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APPENDIX

perspective. We look forward to testing and building on the ideas presented here as others use and debate them. Most of all, we hope to collaborate with the rapidly widening group of individuals and institutions seriously worrying about the consequences of the tensions between rapidly changing information technologies and slowly changing social structures. Consequently, throughout this paper we have included brief descriptions of new projects and of extensions of our own work in the hope that others will join us in taking up the challenges we see.

At several points we have had to note that obvious extensions of our work in preparing this paper would be interesting and useful, but were beyond the scope of this effort. We share the reader's frustration, and look forward to remedying these omissions.

Five themes underlie our discussion:

1. *Differentiating Among Different Forms of Information Resources, Formats and Technology*

2. *The Needs of All Citizens*

3. *The Limits of the Concept of "Intellectual Property"*

4. *The Need for New Policies and Regulations that Do Not Foreclose Experimentation*

5. *Call to Action to the Educational Community*

1. Differentiating Among Different Forms of Information Resources, Formats and Technology

The failure to distinguish among information products that have significantly different characteristics is a continuing source of unnecessary confusion and argumentation in discussions of the uses and regulation of new information technologies. For example, consider the ways in which the following differ in level of resources necessary to develop and maintain them, number of individuals likely to use them, and impact on the individual productivity of the users:
a) a small computer program developed by an individual faculty member to help a few students explore a single concept for a particular course;
b) a new wordprocessing package; and
c) an online database of statistical information.
If citizens are to fully exploit the potential of these technologies, the protection or support of one of them should not come at the expense of another.

2. The Needs of All Citizens

All citizens have a stake in the technologies of freedom, but most are not yet players in the politics of technology. The discussion of the emerging digital environment must be extended beyond current technologies and current stakeholders to include a broader range of perspectives, interests, values, and participants.

Thus far the discussion surrounding national electronic networks and the supporting infrastructure has been dominated by those already having economic interests in present forms of intellectual property. But the vital interests of most citizens are yet not fully represented. This is true, in part, because information technologies have only recently

> new kind of politics–that reflects the transformation in the reality around us?[3]

The risk is that in this rapidly changing technological environment the better-represented and established property interests of traditional publishers and distributors, of information products, and of industries such as entertainment and telecommunications, may influence the development of new economic and legal constraints in ways that inadvertently conflict with the best long-term interests of the creator/producers and of the users of information — especially in educational institutions.

We will argue that the concept of *intellectual exchange* (including the *sharing* of intellectual products) must be made co-equal with the concept of *intellectual property*, to remind us that property has never been the sole mode of exchange of intellectual products; this is particularly true in educational environments.

The current intellectual property system, represented most visibly by the copyright and patent mechanisms, is broken–or at least breaking. If our society is soon to achieve the maximum benefit from the remarkable potential of new information technologies, the relevant infrastructure must be changed or created. A new technology implies a new infrastructure.

> Exclusivity of rights was relatively easy to preserve in colonial times because the methods of reproduction were modest. Explosive technological growth has profoundly changed the capacity for reproduction. When messages were transmitted by wires, cables laid on the ocean floor, or held between book covers, it was fairly simple to distinguish the content of the message from the mechanics of transmission; but when ideas have been reduced to a form that can be read by computers, transmitted by wireless, satellites or lasers, it is increasingly difficult to distinguish the medium from the message or to control either one. Exclusivity of possession is ephemeral when copying can be done without the knowledge, much less the consent, of the holders of the rights.
>
> The appropriate balance between private reward and public good cannot be struck by limiting access to communications technology. Even when it is mechanically or politically possible to destroy access, the results are unacceptable because the effect is to diminish valuable resources that could otherwise supply the needs of millions of human beings ...
>
> The remedy is not to discard patent and copyright systems nor otherwise to destroy the incentives for creativity. What is needed is the invention of additional means for protecting the rewards to creators while still disseminating the results for the good of society.[4]

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3 Cleveland, Harlan, "Information Technology and World Class Ideas," *The Aspen Institute Quarterly*, Winter 1990, Vol. 2, No. 1, p. 45.

4 Hufstedler, Shirley M., "The Global Commons: Technological Advances and a Nest of Dilemas," *The Aspen Institute Quarterly*, Winter 1990, Vol. 2, No. 1, pp. 54-55.

C. Organization of This Paper

Section I. INTRODUCTION

Section II. THE NEED FOR A NEW CONCEPTUAL FRAMEWORK, BILL OF RIGHTS, AND ACTION AGENDA

We identify some emerging issues and trends in the usage of the new information technologies in the academic world–and beyond–that appear increasingly problematic or unlikely to be covered effectively by the policies and regulatory mechanisms already in place.

As new digital formats and media enable the creation of new kinds of intellectual products, it becomes clear that many of these works are not well conceptualized or regulated by the present intellectual property system–the one which has served to regulate the distribution of print materials. Further, without substantial adaptation, the present system will continue to impede unnecessarily the full exploitation of the technology.

Section III. CONCEPTUAL FRAMEWORK–The Electronic Citizen Model

Mindful of the increasing functionality of information technologies, the growing inadequacies of the present intellectual property system, and the potential usefulness of extending intellectual product exchange systems to the new digital environment, we have been led to develop the foundation for a new conceptual framework, including:
- a set of categories for intellectual products reflecting the new variety of forms of information and modes of communication;
- a set of categories for constituencies–both stakeholders and dependents–reflecting their level of involvement and their level of awareness of the changing intellectual property infrastructure and of the NREN itself; and
- an approach that begins by considering information resources, values and cultures which govern the actual creation and distribution of information (especially in the non-profit sector), and then progresses to infer the need for policies and mechanisms to regulate these processes appropriately throughout society–not only within the commercial sector.

