copyright and Internet Music Transmissions: Existing Law, Major Controversies, Possible Solutions*, 55 *U. MIAMI L. REV.* 237, 237 (2001) (noting changes in the music industry caused by the Internet).

¹⁹⁶ In September 2003, the music industry filed lawsuits against 261 alleged online file swappers. Some of those sued included children. This offensive strategy is designed to curb unauthorized reproduction and distribution of musical works. However, some reports indicate that sources of the unauthorized distribution protected works are within the industry. *See* John Schwartz, *Is Legal Action Against File Swappers Good Business?* *THE NEW YORK TIMES*, C1, September 15, 2003.

¹⁹⁷ Eviatar, *supra* note 113, at 4-5 (briefly discussing traditional contracts between music companies and artists, and some expected changes to this model). This statement should be qualified by the fact that there is rarely a single creator of a musical work. Indeed, the complexity of music copyrights and the multiple artists involved in producing a musical work creates the need for an administrative tool to coordinate these interests and efficiently manage the music enterprise. This complexity is at least partly responsible for the disparate power of producers who assume the responsibility for coordinating, promoting and funding the various artists and necessary equipment.

¹⁹⁸ BURNETT, *supra* note 193, at 1 (1995).

¹⁹⁹ *Id.* at 3 (citing IFPI). As of 2002, this amount was estimated at US\$32 billion, reflecting a decline both over time as well as in current dollar terms. The music industry associates the decline with music piracy. *See* Recording Industry Association of America (RIAA), *Some Facts About Music Piracy* (2003), http://www.riaa.com/news/newsletter/062503_c.asp

accounts for over half of the income of major music companies in the developed countries.²⁰⁰ Interestingly, however, the ability to recoup such significant premiums is significantly dependent on property rights granted by copyright law and, more recently, technological restrictions that control the terms of use and access. Such rights directly affect the market for music by structuring ownership, production and distribution in a manner consistent with the enumerated rights.²⁰¹ Consider for example that distinct copyright protection extends to lyrics, sound recordings, musical arrangements and original compilations.²⁰² In addition, copyright protection extends to performances. Given the multiplicity of copyrightable subject matter in any single music project, the music industry operates classically through licenses and contractual agreements that assign ownership rights to the music companies whose capital investment supports production, promotion and distribution of the work.²⁰³ Such licenses and assignments of copyright are necessary instruments to achieve some coordination of interests between creators of such works and those who finance the actual manufacture of the tangible embodiments (i.e., phonograms) of the creative works. The investors, in turn, by virtue of these ownership rights utilize well established business models that typically rely on retailers to distribute the works.²⁰⁴ A brief survey of copyright in the music industry will elucidate the challenges faced by artists in general, and artists from developing countries in particular, given their relative lack of expertise and negotiating power. Music producers in developing countries who attempt to negotiate on behalf of domestic artists also have similar challenges when dealing with the global industry.²⁰⁵

(i) International Copyright Provisions for the Music Industry

The Berne Convention for the Protection of Literary and Artistic Works (Berne Convention)²⁰⁶ requires member countries to provide protection to authors of literary and artistic works.²⁰⁷ The substantive protections afforded by the Berne Convention, as incorporated in the TRIPS Agreement,²⁰⁸ reflect global mandatory minimum requirements for protection of musical works. Under the minimum global provisions, literary and artistic works include “dramatic or dramatico-musical works,” “choreographic works and entertainments in dumb show,” “musical works with or without words.”²⁰⁹ Copyright protection also extends to translations, adaptations, arrangements of music and other alterations of the protected work.²¹⁰ For countries that make the distinction, artists enjoy protection for performances, sound recordings and broadcasts under a “neighboring rights” system.²¹¹ Otherwise, copyright protection in many countries, primarily common law jurisdictions, extends to these works as well.²¹²

²⁰⁰ [http://www.ifpi.org/site-content/antipiracy/piracy 2003-the-key-facts.html](http://www.ifpi.org/site-content/antipiracy/piracy%202003-the-key-facts.html).

²⁰¹ For a detailed analysis of the multiple layers of copyright protection in music see, Loren, *supra* note 194.

²⁰² To further complicate matters, the terminology for various copyrightable expressions in music may differ from country to country. For example, what constitutes a sound recording is different in the United States and the United Kingdom.

²⁰³ See Loren, *supra* note 195 at 680-698 (discussing various licenses in the United States for musical works);

²⁰⁴ BURNETT, *supra* note 193, at 2 (citing IFPI).

²⁰⁵ *Music Business Development in Jamaica*, *supra* note 185 (discussing a variety of institutional factors constraining the potential of the domestic music industry in Jamaica. Despite a degree of sophistication and success, the Jamaican music industry still faces the challenge of global penetration as other developing countries).

²⁰⁶ Berne Convention for the Protection of Literary and Artistic Works, Sept. 9, 1886, as last revised July 24, 1971, amended Oct. 2, 1979, S. Treaty Doc. No. 99-27, 828 U.N.T.S. 221.

²⁰⁷ *Id.*, art. 1.

²⁰⁸ Art. 9 of the TRIPS Agreement incorporates art. 1-21 (excluding art. 6bis) of the Berne Convention.

²⁰⁹ Berne Convention, *supra* note 205, art. 2.

²¹⁰ *Id.*, art. 2(3).

²¹¹ For example, France, Germany and Italy.

²¹² There is little substantive distinction between countries who protect these works under a “neighboring rights” regime and those who do so under a copyright system. The main difference was one of international significance: if these works are protected as “literary and artistic works” in the country’s domestic legislation, copyright protection must extend on the terms required by the Berne Convention. If a country did not define these works as “literary and artistic works” then the country was not obliged to extend national treatment provisions nor the minimum requirements to those works originating from a foreign country. Several international agreements provided protection to neighboring rights distinct from copyright, although the seminal treaty established a subordinate role for

The combination of copyright and neighboring rights protection yields a number of rights that are associated with music creation, use and dissemination. The fundamental right afforded by the copyright system is the exclusive right to reproduce the copyrighted work.²¹³ This right is subject to a limited range of exceptions expressed more precisely in the domestic laws of member countries. The Berne Convention and the TRIPS Agreement both provide a penumbral framework to determine the legitimacy of any domestic limitations to copyright²¹⁴ recognized in member countries. Other than explicitly provided in the relevant treaties, any limitations or exceptions enacted by a member country to the enumerated rights must be consistent with TRIPS Article 13. The legal relationship between the TRIPS Agreement, the Berne Convention and the Rome Convention deserves careful examination beyond the scope of this current discussion. Suffice it to say that as a matter of international law, acceptable limitations to the minimum rights incorporated in TRIPS Article 14, must satisfy the three step test of Berne Convention Article 9(2), as supplemented by the Rome Convention, and incorporated into the TRIPS Agreement. A WTO panel has already construed the scope of Article 13 of the TRIPS Agreement in relation to Article 9(2) of the Berne Convention.²¹⁵ This will be instructive for determining the legitimacy of exceptions and limitations to proprietary interests in musical works.²¹⁶

