Geographic Information Legal Issues[1]

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Summary

Several areas of law affect access to and use of geographic information. Among the most influential include intellectual property (for example, copyright, patent and trade secret), freedom of information (that is, freedom to access the records of government), and the information privacy of individuals. This article briefly summarizes the status of laws in these areas as they relate to access to geographic work products and data sets. It also discusses some of the policy arguments upon which national approaches to accessing geographic data have been predicated. Examples are drawn primarily from high-income nations, those in North America and Europe, since much of the emerging information law at the international level is arising from debates arising from conflicts of laws among these nations. The article suggests that a liberal policy concerning copyright law and the general principle of open and unrestricted access to government information, while accounting for security concerns, are wise policy choices for most nations. These policy approaches, when tempered with appropriate means for protecting other core interests, have been beneficial both in terms of supporting fundamental democratic values and in terms of supporting long term economic advancement for nations.

1. Introduction[2]

The general information policies of nations are often driven by motives such as encouraging an informed citizenry, promoting economic development, protecting national security, securing personal information privacy, supporting the effective functioning of democratic processes, and protecting intellectual property rights. In most nations, all of these motives are supported to varying degrees through a balance of competing yet complementary laws.

A basic policy assumption underlying much information law in high-income nations, particularly those in the west, is that the economic and social benefits of information are maximized by fostering wide diversity in the creation, dissemination and use of information. Private and non-profit businesses, private citizens, local to national government agencies, and non-profit organizations all contribute to this milieu of data suppliers, disseminators and users. The belief, borne through experience, is that diversification of sources and channels for the distribution of information establishes a social condition that allows economies and democracy to thrive. Accordingly, in the following sections this article examines three fundamental aspects of information law as it relates to geographic information, viz.: copyright law, freedom of information law, and privacy law.

2. Copyright Law[3]

A primary objective of copyright law is to encourage expression of ideas in tangible form so that the ideas become accessible to others and can benefit the community at large.

Copyright restricts the use of creative works as an incentive for authors to bring forth knowledge, information and ideas so that others in the community may exploit the knowledge for economic or social gain. By providing limited but substantial protection to the creative author for making their work known, everyone in the community benefits.

In brief, copyright protection subsists in original works of authorship and the author of the work is the owner of the copyright upon creation of the work or expression in tangible form. Copyright allows the holder to bar others from copying the work, creating derivative works, and displaying or performing the work in a public manner.

Because protection exists upon creation, modern international copyright conventions hold there is no longer a need to place a notice of copyright on a work in order to gain copyright protection. In most nations, if the author of a work is an employee and the work was created within scope of his or her employment (that is, "work made for hire"), the employer is the assumed owner of the copyright.

Copyright extends in the typical case in the U.S. for the life of the author plus 70 years or 95 years from publication for corporate created works. These terms are typically shorter in other nations.

There is no international registry for copyright. Registration is typically sought in a country of prime interest with dependence on international laws and treaties for obtaining similar protections in other nations. Because works are immediately protected upon their creation there is no need to register a copyright for the copyright to be valid. However, registering supplies documentation of your creation of the work as against other claimants, provides prima facie evidence of the validity of the copyright, and registration is typically a prerequisite for bringing an infringement action. In the U.S., registration must occur within three moths of publication or prior to infringement to enable claims for statutory damages and attorney's fees. Similar benefits of registration likely accrue in other nations.

Copyright protects only expression, not facts as expressed in the 1986 Berne Convention (U.S. Treaty Doc. 99-27, KAV 2245) The expression protected must be the product of intellectual creativity and not merely labor, time, or money invested. Facts, algorithms, physical truths, and ideas exist for use by everyone. These may be extracted and used freely.

