THE ARTICLE 2B DEBATE AND THE SOCIOLOGY OF THE INFORMATION AGE

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ABSTRACT

The economic institutions and practices that Article 2B seeks to regulate—electronic commerce, knowledge management, and information markets—are changing faster than the tools and concepts that policy makers are using to frame the debate. By describing and analyzing research relating to the nature of "information" and the components of the "digital economy," this Article suggests a new conceptual ground and common language for regulation of these new social and economic structures. In this way, this Article seeks to encourage a dialogue between the legal community, policy makers, modern industry, and social scientists.

Two elements are crucial to the formation of a productive interdisciplinary encounter. First, it is important that the participants in the Article 2B debate recognize that digital information is not simply a new kind of intellectual property that is difficult to regulate because easily copied. Rather, it is also a new kind of economic capital, and an emerging medium for innovative corporate, political, and cultural behavior. Second, the "digital economy" itself is not just a new economic market, just as surely as the Internet is not merely a new distribution channel. Instead, digital technology is transforming the nature and function of the corporation and every sector of the economy. In order to effectively and efficiently regulate the economic structures that digital information technology makes possible, the participants in the Article 2B debate need to recognize that the use of such technology has social as well as economic repercussions.

TABLE OF CONTENTS

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I. INTRODUCTION

The legal debate to formulate commercial laws to govern the information economy is the most sustained and serious exploration of the policy implications of the information age thus far. The dialogue is remarkably interdisciplinary—each side shaping its view of the best regulatory regime upon different assumptions about the future social and economic dynamics of the information age. Yet this social analysis is tacit at best, and rarely grounded in empirical social science research. While legal disagreements about the nature and dynamics of the information age often mirror the debates of the social science research community, the difference is that while social scientists are debating about the right questions, the legal community is already debating about the right answers. Is it too soon to know how to regulate cyberspace? Has a debate about the right answers preempted a debate about the right questions? If so, what are the right questions? This Article is intended to broaden the Article 2B debate by exploring the possible links between current social science research and the social and economic assumptions underlying the various legal positions.

Perhaps the most subtle judgment the legal community must make is how well the concepts and techniques that have been developed to describe, analyze, and regulate our economic life in an industrial age will apply to cyberspace. Will information technology be the cause of fundamentally new social and economic innovations, requiring new concepts and an experimental approach to defining a new legal regime? Or will the digital economy present new variations on social behavior, requiring primarily new applications of established methodologies?

Within the social science community, there is significant disagreement about whether information technology will be different in kind from other communication media, such as the telephone or broadcasting, and, if it is, whether it will require new analytical concepts and methods. I will focus

upon issues concerning the use and dynamics of networked information that are particularly relevant to Article 2B debate's consideration of legal regimes to regulate the digital economy.[1]

Commentators have examined many aspects of the movement toward information technologies. For example, sociologist Karen A. Cerulo argues that information technologies extend the process of innovation begun by industrial technologies, observing that, "Like the railroad and the telegraph, the new technologies have redefined space, place and time."[2] And yet, the inseparable relationship between "information," cognition, and human experience suggests that printing technology, not transportation, is a better analogy. Thus Cerulo concludes, "In doing so, technology has provided us with *new sites of empirical experience and it has reconfigured the complex ties that bind the social and cognitive worlds.*"[3] Given this essentially new *mediated* dimension of human experience, she asks, what are the implications for the traditional methodological assumption "that *physical co-presence* provides the standard by which to judge the importance, the form, and the quality of all other varieties of exchange?"[4] Cerulo concludes that our basic assumption that "direct" is superior to "mediated" experience must change, as must our basic concepts and methods for analyzing the dynamics of social relations. Psychoanalyst Sherry Turkle similarly has described the way that software and network communications are transforming the psychology of personality formation.[5] Turkle concludes that "virtual life" is emotionally and intellectually part of "real life," and asks whether traditional concepts of the self and human identity are sustainable.

The economic implications of this conceptual shift are illustrated by Belgian banker Bernard Lietaer's argument that fundamental economic

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1. Many social scientists believe that it is too soon to know if there is a discontinuity in subject or method, and warn that focusing upon "social impacts of technology" encourages theoretical modeling of the future, distracting from empirical research. *See, e.g.*, Paul Attewell, *Research on Information Technology Impacts*, *in* FOSTERING RESEARCH ON THE ECONOMIC AND SOCIAL IMPACTS OF INFORMATION TECHNOLOGY 133, 134 (The National Research Council, 1998); Claude S. Fischer, *Computer Mediated Communications*, *in* FOSTERING RESEARCH ON THE ECONOMIC AND SOCIAL IMPACTS OF INFORMATION TECHNOLOGY 142, 143 (The National Research Council, 1998).

2. Karen A. Cerulo, *Reframing Sociological Concepts for a Brave New (Virtual?) World*, 67:1 SOCIOLOGICAL INQUIRY 48, 55 (1997).

3. *Id.*

4. *Id.* at 49.

5. *See* SHERRY TURKLE, THE SECOND SELF 24 (1984); Sherry Turkle, *Artificial Intelligence and Psychoanalysis: A New Alliance*, 117:1 DAEDALUS 241, 245 (1988); SHERRY TURKLE, LIFE ON THE SCREEN: IDENTITY IN THE AGE OF THE INTERNET 177-209 (1995).

realities have already changed. Lietaer states that "the development of electronic commerce can be seen as simply the rest of the economy joining in the virtual space where money has been functioning already for the past two or three decades."[6] If we are to develop workable fiscal tools for a global economy comparable to the monetary supply controls with which national economies have managed domestic economies, he argues, we must study the new kinds of exchange (especially network barter and gift exchange) that are developing within electronic virtual communities. That is, we must *discover* what a digital economy is—it cannot be legislated in the first instance.