Article 9 of the Berne Convention explicitly provides that a sound recording “shall be considered as a reproduction.”²¹⁷ Further, under Article 11, authors of dramatic and dramatico-musical works enjoy exclusive rights in (1) the public performance of their works by any means or process; (2) any communication of to the public of the performance of their works and; (3) the same rights of public performance in translations of the original works.²¹⁸ Finally, the Berne Convention grants members

neighboring rights in relation to copyright. Article 1 of the Rome Convention provides that protection under the Convention “shall in no way affect the protection in copyright in literary and artistic works. Consequently, no provision of this Convention may be interpreted as prejudicing such protection.” See International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations (Rome Convention) 1961. Subsequent agreements retained this structural relationship to the Berne Convention. See art. 7 (1), Convention for the Protection of Producers of Phonograms Against Unauthorized Duplication of Their Phonograms (Geneva Phonograms Convention) 1971; art. 1(2) of the WIPO Performances and Phonograms Treaty (1996); and art. 15 of the TRIPS Agreement. Today, the TRIPS Agreement has, for all intents and purposes, negated the distinction by requiring protection for performers, producers of phonograms (sound recordings) and broadcasting organizations. See TRIPS art. 14. Should any question arise, art. 2(2) of TRIPS provides that nothing “shall derogate from existing obligations that members have to each other under the ... Berne Convention, Rome Convention” Thus, even the TRIPS Agreement reinforces the structure first adopted by the Rome Convention, privileging copyright interests above any other rights. See also, Convention Relating to the Distribution of Programme-Carrying Signals Transmitted by Satellite (Brussels Satellite Convention) (1974). For an overview of the history of the neighboring rights agreements and their relationship to the Berne Convention, see SAM RICKETSON, *THE BERNE CONVENTION FOR THE PROTECTION OF LITERARY AND ARTISTIC WORKS: 1886-1986* (1987). See also, Paul Goldstein, *International Copyright: Principles, Law, and Practice*, 36-47 (2001) (discussing neighboring rights treaties).

²¹³ Berne Convention, *supra* note 206, art. 9 (1).

²¹⁴ Berne Convention, art. 9(2); TRIPS Agreement, art. 13. For analyses and discussion of the differences between the TRIPS and Berne framework for assessing national limitations or exceptions to copyright, see Jane C. Ginsburg, *Toward Supranational Copyright Law? The WTO Panel Decision and the “Three-Step Test” for Copyright Exceptions*, in *REVUE INTERNATIONALE DU DROIT D'AUTEUR* 72 (2001). For an early analysis of how a TRIPS dispute panel might interpret the Berne Convention provision, see Neil Netanel, *The Next Round: The Impact of the WIPO Copyright Treaty on TRIPS Dispute Settlement*, 37 *VA. J. INT'L L.* 441 (1997). For analysis of the role of copyright limitations in promoting public welfare and advocating for an international limitation of fair use, see Ruth Okediji, *Toward an International Fair Use Standard*, 39 *COLUMBIA J. TRANSN'L L.* 75 (2000) [hereinafter Okediji, *Fair Use Standard*] (analyzing the relationship between TRIPS Article 13 and the U.S. fair use doctrine).

²¹⁵ See WTO Dispute Panel Report, United States–Section 110(5) of the U.S. Copyright Act, June 15, 2000, WTO Doc. WT/DS160/R (2000).

²¹⁶ There is a question whether countries that protect musical works under neighboring rights will be subject to the same analysis with respect to works that are defined differently under copyright systems since arguably, such works may not be within the purview of the TRIPS incorporation of the Berne Convention. See *supra* note 212.

²¹⁷ *Id.* art. 9(3).

²¹⁸ *Id.*

discretion to impose limitations on the right of authors of musical works and any accompanying words to record the work.²¹⁹

With respect to neighboring rights, the minimum requirements of the TRIPS Agreement protect performers from unauthorized fixations of their unfixed performances and the reproduction of such fixation. Performers may also prevent unauthorized broadcasting by wireless means and other communication of the public of their live performance. Producers of phonograms have the exclusive right to authorize or prohibit the direct or indirect reproduction of their phonograms, the right to prohibit or authorize commercial rental as circumscribed by domestic law;²²⁰ and broadcasting organizations (or where countries do not recognize such rights for broadcasting organizations, then the right vests in the copyright owner of the subject matter) have the right to prohibit unauthorized fixation, reproduction of fixations, rebroadcasting of broadcasts by wireless means and communication to the public of television broadcasts of the fixed work.

A visual depiction of the relevant works, rights and parties implicated in copyright regimes for music can be expressed generally as follows:

COPYRIGHT IN MUSICAL WORKS: AN OVERVIEW

Work	Parties	Rights
Musical work	Composer (lyrics enjoy separate copyright as a literary work)	Reproduction; distribution; derivative adaptations/arrangements; public performance, including broadcasting. Can be subject to compulsory license for reproduction and distribution of mechanical copies, including digital copies that satisfy the definition of “digital phonorecord delivery.”
Sound Recording	Typically, recording artists, musicians, sound engineers under contract with a record label.	Same copyright rights (reproduction, ²²¹ distribution, etc). No general public performance right, limited <i>digital</i> public performance right; can be subject to compulsory license.
Phonograms ²²²	Producer (person who first fixes sounds of a performance or other sounds)	Right to prohibit or authorize the direct or indirect reproduction of their phonograms; rental right.
Performers/Broadcasting	actors, singers, musicians, dancers,	Performers can prevent ²²³

²¹⁹ *Id.* art.13. It isn’t clear if such discretion must conform to the requirements of TRIPS Article 13. This author believes that the answer to this question is “no” under general principles of international law and under a careful reading of the Berne Convention.

²²⁰ This is further subject to Art. 14(4) which allows member countries to substitute this requirement with a system of equitable remuneration for the rental of phonograms so long as such commercial rental does not result in “the material impairment of the exclusive rights of reproduction of right holders.” *See id.* This compromise provision allowed Japan to keep its system of equitable remuneration. *See* DANIEL GERVAIS, THE TRIPS AGREEMENT: DRAFTING HISTORY AND ANALYSIS, 99-100 (1998).

²²¹ In the United States, the reproduction right is limited to reproduction of the actual sounds.

²²² In some countries, the term “phonograms” is defined broadly enough to include sound recordings. In general, reconciling the differences in treatment between phonograms and sound recordings is helped by the WPPT which defines a “phonogram” in a way that could also cover sound recordings. *See* art. 2(b).

²²³ The language used in TRIPS art. 14 (1) is “performers shall have the possibility of preventing” the acts described. Art. 14(1) is substantially the same as Art. 7.1(b) and 7.1(c) of the Rome Convention, which also uses the same phrase. This language means that countries have some discretion in how to implement this obligation. Countries may use a system of imposing levies, fines or copyright-type schemes. A leading commentator has stated that a compulsory license scheme under the Rome Convention was not anticipated as a permissible means of implementing

Organizations	and persons who act, sing, deliver, declaim play or otherwise perform literary or artistic works.	unauthorized fixation of their unfixed performances; reproduction of such fixation; prevent broadcast by wireless means and communication to the public of live performances. Broadcasting Organizations have the right to prohibit unauthorized fixation, reproduction of fixations, rebroadcasting broadcasts by wireless means, and communication to the public of television broadcasts of such rebroadcasts.
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(ii) The Structure of the Music Industry: Challenges for Developing Countries

The significant concentration of ownership, content and revenues in developed countries, most notably the United States, poses a challenge for the music industry in developing countries. This challenge exists on several different levels. No more than six major phonogram companies account for over 80% of worldwide sales of music.²²⁴ This concentration of firms means that in terms of investment in the music industry of developing countries, there is very little foreign direct investment flows directed at local artists. Consequently, barriers to entry for local artists into the global market are significant indeed. Language and cultural barriers, and the inexact science of aligning consumer preferences and artistic style make investment by foreign firms in the talent pool of developing countries a highly speculative venture. An estimated 80% of cultural content in both music and movies is heavily American. Although Brazilian, Indian, Latin and South American artists and products have made important inroads into the industry,²²⁵ it still remains largely homogenous in content and in ownership of the organizations that distribute such content.