In the U.S., if an authored work expresses a mere "modicum" of creativity, the work gains protection under copyright (Feist Publications v. Rural Telephone Service Co. 111 S. Ct. 1281, 1287, 1991). Thus, a very low level of creativity is required to gain protection. However, the protected elements of the resulting work are precisely those that reflect the intellectual creativity, and no more. Further, in the U.S., "(t)he primary objective of copyright law is not to reward authors, but to promote science and useful arts. To this end, copyright assures authors the right to their original expression, but encourages others to build freely upon the ideas and information conveyed by the work. This result is neither unfair nor unfortunate. It is the means by which copyright advances the progress of science and art." (Feist Publications v. Rural Telephone Service Co., 1991).

In other nations, the concept of a "moral right" or "natural right to the bounty of one's efforts" may carry greater weight under copyright law. For instance, in some European

nations, the level of creativity required to gain copyright protection is much higher but the protection may extend typically to the entire work and not to just the creative elements of the work.

Regardless of the nation, copyright subsists usually in compilations of geographic facts if there is some creative "authorship" in the "selection, coordination, or arrangement" of the compilation. There is a modicum of creativity in the selection, arrangement and coordination of almost any geographic data set. Thus, in the U.S., wholesale copying of a competitor's geographic data set without permission is typically illegal under existing copyright law because, in the process of copying a data set, one is inevitably copying the creative elements of the work as well.

Because Europeans nations required typically a higher level of creativity to acquire protection, the commercial and government sectors felt that many databases, such as geographic databases, were not protected adequately in Europe. Hence, they advocated explicit database protection legislation to protect databases above and beyond copyright law. In 1996, the European Community (EC) issued a directive requiring its member nations to pass national laws comporting with a new form of database right. All nations in the EC complied and the effects of the national laws are just beginning to be studied. A study titled *Across Two Worlds: Database Protection in the U.S. and Europe* that was commissioned by Industry Canada to compare the effects of the EC versus the U.S. approach shows that the new laws typically resulted in a onetime boost in database production and a onetime boost in the number of new firms entering the database industry. Further, an analysis of emerging court cases and interviews with those closely familiar with the new laws indicate that the benefits may be offset by (a) excessive protection for certain databases, (b) new barriers to data aggregation, (c) new opportunities for dominant firms to harass competitors with threats of litigation, (d) increased transactional gridlock, and (e) inadvertent impediments and disincentives for non-commercial database providers. Thus, the new laws may be having the reverse effect of the intended goal of promoting long-term economic growth and the advancement of science. However, further studies accomplished over time will be needed to support or falsify the results of the initial studies.

Although some works, including many spatial data sets, are not protected to the extent their compilers would desire, such works often may be protected by alternative laws. Contract, trademark, trade secret and misappropriation laws provide substantial protection for many data sets that lack creativity requisites for protection under copyright.

A major difference between the copyright law of the U.S. and that of other nations is that the United States expressly forbids Federal agencies from imposing copyright in the works of the agencies, thereby placing these information resources in the public domain. Due to their dominant power positions and fiscal incentives to do so, it is very likely that most government agencies would choose in their own best agency interests rather than in the interests of citizens generally if they had the ability to decide whether to impose copyright in government information. Thus the imposition of copyright in government works is addressed by public policy makers in political law making forums. In the U.S., the Copyright Act has long stated that "(c)opyright protection under this title is not available for any work of the United States Government." (17 U.S.C. § 105). The primary reason for not allowing Federal agencies to copyright public records was the fundamental belief that government

copyright is the antithesis of "open access" whereby an informed citizenry can check official abuses. However, other values also are at work, primarily that individuals ought to be able to derive benefit from public goods and that education (increased access to information) is inherently good in its own right. Thus the position of Congress has supported the development by individuals and private businesses of markets for government information and has otherwise encouraged the distribution of government information in the public interest.