The Article 2B debate explores parallel questions about the portability of traditional legal concepts to cyberspace: whether copyright or contract law is more adaptable to new forms of information, whether Article 2B can regulate new modes of authorship and publication, and whether it can apply to new kinds of social contexts. Some Article 2B writers have sounded notes of caution regarding whether we know enough to regulate cyberspace. For example, Michael Froomkin comments, "If we are perhaps beyond the point of experiment and prototype and into the roll-out period, we are still at version 1.0."[7] Thus the first question the legal community may need ask for itself may resemble that faced by the telecommunications industry nearly a decade ago: "How can sufficient experimentation and learning with the new technologies be guaranteed so that demand for advanced applications can be effectively generated?"[8] In a practical sense this would focus the Article 2B debate on defining a social policy to promote innovation and the development of new markets, and would contextualize it within the broader constitutional goal of promoting progress in the useful arts and sciences.

Although social science research about economic and social relationships in cyberspace is necessarily still very new, a dialogue between law and social science may help to clarify two questions that seem to be near the heart of the debate about the proper management of intellectual property in digital works:

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6. Bernard Lietaer, *The Social Impact of Electronic Money: A Challenge to the European Union?* A REPORT TO THE EUROPEAN COMMISSION'S FORWARD STUDIES UNIT (1998) (on file with author).

7. Michael Froomkin, *Article 2B as Legal Software for Electronic Contracting—Operating System or Trojan Horse?*, 13 BERKELEY TECH. L.J. 1023 (1998).

8. *See* Michael Borrus & Francois Bar, *The Future of Networking*, BRIE—Berkeley Roundtable on International Economy, Research Paper, March 16, 1993 *available to be ordered at* <http://brie.berkeley.edu/BRIE/pubs/wp/index.html>) (visited Nov. 8, 1998).

What is information? The need for a new legal regime to govern the digital economy emerged primarily because of the problem of illegal copying of software and other digital works. But upon further examination, regulations of digital technology raise important new questions concerning the use of software as a medium for social control. Discussion of any regulatory regime for the digital economy is therefore, in part, political, because such regulation will structure the new social formations that will take shape around the creation and use of digital information.

What is a digital economy? Digital networks were first described as "information highways," a comforting metaphor suggesting that networks were like the distribution technology of an industrial society, one regulated by the Commerce Department and established commercial codes. But is a network like a highway? Is information a commodity? Although digital networks may become important distribution channels for information "commodities," a new distribution channel does not in itself constitute something that deserves to be called a market, an industry, or an economy. In this respect the U.S. Department of Commerce paper on "The Emerging Digital Economy"[9] oversimplifies the problem of regulating e-commerce. In reporting impressive growth in digital commerce, it presents aggregate data that do not differentiate between various kinds of electronic commerce involving different kinds of digital information, nor does it define a strategic framework for information policy that could provide a context for specific regulatory discussions such as Article 2B. As this Article will demonstrate, there is not one regulatory problem for Article 2B to solve, but many.

In all, the Article 2B debate is remarkably thoughtful, and yet, like most discussions about information policy, uses language about 'information,' the 'network,' and a 'digital economy' as if these words refer to something already well understood. On the contrary, network technology is still evolving rapidly, commercial software is often experimental, and the social and economic formations for which we use labels like "digital economy" are very early in their development.[10] The danger is that a legal

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9. *See* United States Department of Commerce, *The Emerging Digital Economy* (1998).

10. For a review of the growth and dynamics of Internet information, see Peter Lyman and Brewster Kahle, *Archiving Digital Cultural Artifacts*, D-lib (July-August 1998) (visited Nov. 7, 1998) <http://www.dlib.org/dlib/july98/07lyman.html>. Because online information is not archived, and Web sites often disappear, printed citations to Web page sources often outlast the digital documents cited. However, the Internet Archive has established a freely accessible permanent archive of all documents on the public parts of the World Wide Web (that is, those that do not prohibit entry by robot web crawlers). *See* Alexa Internet (visited Nov. 29, 1998) <http://www.Alexa.com>.

regime intended to strengthen the digital economy could inhibit its growth and resiliency in the global economy if it does not fully understand its structures, dynamics, and needs.

II. WHAT IS INFORMATION?

The definition of the concept of information must be at the heart of any information policy. The Article 2B drafters recognized this need in distinguishing between "information," defined as machine to machine communication, and "information content," defined as that information which is perceived by humans.[11] Among the critics of this distinction, Michele Kane is concerned about the status of computer programs as both "information" and as "information content," and whether ambiguities at the boundary may give rise to confusion about a warranty of merchantability.[12] Jane Ginsburg is concerned with the political implications of a syllogism that would generalize from software to all works expressed in digital format, changing our concept of authorship and the relationship between author and publisher or distributor.[13] And Jessica Litman argues that public and private domains traditionally differentiated by copyright would be joined by a contract regime, arguing that Article 2B "contemplates the assertion of rights over material—ideas, facts, information—that the copyright law provides may not be privately owned."[14]

Here, the Article 2B debate engages the most fundamental questions of the sociology of information. What are the social and psychological implications of a new medium for the representation of knowledge that had been previously instantiated in different physical media? And beyond this, what are the implications of entirely novel modes of representation of information, such as simulation or visualization tools? What are the consequences of these differences for our notion of authorship and reading, for the creation and use of knowledge, and of property and power?

Manuel Castells's book "The Rise of the Network Society"[15] describes the nature and dynamics of the information economy in comprehensive terms that may help focus the issues, just as Daniel Bell's "The Coming of

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11. UCC 2B §§ 102(a)(24), (a)(26) (Aug, 1, 1998 Draft).

12. Michele C. Kane, *When is a Computer Program not a Computer Program: The Perplexing World Created by Article 2B*, 13 BERKELEY TECH. L.J. 1013 (1998).

13. Jane C. Ginsburg, *Authors as "Licensors" of "Informational Property Rights" Under Article 2B*, 13 BERKELEY TECH. L.J. 945 (1998).

14. Jessica Litman, *The Tales that Article 2B Tells*, 13 BERKELEY TECH. L.J. 931, 935 (1998).

15. MANUEL CASTELLS, THE RISE OF THE NETWORK SOCIETY (1996).

Post-Industrial Society"[16] did in earlier decades. At its heart is the description of an historic change in the relationship between information and the economy:

> The contemporary change of paradigm may be seen as a shift from a technology based primarily on cheap inputs of energy to one predominantly based on cheap inputs of information derived from advances in microelectronic and telecommunications technology. ... Information is its raw material: these are technologies to act on information, not just information to act on technology, as was the case in previous technological revolutions.[17]

Castells's thesis helps clarify why the concept of information has been difficult to define in the debate over Article 2B. Is the economic value of information that of a commodity, something produced for commercial purposes, or is it better understood as a raw material?[18] If it is not a commodity, is it better conceived of as a flow, a service, or a utility? Does information itself add value, or is it the innovative use of information that is the origin of economic value? If so, how might this change the relative position of producers and consumers of information property in an information economy?