The concentration of content presents another set of barriers to the extent that business models that have proved successful tend to replicate genres and styles that will appeal to the consuming public measured largely in terms consistent with markets in developed countries. Access to the global market, either by the establishment of local record companies, or through other means to reach consumers is thus a vital issue in this sector. This point is significant because “access” in this regard speaks to both the ability of local content producers to penetrate the global industry and the access of consumers to diverse cultural goods. Thus, although it is possible for developed country firms to establish a presence in developing countries, some countries (mainly other developed countries) prohibit this form of access to the main promotion and distribution tributaries of the music industry precisely in the effort to constrain the influence of American content in their domestic cultural markets. Consequently, regulations limiting foreign ownership and/or participation in multimedia ventures indirectly affect the structure of access to the global record companies. In the past, the entrenched structure of the music industry made this an unavoidable tradeoff --cultural preservation versus access to the full resources of the global industry. Today, this equation has been fundamentally affected by the Internet which permits cultural products to circulate within a digital market place without compromising the physical domestic market.

It is important to note, however, that even without these regulatory concerns, there is yet another dimension to the access conundrum facing artists in developing countries. In addition to the opportunity to have creative content exposed in the global market, access also implies the ability to control rates of return to the artist through royalty payments. In developed countries, returns are

the obligation. See CLAUDE MASOUYE, GUIDE TO THE ROME CONVENTION AND TO THE PHONOGRAMS CONVENTION 34, (1981).

²²⁴ See <http://www.ifpi.org>.

²²⁵ See, e.g., Dawn R. Maynor, Note, *Just Let the Music Play: How Classic Bootlegging Can Buoy the Drowning Music Industry*, 10 J. INTELL. PROP. L. 173, 200 (2002) (noting “explosion” of Latin music).

coordinated largely through a complex scheme of collective organizations, compulsory licenses and other blanket licensing schemes. Associations representing artists and performers have formed to collecting societies license works to the public on a per use basis and statutory schemes impose compulsory licenses for use under certain conditions. These mechanisms primarily relate to copyright administration. The collecting societies are represented globally, although the Internet also poses important challenges to the way these societies have hitherto operated. Importantly, despite some initial investigation and several proposals, use of collecting societies in most developing countries is still very weak or nonexistent.²²⁶ Those societies that do exist typically operate on behalf of foreign affiliates attempting to collect revenue from users, not as vehicles to help promote and license the work of local artists.

However, the layout of copyright interests in the music industry is permeated with rights associated with collecting societies and licensing agencies.²²⁷ The multiple rights involved in exploiting and distributing multimedia entertainment necessitates a coordination mechanism to reduce transaction costs and implement effective revenue collection and disbursements to artists. Generally, however, the rights vest initially in the author of the work, or in the case of a work made for hire, in the employer or entity that commissioned the work. In the music industry, however, the author's rights are more symbolic since most rights are assigned both to facilitate investment by a record label as well as to coordinate licensing and collecting functions of copyright administration bodies. It is generally expected that the Internet will ease the transaction costs associated with collection and licensing works.²²⁸ At the very least, the fact that the Internet offers an opportunity to explore options beyond the current state of art in copyright administration, as well as in music production and distribution, will have an effect on how new entrants penetrate the market, how revenues are generated, ownership rights are negotiated and royalties distributed. Thus far, despite the disintermediation afforded by the Internet, the music industry has, at least until very recently, continued to utilize this old business model. In the information age, record companies seek to utilize technological developments to further consolidate ownership interests associated with the control, distribution and delivery of musical content.²²⁹

(iii) Internet Enabled Opportunities: Some Proposals

With regard to promotion of local artists and penetration in global markets, the Internet offers some interesting models for cultural industries in developing countries.²³⁰ While much work still needs to be done in this regard, some immediate prospects of the Internet for overcoming access barriers can be briefly identified. Despite the low Internet penetration rate in most developing countries, it is possible that all developing countries can exploit the Internet in modest ways to enhance the local music industry. Taken together, these three strategies may be described as an evolutionary adaptation of the

²²⁶ *But see, Collective Management in the Caribbean: Achieving Results*, WIPO Magazine, September/October (2003) (discussing recent developments in the Caribbean and showing a growth in membership of Caribbean societies).

²²⁷ Loren, *supra* note 195 (discussing the American setting); BURNETT, *supra* note 193 (discussing generally the global industry); Jonathan Potter, *Confronting the Digital Era: Thoughts on the Music Sector* in BRIE-IGCC, TRACKING A TRANSFORMATION: E-COMMERCE AND THE TERMS OF COMPETITION IN INDUSTRIES (BROOKINGS, 2001) at 129-130,133 (discussing the parties in the music industry and the possibility of global direct licensing through the Internet as a different model to overcome the difficulties associated with collective licensing organizations). *See also*, ROGER WALLIS AND KRISTER MALM, BIG SOUNDS FROM SMALL PEOPLES: THE MUSIC INDUSTRY IN SMALL COUNTRIES 163-215 (1984) (discussing in detail with examples, problems with revenue collection and distribution and collecting/licensing organizations).

²²⁸ Potter, *Id.*

²²⁹ Richard D. Rose, *Connecting the Dots: Navigating the Laws and Licensing Requirements of the Internet Music Revolution*, 42 IDEA 313, 316-17 (2002) (detailing some of the recording industry's technological approaches to protecting its products from unauthorized copying).

²³⁰ GOLDSTEIN AND O'CONNOR, *supra* note 187 at 11 (noting that B2B e-commerce is "reshaping the competitive dynamics in traditional producer-driven and buyer-driven value chains..."). Although the authors refer specifically to the automobile and coffee markets, this observation is highly applicable to cultural industries, particularly music.

Internet to facilitate the development of the domestic cultural industry.

The first strategy is a marketing model. A marketing strategy would retain aspects of the real space music market; the utility of the Internet would be primarily as an advertising forum, utilizing chatrooms, listservs or other Internet communities that already exist in cyberspace. Such marketing might be enhanced by making digital samples available online if the country has the technological capacity for conveying digital files. This model does not require a high Internet penetration rate and thus could be used by countries where telecommunications infrastructure is particularly insufficient or significantly underdeveloped.

A second strategy is a distribution model. Multimedia products such as audiovisual and musical works are supremely suitable for distribution through digital networks. Indeed, this has become the bane of the cultural industry in the United States which has vigorously resisted the use of peer to peer systems and the ubiquitous culture of file sharing on the Internet. Yet, these technologies that threaten the orthodox models of the music industry offer the very real prospect of overcoming barriers to entry for artists and performers in developing countries specifically by facilitating artist-to-consumer transactions and relationships.