The U.S. appears to be unique in the world in taking this open access and non-proprietary stance for the records and products of its national agencies. However, a study for the European Commission in 2000 titled *Commercial exploitation of Europe's public sector information* states that it saw "… compelling evidence of the benefits of the adoption of strong freedom of information, no government copyright, marginal cost recovery, non-exclusive licensing and explicit removal of restrictions on reuse of licensed public sector information." On October 23, 2001 the European Commission adopted a Communication with the goal of improving the exploitation of public sector information throughout Europe. "The purpose is to remove the many barriers content companies are facing trying to develop the next generation of cross-border information services and products based on public sector information. The overall aim is to put these European companies on an equal footing with companies in other markets such as the US, where simpler access and re-use regimes have led to a market up to five times larger than that in Europe. While the Communication comprises a set of European-level measures to facilitate the re-use of government information resources, the Commission is also considering to ease the existing barriers through a directive." Thus, nations in Europe may ultimately follow a national government data approach similar to that found in the U.S.

Meanwhile, most national governments as well as most state and local governments in the U.S. feel that they have the option of imposing copyright in their public records if they choose to do so. In the U.S., attempts by state and local governments at exclusive or restrictive publishing are typically severely limited by free speech rights of citizens. That is, citizens typically have the right to access public government records and divulge them. Antitrust laws are also very suspicious of state monopolies in information. Further, legal scholars have argued that 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. Regardless, some local and state agencies are pursuing the imposition of copyright in some public records. Due to their value, geographic data sets are often included when this approach is taken.

3. Freedom of Information[4]

Freedom of information acts create a balance between the right of citizens to be informed about government activities and the need to maintain confidentiality of some government

records. The presence of such laws in a nation often increase greatly the ability of citizens to access and copy geographic data and records maintained or used by government agencies.

Relatively few nations of the world have broad-based freedom of information acts. Among those that purportedly do include Australia, Austria, Canada, Columbia, Denmark, Finland, France, Hungary, Ireland, Israel, Japan, Luxembourg, Netherlands, New Zealand, South Africa, Sweden and the United States. (see http://foi.missouri.edu/international.html and http://www.missouri.edu/~foiwww/intlfoi.html for listings and details). Many of the national freedom of information acts were enacted within the past 25 years and numerous additional nations are actively considering such acts. The specifics of the acts vary from jurisdiction to jurisdiction but all appear to have a common purpose to "… ensure an informed citizenry, vital to the functioning of a democratic society, needed to check against corruption and to hold the governors accountable to the governed" (NLRB v. Robbins Tire & Co., 1978). Because it was one of the earlier national acts and because of its extensive effect on access to government's geographic information, the Freedom of Information Act of the U.S. is described in greater detail.

The purpose of the U.S. Freedom of Information Act (FOIA) (USCS Title 5 § 552, Pub. L. No. 89-487, 80 Stat. 250 (1966), Pub. L. No. 90-23, 81 Stat. 54 (1967), Pub. L. No. 93-502, 88 Stat. 1561 (1974), Pub. L. No. 99-570, 100 Stat. 3204-48 (1986)) is to require federal agencies to make agency information generally available for public inspection and copying for any public or private purpose. The U.S. Congress has declared that the act has resulted over time in a valuable means through which any person can learn how the government works, has led to the disclosure of waste, fraud, abuse and wrongdoing in the Federal Government, and has led to the identification of unsafe consumer products, harmful drugs, and serious health hazards (for instance, see HR 3802, Electronic Freedom of Information Act Amendments of 1996, http://www.epic.org/open-gov/efoia.html). The 1996 amendments to FOIA ensure that citizens now may obtain copies of government records in electronic form if they exist in that form.

The FOIA of the national government as well as the Open Records Laws of the individual states generally support a policy of broad disclosure by government. For instance, if a data set held by a federal agency is determined to be an agency record, the record must be disclosed to any person requesting it unless the record falls within one of nine narrowly drawn exceptions contained in the FOIA. Exceptions are construed narrowly by the courts so that disclosure is typically favored over non-disclosure. In responding to citizen requests for records, government agencies at most levels in the U.S. are authorized to recover the costs required to respond to the citizen requests.

