Why Location Matters:
The Importance of a Legal and Policy Framework for Spatial Data

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Summary

Spatial technology - which includes a wide range of technologies, such as satellite and aerial imaging systems, web-mapping services (WMS), geographic information systems (GIS), location-based services (LBS), radio frequency identification (RFID) and Global Position System (GPS) - is becoming a critical management and visualization tool for governments and business. Spatial technology consists of data, software applications, hardware and services that are being introduced for the World Wide Web, grid processing, and most recently, cloud computing. The data associated with this technology ("spatial data") is used for purposes ranging from homeland security to climate change, to social networking and satellite navigation devices, to finding alternative energy resources and the deployment of broadband.

Unfortunately, the legal and policy communities have not kept pace with the rapid adaption of this technology for commercial and societal purposes. As a result, there are a wide range of issues associated with spatial technology and the collection, distribution and use of spatial data that remain unresolved or confusing. These issues include privacy, liability, intellectual property rights and national security. This uncertainty is already impacting the cost and ease of collecting and sharing spatial data for both governmental and commercial entities. Unless an informed and cohesive legal and policy framework is developed for spatial data and services, there is a growing risk that this critical technology will ultimately be underutilized.

Spatial Technology/Spatial Data

Historically, spatial technology was primarily the domain of those either in civilian federal government agencies or in defense and intelligence with high security clearances. Military and intelligence agencies used it for global observation, intelligence, treaty verification and the targeting and monitoring of enemies and potential threats. Civilian government agencies used lower resolution imagery for matters such as mapping, infrastructure planning and environmental issues. Local and state governments used it for things such as zoning, taxation and urban planning. Commercial uses were generally limited to industries such as oil and gas, utilities or telecommunications. However, over the past decade, this has begun to change.

Computing power increased and the cost of transmitting data decreased, making it more cost effective to deal with the large data files associated with spatial technology. In

addition, the equipment used to collect spatial data got much smaller, reducing costs and increasing mobility both in the sky and on the ground. Software used to manipulate the imagery became less expensive and more ubiquitous. The elimination of selective availability with regards to the GPS system resulted in a rapid increase in commercial applications. At about the same time several companies began to collect high-resolution satellite imagery for commercial purposes. Shortly thereafter, there was a rapid increase in the number of GPS-equipped mobile phones and other handheld devices, further increasing the demand for mobile and location-based applications. The introduction of Google Earth in 2005, in addition to other web mapping services, contributed to the explosion of interest in spatial technologies around the world.

The result is that many important and widely used applications have been developed to make use of location information for providing services over the web. Such applications as Google Maps, Microsoft Virtual Earth (now Bing Maps) and MapQuest, are in fact used daily by people around the world, while millions more use turn-by-turn directions delivered by satellite navigation devices and mobile phones, or benefit from the "location" aspect of social networking services such as Twitter or Loopt.[1] In addition, many other critical, though less well known applications of "location" technologies remain wide-spread, including, for example, the critical role played by remote sensing in climate change research and the management of such natural disasters as wild fires[2], the use of spatial analysis for tracking the outbreak of pandemics, or the varied uses of GPS location data -- by researchers to define conditions that trigger asthma attacks"[3], by parents to monitor children's activities, or by caregivers to ensure the welfare of Alzheimer patients.

However, the availability of spatial technology has also raised a number of potentially troublesome issues. Some people are concerned about how their mobile phones can be used as a tracking device. Others worry about personal location data collected when they use their debit card for purchases or ATM transactions, or their automatic pass at toll stations, or an electronic identity card to enter an office or parking garage. In some countries, Google Street View has raised a number of privacy issues, and many governments around the world have expressed concern about the national security considerations associated with the display of imagery over their most sensitive military sites on the Internet.

Legal and Policy Issues

It should not be surprising that a consistent and comprehensive legal and policy framework does not exist with regard to spatial technology, since the legal and policy communities are reactive when it comes to the introduction of a new technology. However, given the increased pace with which this technology is deployed and adapted in today's society, the lack of such a framework becomes increasingly noticeable. In addition, because of some unique attributes associated with spatial data, the need for such a framework is arguably even a greater imperative.