A third strategy combines the first two models and adds a payment feature. Given the fairly established patterns of payment on the Internet, local artists may advertise their product, distribute samples and ultimately send the entire product via the network in exchange for payment. A payment system utilizing local banks, wire-transfers, or other electronically processed payment scheme such as those already in use through e-commerce may be employed for these purposes. There are several creative ways to arrange for payment ranging from purely electronic schemes through credit card payments to payments through local banks, wire transfers and Internet based programs. In essence, this model would overlap with existing mechanisms for international capital transfers that are already well established.

The benefits of this evolutionary adaptation flow from its malleability and sensitivity to various developmental stages and the corresponding levels of access to the Internet, as well as the nature of Internet infrastructure which necessarily affects how the products might be exploited. Thus, the utility of the Internet in this industry to overcome traditional barriers facing local artists will require a coordinated framework consisting of the physical infrastructure (computers, Internet access) the software (digitization, encryption and encoding to prevent unauthorized resales or distribution) and the legal regime of copyrights that grants the local artists the exclusive rights to their products. It is interesting that the lack of adequate access to physical infrastructure will necessarily require a greater dependence on copyright rights so that local creators can control and manage their right to returns as their works enter the global market through the agency of the Internet. This dependence on copyright as a means to stimulate the local industry will be in some tension with the interests of developing countries to maintain an environment where access to content on the Internet is sustainable.

Finally, creative analysis of how copyrights/neighboring rights should be structured in developing and least developing countries is particularly important from the global context. The TRIPS Agreement establishes a minimum framework of rules that all member states must recognize. However, interpretation of TRIPS obligations requires an examination of the Rome Convention and other international agreements such as the WPPT, and how these agreements are to be reconciled. Minimal global obligations will depend in part on the particular combination of agreements in effect in a particular jurisdiction. Developing and least developed countries should use the current state of flux in the organization of the global music industry to determine how best to implement the minimum rights articulated in the TRIPS Agreement. Emphasis should be on the nature of rights and institutions necessary to encourage growth of the domestic industry through revenue generation and collection, as well as through the production and distribution of products on a global scale. Rather than mimic the established copyright institutions that have both facilitated the exploitation of works, but that has also proven less satisfactory to creators, developing countries should consider alternatives that provide

opportunities for domestic talent by utilizing the versatility of information technology.²³¹

(2) Education:

One of the most important development objectives implicated by intellectual property rights is access to education. In preparations leading up to the World Summit on the Information Society, (hereinafter World Summit) education has been listed repeatedly as an important development goal, one for which the Internet offers a uniquely important prospect of success.²³² At a general level, social education is made possible simply by the virtue of the vast amounts of information available on the Internet. Individual citizens can search, research and gather information freely over the Internet about an infinite amount of subjects and issues. Online communities and the practice of “linking” make topical navigation of the Internet the most common facilitative interaction of the information age. The significant intellectual commons available on the Internet is breathtaking, giving rise to important needs to organize and systematize such information. There are also the unavoidable issues about the legitimacy and accuracy of information available on the Internet. Yet, even in this respect, there are various “clearinghouses” and business models using search engines that have emerged to provide some organizational structure to Internet content.

In addition to social education, formal education is also a highly valued feature of Internet viability for development goals. Several academic institutions in developed countries have already forged alliances with educational institutions in developing countries to provide educational course materials, to share ideas and research and to engage in distance education. The OpenCourseWare (OCW) initiative launched by the Massachusetts Institute of Technology (MIT) provides a leading example of how the Internet can serve this important development goal.²³³ The OCW is explicitly premised on the ideal of communal sharing of intellectual works by “providing a new model for the dissemination of knowledge and collaboration among scholars around the world, and to contribute to the shared intellectual commons in academia...”²³⁴ In this innovative approach to education in an online environment, OCW offers free and open access to course materials created by instructors at MIT. The course resources are voluntarily submitted by instructors. While the OCW is not a distance education program in the sense that access and use of the materials is not a means to earn a degree or certification, it nonetheless has a powerful appeal for developing countries whose institutions lack the economic resources to educate students and to promote scholarship by instructors. In other words, while sharing course materials has been a contentious issue in the United States for a variety of reasons, such an open approach to educational content is precisely what is most direly needed in developing countries. Indeed, course sharing projects are a vital part of maintaining a real academic commons on the Internet while at the same time building a global knowledge value chain that can benefit developing countries.

Despite the promise of projects such as OCW,²³⁵ copyright interests may still pose barriers for countries seeking to utilize educational materials. First, the WCT obligations provide protection for owners of educational materials who protect their content by technological devices. Thus, circumventing these devices will be suspect under this international agreement. Further, utilizing the Internet to communicate creative content violates multiple copyright rights afforded by the Berne Convention and affirmed by the WIPO Internet treaties, or through bilateral agreements. Substantive access to educational content is also vulnerable to control by owners. For example, in regions where the language of the content is different from the major language, there will be a need to translate the

²³¹ In publishing, for example, new models of publishing that empower users and authors are being explored. See Diane L. Zimmerman, *Authorship without Ownership: Reconsidering Incentives in a Digital Age*, DEPAUL L. REV. (2003) (describing various models).

²³² See generally <http://www.itu.int/wsis/>.

²³³ See <http://ocw.mit.edu/index.html>.

²³⁴ *Id.*

²³⁵ For a recent similar project, see Net Lifeline for African Doctors, University of Toronto Project Provides Online Medical Papers for African Doctors, <http://news.bbc.co.uk/2/hi/technology/3211844.stm>

materials. By virtue of copyright, however, translation rights belong exclusively to the copyright owner. Consequently, potential users may still need to obtain permission to translate the works before access to content can be accomplished.²³⁶

There is also further concern about the diversity of cultural content in course sharing projects. In a truly open collaborative project, the commons is enriched by both access and deposit. In other words, ideas and expressions from developing countries should also be encouraged and efforts should be made to promote an educational commons that benefits from creativity in different cultural contexts. In this regard, the OCW license permits modifications and adaptations so long as the derivative work is also licensed freely and openly on the same terms as OCW works. In this and many other respects, OCW is modeled along lines similar to the Open Source movement in software.

The appeal of an open courseware model is particularly significant given the failure of the compulsory licensing provisions of the Berne Convention in promoting access to educational works for developing countries. The Berne Convention Appendix which governs compulsory licenses has been underutilized for reasons ranging from the complexity of the terms of the Appendix, to the administrative costs associated with using the Appendix.²³⁷ Further, the legal status of the Appendix in a post-TRIPS environment is currently unclear.²³⁸ In any event, with relatively few exceptions, free and open access is still preferable and more accessible than works made available under a compulsory licensing regime. It is implausible that the Appendix could be extended to the Internet in any meaningful way. Interpretations of TRIPS provisions that might suggest the Appendix as a reasonable framework to deal with access to digital content for educational purposes should be viewed with considerable caution by developing countries. Despite the incorporation of the Appendix in the TRIPS Agreement,²³⁹ it seems clear that the Appendix was not negotiated with the information age in mind. The WIPO Internet Treaties presumably are the appropriate texts for considering digital course materials. However, these treaties do not contain similar provisions dealing specifically with the development interests of countries in accessing literary materials for educational instruction. Consequently, attempts by developing countries to create special access regimes²⁴⁰ for educational purposes are reasonably within the purview of legitimate exercises of sovereign discretion.