Section IV. CONCEPTUAL FRAMEWORK AXIS 1: INFORMATION RESOURCES, FORMATS, AND TECHNOLOGY

The concepts of "appreciable" and "implementable" intellectual products are introduced to suggest the beginnings of a taxonomy for categorizing information resources, formats, and the related technology.[7] It is hoped that this taxonomy, or a successor to it, will be more fully developed and will provide a useful basis for the development, articulation, and application of policies for regulating and guiding the treatment of intellectual products.

Section V: CONCEPTUAL FRAMEWORK AXIS 2: CONSTITUENTS AND PARTICIPANTS –Decisionmakers, Stakeholders, and Dependents

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[7] The appendix provides an elaboration of these ideas.

Vision: What happens if constituencies are able to exercise these rights? Alternative views of the future, both short term and longer term, are presented as projections of the impact of implementing the recommendations made in this paper.

Section IX. CONCLUSION

The paper concludes with a description of relevant works in progress of the EDUCOM Educational Uses of Information Technology (EUIT) Program; an articulation of the four basic unmet needs (economic mechanisms, ethics and guidelines, representation for all constituencies, and a forum for the voice of education in the development of the successor to the present intellectual property system); and a list of the most essential next steps.

• *New Standards of Validity*. Information is created and disseminated without clear standards of validity; unlike the journal system for print, most digital works are neither edited nor peer-reviewed. The words we use for online information sources, "data" and "information," suggest that the reader or user must provide the validation process required to transform them into "knowledge." Thus far the technical subcultures which dominate computing have valued democratic access to information, but the principles of selection and judgment which the traditional publishing process provides in the print world are beginning to become important in the digital world as well. Obviously such editing adds value to information, and can become the source of a property claim.

• *Establishing a "Collection" Policy in the Digital Environment.* To use a library metaphor, there is no "collection" policy for these new digital works and formats. There are costs involved in storing digital works, and particular works may be removed from the system, or changed, for economic reasons without reference to a principle of selection, preservation, or collection. Thus far, in consequence, there is no well-established stable body of work, no "literature," in the digital realm. Here again, forming and maintaining such a collection could provide the basis for a new kind of property claim.

• *Differential Treatment of Proprietary, Public, and Private Information.* As the digital infrastructure continues to evolve and the number of individuals using it routinely escalates, the amount of electronically accessible material–both proprietary, public domain, and personally developed–will increase dramatically. How can or should proprietary information be treated differently from public domain? from personally developed and "privately" distributed? What policies can and must be developed to guide the modification, packaging, and distribution of these different categories of information?

2. Constituents and Participants

• *Broaden the Definition of Stakeholders*. The 1986 OTA report on intellectual property "Some problems are particularly pressing because stakeholders are seeking immediate legislative action, societal stakes are particularly high, or technological change is occurring so rapidly that Congress must act sooner rather than later if it wants to deliberately channel its impact."[9]

We broaden the definition of the stakeholders beyond those currently participating in the current debate about the need to modify the legal dimension of the intellectual property system. This step is a necessary response to recent technological innovation and diffusion.

• *Balance Interests of Stakeholders and Citizens*. Clearly, the authors and publishers of printed information resources have vital interests to protect as new digital media emerge; these interests are already well-represented. In this paper we differentiate among those who are current stakeholders in the intellectual property system and the electronic information infrastructure–those who have real vested interests and know it–from groups and individuals who are increasingly dependent on these systems, but remain unaware of it. Without some intervention, the latter may awaken in a few years to discover that information and services that have become essential for their daily work and entertainment have become legally, economically, or technically inaccessible.

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[9] *Intellectual Property Rights in an Age of Electronics and Information*, The Office of Technology Assessment of the Congress of the United States. Washington, D.C., United States Government Printing Office, April 1986, p. 13.

1. Information Resources, Formats, and Technology–NREN

• *Ease of Use.* The comfort and convenience associated with using the NREN will strongly influence how widely, frequently, and effectively it is used. Will an on-line environment comfortable for non-technical users be readily available?

• *Support Staff.* What kinds of users will have access to sophisticated support staff for help both with the identification of initial usage requirements and with the exploitation of the full capabilities of NREN's facilities?

• *Access Device Options.* Will it be possible (including fee structures that are not prohibitively expensive)
(a) to use a broad range of access devices, including less sophisticated and less expensive devices more commonly found in elementary and secondary schools and small colleges? or
(b) to use the more sophisticated and more expensive devices necessary for the disabled to make effective use of the NREN?

2. Constituents and Participants–NREN

• *NREN's Evolving Constituency.* In their first phase, national computer networks were used by a relatively homogeneous group of scientific researchers for relatively homogeneous purposes; e.g., the ARPANET, which had a clear mandate to support communications among government defense contractors. But today, national networks have begun to be used by a more diverse group. Thus the *constituents* for the emerging NREN and the surrounding intellectual property system include not only its creators and the current stakeholders, but also those who will be dependent upon it in the future; just as the national highways initially had a defense purpose, but became the foundation for whole new industries and ultimately a whole new kind of society.

• *The Needs of NREN's Future Users.* To create the initial infrastructure necessary for an electronic community of researchers, students and educators, NREN's design and implementation must reflect the values and needs of the broadest possible constituency. Current stakeholders' needs are important, but so too are the needs of those who may be enabled by NREN to gain access to insight, discovery, knowledge and improved educational opportunity to those constrained by geography, socioeconomic class, ideology and ready access to such resources. As NREN becomes more common, access to its facilities will become increasingly important. By the same token, lack of access to NREN will become a major barrier to quality research and education.

