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Tragedy of the Information Commons

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Abstract

Large amounts of data, information and other intellectual resources have been made available as public goods in the United States for the general benefit of all citizens through a range of legal and institutional mechanisms. The resulting body of information that is freely accessible for use by all constitutes a public commons in information. This information commons has had substantial positive effects on the well being and growth of society. It is suggested, however, that "tragedy of the commons" dynamics are being set in motion that threaten the continued existence of an information commons as we transition to a society that is increasingly reliant on digitally formatted information. As in the environmental realm, identification and recognition of the dynamics leading to a "tragedy of the information commons" may be a first step in addressing the destruction and despoliation of the public commons in information.

1. Introduction

Records and datasets created to fulfill public mandates or legislated purposes have been made available to the public under open records and freedom of information laws in recent decades in the United States. These laws are founded on the long standing principle that people in a democracy have a need and right to know what their government is doing. Thus the primary and initial justification of open records laws at the state level and freedom of information laws at the federal level was to ensure transparency in the functioning of government so that all citizens could check public records for themselves, if they chose to do so, to ensure that government employees and elected officials were acting appropriately in accomplishing their mandated responsibilities. However, public records created for public purposes at taxpayer expense also have had considerable value as public goods. Increased access to public records has helped create and perpetuate a "public commons" of information of substantial value to wide ranging segments of society. School children, teachers, private citizens, consumer interest groups, citizen advocacy groups, commercial enterprises, and other governmental units have all used extensively and benefited from data initially created by government for government purposes. These secondary uses have had profound and widespread educational and economic benefits. Allowing all segments of our society to tap into this "information commons," created for government purposes at taxpayer expense, has been cited as a major factor contributing to overall accelerated economic expansion in the U.S. as compared to those nations with much more restrictive government information policies (Mechling 1994, Karjala 1995, Jaszi 1995, Lopez 1996).

Information produced by government is not the only information contributing to the public information commons. The ability to read copyrighted works and freely use information from them for personal or economic gain is also a form of public good that creates an information commons that all may benefit from; as are the public libraries created at taxpayer expense, where these works may be freely accessed. Data, information, and creative works are the raw materials from which we learn and create (Boyle 1996). As more information and knowledge is disseminated in only digital form over networks, concern arises that society may be on a remorseless path to the loss of these and similar information commons'. For various perspectives on the concept of an information commons, see for instance Lee Felsenstein (1993), Robert Steele-Vivas (1996) presenting a U.S. national interest perspective, Vandana Shiva (1994, 1997) offering a non-western, global, and community control perspective in which neither the state nor the market provide the organizing principles of how people live and how nature's wealth is owned and used, and Gaitenby (1996) sharing a perspective internal to cyberspace.

This article begins with an explanation of the tragedy of the commons dynamic as many perceive it to occur in relation to useful natural resources. The argument is made that information may be viewed as a resource in which a public commons has also developed and that this commons might further develop or diminish depending upon the mutual choices we make in society. The article explains through the use of illustrative examples that the tragedy of the commons dynamic affecting the environmental commons is similarly affecting the information commons. The article goes on to suggest that some of the legal approaches and techniques developed by environmentalists in preserving the environmental commons might be utilized productively in protecting the information commons. Finally, cautious experimentation with a range of economic, technological, and legal models is advocated for maintaining and expanding the information commons.

2. Tragedy of the Commons

The information commons supported by open records and freedom of information laws is currently being threatened by a phenomenon which Garrett Hardin termed the "tragedy of the commons." In his classic 1968 article, Hardin illustrated how the basic dilemma confronted in resolving major environmental issues from local to global scales was the same dilemma confronted by herdsmen in attempting to share a common pasture. If each individual continues to maximize their individual gain the resource is thereby destroyed. Hardin explained the rational tendency toward an onward remorseless march to the ruin of a common resource as follows:

> The tragedy of the commons develops in this way. Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons.... As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he asks, "What is the utility *to me* of adding one more animal to my herd?" This utility has one negative and one positive component.

1) The positive component is a function of the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is *nearly +1.*

2) The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsmen, the negative utility for any particular decision-making herdsman is *only a fraction of -1*.

Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another; and another.... But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit - in a world that is limited. Ruin is the destination to which all men rush, each pursuing his own interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.

As Hardin goes on to explain, the commons can be destroyed not only by taking from it but by putting something into it, such as pollutants. Each rational, independent free-enterpriser acting in his or her own best interest over the short run helps destroy the commons and the resource for everyone in the long run.