This reversal of the relationship between information and tools, making information the raw material for technological processing, has profound implications for the Article 2B discussion. At the birth of capitalism, printed books were one of the first manufactured commodities exchanged in international trade, giving birth to copyright laws intended to regulate commerce in books.[19] In a network age, as broadcast media have taught us, it is difficult to treat a signal as a commodity. Hence, Castells argues that information flows may be the origin of wealth in an information economy, not information commodities. In defining the nature of "information content" in a network age, then, it may not be best to begin by transforming digital signals into commodities, whether through the construction of legal fictions or technological encapsulations (e.g., cryp-

16. DANIEL BELL, THE COMING OF POST-INDUSTRIAL SOCIETY (1973).

17. Castells, *supra* note 15, at 61.

18. Historical economics literature discusses the utility of fictions that treat land, labor and money as commodities. *See, e.g.*, KARL POLANYI, THE GREAT TRANSFORMATION 68-76 (1944).

19. *See* FERNAND BRAUDEL, THE STRUCTURES OF EVERYDAY LIFE 400-01 (1981). If the copyright industry has turned to the information highway metaphor to analyze the network, the academic community has turned to the digital library metaphor, using the history of the book to gain perspective on the current situation. *See, e.g.*, ELIZABETH EISENSTEIN, THE PRINTING PRESS AS AN AGENT OF CHANGE 453-520 (1979).

tolopes). This approach suggests that "information content" may be an entirely new category of knowledge, resembling what we now call data, because its value is derived from its use in a particular social context, not its content *per se*.

There would be profound legal implications to this kind of a shift in the culture of information. Copyright doctrine, in protecting the *expression* of ideas, rather than the ideas themselves, has always balanced property rights ("expressions of ideas") with the cultural domain ("ideas"). For this reason, critics of Article 2B frequently argue that copyright law is more sensitive to the cultural and political dimension of information than contract alone can be. Castells's argument supports this point of view in postulating an inalienable link between information and the quality of life: "Because information is an integral part of all human activity, all processes of our individual and collective existence are directly shaped (although certainly not determined by) the new technological medium."[20]

Software, on the other hand, is an *abstract machine* for data and information processing, and can be viewed as a political device because it serves as a mediating technology for communication between people. If digital signals have value within the context of information flows, the distinction between software ("information" in the Article 2B sense) and information content becomes ambiguous. The problematic public and cultural implications of the concept of "information" (in the sense defined by Article 2B as communication between machines) appears most clearly in Julie Cohen's use of Lawrence Lessig's description of digital code as privatized law, or "code as code." In Lessig's description, code "constitutes itself as an inexorable arbiter of permissible conduct," one "that need not fit with, or respect, public law."[21] Pam Samuelson has made the same point in reminding members of the Association of Computing Machinery of their social responsibility as programmers: "Programmers may not realize it, but computer programs are privately constructed regulatory regimes. In these governance systems, some activities are authorized, while others are, by technical means, forbidden .... Code as code may be 'an efficient means of regulation', but it doesn't always produce socially optimal results."[22] In contrast to the Article 2B definition, sociologists and

20. *See* Castells, *supra* note 15, at 61. *See also* MANUEL CASTELLS, THE POWER OF IDENTITY at 5-67 (1997).

21. Julie Cohen, *Copyright and the Jurisprudence of Self-Help*, 13 BERKELEY TECH. L.J. 1089, 1141 (1998) (quoting Lawrence Lessig, *The Zones of Cyberspace*, 48 STANFORD L. REV. 1403, 1433 (1996)).

22. Pam Samuelson, *Encoding the Law into Digital Libraries*, 41 COMMUNICATIONS OF THE ACM 13, 13-14 (1998).

economists see software not simply as machine to machine communication, but rather as a key to understanding the relationship between technology, productivity and discipline in the workplace, privacy and surveillance in civil society, and, ultimately, structure in the economy.

British sociologists Geoff Cooper and Steve Woolgar also raise issues relating to the public interest in code as code in their presentation of the British Economic and Social Research Council's program of research into the interaction between technology and society:

> In this way of thinking, technology is congealed social relations—that is, a frozen assemblage of the practices, assumptions, beliefs, language and so on involved in its design and manufacture. Technology is thus a cultural artefact [sic] or system of artefacts [sic] which provides for certain new ways of acting and relating. The apposite slogan is that technology is society made durable: technology re-presents a form of social order (a defined concatenation of social relations) in material form. It freezes and offers this fixed version of social relations such that its adequately configured users re-enact the set social arrangements. They can only 'adequately' (that is, socially accountably) use/make sense of the technology as they conform to the community of social relations which the technology makes available.[23]

In describing the design of a new computer, Woolgar demonstrates that hardware is also "code" which has been stored in silicon form, and argues that software in any format is inherently a form of social engineering—a process he describes as "configuring the user."

> [T]he design and production of a new entity (a new range of microcomputers) amounts to a process of configuring its user, where 'configuring' includes defining the identity of putative users, and setting constraints upon their likely future actions .... As a result of this process, the new machine becomes its relationships with its configured users.[24]

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23. Geoff Cooper & Steve Woolgar, *Software is Society made Malleable: The Importance of Conceptions of Audience in Software and Research Practice*, Brunel University, Uxbridge Middlesex, United Kingdom: The Program on Information and Communication Technologies, Policy Research Paper No. 25, 1993, at 2 (on file with author).

24. Steve Woolgar, *Configuring the User: the Case of Usability Trials*, *in* A SOCIOLOGY OF MONSTERS: ESSAYS ON POWER, TECHNOLOGY AND DOMINATION 59 (1991). *See also* Bruno Latour, *Technology is Society Made Durable*, *in* A SOCIOLOGY OF MONSTERS: ESSAYS ON POWER, TECHNOLOGY AND DOMINATION 103-31 (1991).