5. Some Emerging Considerations

5.1 The Information Technology and Intellectual Property Interface

Despite indications of commitment from developed countries to support the integration of information technologies into development programs, most of the activities undertaken in light of these commitments have failed to examine the important relationship between the regulation of information technology and global rules for intellectual property protection. As some scholars have argued, the information economy may require different rules with respect to the protection of content or even hardware, than the traditional economy. The contested boundaries between trademarks for domain names, business method patents for Internet businesses, and copyright protection for content all threaten precipitously to recreate high margins of difference between developed and developing

²³⁶ The OCW project permits translation for non-commercial educational purposes. It is unclear given current judicial precedent in the United States whether an educational institution that downloads OCW material but charges students for the cost of downloads will be violating the OCW stipulation. See *e.g.*, Princeton University Press v. Michigan Document Services, Inc. 99 F.3d 1381 (6th Cir. 1996).

²³⁷ See RICKETSON, *supra* note 212 at 663.

²³⁸ See Ruth L. Okediji, *Sustainable Access to Digital Works* (forthcoming, 2004) (exploring the legal viability of the Berne Appendix in the context of the WIPO Internet Treaties).

²³⁹ See Art. 9 (1).

²⁴⁰ The United States has its own access regime for educational instruction. See "Technology, Education, and Copyright Harmonization Act of 2002" or "TEACH Act." (2002). See generally, Laura Gasaway, *Balancing Copyright Concerns: The TEACH Act of 2001*, EDUCAUSE Rev. 82 (2001).

countries. The irrepressible move to create a global property rights system in data and databases, both of which are the primary constitutive elements of the Internet and associated applications,²⁴¹ together with the existing multilateral agreements create an unhealthy environment for development. In this “back to the future” paradigm, developing countries will be bound by international agreements that constrain their efforts to access the building blocks of economic growth which consist of access to content and competitive opportunities to create new markets and new products. It is important to note that this problem is not limited to developing countries; there continue to be conflicts and heated negotiations between stakeholders in developed countries about the nature and extent of rules designed for social and economic use of the information.

Of immediate strategic importance is the need for developing and least developed countries to reconcile their identifiable ICT priorities with their participation in intellectual property agreements. Inadequate appreciation of the relationship between development goals that require access to the tools of the information age, and global agreements regarding intellectual property rights, can potentially limit the policy space within which countries can pursue their development agendas. Specifically, it is important for developing countries to consider the impact of accession to the WIPO Internet treaties on their development goals. For those countries that have ratified the treaties, careful consideration should be given to best options for integrating the obligations of the treaties into domestic law. The point is not that copyright rules are detrimental to development efforts, but instead that the unbridled extension of these rules to the Internet environment, without corresponding limitations to facilitate legitimate public policy objectives will unnecessarily handicap identified development strategies.

5.2 Open Source versus Proprietary Software

Domestically, and perhaps even regionally, developing countries have to consider how best to promote innovation, competition, and use of information technology. An important issue, increasingly global in nature, is the choice between proprietary or open source software development methods.²⁴² The open source movement has its roots in the early era of the Internet when significant aspects of computer operating systems were developed in academic communities.²⁴³ By one estimate in 2002, the open source program Linux has anywhere between seven and twenty one million users worldwide and an expected growth rate of 200%.²⁴⁴ There have been significant capital investments in open source projects from established firms including IBM and Sun Microsystems, and a significant investment in commercializing Linux.²⁴⁵ Beneficiaries of the open source movement include software developers whose collaborations build add value to the chain of software supply, developing countries whose benefit from access to free software and major corporations.²⁴⁶

The Open Source movement is a model of software development that utilizes volunteer collaborative communities of programmers. In an Open Source project, the source code of the software program is available to other programmers to use, study, adapt or distribute under liberal licensing terms. These terms reflect a tradition of open standards, sharing and collaboration to create, improve, modify and

²⁴¹ Although international activity concerning database protection has been dormant for several years, the recent proposed bill in circulation in the U.S. House of Representatives indicates that this silent stage will surely be short lived. It is fairly predictable that once the U.S. passes a database bill, regardless of its iteration, movement toward an international treaty will follow inevitably. On the proposed U.S. bill in circulation, see “*Databases—the Next Copyright Battle?*” Reuters September 5, 2003.

²⁴² See Georg von Krogh, *Open- Source Software Development: An Overview of New Research on Innovator’s Incentives and the Innovation Process*, 44 MIT SLOAN MANAGEMENT REV. 14, 14 (2003) (describing open-source software development as “an important economic and cultural phenomenon”).

²⁴³ Josh Lerner and Jean Tirole, *Some Simple Economics of Open Source*, 197, 200-201, THE JOURNAL OF INDUSTRIAL ECONOMICS, 197 June 2002

²⁴⁴ Lerner and Tirole, *id.* at 197.

²⁴⁵ *Id.* at 198. See also, Alfonso Fuggetta, *Open Source Software—An Evaluation*, 66 *The Journal of Systems and Software*, 77, 77-78 (2003).

²⁴⁶ *Id.* See also, John Landry, *Profiting from Open Source*, 78 HARVARD BUSINESS REVIEW, 22 Sep/Oct. 2000 (interview about Hewlett Packard’s decision to use open-source as its model for one of its software products).

distribute software.²⁴⁷ The most well known expression of the open source culture is the GNU General Public License (GNU GPL) which is behind the GNU/Linux operating system. This is also often referred to as the “copyleft” license because rather than use the copyright interest in source code to restrict what others can do with and to the software, the GNU GPL uses such ownership in conjunction with contract law, to enforce a norm of open access to computer programs.²⁴⁸ The first software programmers writing computer code for the Linux system distributed their copyrighted works pursuant to the GNU GPL which authorizes others to use, modify and redistribute the programs, as well as to create and distribute new programs that are based on the original ones. Under copyright law, such modifications would be considered derivative works and would normally be a violation of the first author’s rights. The GNU GPL authorizes the creation of such derivative works, however, only so long as the same culture of openness is adhered to by subsequent developers. Thus, contrary to popular perception, the open-source movement relies significantly on the proprietary principles of copyright; the important distinction is that open-source projects utilize copyright as a means to ensure and promote access to creative works.