A similar phenomenon is occurring and threatening a large segment of public domain information in the United States. Much information in the public domain in the U.S. has arrived there primarily as a byproduct of federal, state, and local governments in the U.S. as they have carried out their mandated governmental functions. The continued supply of this information to the public domain is now threatened by tragedy of the commons dynamics. Similar tragedy dynamics are occurring throughout a number of related information resource arenas. These dynamics pose threats ranging from the elimination of the public's ability to read copyrighted works in public library-like arrangements in our digital future to the creation of scarcities in personal information privacy.

3. Information as a Resource

Few people now question that information is a highly valuable resource. Information may be "mined" to create knowledge and knowledge is the primary and growing basis of power in modern society. "Information (organized data, the raw material for specialized knowledge and generalist wisdom) is now our most important, and pervasive, resource" (Cleveland 1985, 185). Through the use of information and the knowledge that may be extracted from it we are able to produce more products and increase effectiveness and efficiency through expenditure of less labor, less capital, and through use of fewer physical resources. (Cleveland 1982, Mackaay 1982)

Of course the argument may be made that information as a resource is so inherently different from the traditional resources of labor, capital, and physical materials that many principles applying to these other resources should not apply to information. Cleveland points out that, unlike conventional resources, information expands. It is consumed but not depleted; after you

give it away you still have it. It takes few other physical or biological resources to create or transport information; its transport is instantaneous compared to other resources; and information can replace capital, labor, and materials. (Cleveland 1982)

Doctrines as currently articulated in the law that may not be relevant to information resources include the "public trust doctrine" and "public stewardship" doctrines. These principles are founded on the assumption that valuable public resources should be protected from consumption or despoliation by one generation so that those resources remain available for the enjoyment of future generations. Because information may be consumed at will and yet remains available for innumerable others as well as future generations, the public trust doctrine and public stewardship principles are not supported by restricting peoples use of these public resources. In fact, the opposite may be argued. To ensure public information resources are available for future generations, public information should be duplicated and transferred as often and through as many channels as possible. Public information resources should be applied to as many uses as possible and placed in as many formal and informal depositories as possible. By making public information resources widely available their potential for use by future generations is increased, not decreased.

4. The Information Commons

The information commons consists of information that is freely usable by anyone with no intellectual property rights interfering with the use. No one has an ownership interest in what is often referred to as "public domain" data or information and thus we are all free to use it for whatever purposes we see fit. Ideas, thoughts, facts, concepts, and mathematical formulas all fall within the public domain. All of us are free to use any of the information we gain from reading books and newspapers or from viewing photos or movies. Copyright protects only "original expression" and even that enters the public domain for the use and benefit of everyone in society after the time limit for copyright has run its course. Copyright in the U.S. is a constitutionally enumerated doctrine to "promote the progress of science and useful arts." (U.S. Constitution Article 1, Section 8).

In the U.S., section 105 of the Copyright Act precludes copyright protection for works produced by the Federal government. The fundamental reason for not allowing the imposition of copyright by Federal agencies is that it would tend to subvert the goal of promoting open access to government. An open government is seen as being far more important to supporting a democratic society than allowing government to impose ownership interests in its works. However, other goals are at work as well. Broad access to government information is encouraged as a means to provide economic opportunity in addition to political opportunity. Freedom of information, copyright, and other U.S. public information laws and policies have been derived from four broad motives: (1) to encourage public education and enlightenment; (2) to protect intellectual property rights; (3) to assist economic development; and (4) to protect national security (Ballard 1989, 86). Among the economic values at work is that individuals ought to be able to derive economic benefit from public goods (such as public information). (U.S. Congress 1986)

At the state and local government levels, open records laws generally support the same policies supported by the Federal Freedom of Information Act and many are patterned after it. The traditional stance at the state and local government levels has been to make public records available to citizens and businesses without imposing government ownership rights or restrictions in them. That is, most such records have been made available to interested persons at the cost of dissemination without imposing licensing, contracting, or copyright provisions in attempts to control subsequent use by citizens. Under the patents and copyright clause of the U.S. Constitution, Congress lacks the ability to extend copyright beyond that which is necessary to provide incentives to authors to make their works available. When state or local government agencies collect information in response to a legislated obligation, it is the public need as defined by the legislative obligation that provides the incentive to gather information or create a public record. If copyright failed to exist, the information would still be collected. This being the case, copyright provides no incentive and the works may not be protected by copyright. "Even if the Copyright Act were interpreted to extend to public information at the state and local level, and even if section 105 of the Copyright Act were amended to allow federal government copyright, the First Amendment to the United States Constitution and similar state constitutional grants of privleges and immunities with respect to communication and expression would limit the assertion of such copyright." (Perritt 1996, p. 489) The accumulating effect of these government information policies at the federal, state, and local government levels in the U.S. has been to allow vast amounts of data and information produced for government purposes to flow into the public domain, or information commons.