The values of stakeholders do not always match with those critical to the broader population of users.[11]

3. Control and Influence Mechanisms–NREN

• *NREN and the Need for a New Approach to "Intellectual Property"*

> A national network will link academic researchers and industry, clustering research centers, and business around network

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11 Also see Section V. below for a more extended discussion of this topic.

reliable, respectable, simple means of determining a document's quality (as is currently done by the scholarly journals). It will also be necessary to provide facilities to allow communications among selected participants to foster collaborative work, while simultaneously offering the option of restricting access to certain information only to its creators or their designees. For example, access to collaboratively generated documents could be restricted only to those researchers attacking a common problem, or to members of a specific field of study, or to students invited to monitor the researchers' interactions but not to contribute.

D. Need for a New Conceptual Framework

New information technologies — computers, telecommunications, video, etc. — have already revolutionized our capability to create, organize, store, find, transfer, modify, and use information. These functions are vital to teaching, learning, and research. But the technological challenges are now secondary to the need for a new system of organizational, economic, political, and legal mechanisms for enabling higher education and industry to conduct the research and instruction necessary for the United States to achieve social goals at home and remain competitive in the world of the 21st century.

In the first chapter of *Intellectual Property Rights in an Age of Electronics and Information*, a conceptual framework for these issues was presented and explored:

> An intellectual property system is made up of laws and practices and the relationships they generate among individuals and institutions. A system of this kind reflects the larger society of which it is a part. For, although intellectual property rights have been recognized in natural law, historically, governments have granted such rights to achieve a variety of policy goals. This is equally true today. Which policy goals a particular intellectual property system is designed to serve depends, in large measure, on history, circumstances, and the overriding needs of society.
>
> Technological change has been one factor that has had an especially significant influence on both social systems and the intellectual property systems that arise from them. Today, it is posing a formidable challenge to the intellectual property system.[13]
>
> ...
>
> Together, these rights, incentives, and the conditions under which they are granted constitute **the operating rules of the intellectual property system.** ... Different intellectual property systems may define intellectual properties differently, and each may attach different rights, responsibilities, and benefits to them. The

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13 The Office of Technology Assessment of the Congress of the United States, *Intellectual Property Rights in an Age of Electronics and Information* , United States Government Printing Office, Washington, D.C., April 1986, p. 19.

E. New Perspective: Start with Culture and Values, Not Laws and Economics

In any system or organization, values influence expectations and limit the alternative uses that participants even consider. Society establishes mechanisms–both formal and informal–to encourage, preserve, and in some instances enforce such values as truth, honesty, respect for the rights of others, and privacy. The mechanisms are established to support the values; the mechanisms emerge from the values.

Recent events in Eastern Europe present the most vivid examples of a society recognizing that their mechanisms are no longer consistent with their values. In such cases, it is the mechanisms–not the values–that give way.

In the next sections we will present a conceptual framework and an approach that moves beyond the print-based intellectual property system. Our approach focuses first on the changing functions of information and communications, second on constituencies and subcultures, and third, on their values, and needs. Within our framework, we see policies and regulatory devices as implementation mechanisms to meet constituencies' needs and embody their values in this new environment. We reverse the usual order: *instead of beginning with the currently applicable law, we advocate starting with an understanding of the values and culture of the non-profit (especially educational) sector and, from that perspective, reexamining the legal system for regulating idea-properties and the commercial system for distributing idea-properties.* We want to develop a value-based and culture-based analysis. The scope of this paper permits only a beginning of this process, since by definition it must be the work of a large and diverse group.

B. Description

The conceptual framework we propose is intended to facilitate the development of influence and control mechanisms based on the cultures and values that will influence behavior throughout the emerging digital infrastructure–an infrastructure that includes, but is not limited to, the traditional meaning of the term "intellectual property system."

The model we propose has three axes:

1. *Information* resources, formats, and technology,
2. *Constituents* and participants, and
3. *Control* and influence mechanisms.

The *axis for information resources, formats, and technology* addresses the new variety of information products and the electronic infrastructure for creating, storing, and distributing them. The *axis for constituents and participants* represents the wide cross-section of organizations and individuals who are active in the development, operation and use of the NREN and the entire emerging digital infrastructure of which it is a part. The *axis for control and influence mechanisms* represents the various legal, economic, social and ethical mechanisms that guide the achievement of the goals for NREN and the surrounding system.

The model we propose is titled the *Electronic Citizen Model* because it provides a context in which the various constituents and participants can understand and exercise their rights and duties as citizens in the new electronic, information-rich environment. This model offers a framework for considering more conventional "intellectual property" issues in a new context and for identifying and developing critical elements of NREN. We are proposing a context for debate that avoids the problem of beginning with jargon or assumptions that prematurely and arbitrarily favor a particular set of stakeholders.

The three axes suggest a three-dimensional model in which individual cells are associated with a particular information format (e.g., an implementable product), a particular constituency (e.g., potential users), and a particular control mechanism (e.g., shrink-wrap licenses). Preliminary analysis suggests that it will be useful to develop the three axes more fully and to consider which categories of intellectual products belong in each cell and what implications may be revealed by this detailed articulation. Unfortunately, this task is beyond the scope of this paper.