May a private citizen acquire an entire geographic data set produced by a U.S. government agency? The answer to this question typically is "yes" and the rate charged for data sets is essentially the cost of duplication. There exists a general presumption of disclosure and the courts have held that records stored in a computer are available through the FOIA (Yeager v. DEA, 678 F. 2d 315, 321 (D.C. Cir. 1982)). However, if the digital data set is protected by one of the nine exceptions to the act, it may be withheld from disclosure. For instance, exception 3 protects agency records that are specifically exempted from disclosure by statute. Thus, the Landsat Commercialization Act of 1984 allowed Landsat data sets to be sold at a much higher rate than the costs of duplication. It is worth noting that allowing an exception

for Landsat data and the resulting high costs for obtaining it greatly curtailed the use of that data for an extended period of time. Unlike food and clothing, the demand for information is highly elastic so that if the price for information is perceived by individuals as being too high, they will often choose to do without rather than paying the demanded price.

It should be noted that many federal agencies in the U.S. voluntarily have been placing their geographic information datasets openly on the web to make their data sets more accessible to other government agencies as well as to for-profit businesses, non-profit organizations, and citizens generally (for example, see http://www.fgdc.gov/clearinghouse.html). However, federal agencies also bear affirmative obligations to actively disseminate their information as defined by the provisions of Office of Management and Budget (OMB) Circular A-130 of June 1993. They are particularly encouraged to disseminate raw content upon which value-added products may be built and to do so at the cost of dissemination, with no imposition of restrictions on the use of the data and through a diversity of channels. The core provisions of OMB Circular A-130 were incorporated into the Paperwork Reduction Act of 1995 (PRA) and that act additionally encourages the use of information technologies by agencies for providing public access, rather than relying on cumbersome FOIA processes. With the expanded use of world wide web servers by agencies at the national, state and local government levels the cost of dissemination for many government data sets has become negligible and thus many data sets are now freely available to anyone with the ability to access them over the internet.

Similar to the national situation, the Open Records Laws of the individual states typically mandate citizen access to the records of state and local governments. Because local and state governments are not eliminated from claiming copyright in their public records by federal copyright law, some have advocated altering state open records laws to exempt geographic information data sets from release to citizens under the provisions of those laws. These local governments have perceived a possibility of paying for the creation and maintenance of improved land records systems other than through general tax revenues. Restricting access to public records is contrary to the plain letter language of most state open records laws in the U.S. and therefore explicit legislation is typically required to allow the restrictions. Those who seek to impose the restrictions on citizens should be required to overcome the underlying policy arguments on which such laws are based, foremost of which are that open access keeps government accountable and that open access to government information has far greater long term economic benefits for a community than does pursuing agency revenue generation approaches.

4. Privacy Law[5]

Geographic information technologies are now in common usage in high-income nations for amassing detailed information that has in common a stationary location. They are also being used for the corollary of tracking mobile individuals or objects over space and time. Combining techniques from the geographic information system, global position system, digital map, mobile technology, database, and location-based services communities is allowing for a rich suite of methods for tracking and amassing information. Such technologies are being used currently at the local level in high-income nations to:

- dispatch and route emergency vehicles;
- map and analyze crime patterns;
- track and model the quality of ground and surface water;
- inventory and manage roads, utilities and other physical facilities;
- update and reproduce tax maps, zoning maps and land use maps;
- optimize delivery of rural health and medical services;
- create maps as needed that overlay multiple layers of information such as aerial images, zoning, property lines, topography, sewer lines, water lines and wet lands;
- select optimal sites for locating businesses and other facilities;
- track and manage urban growth;
- dynamically optimize the efficiency of traffic flows through urban areas;
- evaluate sites for waste disposal;
- advance economic development through provision of detailed asset information;
- track and model the spread of pollutants or destructive biological agents;
- evenly distribute class load burdens among schools and route school buses efficiently;
- identify hazardous waste sites and map brown fields;
- provide citizens with remote access to local government information;
- optimize preservation of farmlands;
- track down power outage locations;
- provide detailed planning for efficient and sound land development;
- map the territories of animal and plant species;
- track depletion and recovery patterns of fisheries, forests, and soil erosion;
- locate sites for telecommunication towers and cell phone facilities;
- enable citizens to access and evaluate local government records for themselves.