5. Public Goods

Information gathered for government purposes typically fulfills the traditional criteria established by economists for goods that should be provided by government through general tax revenues. Such taxes are raised proportionately based on wealth. Funding of public goods in this manner is appropriate so that all downstream beneficiaries throughout the general public carry more equitable burdens in providing these types of goods. The classic definition for public goods is that pure public goods are *nonrival* and *nonexcludable*.

A *nonrival* good is one in which a unit of the good can be consumed without detracting, in the slightest, from the consumption opportunities still available to others from the unit (Cornes and Sandler 1986, 6). Information enjoys this characteristic. Many people may use information and yet it remains available for many others to use as well.

A *nonexcludable* good is one whose benefits are available to all once the good is provided. Goods such as fireworks displays, strategic weapons, pollution-free air and street lighting provide nonexcludable benefits since once provided the benefits are difficult or perhaps impossible to exclude from others even though others may not have helped pay for the good (Cornes and Sandler 1986, 6). Government public records are primarily nonexcludable. Such records must be made available and open to citizens so the electorate has the opportunity to scrutinize in detail

the functioning of government, the actions of government officials, and the documents upon which government decisions have been made. In support of these objectives the federal freedom of information act and the open records laws of the states generally start with the presumption that access must be allowed unless specifically denied by a legislated exception and any exceptions are to be construed narrowly by the courts. Since the information in public records is typically fully accessible to the general public in the interest of continuing to secure democratic principles and openness in the functioning of government, it is difficult to keep government information secret over a short time and almost impossible over a long time. Information as a general rule is diffusive. "It tends to leak - and the more it leaks the more we have" (Cleveland, 1985). Government information is far more leaky than business information and once available for one public use its benefits become largely nonexcludable. Even if in some instances government information is not a pure public good due to attempts to make it excludable, government information created for government purposes through tax dollars has characteristics far closer to that of a "public good" than a "private good."

6. Tragedy of the Information Commons

As society converts from government information in paper form to digital forms of public records, evidence suggests that the current information commons is in danger of shrinking rather than expanding. The following example illustrates the phenomenon as it is occurring relative to geographic information produced by local and state governments.

Throughout the United States, state and local governments are in the process of building geographic datasets to support various governmental functions. Geographic information systems (GIS), related spatial technologies, and affiliated datasets are being used for government tasks such as street and utility maintenance, routing of town services, tax assessment, zoning and building code enforcement, planning, inventorying of city buildings and real estate, and using the systems for a variety of land use analysis purposes.

Some state and local government GIS agencies are now imposing intellectual property and ownership rights in the datasets being created for public purposes and are attempting to generate revenue streams from secondary uses of the data being made by citizens and businesses. The stated goal in imposing restrictions is typically to protect the "public trust" by not allowing private individuals or businesses to benefit at the expense of the general taxpayer. As indicated above, the logic of this reasoning is suspect since the preservation and general community use of the information is probably much better served by distributing the data as often as possible and through as many channels and intermediaries as possible with no restrictions on the use of the data. To sell government data to a few private firms that can afford it benefits primarily those privileged firms at the expense of the general public and loss of widespread general benefits to the community. An additional argument often made by government bureaucrats is that there is a need in times of revenue shortfalls to "reinvent government" and that government should impose user fees for government services that respond to private needs for information. This argument presupposes that it is wise for government to enter into the business of responding to private

needs for information, either by itself or in partnership with a limited number of private sector intermediaries, rather than focusing primarily on government needs for information. Justification for this major change in the role of government is yet to be supported by evidence of overall improved benefits for society. Regardless of the justification arguments and their validity, the practice of restricting access to the data produced by government eliminates or reduces use of such data as a public good.

Other state and local GIS agencies are continuing to make available to the public domain those geographic datasets that have been produced to fulfill government mandates and missions. These governments appear to believe that restrictive government information practices, such as imposing intellectual property or contract controls over future uses and charging above traditional dissemination costs, eliminate much of the potential for experimentation and innovation by private individuals in competing with each other in offering value-added products and services to the community or in building a strong information economy in the community. They also argue that imposition of contracts and licenses for secondary and further downstream private uses of government information requires expansion of the government bureaucracy in order to service private needs for information. Servicing private needs rather than government needs they argue is an inappropriate role or should be a very low priority for government. There is also a firm belief on the part of these "open access" governments that private enterprise and the commercial marketplace promote greater efficiency and innovation in supplying a wider diversity of information products and services than if restrictive government information policies place the power to add value to government information in a fewer number of privileged hands. These governments believe that stimulation of the private sector economy in a community and growth of the tax base through an open government information commons results in greater economic benefits for the community in the long run than restrictive government information practices. Yet others argue that compromise models exist for pursuing revenue generation by a GIS agency without violating open access principles or stifling economic activity in the general commercial sector or in the private sector information industry (Onsrud, Johnson, and Winnecki 1996).