V. CONCEPTUAL FRAMEWORK AXIS 2: CONSTITUENTS AND PARTICIPANTS–Decisionmakers, Stakeholders, and Dependents

A. Introduction

The *Axis for Constituents and Participants* represents the variety of individuals and organizations that are involved in the creation, operation and use of NREN and the surrounding infrastructure–computer scientists, politicians, lawyers, teachers, researchers, students, technicians, etc. These are *Electronic Citizens* whose values shape the context in which NREN will operate. The values they hold vary significantly based upon the role they play; for example, the computer science creators of NREN might value being on the leading edge of technology or transmitting some number of gigabytes of data at unprecedented network speeds. At the same time, a social science researcher can value a user-friendly environment that makes accessing disparate databases easy; a genetic researcher can value the ability to exchange research findings or hypotheses with associates with a sense of security based on confidence that no one can eavesdrop on their discussion; and the authors of application programs may value the ability to track those who download their works.

NOTE: While this section focuses entirely on the constituents and participants for the NREN, the categories offered and discussion of their significance can and should also be applied much more broadly–to the entire emerging digital infrastructure. That process is beyond the scope of this paper.

> Stakeholder, n: a person entrusted with the stakes of bettors.
>
> Vested interest, n a group enjoying benefits from an existing economic or political privilege.[17]

In the case of NREN the "stakeholders" are those actively involved in the process of planning for the national electronic highway, while the "bettors" are the researchers, educators, students, taxpayers and voters who may reap the benefits of using the highway. If NREN is to serve the needs and interests of the nation, we must not only identify and consider the current planners' roles, and expectations *vis a vis* the electronic highway, but we must also recognize that some of the "bettors" don't yet even know they are in the game. The interests of the latter must also be represented and protected.

Perhaps the broadest classification scheme possible is to divide the population into current stakeholders/users and potential users. Current stakeholders and users of electronic networks represent an active minority of those involved in research and education. Even the latter two groups are a tiny fraction of *all* the potential users of the electronic highway system.

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17 *Webster's' New Collegiate Dictionary,* 1975.

work, but also those who use the networks primarily for communicating with colleagues and friends. These are students, teachers, researchers, professors, business people, lawyers, *et al.*. These are the customers who will use the electronic highway to do their research and teaching. They will use the highway to create sonatas and plays, to analyze census data and predict stock market fluctuations, as well as to model the universe and predict weather.

E. Potential Users.

This category includes the vast majority of people in this country who at present do not use electronic networks at all, but have the potential to find them useful–even necessary–in the future. These individuals have no vested interest, but their existence provides an important basis for justifying the investment required to build the NREN. Typically, they have no knowledge or involvement in the decision making process, and–to the best of our knowledge at this time–their specific interests are not being determined or considered.

We are concerned that the constraints that may be embedded within relatively simple extensions of the current intellectual property system–through pricing mechanisms or legislative restrictions–by active stakeholders may limit the future use of the NREN and the surrounding structure by this largest category–the potential users. (Note: Collecting additional information about the potential value of NREN to these under-represented constituencies is a current project of the EDUCOM Educational Uses of Information Technology (EUIT) Program).

Now, let us also examine another way of looking at groups within the categories of current stakeholders, current users, and potential users. Consider another three category system for classifying constituents or participants: *creators/producers, publishers/distributors, and users.*

Since we have already discussed "users" and "potential users" above, we will not repeat that material here. However, we note again that the new information technologies make it easier and increasingly likely that "users" also function as creator/producers and as publisher/distributors.

F. Creators and Producers

Creators and producers of intellectual products have a vested interest in the digital infrastructure in general and NREN in particular, although many of them have little knowledge of the process by which NREN is being formed and little connection to it. Their interests are probably not being represented. These individuals or groups usually conceive and produce locally usable versions of intellectual products, usually accessible and usable by only a small number of people–at least within a short period of time after creation. Included in this category are: researchers collecting data on a myriad of topics from anthropology to zoology, scientists conducting experiments, programmers writing code, writers at all levels of expertise and on any topic. Examples of the types of work that would be created by these would include papers, sophisticated collections of data, anthologies in various formats, computer programs, musical works, etc.

G. Publishers and Distributors

This category is comprised of those who transform the "locally usable version" of an intellectual product produced by *creators/producers* into one that is

VI. CONCEPTUAL FRAMEWORK AXIS 3: CONTROL AND INFLUENCE MECHANISMS–Intellectual Property and Intellectual Exchange Systems

The *Axis for Control and Influence Mechanisms* represents the various devices that exist to establish, maintain and, if necessary, enforce the values of the *Electronic Citizens*. These include such things as copyright and patent law, economic agreements and contracts, organization policy of NREN and the various organizations to which constituents and participants belong, and the social norms and ethical constraints of our society and culture.

A. Definition of the Issues

1. Intellectual Property and Exchange Systems

Historically, the promise of new technologies and knowledge formats has often been stunted by the habits and concepts based upon the use of familiar tools. Thus for over a century the printing press was used to produce imitations of handwritten manuscripts for monastic libraries, before print was introduced and became the mass medium foundation of democratic society.[18] In the first stage of technological innovation new technologies are often used only as more efficient means to achieve traditional ends. In our own time, "automation" is a term reflecting this approach; for example, the automation of the library catalog has been based on replicating the contents of the old paper records, while computer technologies had the potential to create far more complex records (e.g., including pictures, voice, tables of content, abstracts, etc.).

Today our culture is using terms and concepts based upon centuries of use of printed documents to define new digital texts which are often wholly unlike print. For example, printed documents have *tangibility:* they may be seen at a fixed point in space, thus it is possible to regulate them by charging for copies. Digital products are *malleable:* they may be seen (or used) at a fixed point in time, but copied or moved from place to place at will; thus it is difficult to regulate them because they may be reproduced at will. While it is easy to understand printed documents as property, it is difficult to experience digital productions as tangible things, much less as property.