While accomplishing any of these activities in isolation may not raise personal privacy concerns, information systems with the ability to massively merge information from many or all of such applications in networked environments does raise the specter of a surveillance society.

The legal right to privacy is essentially the right to be left alone. Ones' right to privacy is still dependent largely on the specific laws and general legal philosophy of the specific nation in which one is physically present. The context within which privacy rights were originally argued and developed in most nations was one involving conflicts among singularly identified individuals. Although such laws often remain valid and provide some personal privacy protection, modern society has entered a new social and technological era in which privacy conflicts involve detailed data collection and identity profiling on large portions of the population.

In the U.S., by example, the judiciary developed and clarified the right to privacy through case law over many years. The right "prevents governmental interference in intimate personal ... activities and freedoms of the individual to make fundamental choices involving himself, his family, and his relationship with others" (Industrial Foundation of the South v. Texas Indus. Acc. Bd., Tex., 540 S.W.2d 668, 679). Although the word "privacy" does not appear in the U.S. Constitution, the U.S. Supreme Court over time has interpreted a right of

privacy to exist for individuals under the First, Fourth, Fifth, Ninth and Fourteenth Amendments.

In addition to judge-made law, numerous legislative enactments address privacy in the U.S. at both the federal and state levels. The major federal privacy statute is the Privacy Act of 1974 (Pub. L. No. 93-579, 88 Stat. 1896 (1974), Pub. L. No. 94-394, 90 Stat. 1198 (1976), Pub. L. No. 95-38, 91 Stat. 179 (1977), Pub. L. No. 100-503, 102 Stat. 2513 (1988)). The Privacy Act (1) allows individuals to determine what records pertaining to them are being collected, maintained, or used by federal agencies, (2) allows individuals to be notified when records obtained for a particular purpose will be used or made available for another purpose without their consent, (3) allows individuals to gain access to such records, make copies of them and make corrections, (4) requires agencies to ensure that any record which identifies individuals is for a necessary and lawful purpose, and (5) requires agencies to provide adequate safeguards to prevent misuse of personal information. Numerous additional federal acts require private businesses, utilities, and government agencies to protect certain classes of personal information (for example, medical, financial, and credit records) or to protect personal information under specific circumstances. Similarly, many state governments in the U.S. have a general privacy act that mirrors the federal government's Privacy Act. These acts typically control the information that state agencies and local governments may gather on individuals. Also similar to the federal law situation, most states have numerous separate acts addressing privacy problems in specific situations.

There is a general understanding in the U.S. that if people want to protect themselves from privacy abuses by government agencies, government records need to be open and transparent as possible. If citizens have a right to know exactly what government agencies are collecting and what they are doing with it - and they do not like it, they can rise up and pass laws to tell an agency what they can and cannot do with personal information about citizens. So to protect personal privacy the general rule in the U.S. is that government records should be as open as possible whereas exceptions to openness should be uncommon and only when needed for specific and narrowly drawn governmental needs.

Thus, there are several major differences in the general U.S. approach versus European approach to protecting personal information privacy. U.S. laws have tended to restrict the personal information that government at all levels may collect and have provided significant safeguards against privacy intrusions by government agencies. That is, in many instances government agencies are banned from even gathering or accessing certain personal information. By contrast, government agencies in many European nations are allowed often to compile information in much greater detail on individuals. In many of these instances they typically have much stronger sanctions for government personnel who inappropriately use or divulge such private personal information.

U.S. laws also have tended to give the commercial sector great leeway in what personal information private businesses may collect on private individuals and what they may do with it. This may reflect in U.S. society a belief that individuals should be responsible for protecting their own privacy interests relative to the commercial sector rather than relying on government to do it for them, a belief that economic efficiency will be stifled by imposing greater personal privacy restrictions, a greater distrust of government power than in private

commercial power, or simply an inability to overcome industry resistance to privacy legislation initiatives at state and federal levels.

In short, the current U.S. approach generally to protecting personal information privacy is to avoid regulating emerging technologies and new information system developments. Rather, laws are passed that enable private citizens to protect their own information privacy by going after abusers and lawbreakers. This approach purportedly supports economic efficiency and most in the commercial sector are strong supporters of this general approach.