Since they are not banned from imposing copyright in their works of original authorship, state and thereby local governments are free to choose whether to allow information produced for public purposes to enter the public domain or not. Those state and local governments following open records principles (i.e. distribution at the cost of dissemination with no restrictions imposed on secondary use) are helping to expand the public domain in geographic information while those choosing to sell geographic information that was compiled for government purposes are decreasing it. As public records previously available in paper form are converted over time to being available only in electronic form, the public commons in information is decreased in those jurisdictions whereby the electronic files may be obtained only under contractual purchase or license conditions.

The argument can be made that voters and government officials in a democracy should have the freedom to make bad policy choices and make other mistakes. After all, they are the ones that will be disadvantaged by their mistakes. The problem arises when the poor policy choices of one

jurisdiction place other jurisdictions at a disadvantage. This disadvantage can trigger tragedy dynamics that rapidly spread and escalate to destroy the information commons.

By illustration, consider the following recent case (Johnson and Onsrud 1995). A county GIS agency in the U.S. was having difficulty sharing digital data with a city within its geographic bounds. The county was having difficulty because the city followed a revenue generation approach in distributing its geographic data while the county followed open records principles in distributing its data. The city insisted that it could freely take digital data files from the county since the county's open records laws allowed this while the county would have to pay $700,000 for the geographic data files it wanted from the city. The unfairness of this situation immediately suggested to county administrators that they should pass a similar local ordinance that would allow them as well to impose contractual conditions and charge for their digital geographic information. They felt that this was a poor policy choice in the long run for the economic and political well being of the community but perhaps it was the only way to survive in the short run. Instituting restrictive information practices appeared necessary in order to increase their power at the bargaining table. Without restrictive policies in place they would be subject to any other city or town in their geographic limits that might choose to "ride free" on the county's digital geographic data without reciprocating. Politically and practically it would be very difficult to keep access open to the county's geographic data for citizens and businesses while imposing restrictions on use of the data by city governments. Therefore, similar restrictions and charges would now have to be imposed against all citizens and businesses.

It is easy to see the ripple effect as each jurisdiction in turn is confronted with the dilemma and takes a defensive position in their own short term best interest. The threat may come from jurisdictions above, below, or laterally. Thus the commons in digital geographic information is destroyed over time or never built and the long term economic and political benefits to be derived from an information commons fail to materialize.

In addition to not gaining the long term economic and political benefits for their citizens, whether a significant commercial market exists for government collected geographic information is often speculative. Few or no U.S. jurisdictions have regularly raised more than a very small percentage of their operating budgets through sales or licensing of geographic data to other than other governmental or quasi-governmental units (Johnson and Onsrud 1995) nor is keeping geographic data secret over the long run likely (Cleveland 1985). There is a significant danger of net losses to jurisdictions imposing revenue generation approaches due to the extra bureaucracy involved in supporting the process; although these costs are often hidden (e.g. developing contracts and licenses, ongoing administration of contracts and fee collection, attorney and consultant fees to resolve conflicts involving intellectual property rights, liability, equal treatment, antitrust, undue competition, and similar issues). Thus, not only are economic opportunities in the private sector lost by imposing overly restrictive government information practices but new cost burdens may accrue for government agencies. Although the above example relates to geographic information, other categories of information produced by government are threatened similarly.

Another example of destruction of the information commons is readily drawn from trends witnessed in the digital libraries community. How might an analog to the traditional "public goods" library model be retained in our digital future whereby any person (child, scientist, business person, citizen) may browse, study, and borrow copyrighted information resources from the virtual library at no direct cost? Most of the economic and operational models for "virtual libraries" emerging on the net and in the existing library community appear to more closely resemble "virtual bookstores" where patrons must pay on a per use basis rather than publicly supported libraries where all patrons have equal opportunity to access knowledge. In short, will there be a "right to read" in our digital future? (Stallman 1997) Without the ability to read copyrighted works in public library-like arrangements we can expect to see a widening gap between those who can afford to access information and those who cannot. The inability to browse and read copyrighted materials in a free-form manner in a public goods or public library-like environment can be expected to have very severe negative impacts on learning for educational, social, political, and economic purposes. Publishers and authors in their rush to expand their own economic interests and intellectual property protections often don't see that it is important to the long term economic interests of society (and thus to their own economic interests) that their works should somehow remain accessible to benefit all segments of society. The "information commons" currently accessible to all library patrons is likely to shrink as society makes larger and larger volumes of information available only in digital form if the ability to read those copyrighted digital works is made available only on a user fee basis (Hawkins 1993)