The term "intellectual property rights" is most functional within legal and economic contexts, but does not accurately describe digital products themselves, nor the social contexts within which they are used. For that reason we need to reverse perspectives, working from the characteristics of digital products and their social contexts back toward the problem of defining "ownership" and related issues of rewards, incentives, and mechanisms of regulation. In this section we suggest a distinction between "intellectual products exchange systems" and "intellectual property systems" that should help develop more appropriate and effective mechanisms for controlling, regulating, and influencing the behavior of "knowledge workers." However, we are only at the dawn of an information society, and only beginning to know the nature of digital products and their use.

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18 Elizabeth I. Eisenstein, *The Printing Press as an Agent of Change,* Cambridge University Press, Cambridge 1979.

• *Problems at the Boundaries.* The greatest problems in regulating intellectual products come at the boundaries between the property and exchange systems. When, for example, intellectual property is illegally accessed or copied and brought into the public domain as freely exchanged goods. Or, for example, when free information or programs are removed from the public domain and treated as private property.

• *Serving the Public Interest Must Come First.* The important institutions which participate in the creation, publication, regulation and dissemination of intellectual products in the United States are not very old: publishers (in the modern sense) have only existed for about 150 years; most public libraries have only existed about 100 years; modern-style research-oriented universities have existed less than 100 years; and intellectual property laws, while anticipated in the U.S. Constitution, have mostly been defined in the past century. Historically, all of these institutions are relatively new, and have been evolving rapidly. It is very possible that none of them will exist in their present form in another century. Thus, serving the public interest through the current system(s) for valuing intellectual products is not necessarily identical with serving the interests of these particular institutional arrangements. We cannot yet predict what form these institutions will take, nor are we ready to prescribe the systems for valuing intellectual products that will be most effective; but scholarly studies do indicate that a plurality of values and cultures for dealing with intellectual products can be of great value to a society.

3. Values and Communities

Thus while the intellectual property system serves the needs of the commercial sector, the needs of other sectors must be considered in parallel, and not simply through the perspective of intellectual property. A good example of how the intellectual property system can narrow the way we think about intellectual products is the definition of "property right" in *Intellectual Property Rights in an Age of Electronics and Information :*

> Property rights are granted as incentives and rewards. A property right might include, for example, one or any number of the following rights:
>
> 1. the right to possess or physically control something,
> 2. the right to use or enjoy its benefits,
> 3. the right to manage or decide how it is to be used,
> 4. the right to receive income from it,
> 5. the right to consume or destroy it,
> 6. the right to modify it,
> 7. the right to transfer it,
> 8. the right to distribute it,
> 9. the right to exclude others from using it.[20]

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20 The Office of Technology Assessment of the Congress of the United States, *op. cit.,* pp. 21-22.

1. The Dynamism of Overlapping Property and Exchange Systems in Higher Education

Although individual members of the faculty are often economic actors, establishing property rights and selling them to publishers or other companies, collectively they live in an exchange system. Their intellectual products–articles, books, patents–generally serve to provide them with exchange value, professional prestige or promotion to higher academic ranks, non-monetary economic values, such as tenure, and monetary rewards, such as salary. Many of EDUCOM's own activities are conducted by volunteers from various colleges and universities, generally those in an exchange network in which the benefits of cooperative work are access to professional "news" such as job opportunities, collegiality, the production of useful intellectual products, and prestige.

These kinds of exchange relationships are fundamental to educational institutions for historical reasons. But they also serve as an appropriate context for both teaching and research, both of which require cooperative social relationships. *While there are many contradictions between property and exchange systems within higher education, by and large these contradictions make the system more dynamic: the property system keeps institutions connected and responsive to the economic realities of the broader society; the exchange system creates a special culture within which education and innovation may thrive.* Both elements of this dynamism are essential to fostering NREN's fulfillment of its potential to become a communications highway.

The symbiosis of property and gift systems can be observed in today's network environments. TCP/IP code is written by a small geographically dispersed community of programmers who find important problems to solve, consult with each other to make sure others are not working on the solution, write code, then offer it in the public domain. At times some part of this code may be spun off to a private company, which makes a property claim in exchange for providing the added value of commercial quality maintenance and support. This sort of pattern was also found in the library world at the beginning of the automation of library catalogs (e.g., OCLC) and today (RLG). We must be sure we do not let litigation on intellectual property rights damage this natural arena of research and development which occurs on the boundary between cooperative gift giving and proprietary controls.

2. A Note on Libraries

Public libraries are another hybrid institution in which objects produced and distributed within the intellectual property system are used in common without charge to individuals. The current intellectual property system has granted special exceptions for educational purposes in the belief that innovation and education are of special social value. One important example of such an exception is the "fair use" provision which grants the right to make private copies. Here again problems occur at the boundary; for example, when photocopying is used to appropriate intellectual property made available in public libraries.

Photocopying technology is an important technological innovation which created the possibility of new forms of added value and wealth where none existed before. There are several lessons here. Technology created a new kind of value, which disrupted the peaceful symbiosis of property and exchange systems in the library.[22]

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22 NOTE: Ironically, it is the existence of an institution based upon exchange values–the library–which is the precondition for this economic value; the patents for the photocopying process were developed in the New York Public Library by an individual reader who paid

within the traditions and culture of higher education. Without careful attention to the problems at this boundary, educators and intellectual property holders can find themselves in extended legal conflict.

b. Ways in Which Integration of the New Information Technologies IS NOT an Extension of Academic Tradition

Some of the powers of the new information technologies make it harder for individuals to recognize that many of the uses of these technologies can and should be treated within respected old ethical systems. In addition, some uses of new information technologies simply don't fit well within the traditional systems.