By contrast, in Europe, many of the legal restrictions and regulations imposed on government in the handling of personal information are similarly imposed on the private sector. With the strong privacy protection mandates being imposed by the European Union we may see much greater consistency across Europe in implementing privacy protection measures than we may see, for instance, across the individual states in the United States. Due to the ability to construct contracts that can accommodate the differences in privacy laws among nations, EU privacy legislation is not expected to significantly impede trade with the U.S. and other nations.

5. Conclusions

If intellectual property laws are too lax, there may be insufficient incentives to produce information works. Thus, one economic goal of copyright is to protect and reward creative activity such that creators have an incentive to make their works available to others. However, if protection is too rigid, it impedes the free flow and fair use of information. Thus the intellectual property regimes of most modern nations strive to provide sufficient access for citizens in order to provide the raw materials that citizens may use to create new ideas, products, services. Through such value-added activities the economic and social well being of the nation as a whole is advanced.

Freedom to access government information to enable citizens to be informed about what government is up to is a relatively recent world phenomenon. Such laws appear to be having a substantial positive effect in building citizen trust in government and in promoting social and economic well-being. Weiss and Backlund summarize U.S. domestic information policy at the Federal government level as: "a strong freedom of information law, no government copyright, fees limited to recouping the cost of dissemination, and no restrictions on reuse." Other nations, such as those in Europe, may be moving in closer alignment with these principles.

The expanding use of spatial technologies, the amassing of spatial databases, and the use of location data as the foundation for building many forms of information systems is heightening personal information privacy concerns. Some high-income nations are placing emphasis on government controls over what personal data is allowed to be collected and controls over the directions that technology advancements should be allowed to take. Other nations are emphasizing freedom of the marketplace while providing citizens with legal tools to protect themselves from information privacy abuses. Thus, substantial variations exist among nations in the privacy approaches being pursued.

Global electronic networks have advanced to the point where we are now well along in participating in global economies. This suggests that the need to reconcile competing interests in digital geographic data will become more intense over time. Yet, each nation needs to individually resolve internally the appropriateness of proposed changes in its policies and practices in light of the culture its citizens desire to maintain.

Nations should be very cautious about proposing new laws. New legislation should be enacted typically only when changed circumstances can't be dealt with through the marketplace, private contracting or technological responses. The law should react, not lead, in times of rapidly changing technological and social conditions. New legislation based on fear of what might happen rather than on actual conflicts tends to complicate the law and increase the complexity of resolving future disputes. Courts are able to adapt to changing circumstances and, as a general rule, nations should let legal principles evolve through actual experiences in dealing with new conflicts and technologies prior to advocating legislative solutions. When specific conflicts arise among nations that can not be resolved by other means, certainly cautious legislative adjustments may be appropriate.

Even if a group of scholars could strongly document that giving deference in the law to new innovations and investment over old innovations and investment would have a highly desirable effect on the long term economic and social well being of a nation, democracies allow citizens to select government officials who may chose to ignore the advice of experts. Citizens also have the right at the ballot box to make mistakes. Therefore, the initial critical issue in determining which policy alternatives are practically feasible in a specific jurisdiction may be to answer the question of *who* has the power in that jurisdiction to make decisions - whether or not those decisions are considered by experts to be rational.

If through the political process, citizens have been convinced that leaders advocating "restrictive information practices" are appropriate, such practices are likely to be implemented. Whether the current balances in copyright law, laws controlling access to government information, and privacy laws will continue in any nation into the near and distant future is unknown. However, political realities do not negate the responsibility of citizens, practitioners, government administrators and researchers to continually question and investigate whether specific approaches provide greater or lesser economic and social equity benefits than others. In democracies, irrational governmental policies are inevitably exposed over time with the result that the system corrects itself.