Threats to the information commons are also readily evident from the current legal maneuvering over intellectual property rights in information. As laws are changed to respond to digital and networked environments, the ability to use the works of others (which tends to promote experimentation and innovation) is being threatened (Samuelson 1996). Rights are being expanded primarily to benefit not authors or innovators but those with large scale interests in "canned" creative expression (Barlow 1995). Corporations around the globe have been lobbying their governments for expansion and extension of intellectual property laws (Karjala 1995). In the words of one U.S. law professor; "Governments are complying, granting monopolies over information and information products that make the monopolies of the 19th-century look like penny-ante operations" (Boyle 1996). This narrowing of the information commons through expansion of intellectual property rights primarily for publishers and corporate "owners of content" again results in further restricting the ability of the general population to read or view copyrighted materials, whether they be books, articles, maps, movies, photographs, or images. While increased control over intellectual works is likely to generate substantial economic benefits for corporate interests in the short term, the long term detrimental effects on learning are likely to create long term detrimental effects for the economy as a whole.

The internet is another form of public commons with obvious widespread public benefits. Again, this valuable information commons is under constant threat of domination by corporate entities and governments that wish to control the resource. As Brin notes, pessimists believe that these "gray faceless mansions of unassailable power" will inevitably "...parcel out the territory of data-

space, erecting a maze of fences, walls, and for-profit channels ..." that will ultimately despoil or destroy this valuable public resource (Brin 1995)

As we move further into the age of information, destruction of the information commons or failure to build it at all is not inevitable. Because retention of an expansive information commons has vast long term public benefits, numerous individuals, business entities, and government policy makers are continually striving to seek approaches and practices that help preserve and foster the commons. Administrative, political, and legal techniques developed to deal with destruction of the commons in the environmental arena provide some valuable insights in how the information commons might be spared of its seemingly inevitable destruction.

7. Reversing the Trend: Response of Environmentalists

One of the favored and most effective techniques of environmentalists in protecting the environmental commons has been to expose a full cost accounting of the effects of actions that diminish or despoil the environmental commons. If a business is free to pollute into a river and the pollution causes destruction of downstream commercial fishing, ruin of tourism, and other adverse consequences for down stream users, the loss in economic terms caused by the pollution should be computed so that society knows whether allowing the pollution is logical from even a pragmatic short term economic perspective. Allowing pollution is often highly illogical when the costs external to the decision-maker are added in. When all the current and future benefits and costs of an action affecting the commons are tallied up, if there are fewer economic gains than economic losses to society as a whole, it is rational for society to respond by passing laws that reduce or eliminate the cause of pollution. Many proposed actions with adverse environmental consequences have been altered so as to avoid or eliminate the adverse consequences through the simple expedient of a tallying process.

Of course economists and environmentalists have explored and used far more advanced and complex economic assessment techniques than a mere tallying up of readily observable costs and benefits. The limitations and shortcomings of various economic assessment techniques as applied to environmental disputes have been identified and attempts have been made to address many of those limitations. For instance, one of the limitations in using economic approaches is that in environmental disputes the benefits in producing a product is often easier to quantify than the costs of the product. Many costs imposed on the environment are extremely difficult to value due to lack of a functioning market in the sale and exchange of adverse effects that impact the commons. When markets are unavailable or imperfect, these considerations must be taken into account for any economic analysis to be valid. A further limitation in applying economic analysis to environmental assessments is that market values may not be the best means of measuring the interests of society because the interests of the poor and the interests of future generations are typically underrepresented. For instance, standard economic analysis takes the existing unequal distribution of wealth in society as a beginning premise. This works against the interests of the poor. Economic analysis also doesn't account for such issues as morality of

eliminating a species when the species has little current value to humans (Plater, Abrams, and Goldfarb, p. 30).