At the heart of academic traditions for respecting the rights of those who produce intellectual products are the attribution of credit and plagiarism. Academicians are especially sensitive to practices that may, even inadvertently, imply that one individual has authored something that was actually created by another.

Fortunately for the users of microcomputers, but unfortunately for those who wish to maintain the present legal and economic mechanisms for regulating the use of computer software, some of the most frequently used computer applications are becoming dramatically easier to use. In particular, wordprocessing software is getting both easier to use and more powerful. As this trend continues, most users of wordprocessing will be even less aware than they are now that they are using an intellectual product at all. They will be unaware of the identity of the creators and producers who developed the software. And they will have no sense that anyone will believe their use of such software "without attribution" will imply that they created it themselves!

In short, most users simply won't think much about the source of the valuable device–software and hardware combined–they are using. For goals of individual productivity, this is a desirable outcome; for goals of engaging users in a copyright-based system that returns rewards and/or resources to creator/producers, this is a challenge. It is increasingly difficult to get users to remember to avoid making convenient unauthorized copies, and it will be increasingly difficult to get individual users to go through a fee-paying process associated with something invisible and imperceptible. Enforcement problems are no justification for abandoning a principle; however they may reflect fundamental tensions between principle and the everyday world of citizens.

4. NREN

The facilities of NREN will integrate and enhance not only the existing electronic networks (BITNET, Internet, etc.) but also the facilities and resources of other communications channels such as newspapers, professional journals, libraries, conferences and even exhibits. NREN, as a two-way distribution system, will accommodate the needs of both creators and users of information and ideas. Increasingly the user/creators will be actively refining ideas in collaborative exchanges with others through the NREN.

Viewed as an *exchange system* for intellectual products, NREN will provide facilities for openly and freely sharing ideas across the network. Under the exchange paradigm users will create, contribute, refine and adapt each other's work in the highest traditions of academia. Reward is garnered from the opportunity to share with the leading minds and scholars in one's field, and in advancing knowledge and

The absence of a national system for the cataloging and distribution of academic course-related software is a good example of the present lack of coherent linkage among current stakeholders themselves, and between them and the needs of potential users. While many faculty members are writing microcomputer software to aid research and instruction, there is no single coherent system of software publication by which potential users would be able to find what they need, procure a copy, and be assured that it meets quality standards.

However, we are beginning to see the emergence of competing publishing organizations in the area of instructional software for higher education.

Both Apple Computer and IBM have supported experimental prototype distribution mechanisms for the non-commercial software that runs on their machines: Apple has organized the Apple Courseware Exchange; IBM has organized Wisc-Ware; other vendors have also organized cooperative software exchanges.[23]

At the same time as the vendor-sponsored clearinghouse initiatives, EDUCOM (founded in 1964, now a consortium of some 600 colleges and universities and more than 120 Corporate Associates dedicated to facilitating the more effective use of information technology in higher education) and the National Center for Research in Post-Secondary Teaching and Learning (NCRIPTAL) have organized a national competition to identify "Distinguished" and "Best" instructional software, in cooperation with several national disciplinary associations (i.e., American Psychological Association, Mathematical Association of America, *et al.*). In making awards, EDUCOM and NCRIPTAL have created a system of peer review for digital works, which includes both experts in instructional design and in content areas. In the long run, one of the most important contributions from this program will be the definition of standards for excellence in software.

EDUCOM and OCLC have sought funding for a national online catalog of academic software, a central database listing all known instructional software and providing at least minimal bibliographic information. In preparation for obtaining funding, it has been repeatedly confirmed that there is no single information source that already provides this service.

The earliest stages of a national system of publication and distribution for academic software is just barely beginning to emerge.

It is very telling that no traditional print publishers have participated in these pioneering efforts; they have been based upon consortia and cooperative efforts of users, supported by hardware vendors and foundations. The catalyst for many of these efforts has been EDUCOM, a consortium of educational institutions. The Department of Education has funded NCRIPTAL, but the software awards program is largely funded by donations from hardware manufacturers who are EDUCOM's Corporate Associates. Wisc-Ware is based at the University of Wisconsin, and is funded by user fees as well as IBM. The Apple Courseware Exchange has been funded by Apple Computer, and run by Kinko's until December, 1989. The

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[23] A more complete list would be useful, including such activities as the Clearinghouse at Iowa State University subsidized by Digital Equipment Corporation, CONDUIT, and the new effort in the social sciences being undertaken by Duke University Press.

VII. TOWARD A BILL OF RIGHTS FOR ELECTRONIC CITIZENS

A. Introduction: Prerogatives of Constituencies are not Necessarily Property Rights

One of the goals of the discussion to further define a National Research and Education Network (NREN) should be the development of a Bill of Rights for Electronic Citizens. What are the rights and obligations of citizens in their capacity as users of the emerging international digital infrastructure? The NREN? While the legal, economic, and technological topics which have dominated the discussion thus far are essential, they are incomplete without a consideration of the way end-users should be empowered, and the way the digital infrastructure should be governed and influenced on their behalf. While technological discussions of "access" include some aspects of this question, they tend to focus upon the technical means which are necessary for using the system. We recommend that the discussion begin with how (For what purposes? In what modes? By what technological means of access?) different kinds of users will actually use the systems, their needs and their rights.