Software, understood from this perspective, is a relation between a machine and its human user because *technology imposes a social discipline upon its users*, which they, as users, would call "skills."

An analysis of the consequences of "code as code" for the social structure of the digital economy can be seen in the "productivity paradox" —that is, the empirical observation that the introduction of information technology has not seemed to increase the productivity of knowledge workers. Erik Brynjolfsson defines three dimensions within which a solution to the productivity paradox might be found.[25] First, he notes that perhaps this "paradox" is in fact a measurement problem, since the outcomes of work mediated by information technology may not fit traditional categories. For example, bank productivity has been measured by outcomes such as the number of transactions by written checks; today the use of checks has been sharply reduced by the number of credit and debit card transactions. Or, secondly, productivity gains might only follow the reorganization of work processes, since the use of information technology might require very different work cultures, requiring new kinds of skills and incentives. Third, information technology may create new kinds of economic value (such as timeliness, or customized service), changing the very nature of the enterprise. Brynjolfsson's analysis suggests there is a mutually defining relationship between code, the organization and culture of work, and economic productivity. "Information" is more than machine to machine communication; rather, it is inherently linked to human behavior as it is experienced in organizational and psychological terms. And the use, social context, and format of "information content" (such as ATM transactions) are inherently structured by code.

Precisely these kinds of innovations in the organizational forms of the economy were discussed at a recent conference on "Knowledge and the Firm," hosted by the Institute of Management, Innovation, and Organization at UC Berkeley. Innovation was defined as the key to the production of wealth in the corporation of the future: "The fundamental bases of wealth creation are changing. Intellectual capital is the key to creating and appropriating wealth."[26] This premise led to two conclusions of importance to the Article 2B debate. First, and as discussed below, networks now make possible new modes of corporate organization that will be the foundation of the digital economy. And second, it was argued that the creator of information content in cyberspace may not be the "author" in

25. Erik Brynjolfsson, *The Productivity Paradox of Information Technology: Review and Assessment*, 36 COMMUNICATIONS OF THE ACM 67, 67-77 (1993).

26. Don Cohen, *Toward a Knowledge Context*, 40 CALIFORNIA MANAGEMENT REVIEW 22, 23 (1998).

any traditional sense, but the new kinds of social collectives made possible by network communication—the "network enterprise," "communities of practice," and "virtual communities."

These "communities of practice" are the informal organizations of professionals with shared goals, specialized knowledge and skills, that may be extended over space and time by information technology.[27] Research in the field, reports one review of the literature,

> has ranged from the effectiveness of the invisible colleges in the progress of the scientific enterprise, to the roles of cliques in the functioning of bureaucracies. In between, they run the gamut from informal networks of cooperation among chemists working for competitive pharmaceutical industries, to back channel exchanges between members of the foreign offices of adversary countries and the appearance of gangs in schools and prisons.[28]

Because computer networks enable such communication, on an unprecedented scale and depth, the idea of communities of practice is rapidly becoming the theoretical foundation of new theories of social organization, particularly in work focusing on the corporation of the future. That is, "communities of practice" are about the use of networked information in the *practice of knowledge*, and as such, suggest the possible shape of the information markets of the future.

A particularly striking passage describes the leading-edge scientific research, which has profound implications for the way we think about the nature of intellectual property management and its relationship to the larger constitutional goal of progress in the sciences and useful arts. Describing authorship in biotechnology, Don Cohen says:

> [T]he complexity and rapid pace of research means that *advances are necessarily made by large teams connected by their interlocking areas of expertise rather than by employment at the same institution or location*. Thus ... a recently published paper on the DNA sequence of yeast chromosomes listed 133 authors from 85 institutions. In the biotech industry, collaborative networks are becoming the places where important intellectual activity occurs; belonging to them is essential to success in an industry that exists on the frontier of developing knowledge. ...

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27. JEAN LAVE & ETIENNE WENGER, SITUATED LEARNING: LEGITIMATE PERIPHERAL PARTICIPATION 94-99 (1991).

28. Bernardo A. Huberman & Tad Hogg, *Communities of Practice: Performance and Evolution*, 1 COMPUTATIONAL AND MATHEMATICAL ORGANIZATION THEORY 73, 73-74 (1995).

> These virtual teams point to the future shape of knowledge work in general, which some predict will be accomplished by widely dispersed groups and individuals woven into communities of practice by networks, groupware and a complex common task.[29]

The biotechnology paper mentioned by Cohen was written by Walter Powell, and describes collaborative research across both corporate and national boundaries, illustrating the role of information flows in the innovation process in a networked society.[30] A similar contention was recently made in an article in *Science Magazine*, which argued that recently proposed database protection legislation would overprotect information, and so inhibit the progress of science.[31]

The notion of "communities of practice" expands upon the idea that networked communication creates a sense of "virtual community." The term "virtual community" describes the feelings of social solidarity made possible by network software, such as e-mail, Internet relay chat (IRC), bulletin boards, multi-user domains (MUDS), and MOOS (MUDS object oriented).[32] For example, SeniorNet is an organization using digital network services to link together elderly people, many of whom live alone, into a vibrant on-line community. Studies of the use of SeniorNet services suggest that it is not on-line information (e.g., databases) that sustains a sense of community, but rather the interactive services (such as e-mail and on-line chat groups) that SeniorNet provides.[33] This illustrates the point that it is information as flow, not as commodity, that creates value in the digital economy.

This exploration of the meanings of "information" suggests that a one-dimensional legal code will fail to regulate effectively the many kinds of

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29. Cohen, *supra* note 26, at 37 (italics added).

30. Walter W. Powell, *Learning from Collaboration: Knowledge and Networks in the Biotechnology and Pharmaceutical Industries*, 40 CALIFORNIA MANAGEMENT REVIEW 228, 228-240 (1998); *see also* Mario Biagioli, *The Instability of Authorship: Credit and Responsibility in Contemporary Biomedicine*, 12 FASEB JOURNAL 3, 3-4 (1998).