In an economic analysis of actions effecting the information commons, similar difficulties arise in computing the total costs of adverse actions, accounting for the interests of the underprivileged and future generations, and accounting for such issues as the morality of intruding on personal privacy. For instance, recent bills in Congress have advocated the extension of copyright law by twenty years. Although the costs imposed on the public would appear to be extremely high and obvious, reliably estimating the total aggregate social costs is very difficult (Karjala 1995). Among the moral issues typically not included in an economic analysis might be such issues as the morality of intruding on personal information privacy, allowing important social information to be irreversibly destroyed or not collected at all, or rewarding distant heirs or corporations with control over current information resources to the detriment of society even though the current rights holders had absolutely not creative relationship with works authored many generations ago. In summary, even though economic analysis may be difficult to accomplish and has significant limitations in valuing the commons, a full cost accounting of the effects of actions that might diminish or despoil a commons remains one of the most powerful tools for protecting the commons.

In recent years, much of the discussion in government agencies about handling data and information has focused on acquiring the effectiveness, efficiency, and innovativeness of private sector information handling practices. In the rush to jump on this bandwagon, some government agencies seem to have lost sight of the public goods benefits of making government information generally available. When raising barriers to accessing public goods is proposed, agencies often fail to consider the costs and detrimental effects of these barriers to long term economic development, education, representative democracy, and openness of government. Citizen advocates need to force a tallying process.

In the environmental arena in the U.S., "major Federal actions significantly affecting the quality of the human environment" may only proceed after preparation of an environmental impact statement (EIS). This statement must provide:

(i) the environmental mpact of the proposed action,
(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
(iii) alternatives to the proposed action,
(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
(v) and irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. (Sec 102, National Environmental Policy Act, Public Law 91-190, 1970)

If access to governmental information continues to be restricted through tragedy of the commons dynamics, perhaps one way of reversing the trend would be to require of government officials an

"information access impact statement" for any major state or local government action significantly affecting the quality of citizen access to government information (Stubkjaer 1992).

Of course, environmental impact statements in the U.S. don't legally force federal agencies to take any particular action. An agency may even take the most environmentally damaging alternative out of all the alternatives evaluated if the agency has more than arbitrary reasons for moving forward with that chosen alternative and has the political will to do so. However, if government agencies are required to prepare an impact assessment statement, their decisions will by necessity be made in an environment of public openess, with an increased obligation for full cost accounting to be performed before specific action is actually decided upon or taken.

In dealing with commercial or private sector actions affecting the environment, one of the favored techniques of environmentalists has been to convert "external costs" to "internal costs" for decision-makers in the commercial and industrial sectors. Simply informing decision-makers that their proposed action will have an overall adverse impact on society typically has little effect on the commercial decision-maker's primary goal of maximizing individual. Thus, internalizing costs is most often accomplished by passing laws and regulations. These typically require the destroyer or polluter of the commons to bear the loss in value of the resource or bear the cost of clean-up that the general public would otherwise have to bear due to the action taken by the decision-maker. Thus, the destructive cost of the action becomes "internalized" by the business and the rational decision-maker finds it is less expensive and more logical to eliminate destructive practices or provide pollution control devices than it is to pay fines or clean up pollutants later profit (Plater, Abrams, and Goldfarb, p. 29).

If there is no cost in allowing an information commons to be destroyed, the rational business or government decision-maker will allow this to happen. Thus the goal should be to create information markets that force a cost accounting of the negatives of destroying an information commons or not allowing an information commons to form. Advocates need to investigate the full range of practices destructive to the information commons and explore means for converting the costs borne by society to internalized business costs. Positive models for growing the public domain information commons also must be explored.

8. An Illustrative Model for Consideration

An interesting economic and technological model is being developed in the U.S. which provides incentives for state government agencies to make their public records more accessible to the taxpayers who paid to help create those records. The model is evolving as various states have attempted to use private sector companies to provide access services across the web and have learned from the shortcomings of each predecessors attempts. Among the states helping to evolve the model have been Arkansas, Georgia, Illinois, Kansas, Nebraska, and Virginia. Most recently, the model, as interpretted by this author, begins with the assumption that traditional principles of open access to government records will continue to be fully supported. The model also assumes that a private sector company with a profit motive will be more effective and

efficient in developing and providing access services to the public than will a government agency or a highly regulated "information utility." The profit motive inherent in private company operations is harnessed in this model to build and continually expand the body of government records that is freely accessible on-line to the general public. Enhancing access and charging for enhanced access to those government records that have greatest value in the economic marketplace and which are used primarily by private sector businesses is used to finance and continually expand the body of government records that become freely accessible to the general public. The beauty of the model is that all government data, including commercially valuable data, eventually migrates over time to becoming freely accessible on-line to all members of the public.