We suggest the following list of issues and questions as a starting place in the development of a Bill of Rights for Electronic Citizens. We have grouped these questions and themes in rough categories, although each topic has implications for the others. While we have focused especially on the NREN here, the final Bill of Rights should be applicable to the entire digital infrastructure as well.[24]

B. Governance of the Delivery Systems–Especially NREN

This section concerns the governance of the network, with special focus on equality of access to the network and its resources, and participation in the governance of the network by users of all classes. Clearly, there are other governance issues beyond the scope of this paper.

1. Ability to Influence and Control Decisions.

Who will have the ability to influence and control decisions about the management of the network? Will all classes of end users have the right to voice their needs, or to call decisionmakers to task? How will users participate in the governance of the network?

2. One Class of User Access Rights?

Will different users have different kinds of access rights to network resources, or will all users have the same access rights? Will pricing structures and incentives be the same for all classes of users, or different? How will these decisions be made? What priority will be given to creating incentives and opportunities which will broaden the use of the network?

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[24] NOTE: The process by which we drafted, revised, and built consensus for the EDUCOM Code could be an effective model for building the Bill of Rights for Electronic Citizens. In that spirit, we look forward to developing and participating in a process to refine and revise the list that follows; we offer it simply as a starting point.

democratic access to government documents and resources, or will those without network connections be further disenfranchised?

D. Intellectual Products

This section concerns a broad spectrum of issues about intellectual products, ranging from the definition of ethical norms for network users to property rights exercised by the creators and owners of intellectual products. But from a broader perspective, the contents and information resources of the national network could be conceptualized as a national digital library, which must be managed in such a way as to accomplish the functions of publishers and librarians in the print world.

Again, there are other issues in this area that are beyond the scope of this paper.

1. Attribution

Since digital products are easily moved, copied and changed, what ethical standards and legal rights will ensure that intellectual products are attributed to their authors? If an attributed intellectual product is changed, will the original author be able to claim, or disclaim, ownership? How will such standards, rights and procedures be communicated to network users? How will they be enforced?

2. Rewards and Incentives

What will be the rewards and other incentives for contribution to networked intellectual products? By what mechanisms will these rewards and incentives be governed?

3. Editorial Control, Collection Policy, and Preservation Policies

It is very likely that the national network will perform some of the functions of a national digital library. Is this a manifest or tacit goal of the network? How will this library be governed?

What kinds of editorial policies, goals, and standards for selection will govern contributions to collections of digital products? Will there be editorial control or selection, or will every contribution be valued equally? Who will make these decisions?

What kinds of preservation policies will govern the collection? Will, for example, attention be given to preserving audit trails and texts of historical significance? Who will do this; how will they select materials; how will they be preserved?

4. Intellectual Property and Intellectual Exchange

Will the network support both intellectual property (e.g., fee for service access to intellectual products) and intellectual exchange (e.g., non-fee sharing of collective resources)? How will it differentiate between such activities?

E. Collaborative and Group Work

The national network could become a great resource for geographically dispersed collaborative work groups; we assume this is an explicit goal of the network, but even

VIII. THE FUTURE[25]

A. Default: What happens if nothing is done to develop and enact these rights? Especially with respect to the evolution of the NREN?

What if nothing is done? We will see the end of simple copyright and the exacerbation of social and political problems.

It is an asset of the new technology, not a defect, that permits users to make and modify copies of information of all kinds — easily, cheaply, and accurately. This is one of the fundamental powers of this technology and it cannot be repressed.

Until recently, the traditional print-oriented "intellectual property" system, based on the legal concepts of copyright, patent, and favorable terms of access ("fair use") for socially beneficial activities such as education, has maintained a reasonable balance; i.e., enough resources are collected from users to sustain the producers and distributors, and users feel that they have adequate access to intellectual works of all kinds.

The present economic system is based on being able to effectively monitor the users, and being able to effectively require and obtain some form of fee based on usage. The aggregation of these usage fees has been adequate to sustain the publisher/distributors' work, who in turn provide resources and rewards to the creator/producers. But this system is based on having been able to easily monitor, control, and charge fees for the making of individual copies, an arrangement which is no longer possible or entirely desirable. The capabilities of the new information technology has made the present system inadequate.

Achieving the potential of information technology to provide a new quality of access to information and new enhancements to personal productivity cannot be stopped, only slowed. Political and economic pressure will press harder and harder against any laws or economic practices that impede this progress. Any pattern that resembles information disenfranchisement of the masses will become more obviously socially and politically unacceptable.

B. Vision: What happens if constituencies are able to exercise these rights?

1. Short Term

Our first task is to articulate the issues with sufficient clarity to permit the development of effective strategies involving collaborations of all interested sectors. The best that can be hoped for in the near future is that we reach a better understanding of the problems, issues, needs, and resources that are tangled in the interaction of information technology, intellectual property, education, and industries such as entertainment, telecommunications, publishing, etc. And that such an understanding

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[25] NOTE: This section is based closely on the testimony presented on November 8, 1989 by Steven W. Gilbert, Vice President, EDUCOM, before the Oversight Hearing on Computers and Intellectual Property conducted by the House Subcommittee on Courts, Intellectual Property and the Administration of Justice.

IX. CONCLUSION[26]

Four fundamental needs should be addressed:

1. Economic Mechanisms

We need new economic mechanisms to democratize the use of information, and we need to consider economic mechanisms beyond copyright and patent.

It would be a tragedy if the technology that offers the greatest hope for democratizing information became the mechanism for withholding it. We must make information accessible to those who need it.

Under the present legal and economic conventions, easy use of the widest range of information and related services may only be available to individuals affiliated with a few large universities or corporations. Even for those institutions, negotiating the terms and conditions of usage will be costly and burdensome.