Several important development benefits have been attributed to open source. First, Open Source supplies developing countries with access to the dominant UNIX/X Windows computing environment with *de minimis* software costs.²⁴⁹ The benefits of low cost are compounded by the fact that Linux runs on IBM compatible hardware which is generally more accessible in developing countries than other PC’s. Further, complementary tools for Linux applications are also more freely available to software developers. Evidence from developing countries such as India and Pakistan suggests that the large variety of tools freely available has added value to the educational endeavor of teaching courses in computer science and electrical engineering.²⁵⁰ Open Source thus has an indispensable and powerful development strategy namely, the growth of a domestic cadre of computer software engineers and developers who are skilled and equipped to participate in the global software commons. Open Source adoption by developing countries has been encouraged by international organizations, scholars and civil society groups.²⁵¹ Most recently, several developed and developing countries have announced their intention to encourage or develop their own open source programs.²⁵² Recently, individual states in the United States have followed suit.²⁵³

The Open Source model is not, however, without challenges. Quality control of the software is difficult to monitor given the number of software developers involved in a project. Further, it is difficult to guarantee that proprietary code has not been utilized by a participant in the project thus violating a third party’s proprietary rights. Recent litigation in the United States suggests that the Open Source movement is vulnerable to such legal attacks.²⁵⁴ Nonetheless, it seems unquestionable that the open-source model has important development benefits and its value should be considered as a

²⁴⁷ See Tim O’Reilly, *Lessons from Open-Source Software Development*, COMMUNICATIONS OF THE ACM, 33 April 1999; David Bretthauer, *Open Source Software: A History, Information Technology and Libraries*, 3 March 2002.

²⁴⁸ The GNU GPL is available at <http://www.fsf.org/copyleft/gpl.html>.

²⁴⁹ See generally, Shahid H. Bokhari and Rafeequr Rehman, *Linux and the Developing World*, IEEE Software January/February 1999.

²⁵⁰ Shahid H. Bokhari and Rafeequr Rehman, *id.*, at 59-61 (describing teaching with Linux in Pakistan).

²⁵¹ See e.g., UNCTAD E-Commerce and Development Report (2002). In July 2003, WIPO was asked to convene a meeting to discuss the relevance of open-source as a model for development and economic growth. The proposal was ultimately rejected at the objection of the United States Patent and Trademark Office. See generally Jonathan Krim, *The Quiet War Over Open-Source*, The Washington Post, Aug. 21, 2003.

²⁵² See e.g., Free and Open Source Software Foundation for Africa Launched, Africa News Service, March 7, 2003.

²⁵³ See Darryl K. Taft, *Open-Source Movement Gains Ground on Microsoft*, EWEEK, March 24, 2003 (discussing a proposal in Texas that would enable the state to consider open-source technology in its software procurements). The state of Oregon was considering a similar proposal. See also *Massachusetts Goes Open Source*, News Factor Network, October 20, 2003.

²⁵⁴ See *Caldera v. IBM*, complaint available at <http://www.sco.com/scosource/complaint3.06.03.html>. The lawsuit has implications for all Linux users and is being watched carefully by the entire open source community. See generally, Eric Raymond, OSI Position Paper on the SCO-vs.-IBM Complaint, available at <http://www.opensource.org/sco-vs-ibm.html>.

viable platform for developing countries.

5.3 Appropriating the Benefits of the Information Age

The Internet offers a dynamic set of technological tools, and is the subject of experimental regulatory frameworks and legal rules. It is unlikely that anything firm or consistently predictable will emerge any time soon to govern this digital space. For developing countries this presents both opportunities and challenges. Appropriating the benefits of the information age is directly related to how investments in information technology are influenced and supported by regulatory frameworks that promote innovation, access and use. In addition to capital investments in information technology, developing countries should undertake to invest in the necessary macroeconomic policies that will facilitate an environment where the domestic population is able to adapt to the existence of the Internet, and to encourage entrepreneurial uses of the different opportunities that information technology can offer to deal with existing distribution, dissemination and communication problems that bedevil developing country markets. Developing countries can do so currently by utilizing existing capacities and developing the infrastructure necessary to maintain substantial and viable connections to the Internet. On the other hand, there are also risks associated with a static approach. In most other areas of technological development, developing countries have been left behind both in terms of capacity and infrastructure, but also in terms of their participation in the formulation and negotiation of legal rules that are then implemented globally or that have global effect. It is important that developing countries strike a balance between free-riding on existing spillover effects of the Internet and participation in global negotiations where rules are being developed that will shape the future of the Internet and hence, the terms on which all countries will participate in an increasingly and irrevocably networked global environment.

6. Conclusion

Information asymmetries introduced or supported by legal rules such as intellectual property rights, or regulatory policies affecting competition in the provision of telecommunications services, can skew the competitive advantages that information technologies offer for developing countries. The following points summarize important factors that policy makers should keep in mind in formulating information policies with a development focus.

(a) Despite the emphasis on the need for a strong telecommunications infrastructure for greater physical access to the Internet, the development of third generation Internet technologies through satellite suggests that in a short period of time even this major problem may not be as significant a barrier for access to the Internet. An important task, then, is to develop guidelines concerning how much developing country resources should be invested in adapting to the current Internet state of art given the dynamic rate of innovation in communications technology. These are questions that require careful and sustained empirical analysis to ensure that developing countries the digital divide does not remain a permanent feature of the information age.

(b) Exploiting the potential of the Internet to facilitate development objectives requires access to hardware (computers), software and content. Innovation, competition and deregulation in the telecommunications industry will enhance the opportunities for access to hardware by citizens. Intellectual property agreements have important implications for access to software and digital content. In the context of software, developing countries need to explore alternatives to proprietary regimes, the most important being the Open Source model which has proven to be a dynamic and, in some instances, more effective model of software development. For developing countries and LDCs, the Open Source model is not just beneficial for improving access to software, but also for the opportunities it offers to facilitate the training of domestic software engineers, and the relatively low cost of complementary technologies.

(c) Business method patents can have inhibiting effects on competition in new markets and the opportunities made possible by information technologies. Most economic analyses of business method patents suggest that such patents have an inimical effect on competition and organizational innovation. Developing countries should preserve domestic policy space to make decisions that are consistent with development priorities by adopting, as India has done, a *per se* rule against the patentability of business methods.

(d) International copyright agreements have a significant and unavoidable impact on access to creative works in the digital age. The two WIPO Internet treaties have been implemented in a few developed countries in a manner that is highly restrictive and that imposes undue social costs on consumers. Developing countries should be aware that these two treaties affect access by wire and wireless means, and domestic limitations or exceptions to the rights granted by the treaties are likely to be influenced by interpretations of the TRIPS Agreement. Developing countries must insist on the possibility of enacting domestic limitations, including the application of compulsory licenses, to digital works.

(e) The Appendix to the Berne Convention is currently the most prominent access model to literary works in international copyright law. However, developing countries have not successfully utilized the provisions of the Appendix with regard to facilitating access to protected works through compulsory licenses. Consequently, an alternative model must be considered. Developing countries and LDCs should consider, for example, adopting ad hoc provisions to deal with copyright in digital works, rather than adopting wholesale treaty provisions that may deprive them of policy options more conducive to national priorities. What is ultimately important is that, in the context of multilateral or bilateral negotiations, developing countries must appreciate the importance of copyright to the ability to access and realize the benefits of information technology and information goods. Robust access principles in the international agreements, or the freedom to impose such access mechanisms domestically, must be preserved for development purposes.

(f) Institutions of higher learning are an important aspect of developing a strong technology base in any society. The possibility of distance education learning should occupy a central place in development strategies for the information age. This will require implementation of copyright treaties in a way that ensures that proprietary rights are balanced with public policy limitations that permit use and access for educational purposes, distinct from other socially beneficial uses.