Under this model, a private contractor is hired by contract with the State, for say an initial five year period, but the private contractor acquires no intellectual property in any of the data or information made available through the on-line system. The State receives a perpetual license or ownership in any software that might be developed by the private company to make the system function. This is necessary to protect the State in the event of a breach of contract by the contractor or in case the State switches to another contractor at a later time. Equipment to operate the system is typically leased, but whether leased or purchased, the state retains an option to acquire the leases or equipment in the event of switching to a new contractor. Virtually no up-front costs are borne by the State. Stockholders or owners in the company winning the bid with the State bear the burden of economic losses if the information service to State government information fails.

In developing such an on-line access system to government information, the initial goal might be to make 90% of the information available in the system freely accessible by the general public but to charge service fees for enhancing access to that 10% of the information which is most valuable commercially and for which government is already charging permit fees, fees specified by statute, or cost of dissemination fees. The government data and information itself is still available directly from each government agency under open records principles if currently available under such principles but access to the enhanced electronic service provided by the selected contractor is not allowed unless the fee for enhanced electronic access is paid. Commercial companies appear to be more than willing to pay for the enhanced access service which then finances the expansion of access to other important government records that may not be as valued by the commercial sector but may have other valuable uses by citizens.

Let us assume that a government agency currently charges $5 for a particular license. To obtain this same license through an on-line service, the citizen might pay $6. Five dollars is sent to the agency by the contractor so that the agency still receives the fees it was previously receiving but it now has fewer people visiting its offices. The additional one dollar charged for the enhanced electronic access is used to expand the on-line access capability by citizens to all State agencies. How the one dollar is spent is determined by the terms of the contract with the private company and by a control board with equal representation from citizen advocacy, government agency, and commercial sectors. Appointments to the board are typically made by the governor of the State.

Six cents of the dollar might be designated as profit for the private contractor running the access service while 94 cents is used for the expenses in employing people to develop both the freely available and premium service web pages, to work with state agencies in meeting their needs, and to pay for hardware, software, and anything else needed to make the service work. Which government records are made available on the on-line system and in what chronological order is determined by the oversight board in consultation with state agencies, state businesses, citizen advocates, and the private firm running the access service.

Incentives

In some states, government agencies have been very interested in getting their records on-line and provided by the private service so the agency can eliminate the burden on their staff in responding to license, permit, and open records requests. Once an agency's information request handling is on-line the number of requests to the agency may increase due to the greater convenience for citizens and businesses in obtaining the information or permits they desire. This increase in requests has resulted in increased fees paid to state agencies in some instances. In addition, each state agency obtains increased access to every other state agency's records. If access is enhanced for citizens to a particular agency's records, it is also enhanced for personnel in every other state agency.

State agencies and state supported bodies such as state universities should have free access to the "premium access services" for which commercial businesses are charged. There probably won't be a large demand for the premium services in the academic, government, or public interest sectors because the premium services are developed to meet very specific and focused commercial needs. Regardless, access to the premium services should be provided to state agencies and state supported bodies to promote as much openess as possible. Premium services should not be made available for free to off-the-street patrons of public or university libraries since this would then allow commercial businesses to circumvent paying for the premium service. Public or university library administrators should have free access to the premium services and could make them available to patrons for a fee per use as approved by the oversight board. All library patrons would of course have unfettered access to the 90% of data made freely accessible to the public, the body of which should continually grow over time until such time as greater and greater proportions of the data can simply be made freely accessible.

The private contractor winning the bid to provide the access service has the incentive to place on-line as many commercially valuable records as possible since for every "enhanced access dollar" brought in (i.e. above the amount that automatically goes to the agency) the contractor receives six cents. In addition, this company has the obligation to spend the other 94 cents in the manner specified by the control board. Much of this will go into labor expenses for the private company.

Citizen advocates and private businesses like the system because for every "enhanced access dollar" that comes in, 94 cents must be spent on increasing the efficiency and effectiveness of

access to those government data sets that citizen and business representatives feel would be most valuable to their constituencies. This expenditure toward expanding on-line access may add up to several million dollars per year in a single state. Most of the on-line records linked through this expenditure must be freely accessible to citizens and only a very small percentage will have an access fee attached to them. Citizen advocates on the control board are typically also very interested in developing interactive on-line processes between citizens and government agencies that allow citizens greater participation in government decision-making. If the control board takes this on as a priority for the expenditure of funds from the system, enhanced two-way discourse on important state-wide matters becomes a real possibility. Democratization of decision-making involving all parties interested in important issues might be substantially enhanced through the creation of new forms of communication among citizens, government officials, and government personnel.

At some point the oversight board may determine that the premium access service (i.e. that for which fees are charged) is bringing in more funds than reasonably can be spent on further enhancing access to state government information. In this instance, the oversight Board would probably choose to make increasing proportions of the commercially valuable information freely available in order to reduce income to the system. They might also opt to reduce across the board information access fees for the commercially valuable information.