31. *See, e.g*, William Gardner & Joseph Rosenbaum, *Intellectual Property: Database Protection and Access to Information*, 281 SCIENCE MAGAZINE, Aug. 7, 1998, at 786-787.

32. On the application of social network theory to virtual communities, see Barry Wellman & Milena Gulia, *Net Surfers Don't Ride Alone: Virtual Communities as Communities*, *in* COMMUNITIES IN CYBERSPACE (Peter Kollock & Marc Smith, eds.) (forthcoming 1999) *available at* <http://www.chass.utoronto.ca/~wellman/links/index.html> (visited Oct. 29, 1998).

33. Mary S. Furlong, *An Electronic Community for Older Adults: The SeniorNet Network*, 39 JOURNAL OF COMMUNICATION 145, 149 (1989).

digital information, in all the many social contexts and uses in which economic value is created. For one thing, it is *networked* information that is distinctively new, not digital information. Other aspects of "the digital economy" described by the Commerce Department report do not raise fundamentally new kinds of regulatory problems. CD-ROMs, for example, contain digital documents, but are distributed in commodity form like any other product. Similarly, "hybrid" digital commerce, such as that performed by on-line retailers such as Amazon.com, that sells print books through network transactions, does not require a revised understanding of economic transactions (other than, perhaps, new privacy issues derived from the commercialization of data about on-line consumer behavior). Article 2B fails to recognize that the information economy will involve transactions in various kinds of information, and so will obscure the fundamentally different legal needs present in different information markets.

III. WHAT IS A DIGITAL ECONOMY?

The initial problem to be solved by Article 2B was to develop a commercial code for the use of the Internet as a distribution channel for software and digital publications. In the first instance, the success of this project rests upon an understanding of the use and dynamics of different kinds of digital information as deliverable products. The first part of this Article raises fundamental questions about whether digital signals can and should be treated simply as commodities, and found little empirical support for the proposed distinction between information and information content. But there is a second dimension to this problem as well: to regulate the "Internet economy," it is essential to begin by exploring the nature of "the Internet" as an economic organization, not simply as a technical infrastructure or distribution channel.

Current social science research suggests that the Internet is accelerating changes in the nature and structure of the economy itself, not just introducing a new distribution channel into the established structure. In this section the image of the Internet as an "information highway" or distribution channel will be questioned by describing social science research into two kinds of economic formations that appear consistent with the idea of a "knowledge economy" emerging in cyberspace. First, this Article will consider the "network enterprise," which may be described as a new form of corporation or industry that is changing not only the digital economy, but the manufacturing economy as well. Second, it will discuss the emerging social structure of the digital marketplace—that is, the possible emergence of new forms of consumer behavior that may shift the balance

of market power from the rights holder to the consumer. But these findings do not necessarily support a simplistic "information revolution" thesis envisioning the replacement of an industrial economy by a new information economy. Thus far the process of change seems to reflect different kinds of transformations within each sector of the economy, including manufacturing, as much as the growth of a new sector called "the digital economy." Thus the Article 2B policy choices should reflect a careful analysis of the differential impact that information technology will cause in each industry and economic sector, one at a time.

A. What form will the corporation take in a network society?

Alfred Chandler, a leading business historian, argues that the modern corporation took shape at the turn of the 20th century, reflecting dramatic improvements in the technology of communication, production and transportation. Today's business theory is centrally concerned with exploring the impact of information technology upon the shape and dynamics of the corporation economy as it grows more complex and diffuse. Manuel Castells's offers three propositions that provide a sociological description of the dynamics of a knowledge economy that may serve to provoke interesting questions for the Article 2B debate.

1. The "network enterprise" is a fundamentally new, post-industrial, organizational paradigm.

As a consequence of the open architecture of the Internet, the "network enterprise" makes possible a flexible organization, one very unlike the hierarchical forms of authority and control in industrial society. Castells argues, "Not only processes are reversible, but organizations and institutions can be modified, and even fundamentally altered, by rearranging their components."[34] Thus the network enterprise implies not only a system of *distribution* for digital products, but even more important, the transformation of *manufacturing* itself. Thus Borrus and Zysman describe the emergence of "cross-national production networks" (CPNs)—that is, manufacturing organizations which coordinate the means of production by outsourcing, rather than owning them.[35]

> CPN is a label we apply to the consequent dis-integration of the industry's value chain into constituent functions that can be contracted out to independent producers wherever those companies are located in the global economy. ... The networks permit firms

34. Castells, *supra* note 15, at 62.

35. Michael Borrus & John Zysman, *Globalization with Borders: The Rise of Wintelism as the Future of Global Competition*, 4 INDUSTRY AND INNOVATION 141(1997).

> to weave together the constituent elements of the value-chain into competitively effective new production systems, while facilitating diverse points of innovation. But even more importantly, CPN's have turned large segments of complex manufacturing into a commodity available in the market.[36]

While Fordism was characterized by the technical division of labor using privately owned industrial capital, making possible mass production, today manufacturing is characterized by customization of product design, and outsourcing of the production process itself. Compaq Computer, which builds only to fill a network order, and contracts out production to a company that assembles many other brands of computers, is a good example of such a "network enterprise." Companies like Federal Express have had a similar revolutionary impact upon distribution.

2. Innovation is the primary economic activity of the network enterprise.

Castells argues that the primary source of economic power in the network society will not be the manufacturing and distribution of commodities, but innovation and the customization of products.

> Value added is mainly generated by innovation, both of process and products. ... Innovation is itself dependent upon two conditions: research potential and specification capability. That is, new knowledge has to be discovered, then applied to specific purposes in a given organizational or institutional context. Custom design is critical for microelectronics in the 1990s; instant reaction to macroeconomic changes is fundamental in managing the volatile financial products created in the global market.[37]

The larger economic context of the Article 2B discussion, then, might well be its consequence for innovation and organizational flexibility in a knowledge economy. This would shift the focus away from the application of a theory of property rights based in the natural rights argument of early capitalism, which assumes that innovation is a matter of producing new intellectual property.