Finally, there has been caution expressed by some scholars and commentators about the unbridled optimism and expectation of what information technology can accomplish for developing countries. It is certainly the case that technology does not represent the exclusive or even primary solution to the multifaceted challenges of underdevelopment. However, the ubiquitousness of information technologies provides a universal context to examine the backward looking question of how to rethink approaches to existing impediments to economic growth, and the forward looking question of how new technology can be deployed to generate new revenue streams and stimulate entrepreneurial activity in developing countries.

Appendix A: The Top 20 Countries with the Highest Internet Penetration Rate

Source: InternetWorld Stats.com (2003)

#	Country or Region	Penetration (% Population)	Population (Est. 2003)	Users Latest Data	Source of Latest Data
1	Sweden	67.9 %	8,872,600	6,025,927	NielsenNR - May/03
2	Hong Kong	67.0 %	6,827,000	4,571,536	NielsenNR - May/03
3	Netherlands	63.7 %	16,258,300	10,351,064	NielsenNR - May/03
4	Denmark	62.7 %	5,387,300	3,375,850	NielsenNR - July/02
5	United States	60.5 %	291,639,900	176,418,380	NielsenNR - May/03
6	Iceland	59.5 %	294,300	175,000	ITU - Dec/2002
7	Switzerland	57.8 %	7,376,000	4,264,828	NielsenNR - May/03
8	South Korea	56.1 %	46,852,300	26,270,000	ITU - Dec/2002
9	Singapore	54.6 %	4,225,000	2,308,296	NielsenNR - May/02
10	New Zealand	54.5 %	3,785,600	2,063,831	NielsenNR - Aug/02
11	Australia	54.0 %	19,978,100	10,792,601	NielsenNR - May/03
12	Germany	53.3 %	81,904,100	43,664,594	NielsenNR - May/03
13	Canada	53.1 %	31,720,400	16,841,811	NielsenNR - Mar/02
14	Finland	50.8 %	5,215,100	2,650,000	ITU - Dec/2002
15	Norway	50.5 %	4,551,100	2,300,000	ITU - Dec/2002
16	Taiwan	49.1 %	23,614,200	11,602,523	NielsenNR - July/01
17	United Kingdom	49.1 %	59,040,300	28,995,206	NielsenNR - May/03
18	Bermuda	46.5 %	64,500	30,000	ITU - Dec/2001
19	Japan	45.0 %	127,708,000	57,520,708	NielsenNR - May/03
20	Estonia	44.2 %	1,268,300	560,000	ITU - Dec/2002
TOP 20 Countries		55.0 %	746,582,400	410,782,155	IWS - Jul/2003

Appendix B: Internet Usage in Central and South America

<u>CENTRAL AMERICA</u>	<u>Population (2003)</u>	<u>Users, Year 2000</u>	<u>Users, Latest Data</u>	<u>(%) Table</u>	<u>Growth (2000-2003)</u>	<u>% Population (Penetration)</u>
Belize	257,400	15,000	22,000	1.7 %	46.7 %	8.5 %
Costa Rica	4,148,500	250,000	384,000	29.2 %	53.6 %	9.3 %
El Salvador	6,178,700	40,000	300,000	22.8 %	650.0 %	4.9 %
Guatemala	14,223,400	65,000	200,000	15.2 %	207.7 %	1.4 %
Honduras	6,606,100	40,000	200,000	15.2 %	400.0 %	3.0 %
Nicaragua	5,777,700	50,000	90,000	6.8 %	80.0 %	1.6 %
Panama	2,991,000	45,000	120,000	9.1 %	166.7 %	4.0 %
TOTAL	40,182,800	505,000	1,316,000	100 %	160.6 %	3.3 %
<u>SOUTH AMERICA</u>	<u>Population (Est. 2003)</u>	<u>Users, Year 2000</u>	<u>Users, Latest Data</u>	<u>% Table</u>	<u>Growth (2000-2003)</u>	<u>Penetration (% Pop.)</u>
Argentina	36,993,000	2,500,000	4,100,000	14.6 %	64.0 %	11.1 %
Bolivia	8,676,000	120,000	180,000	0.6 %	50.0 %	2.1 %
Brazil	179,712,500	5,000,000	14,322,367	51.0 %	186.4 %	8.0 %
Chile	15,265,600	1,757,400	3,102,200	11.0 %	76.5 %	20.3 %
Colombia	44,533,300	878,000	1,982,000	7.1 %	125.7 %	4.5 %
Ecuador	12,471,600	180,000	503,300	1.8 %	179.6 %	4.0 %
Falkland Islands	2,300	-	-	0.0 %	-	n/a
French Guiana	188,200	2,000	2,000	0.0 %	0.0 %	1.1 %
Guyana	865,200	3,000	95,000	0.3 %	3066.7 %	11.0 %
Paraguay	6,028,900	20,000	100,000	0.4 %	400.0 %	1.7 %
Peru	27,083,400	2,500,000	2,000,000	7.1 %	-20.0 %	7.4 %
Suriname	456,900	11,700	14,500	0.1 %	23.9 %	3.2 %
Uruguay	3,452,600	370,000	400,000	1.4 %	8.1 %	11.6 %
Venezuela	23,865,800	950,000	1,274,400	4.5 %	34.1 %	5.3 %
TOTAL	359,595,300	14,292,100	28,075,767	100 %	96.4 %	7.8 %

Source: InternetWorld Stats.com (2003)

Appendix C: Internet Usage in Africa

AFRICA	Population (Est. 2003)	Users as of Dec/2000	Users, Latest Data	(%) Table	Growth (2000-2003)	% Population (Penetration)
Algeria	33,577,500	50,000	500,000	6.2 %	900.0 %	1.5 %
Angola	13,036,300	30,000	41,000	0.5 %	36.7 %	0.3 %
Benin	6,738,600	15,000	25,000	0.4 %	66.0 %	0.4 %
Botswana	1,762,100	15,000	50,000	0.6 %	233.3 %	2.8 %
Burkina Faso	11,862,600	10,000	19,000	0.2 %	90.0 %	0.2 %
Burundi	7,596,700	3,000	6,000	0.1 %	100.0 %	0.1 %
Cameroon	16,341,000	20,000	45,000	0.6 %	125.0 %	0.3 %
Cape Verde	456,300	8,000	16,000	0.2 %	100.0 %	3.5 %
Central African Rep.	3,986,400	1,500	3,000	0.0 %	100.0 %	0.1 %
Chad	7,210,200	1,000	4,000	0.0 %	300.0 %	0.1 %
Comoros	628,500	1,500	3,200	0.0 %	113.3 %	0.5 %
Congo	3,362,200	500	1,000	0.0 %	100.0 %	0.02 %
Congo, Democ. Rep.	56,861,100	500	6,000	0.1 %	1,100.0 %	0.01 %
Djibouti	820,600	1,400	4,500	0.1 %	221.4 %	0.5 %
Egypt	69,296,000	450,000	600,000	7.4 %	33.3 %	0.9 %
Eritrea	3,991,800	5,000	9,000	0.1 %	80.0 %	0.2 %
Ethiopia	69,981,800	10,000	50,000	0.6 %	400.0 %	0.1 %
Gabon	1,345,300	15,000	25,000	0.3 %	66.7 %	1.9 %
Gambia	1,522,700	4,000	18,000	0.2 %	350.0 %	1.2 %
Ghana	19,850,800	30,000	40,500	0.5 %	35.0 %	0.2 %
Guinea	8,011,200	8,000	15,000	0.2 %	87.5 %	0.2 %
Guinea-Bissau	1,346,800	1,500	4,000	0.0 %	166.7 %	0.3 %
Equatorial Guinea	476,200	500	1,700	0.0 %	240.0 %	0.4 %
Ivory Coast	18,301,200	40,000	90,000	1.1 %	125.0 %	0.5 %
Kenya	32,499,100	200,000	500,000	6.2 %	150.0 %	1.5 %
Lesotho	2,523,400	4,000	5,000	0.1 %	25.0 %	0.2 %