Disincentives

All agencies should be banned from providing a similar premium service and charging for it. To allow them to do so would result in agencies selling enhanced access to those public records in greatest commercial demand to the detriment of enhanced access to public records and services across all government agencies in response to the full range of public interests. If allowed to do so, fees would be reinvested in that agency's operations rather than reinvested in increasing citizen access generally across government. Allowing an agency to "cherry pick" would also work to the detriment of expanding access to that individual agency's records. The process of collecting and expending funds would be internal and the incentive would be to charge for any and all information that it could. The oversight board arrangement with cross constituency representation helps ensure that records of the agency of most value to citizens and businesses would be the datasets receiving greatest attention for on-line access.

All agencies should be allowed, encouraged, and required to provide full copies of their digital data files to anyone requesting them under open records law principles. However, government agencies should not attempt to compete with the private contractor hired to provide access services across state government. If competition to the access service arises, it should arise from the private sector. Private companies should feel free to acquire copies of digital data files through open records requests and provide a competing service to that provided by the state contractor. However, from a practical perspective, this will be difficult to do for many datasets unless the contractor is operating very inefficiently. In that case, competition would be deserved and beneficial to all.

Requiring that fees be paid into a general purpose state revenue fund to avoid "cherry picking" would also eliminate the incentive of agencies to enhance electronic access to their records. Thus, the model above attempts to provide a mechanism for funding expanded access to citizens while providing significant incentives for agencies to participate in making their electronic records available.

Testing the Model

For any economic and operational model such as that proposed and being implemented, the devil is in the details. However, this is a model that looks promising in expanding the public commons in government information rather than promoting diminishment or elimination of the information commons. This model and other innovative models that expand access for citizens to information should be considered at all levels of government in the U.S. Models for enhancing the "ability to read" in library-like settings in our virtual future similarly need to be explored.

Following from the “tragedy of the information commons” metaphor, one might assume that we live merely in a “world of imperfect communication” and if private, commercial, and government decision-makers only knew of the adverse ramifications and high costs to society of their actions or only knew of the long term detriments to their own interests, they would alter their decisionmaking towards beneficial ends. Sometimes this is indeed the case. However, the metaphor more typically suggests that we live in a “world of imperfect decisionmaking”. This conclusion suggests that even though communications are perfect and parties are fully informed of the adverse effects of their actions on society, they will often choose to take those actions anyway in furthering their own short term objectives. Thus, communications regarding adverse effects must be directed at legislatures and other rulemaking bodies in addition to individual private decision makers. Government agencies as well can take a leadership role in reversing tragedy dynamics by recognizing and halting actions which tend to stifle or diminish the information commons take affirmative actions that result in expanding the information commons.

9. Summary

Recent commentators have argued that the primary problem we face as society becomes more and more dependent on digital forms of information is that we will have too much of it. We are already drowning in information. If the supply of information appears to inherently grow rather than diminish, how then may the information commons be threatened or destroyed?

Whether limiting the information commons through diminishing delivery of government information to the public domain, decreasing the public's ability to read copyrighted works in public library-like arrangements, or expanding intellectual property rights for marginal creative expression to the detriment of the advancement of science and the useful arts, the tragedy of the commons develops in this way. An entity whether in an attempt to correct an unjust situation or in an attempt to gain an economic advantage, advances its own interests by instituting or causing

to be instituted restrictive information policies that keep information and the knowledge that such information may bring out of the public domain. Over the short term this practice gives the entity, whether an individual, commercial enterprise or government agency, an advantage in exchanging information. Seeing the inequity, others respond in kind by instituting their own more restrictive information policies. This results in a snowballing effect towards keeping more and more information out of the public domain.

Destruction of the information commons or failure to build it at all is not inevitable. By exposing and communicating to legislative bodies the full aggregate social costs of actions that are adverse to the information commons, we may mutually enact laws, regulations, and guidelines that coerce each of us into protecting and expanding the public information commons to our mutual benefit. One of the goals of lawmaking should be to place the societal costs of information commons degradation squarely on the shoulders of those causing it. If the destructive cost of an action becomes "internalized" by a business, the rational decision-maker will find it is less expensive and more logical to eliminate the destructive practice than to suffer penalties and damages. Learning from the administrative, legal, economic, and political techniques used in combating destruction of the environmental commons, we can contribute to and maintain a highly productive and beneficial information commons.

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Legal Resources

Copyright Act, Sec. 105

National Environmental Policy Act, Public Law 91-190, 1970, Sec 102

United States Constitution