Bibliography

Clarke, R. (2001) Person-Location and Person-Tracking: Technologies, Risks and Policy Implications, Information Technology & People 14, 2 (Summer 2001) 206-231. A basic overview article on emerging location based technologies and their potential policy implications.

Maurer, S. (2001) Across Two Worlds: Database Protection in the US and Europe. In *Intellectual Property and Innovation in the Knowledge-Based Economy*, J.Putnam,ed., Proceedings of the Conference 23 to 24 May 2001, Toronto, ON, Canada (University of Calgary Press,

Calgary, AB, Canada). Compares through empirical evidence the before and after ramifications of the European Database Directive.

Maurer, S., P.B. Hugenholtz, and H. Onsrud, (2001) Europe's Database Experiment, *Science*, 294: 789-790, 26 Oct 2001. Assesses the evidence to date of the impact of database legislation in European nations and suggests recommendations for other nations.

National Research Council, Panel on Distributed Geolibraries, Mapping Science Committee (1999). Distributed Geolibraries: Spatial Information Resources. Washington, D.C. National Academy Press. Describes the characteristics and benefits of distributed geolibraries as well as the architectural, intellectual property and organization issues confronted in their pursuit.

National Research Council, Committee for a Study on Promoting Access to Scientific and Technical Data for the Public Interest (1999). A Question of Balance: Private Rights and the Public Interest in Scientific and Technical Databases. Washington, D.C. National Academy Press. Discusses the benefits of open access to scientific and technical data for the progress of science and reviews the potential effects of proposed legal changes on the nation's research, education and commercial communities.

National Research Council, Committee on Intellectual Property Rights and the Emerging Information Infrastructure (2000). The Digital Dilemma: Intellectual Property in the Information Age. Washington, D.C. National Academy Press. Comprehensively reviews the characteristics of existing and proposed intellectual property law and recommends legal changes necessary to maintain a reasonable balance between the protection of property rights and public interests.

Onsrud, H.J. (1999) Liability in the Use of GIS and Geographical Datasets in: P. Longley, M. Goodchild, D. Maguire, and D. Rhind (eds.), Geographical Information Systems: Vol.2 Management Issues and Applications, John Wiley and Sons, Inc., pp. 643-652. Explains liability concepts as they relate to geographic information products and services.

Pira International Ltd. (2000) *Commercial exploitation of Europe's public sector information*, Luxembourg: Office of Official Publications of the European Communities, 20 Sept 2000. An economic analysis of the importance of public sector information in the digital economy and the benefits to be derived from such information for the commercial sector.

Weiss, P.N. and P. Backlund (1996) International Information Policy in Conflict: 'Open and Unrestricted Access' versus 'Government Commercialization', Papers of the Conference on Information, National Policies, and International Infrastructure, HIIP, Jan 28-30, 1996 http://ksgwww.harvard.edu/iip/GIIconf/weiss.html. Articulates the drawbacks and benefits of open access versus more restrictive approaches to distributing government data.

Notes:

[1] This work, entitled "Geographic Information Legal

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[2] Substantial portions of this work have been drawn from Onsrud, H. (1998) "Access to geographic information in the United States", in: J.A. Zevenbergen (ed.), *Free accessibility of geo-information in the Netherlands, the United States and the European Community: Seminar Proceedings*. Delft: Delft University Press.

[3] Segments of this section were drawn from H.J. Onsrud and X.R. Lopez (1997) "Intellectual Property Rights in Disseminating Geographic Data, Products, and Services: Conflicts and Commonalities Among European Union and United States Approaches", in: I. Masser and F. Slagé (eds.), *European Geographic Information Infrastructures*. London: Taylor & Francis.

[4] Segments of this section were drawn from Onsrud, H.J. (1992) "In Support of Open Access for Publicly Held Geographic Information", *GIS Law*, 1(1), Jan/March 1992, pp. 3-6.

[5] Segments of this section were drawn from H.J. Onsrud, J. Johnson, and X. Lopez (1994) "Protecting Personal Privacy in Using Geographic Information Systems", *Photogrammetric Engineering and Remote Sensing*, 60 (9), pp. 1083-1095