We want to be sure that economically disadvantaged students are not further prevented from access to computer software and related facilities, and that less wealthy educational institutions are not prevented from encouraging their faculty members to review computer software for possible instructional uses.

We need new economic mechanisms that both provide adequate resources for the organizations that publish and distribute information, and encourage them to make information readily available on computer networks — and through other media — to the broadest range of users, with a pricing structure well within their reach. (These new mechanisms are almost certain to require metrics not based on counting copies.)

We need an extension of the concept of "fair use" to the new technological and economic environment. We need an electronic "information safety net" to provide information resources and services through some mechanism that is affordable to the vast majority of educational institutions. The present inter-library loan system provides a useful analogy.

We need thoughtful guidelines about the funding, control, and access to a fully comprehensive national electronic library, since many now believe that such a library is an inexorable and desirable consequence of the pace and direction of development of information technology and of new information.

2. Ethics and Guidelines

We need a new code of ethics and new guidelines.

We need to move beyond the EDUCOM Code to developing new rules, perhaps a new professional code of ethics for education, guiding the behavior of individuals who can and should easily find and build on the ideas of others, making their own

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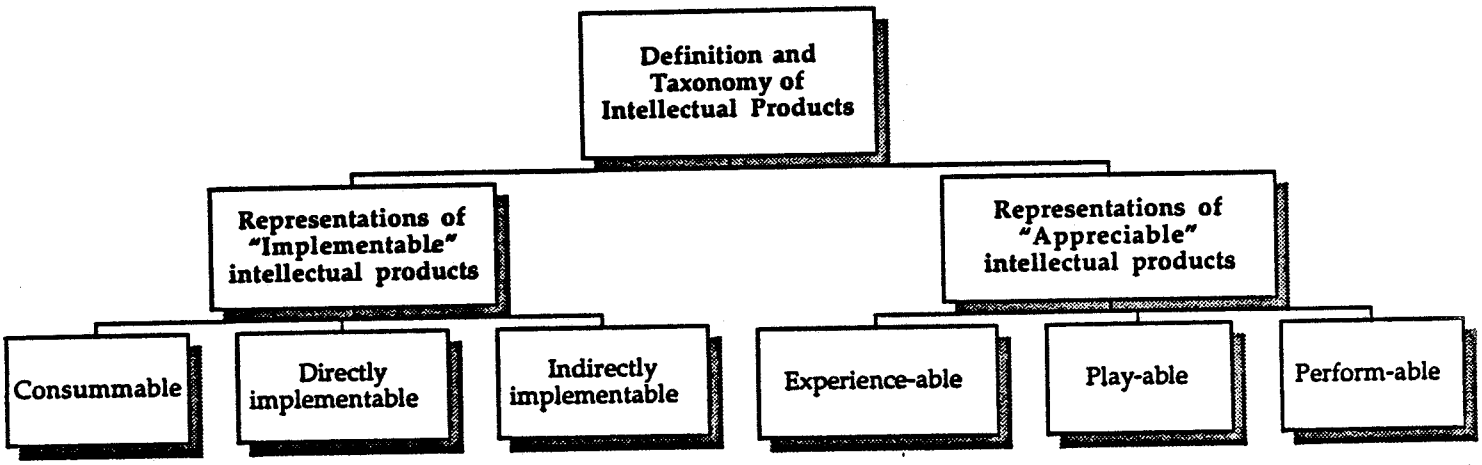
[26] NOTE: The following section is based closely on the testimony presented on November 8, 1989 by Steven W. Gilbert, Vice President, EDUCOM, before the Oversight Hearing on Computers and Intellectual Property conducted by the House Subcommittee on Courts, Intellectual Property and the Administration of Justice.

of new laws and economic models for funding the electronic distribution of information based upon measures other than counting copies.

B. Diagram


Definition and Taxonomy of Intellectual Products
Representations of "Implementable" intellectual products
Representations of "Appreciable" intellectual products
Consummable
Directly implementable
Indirectly implementable
Experience-able
Play-able
Perform-able

Example: "courseware"
Example: Non-user-friendly utility computer programs
Example: "Do-it-yourself" books
Example: recipes
Example: Red-Cross first aid book
Example: road maps

2. *"Appreciable" Intellectual Products*

"Appreciable" intellectual products are those whose primary value lies in the "user's" direct experience of a representation of them. Note that the term "user" often seems inappropriate for those who acquire and make use of this kind of intellectual product. Representations of appreciable intellectual products may be experience-able, play-able, or perform-able.

Experience-able Representations of Intellectual Products. Immediately upon acquisition of an "experience-able" representation, the possessor can gain the associated intellectual, aesthetic, or entertaining experience using virtually no knowledge, skill, or tangible technology

Example: Paintings
Example: Theatrical performances

Play-able Representations of Intellectual Products. "Play-able" representations of intellectual products are those that require only minimal knowledge and skill from the possessor to modify or prepare the necessary tangible technology — if any. The "player" ("listener," "viewer," etc.) can then immediately and directly have the desired intellectual, aesthetic, or entertainment experience.

Example: Musical recordings (phonorecords, etc.)
Example: VCR recordings
Example: "Conventional" videogames
Example: Novels

Perform-able Representations of Intellectual Products. "Perform-able" representations of intellectual products are those that require the user to (a) have more than minimal knowledge, experience, or skill in using this form of representation with the necessary tangible technology; and/or (b) apply more than casual attention and take more than a minute or two to modify or prepare the necessary tangible technology. In addition, the quality of the "performance" is generally recognized as dependent on the quality of the "performers" as well as on the quality of the underlying intellectual product.

Example: Sheet music
Example: Complex, interactive computer games
Example: Movie scripts