Castells's research began by asking how and why technical innovation occurs. As an urban sociologist he first turned to major world cities as the classic social milieu of innovation. Yet, as Castells found, the San Francisco Bay Area, though not one of the world's largest metropolitan regions, has been home to both the computer and biotechnology industries'

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36. *Id.* at 141-42.
37. Castells, *supra* note 15, at 243.

revolutions. Innovation in the modern world, he argues, is the product of a "milieu of innovation," characterized by a free flow of ideas.[38] In the case of Silicon Valley, it is the proximity of research universities (Berkeley, UCSF, and Stanford) and the development of a culture of entrepreneurship supported by venture capital that creates a critical mass of information for innovation. Yet, it is not information *per se* that is the central analytic concept of the network enterprise, nor flexible institutional form alone, but the *flow* of information; this *flow* is in turn the key to progress in the useful arts and sciences in an information society. Thus, Castells suggests that our traditional sense of geographic place should be replaced by an understanding of "the space of flows"—that is, the information flows that determine the wealth or poverty of a given neighborhood, city, region or nation.[39]

What is the relationship between the space of flows, the free flow of ideas, and the proposed contract regime? If indeed it is the flow of ideas that determines innovation and wealth, then Article 2B tends to commercialize and privatize political questions concerning progress in the useful arts and sciences by placing economic control into the hands of international corporations. But more importantly, if the protection of intellectual property is defined as the primary policy goal, whether by copyright or contract, the nature of the Internet as a "space of flows" will be transformed by encryption and other technological controls, turning signals into commodities by limiting access. Will the economic benefit of the network be fatally compromised—that is, will protection inhibit the flexibility making possible the "network enterprise" itself?

3. Globalization with borders?

It is often stated that the network economy is global, but Castells argues that there is a fundamental difference between the global economy and the industrial world economy we have previously experienced. The global economy has the "capacity to work as a unit in real time on a planetary scale," while the world economy that has developed over the past two centuries has organized "capital accumulation ... *throughout* the

38. *Id.* On the urban milieu of innovation, *see generally* MANUEL CASTELLS, THE INFORMATIONAL CITY: INFORMATION TECHNOLOGY, ECONOMIC RESTRUCTURING AND THE URBAN-REGIONAL PROCESS (1989) (discussing the theoretical notion of urban milieu as conducive to or oppressive of innovation); ANNALEE SAXENIAN, REGIONAL ADVANTAGE (1994) (applying the notion that urban milieu and innovation are connected by comparing the business and social networks that contributed to innovation in the Silicon Valley area to those in Boston's less successful "Route 128" region).

39. Castells, *supra* note 15, at 378-79.

world."[40] This global scale of the network economy threatens to transcend regulation due to both the temporal pace and spatial scope of the network enterprise.[41] If the flow of information on the network is replaced with technological control and surveillance aimed at protecting intellectual property, it is certainly not impossible to see multi-national corporations replacing the nation state as the central actors in the new economic order.

B. What is a digital marketplace?

While the Article 2B debate focuses on the rights of the owners of digital property, it pays little attention to consumers' use of information, consumers' rights, and consumers' access to possible sources of economic power. But it is consumers who make markets, not rights holders alone. If the sociology of information suggests that the network expands the range of civil society, and that the author of the future may well be a community, what, then, will digital *markets* look like—how will the consumer of digital products use the network?

One economic historian describes the Internet as "a new economic space," stating,

> [t]he vast mass of information, images, and opinions on the Internet is accessible to any computer owner with even a relatively low-cost connection. It is an interactive communications medium through which the user travels virtually; by accessing the Internet, information that would have taken much time and even physical effort to find, is now almost instantly available. The traditional marketplace ... is now accessible to everywhere, simultaneously.[42]

How does this distribution system and consumer information system become an *economy*?

It might be argued that networks indeed make possible virtual communities, but that this merely impacts social relations, not the economy.[43]

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40. *Id.* at 92 (emphasis added).

41. *See generally* BORDERS IN CYBERSPACE: INFORMATION POLICY AND THE GLOBAL INFORMATION INFRASTRUCTURE (Brian Kahin & Charles Nesson, eds. 1997).

42. Martin Kenney & James Curry, *The Internet, New Firm Formation, and Enterprise Patterns*, The International Workshop on Business Venture Creation and New Human Resource Management Strategies in Japan, Europe and the U.S. Tokyo, October 1-2, 1998 46 HITOTSUBUSHI BUSINESS REVIEW (forthcoming 1998) (manuscript at 6, on file with author).

43. On virtual communities and civil society, see Mary E. Virnoche and Gary T. Marx, *"Only connect"—E.M. Forster in an Age of Electronic Communication: Com-*

John Hagel and Arthur Armstrong reject such a limited view of a network economy, arguing that access to information will shift market power from the producer to the consumer, and that therefore the key to business success in the information age will be the use of virtual community technology to create customer loyalty:

> As virtual communities tip the balance of power in commercial transactions toward the customer, they'll provide a powerful vehicle for vendors to deepen and broaden their relationships with customers. This is likely to affect the way traditional businesses are run in 'physical space' as well as in the virtual world ... In fact, ownership of customer relationships as a whole is likely to be thrown up for grabs by the emergence of virtual communities.[44]

While Article 2B imagines a scarcity-based marketplace tightly controlled by information owners, some network entrepreneurs imagine the consumer living in an information rich environment in which vendors must compete to provide community services in order to sell products. This prediction was not based upon any systematic analysis of digital commerce, for even the basic economic indicators needed to perform such research have not yet been defined. But it does suggest that Article 2B's focus upon the rights of property owners should be complemented by an interest in the power of consumers in the development and dynamics of the digital marketplace. Indeed, information about the use of networked information by consumers has become the first successful cash crop of the Internet economy, but has also raised issues involving consumers' right to privacy, acceptable means of surveillance, and the ownership of surveillance data.

IV. ARTICLE 2B AS INFORMATION POLICY

This paper has explored two questions about the nature of an information society that underlie the Article 2B debate, yet are rarely formulated directly by commentators, namely: (1) What is information? and (2) What is a digital economy? Seen from the perspective of social science, the Article 2B debate has become too focused upon legal technique—the means by which, and degree to which, intellectual property should be protected in an information economy—and is too little aware of its implications for

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puter-Mediated Association and Community Networks, 67 SOCIOLOGICAL INQUIRY 85, 86-88 (1997).