Liberia	2,814,300	500	500	0.0 %	0.0 %	0.02 %
Libya	7,250,800	10,000	20,000	0.2 %	100.0 %	0.3 %
Madagascar	15,243,100	30,000	35,000	0.4 %	16.7 %	0.2 %
Malawi	11,265,500	15,000	27,000	0.3 %	80.0 %	0.2 %
Mali	10,441,300	18,800	30,000	0.4 %	59.6 %	0.3 %
Mauritania	2,754,400	5,000	10,000	0.1 %	100.0 %	0.4 %
Mauritius	1,243,000	87,000	180,000	2.2 %	106.9 %	14.5 %
Mayotte	183,400	-	-	0.0 %	-	n/a
Morocco	30,456,900	100,000	500,000	6.2 %	400.0 %	1.6 %
Mozambique	18,151,100	30,000	30,000	0.4 %	0.0 %	0.2 %
Namibia	1,923,800	30,000	45,000	0.6 %	50.0 %	2.3 %
Niger	12,241,700	5,000	12,000	0.1 %	140.0 %	0.1 %
Nigeria	150,539,700	200,000	200,000	2.5 %	0.0 %	0.1 %
Reunion	764,300	130,000	130,000	1.6 %	0.0 %	17.0 %
Rwanda	8,379,800	5,000	20,000	0.2 %	300.0 %	0.2 %
S. Tome & Principe	137,300	6,500	9,000	0.1 %	38.5 %	6.6 %
Senegal	11,326,800	40,000	105,000	1.3 %	162.5 %	1.0 %
Seychelles	82,000	6,000	9,000	0.1 %	50.0 %	11.1 %
Sierra Leone	4,850,800	5,000	7,000	0.1 %	40.0 %	0.1 %
Somalia	11,326,800	200	200	0.0 %	0.0 %	0.002 %
Sudan	37,985,900	30,000	84,000	1.0 %	180.0 %	0.2 %
South Africa	45,919,200	2,400,000	3,100,000	38.4 %	29.2 %	6.8 %
Swaziland	1,068,600	10,000	20,000	0.2 %	100.0 %	1.9 %
Tanzania	34,827,600	115,000	100,000	1.2 %	-13.0 %	0.3 %
Togo	5,097,400	100,000	200,000	2.5 %	100.0 %	3.9 %
Tunisia	9,879,600	100,000	505,500	6.3 %	405.5 %	5.1 %
Uganda	25,474,700	40,000	60,000	0.7 %	50.0 %	0.2 %
Zambia	11,193,900	20,000	52,000	0.6 %	162.0 %	0.2 %
Zimbabwe	14,300,700	50,000	500,000	6.2 %	900.0 %	3.5 %

TOTAL AFRICA	879,855,500	4,514,400	8,073,500	100 %	78.8 %	0.9 %
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Source: InternetWorld Stats.com (2003)

Appendix D: Internet Usage in Asia

(Asia Internet Users & Population Statistics)

ASIA	Population (2003)	Users, (Year 2000)	Users, Latest Data	(%) Table	Growth (2000-2003)	% Population (Penetration)
Afganistan	25,089,800	-	-	0.0 %	-	n/a
Armenia	3,912,600	30,000	70,000	0.0 %	133.3 %	1.8 %
Azerbaijan	8,239,200	12,000	300,000	0.1 %	2400.0 %	3.6 %
Bangladesh	138,900,600	100,000	204,000	0.1 %	104.0 %	0.1 %
Bhutan	1,745,500	500	10,000	0.0 %	1900.0 %	0.6 %
Brunei Darussalem	362,700	30,000	35,000	0.0 %	16.7 %	9.6 %
Cambodia	13,382,400	6,000	30,000	0.0 %	400.0 %	0.2 %
China	1,311,863,500	22,500,000	59,100,000	29.5 %	162.7 %	4.5 %
Georgia	5,334,800	20,000	73,500	0.0 %	267.5 %	1.4 %
Hong Kong*	6,827,000	2,283,000	4,571,536	2.3 %	100.2 %	67.0 %
India	1,067,421,100	5,000,000	16,580,000	8.3 %	231.6 %	1.6 %
Indonesia	217,825,400	2,000,000	4,000,000	2.0 %	100.0 %	1.8 %
Japan	127,708,000	47,080,000	57,520,708	28.7 %	22.2 %	45.0 %
Kazakhstan	14,168,300	70,000	150,000	0.1 %	114.3 %	1.1 %
Kyrgystan	5,218,900	51,600	152,000	0.0 %	194.6 %	2.9 %
Korea, North	25,191,700	-	-	0 %	-	n/a
Korea, South	46,852,300	19,040,000	26,270,000	13.1 %	38.0 %	56.1 %
Laos	5,559,200	6,000	15,000	0.0 %	150.0 %	0.3 %
Macao*	442,000	60,000	115,000	0.1 %	91.7 %	26.0 %
Malaysia	24,014,200	3,700,000	7,800,000	3.9 %	110.8 %	32.5 %
Maldives	286,400	6,000	15,000	0.0 %	150.0 %	5.2 %
Mongolia	2,511,400	30,000	40,000	0.0 %	33.3 %	1.6 %
Myanmar	51,853,100	1,000	10,000	0.0 %	900.0 %	0.0 %
Nepal	25,836,100	50,000	60,000	0.0 %	20.0 %	0.2 %

Nepal	25,836,100	50,000	60,000	0.0 %	20.0 %	0.2 %
Pakistan	153,124,800	133,900	500,000	0.2 %	273.4 %	0.3 %
Philippines	81,636,000	2,000,000	2,000,000	1.0 %	0.0 %	2.4 %
Singapore	4,225,000	1,200,000	2,308,296	1.2 %	92.4 %	54.6 %
Sri Lanka	19,615,300	121,500	200,000	0.1 %	64.6 %	1.0 %
Thailand	63,393,600	2,300,000	4,800,000	2.4 %	108.7 %	7.6 %
Taiwan	23,614,200	6,260,000	11,602,523	5.8 %	85.3 %	49.1 %
Tajikistan	6,435,300	2,000	3,500	0.0 %	75.0 %	0.1 %
Timor, West	965,300	-	-	0.0 %	-	n/a
Turkmenistan	5,650,400	2,000	8,000	0.0 %	300.0 %	0.1 %
Uzbekistan	26,599,200	7,500	275,000	0.1 %	3566.7 %	1.0 %
Vietnam	81,660,400	200,000	1,500,000	0.7 %	650.0 %	1.8 %
TOTAL for ASIA	3,590,196,700	114,303,000	200,319,063	100 %	75.3 %	5.6 %

Source: InternetWorld Stats.com (2003)