Intellectual property rights – Determining a party's intellectual property rights (IPR) in spatial data is a challenge. Copyright law with respect to spatial data is complicated and can be confusing and there are a number of factors that must be considered in determining a party's property rights, including where the data was collected, the type of party (e.g. private company or public entity) exercising the rights and how the data was compiled. Adding to the confusion is the fact that some countries also protect databases.

Data Quality – One of the unique attributes of spatial data is its versatility. A single data set can be used for a number of different applications. However, the quality of the data (accuracy, timeliness, completeness, etc.) may not be sufficient for all such applications. As the use of spatial data for commercial purposes increases, it is increasingly important to know who bears the responsibility for determining the adequacy of data quality for a particular application, as well as who is responsible for data collection and documentation of related metadata. Metadata – which can include such information as the date and time that data was obtained, from what sensor types and locations, and the method by which it was processed for use – can be considered the DNA of spatial data; and its importance to spatial data is greater than with most other types of data.

This issue becomes more important with the rise of "crowdsourcing". More and more individuals are contributing to the spatial data landscape. They are "geotagging" and uploading data on the Internet. They are correcting errors in data used by satellite navigation devices. They are also contributing to the sites such as the OpenStreetMap. As these data sets work their way into the spatial data landscape, there will be an increased need for oversight.

Privacy – As applications using spatial data have increased, so have the general public's concerns with respect to "location" privacy. The challenge for policymakers and the legal community as a whole will be to differentiate between real and perceived threats to an individual's privacy. For example, media reports on Google's Street View will frequently associate the privacy concerns of collecting an image of a person on a public street and displaying it on the Internet with monitoring an individual's location on a continuous basis through the use of the mobile phone or similar device. However, the spatial technology used and the implications of such use are very different and any effort to compare the two can be misleading.

Also, the concept of privacy from a location standpoint is quite new. For example, the U.S. government's privacy policy with respect to data collected on citizens does not explicitly cover "the dramatic growth in the number and types of technologies that can track individuals"[4] Any efforts to update these policies requires an understanding of the technologies' capabilities and limitations.

National Security – Government officials at all levels have expressed concerns that the broad availability of spatial data will be a risk to national security, both to forces abroad as well as to homeland security. The collection of satellite imagery by commercial

companies and the distribution of such imagery on the Internet are causing particular concern. However, a number of well-researched reports have concluded that other than a few very rare exceptions, the increased availability of spatial data over the Internet is not a major national security concern. [5] In addition, there are a growing number of court cases in the U.S. that suggest efforts to restrict such data on national security grounds are impermissible.[6]

International Considerations – Many of these issues are made even more complicated because of the international nature of spatial technology. Governments around the world use spatial data for planning and national security purposes, and the collection of spatial data is frequently done on a global scale. Cultural and political differences have resulted in varying concepts of privacy and national security.[7] For example, in India, the government prohibits its citizens from buying high-resolution satellite imagery except through a governmental organization that screens the imagery from overseas providers for anything sensitive. Concepts such as liability also frequently vary across nations, as do protections of international property rights.

Uncertainty associated with these and other important issues are key factors limiting both the collection and the sharing of spatial data. For example, government agencies are reluctant to share data because they are uncertain as to how it is going to be used. Private companies are reluctant to share data with government agencies because they are concerned that they will lose important intellectual property protections. Internationally, governments are reluctant to share data among themselves due to concerns of national security and their citizens' privacy. This uncertainty leads to duplication, increased costs and important data gaps.[8] It also leads to questions as to the respective roles of government and industry in the collection and distribution of spatial data.

Underlying Risks

One of the biggest risks associated with a continued lack of a well thought out legal and policy framework is that one will be developed haphazardly by policymakers, lawyers and jurists who do not fully understand either the technology or the implications of their decisions. For example, a single spatial data set can be used for a variety of applications. As a result, an attempt to regulate or limit a type of data for a particular application due, for instance, to national security concerns, may result in the unintended consequence of limiting the use of such data for other valid concerns. Similarly, if the language in a court decision is overly broad, such that it fails to take into account the various types of data that can be considered spatial data or location data, there is a risk that important applications will be improperly curtailed.[9] Alternatively, laws may take so long to pass that they become obsolete immediately upon implementation.