44. JOHN HAGEL III & ARTHUR G. ARMSTRONG, NETGAIN: EXPANDING MARKETS THROUGH VIRTUAL COMMUNITIES 187 (1997).

American information policy as a whole. Seen as an information policy, the legal debate about Article 2B must consider the social dynamics of code as code and the emerging social relations in cyberspace—the "network enterprise" and "virtual communities" of consumers—before imposing regulations that may inhibit the development of these new economic formations. Only by integrating legal analysis with some understanding of the social relations that are developing around network technology might the drafters of Article 2B succeed in crafting a legal regime that truly promotes the progress of science and the useful arts.

The Article 2B argument is ultimately tangled because it contemplates changes so fundamental that it engages every level of a comprehensive information policy. In conclusion, this Article will illustrate the way that Article 2B changes American information policy by examining the impact of a contract regime upon the research library, the institution developed over the past century to promote progress in the useful arts and sciences. And, since Article 2B is an information policy masquerading as an application of the commercial code to a new distribution channel, the quality of the debate will be measured against the four dimensions any information policy for a digital economy must achieve.

A. The death of the research library.

Alfred D. Chandler points out that the history of the corporation, and thereby the shape of economic power, directly reflects the history of control over "information flows," which he calls "paths of learning."[45] Ultimately Article 2B is a debate about concentration of economic power. The information age may well pose unprecedented monopoly problems if the control of information flows is privatized because today the basic "know how" about code is concentrated in a few corporations. In the past, Chandler argues, most industries were characterized by multiple paths of learning, which ensured competition; today while biotechnology is characterized by multiple information flows, as was illustrated by the "community of practice" described earlier, information technology is characterized by increasing concentration of power over the information infrastructure.[46]

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45. Alfred D. Chandler, *Paths of Learning*, Address at the Haas School of Business at the University of California, Berkeley Conference on Knowledge Creation and Transfer: The Second Annual UC Berkeley Forum on Knowledge and the Firm (Sept. 25, 1998) (visited Oct. 29, 1998) <http://www.haas.berkeley.edu/~imio/conference>. "Paths of Learning" will be the title of Professor Chandler's forthcoming book.

46. *Id.*

Social science research has largely concentrated upon social formations in the public portion of the World Wide Web, while the Article 2B discussion has focused upon commercial information resources, licensed and perhaps protected by password and encryption. These parallel realities are not necessarily in conflict, although they are different. All markets consist of a mix of what anthropologists call gift exchange and market exchange. The two are not opposites, but are inter-related and symbiotic: exchange within the family tends to be characterized by gift exchange, for example, but families interact with the economy through market exchange. Today the Internet includes many varieties of gift exchange, such as shareware and freeware (e.g. Linux, Apache), along with varieties of market exchange, such as software that can be downloaded but requires a keyword to activate. The problem is at the boundary, when public domain information or software is privatized ("enclosure"), and private information property is copied illegally ("software piracy").

In the print world, this boundary has been managed by copyright laws, particularly fair use and the first sale doctrine, which has made possible the modern public research library as a boundary maintenance institution, buying information in the market, but loaning it within a gift culture.[47] The public research library has governed the information flow for innovation and research for the past century, and, together with the Land Grant University, has served as the core of American information policy in the age of industrialization. But this strategy is now becoming endangered by the enclosure of the public domain. Today the digital library is still a hybrid of gift and market exchange, as libraries digitize works that are out of copyright or produced for the public domain. But many current publications, particularly scientific journals, are regulated by contractual terms that do not permit sales to libraries, but instead only license the use of their "information content." Indeed, the term "information content" was designed by the publishing industry to signify that they have become merchant bankers in intellectual property; the business of publishing now concerns ownership of information flows, the licensing of the use of information. Publishers' contracts generally forbid the use of digital documents in the traditional library gift economy, such as circulation outside of the institutional license or inter-library loan. Research information flows in the digital library of the future will likely be governed on a per capita or fee for service basis.

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47. Peter Lyman, *What is a Digital Library? Technology, Intellectual Property and the Public Interest*, 125 DAEDALUS 1, 26-28 (1996).

There are costs and benefits in this vision of the information economy, as the Article 2B discussion has revealed. The benefits include economic incentives to develop high quality networked information, and, in principle, universal access to research information nearly anywhere in the world through the Internet. The cost is that, in practice, access to information will be governed by the ability to pay, and, given the increasing commercialization of scientific publishing, the price of journals will continue to increase at double-digit annual rates. Previously, fair use based information policy had subsidized information access in the name of the public interest in education. Today, universal access is being defined as access to the Internet itself, rather than to educational content. Will there be an Internet equivalent to the bandwidth reserved for public interest broadcasting?

In many ways Article 2B merely formalizes the transition from an information policy based on public libraries to a system of "universal access" modeled after telecommunications, in which public access to information flow technology is subsidized, but information services are paid for by the consumer. This has become a legitimation crisis, as few funding authorities have been willing to increase library budgets at a double-digit annual rate simply to subsidize free access to information. Hence, today, library collections represent an increasingly smaller proportions of published information. The research library of the future is likely to become a repository of public domain information (including, at least for the moment, government information), and access to licensed information on a fee-for-service basis. The primary unsolved problem in this scenario is the funding of archives: in the past, libraries have preserved and stored printed information as an archive of the history of knowledge; as information loses its commercial value, it is unlikely that commercial rights-holders will subsidize its continued existence. Only late in its evolution has the Article 2B debate begun to address the role, if any, of public interest subsidies for libraries and education. In the absence of a concept of the public interest, there should be an accounting of the consequences for a democratic society of the enclosure of the domain of publicly accessible information.

B. A Framework for Further Analysis.

Bar and Murase have defined four basic levels of function which must exist in any system of commerce, whether conventional or electronic, posing linked yet differentiated kinds of technological and regulatory

challenges.[48] Their "levels" might serve as a helpful framework for organizing an analysis of the Article 2B debate:

> Commercial activities, whether conventional or electronic, involve four basic levels: a *communication infrastructure*, carrying messages about prices, quantities, service or product characteristics; *a marketplace*, the market coordination environment within which buyers meet sellers and negotiate; *transaction* mechanisms to send, execute and settle orders (including payments); and *deliverables*, the service or merchandise being exchanged.[49]

The Article 2B debate engages each of these levels of discourse at different times, reminding us that the present legal debate implies the formation of a comprehensive economic policy for emerging markets. But this larger context is often lost for one of three reasons. First, there may be confusion about the level of commercial infrastructure involved, or the implications of an argument made at one level for policy at another level. Second, examples of "the digital economy" often confuse "indirect" or "hybrid" e-commerce, such as the electronic ordering of tangible goods (sometimes called "network aided conventional commerce"), with "direct" e-commerce, the on-line delivery of e-goods, where all four levels are electronic. And finally, national debates about policy regulation of electronic commerce necessarily occur within the broader context of global competition, because the scope of the network economy is international. For this reason, even a commercial code may require global coordination through trade and treaty negotiations, given that the scope of the network economy transcends traditionally national legal jurisdictions.

1. A communication infrastructure

The infrastructure that makes communication and transportation possible is the precondition of all commerce; as Bar and Murase describe this level, "widespread diffusion of electronic commerce requires an *advanced network infrastructure* that can be accessed equitably and on a technologically neutral basis. ... Governments must therefore set ground rules that guarantee infrastructure access, network interoperability, and technical standards."[50] As we have seen, however, "code as code" is not simply a matter of network management, but shapes and regulates conduct and or-

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48. Francois Bar & Emily M. Murase, *Charting Cyberspace: A U.S.-European-Japanese Blueprint for Electronic Commerce*, *in* TRANSATLANTIC TRADE COOPERATION IN ASIA: SECTORS, ISSUES AND MODALITIES 5 (Richard Steinberg & Bruce Stokes eds.) (forthcoming 1998).

49. *Id.*

50. *Id.* at 7-8.

ganizations as well. Therefore, there can be no such a thing as a "technologically neutral basis" of access. These social contexts are illustrated by this definition of the word "computer" in a review of the literature: "Computers, in this review, refer to substantially more than the basic machines associated with computing. Computer technology is a 'package' that encompasses a complex, interdependent system comprised of people (computer specialists, users, managers), hardware (computer mainframes, peripherals, telecommunications gear), software (operating systems, utilities and application programs), techniques (management science models, procedures, organizational arrangements), and data."[51] Inevitably, then, issues of economic power and monopoly will arise when technical standards and practices are allowed to be proprietary.

2. A marketplace.

"A *network marketplace*," then, "is created upon this infrastructure by defining, through *software* configuration, the rules of market participation and coordination."[52] But Bar and Murase continue, "Policies defining a 'Commercial Code' for e-commerce, as well as ground rules for privacy or taxation, will critically shape the emerging e-marketplace."[53] The notion of an e-marketplace has been the goal of the Article 2B debate, although there has been relatively little discussion of consumers' rights or the creation of new markets. The issue of taxation policy has been recognized as an important economic factor, but one that is separable in principle from either commercial codes or copyright policy. The issue of privacy has come up primarily within the context of self-help, rather than in terms of a user's ability to control access to personal data generated in using networked information. In general, Bar and Murase contrast American policy, an "approach that relies heavily on industry self-regulation and ex-post legal remedies," with European Union policy, "a comprehensive regulatory regime that provides *ex-ante* legal protection for consumers."[54] This contrast resonates with Cohen's statement that "the drafters are far more concerned with intangible harms to commercial interests than with intangible harms to individuals."[55] These factors provide good examples of

51. John Leslie King & Kenneth L. Kraemer, *Computer and Communication Technologies: Impacts on the Organization of Enterprise and the Establishment and Maintenance of Civil Society*, FOSTERING RESEARCH ON THE ECONOMIC AND SOCIAL IMPACTS OF INFORMATION TECHNOLOGY 188, 190-91 (The National Research Council, 1998).

52. Bar & Murase, *supra* note 47, at 8.

53. *Id.*

54. *Id.* at 27.

55. Cohen, *supra* note 21, at 1106.

why code must be understood as "frozen social policy," and as raising issues of the public interest as much as private property rights.

3. Transaction mechanisms.

The third level consists of "the electronic transactions that occur within the network marketplaces [that] require guarantees about data security and support for electronic payments ...."[56] At this level the Article 2B debate has not engaged the global dimensions of information policy, particularly international debates concerning data security. For example, American insistence upon export controls over encryption technologies and "back doors" accessible to U.S. national security agencies is perceived by Europeans as a thinly disguised trade barrier.

4. Deliverables.

Finally, "in cases where the deliverables themselves are electronic (e.g., software sold over the Internet), e-commerce will also involve policies about intellectual property rights and content regulation."[57] The Article 2B debate is centrally focused on the adequacy of the definitions of deliverables as "information" and "information content," as well as issues concerning the coordination between federal laws concerning copyright and state commercial codes.

5. Summary: The commonality of code across these levels.

Although parsing the problem in these four levels is helpful in gaining a sense of the place of the Article 2B debate in a comprehensive information policy, it is striking that there is also a commonality across the four levels of analysis. At each level the digital economy is dependent upon code. Whether software-based or instantiated in silicon, code determines both the means and the mode of production, and therefore it is the key to wealth and power in an information society. Indeed, a vision of an information society is the real subject of the Article 2B debate, even if it is only occasionally visible as such.

V. CONCLUSION

This paper has argued that the Article 2B debate, like all discussions of "the computer revolution," has become trapped in its own metaphors—metaphors about "information highways" and the "knowledge economy."

56. Bar & Murase, *supra* note 47, at 9.
57. *Id.*

The first stage of every process of historical change must necessarily use metaphors from the past, but they are at best heuristic.

Social science research has been presented in this paper as a test of these heuristics, and has identified two important concerns. First, while software code is the infrastructure of the new economy, it is not simply a commodity like other forms of capital investment; it is also a communications medium that engages important political interests. Second, the knowledge economy does not replace the industrial economy in any simple sense; rather each economic sector is being transformed according to its own logic, and therefore regulatory policy must be modest and incremental. Unfortunately, the Article 2B debate has most often failed to appreciate and respond to these concerns.