Another risk is that a framework will develop with respect to spatial data without anyone realizing it. This may occur because quite understandably, the various interest groups concerned with spatial technology tend to focus on those issues that are important to them. For example, the commercial satellite imagery segment generally does not

follow what is happening in the location-based services segment. Similarly, those involved with the development of spatial data infrastructures (SDIs) are less interested in developments in RFID applications. However, such a narrow focus does not take into account the actual processes by which policy and law are developed and how they interrelate. Generally, once policymakers find a framework that they are comfortable with – for example with respect to privacy – there is a tendency to use that framework for all applicable matters.[10] In other words, for policymakers a location privacy framework may seem appropriate regardless of the type of technology used, or who uses it. In addition, lawmakers tend to lead by example. As a result, frequently a bill that is introduced in one state legislature will be introduced – with limited variations – in other states. Similarly, judges and lawyers are unlikely to examine the nuanced differences between spatial technologies in determining how the law should apply unless they are forced to do so. As a result, from a legal and policy standpoint, it is imperative to look beyond the silos, and to drill down into the issues so as to understand how they cut across spatial technology. Only then can a logical and consistent framework be developed.

Conclusion

Spatial technology is having a significant impact on our society as well as the global economy. Almost daily, new and useful applications for collecting, analyzing and distributing spatial data are being developed; and, it is safe to assume that these applications will continue to grow with increased computer power, reduced costs associated with broadband and connectivity, and the growing movement towards "geotagging". The challenge will be to develop a legal and policy framework that nurtures this growth while at the same time protecting important societal and personal interests. Developing this framework will require an active dialogue between technical experts, policymakers, lawyers and business professionals.

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Key Terms

Crowdsourcing – in a spatial context, a group of individuals from the general public that collect and share spatial data

Geotagging – the process of adding geographic information (such as latitude and longitude) to data or information (such as a photograph or news story)

GIS (Geographic Information Systems) - generally defined as a computer system capable of capturing, storing, analyzing and displaying geographically referenced information.

GPS (Global Positioning System) - a global navigation system that is based on triangulation from a constellation of 24 satellites orbiting the earth

Spatial (or Geospatial) Data – generally defined as any information that can be tied to a geographical reference. By some accounts 80% of all data can become spatial data.

SDI (Spatial Data Infrastructures) – generally defined as the technology, policies, standards, human resources, and related activities necessary to acquire, process, distribute, use, maintain, and preserve spatial data

RFID (Radio Frequency Identification) - a technology used to collect and store data uses electronic tags.

WMS (Web Mapping Service) - a standard protocol for serving map images over the Internet that are generated by a server using data from a GIS database.

Endnotes

[1] See e.g. "I am Here: One Man's Experiment with the Location-Aware Lifestyle" Wired Magazine (http://www.wired.com/gadgets/wireless/magazine/17-02/lp_guineapig?currentPage=2)
[2] "Australia government limited Google's brushfire map", David Braue, Digital Media – CNET News (http://news.cnet.com/australia-government-limited-googles-bushfire-map/
[3] "Researcher uses GPS to find asthma causes", GIS in Education (March 3, 2009)
[4] Toward A 21st Century Framework for Federal Government Privacy Policy (Information Security and Privacy Advisory Board, May 2009)
[5] Mapping the Risks: Assessing the Homeland Security Implications of Publicly Available Geospatial Information RAND National Defense Research Institute Rand Report, (John C. Baker . . . [et al]). 2004
[6] See e.g. Greenwich v. Whitaker ,SC 17262 (Ct. Sup. Ct. June 21, 2005); California First Amendment Coalition v. County of Santa Clara, No 1-06-CV-072630 (2007) and related filings
[7] http://globalvoicesonline.org/2008/08/08/japan-letter-to-google-about-street-view/
[8] See e.g. Geospatial Information and Geographic Information Systems (GIS): Current Issues and Challenges (Congressional Research Service, June 8, 2009)
[9] See e.g. Kyllo v. U.S., 533 U.S. 27 (2001)
[10] See e.g. the Health Insurance Portability Act and the Gramm-Leach-Bliley Act.