

From Public Records to Open Government: Access to Massachusetts Municipal Geographic Data

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Abstract: *Increasingly, citizens are demanding access to raw data from governments to hold public officials accountable, look up facts, conduct analysis, or create innovative applications and services. Cities and towns create data using geographic information systems such as layers describing parcels, zoning, and infrastructure that are useful for a wide range of purposes. Through a public records request to all 351 Massachusetts municipalities, this paper investigates whether these data are accessible to citizens in practice. Some response was received by 78.6 percent of the municipalities. Two municipalities refused access to all electronic records. Many others charged fees ranging up to \$453 or placed legal restrictions on the data through licensing that could chill or prohibit creative reuses of the information through emerging technologies. Other practical barriers limited public access to data, such as limited resources, government officials' limited technical knowledge, and outsourcing to private vendors. A follow-up survey among municipalities that did not respond to the request was conducted to determine if they had GIS systems or data policies, and this information was collected for 80.3 percent of the municipalities. Finally, the paper discusses the legal, policy, and technical steps that can be taken by governments to move from a "public records" to an "open government" paradigm for transparency of government data. The policy recommendations for municipalities include publishing GIS data for free online and with minimal legal restrictions.*

INTRODUCTION

The Internet is making sharing, combining, and analyzing geographic data easier and more commonplace. The development of standard formats and application programming interfaces (APIs) mean data from multiple sources can be combined and presented in new ways by applications, Web sites, and map mashups (Ferreira 2008). Tim Berners-Lee, the inventor of the World Wide Web, has argued that improved means of organizing and sharing data will usher in the next phase of the Internet (Bizer, Heath, and Berners-Lee 2009). U.S. government agencies are involved in the creation and management of large amounts of data. Public access to this information is required to hold public officials accountable and provide value to a range of data users, and may result in benefits to governments through data quality improvement. The growth of the Internet has made possible new forms of data sharing and exchange, and increasingly government agencies also are making data available in "raw" formats for processing, analysis, and reuse. This trend has been encouraged by scholars who argue it is the most efficient means of realizing the public value of government data (Robinson et al. 2009). A significant portion of government data are geographic, much of it created and managed using geographic information systems (GIS).

Local governments not only create unique datasets but also determine how they are used through technical, legal, and policy choices. These unique datasets created at the local level include data describing the assessed value and characteristics of taxable real estate, parcel boundaries, zoning district boundaries, local infrastructure, and natural features. This information is useful for

local environmental regulation and urban planning, and often is not available from any other sources.

The purpose of this study is to investigate access to GIS data at the local level through a public records request to all Massachusetts municipalities. It seeks to answer the questions: What costs do citizens incur obtaining the data and what licensing restrictions are placed on it that restrict the public uses described previously? In addition, what types of data are exempted from public release under the law's public-safety exemption? The paper closes with a discussion of how existing laws and practices could be changed to achieve policy goals: government transparency, fostering civic innovation, respecting privacy, and safeguarding public safety.

There are several arguments for making local GIS data available to citizens: legal mandates, government transparency, and public benefits. In addition, releasing information often can serve government priorities such as ensuring data quality or advancing policy goals.

First, the federal Freedom of Information Act (FOIA) and the state of Massachusetts Public Records Law (PRL) requires that all government records should be available for citizen inspection, except for clearly defined exceptions. Because records must be public, information technology can reduce the cost and inconvenience of satisfying requests for both government and citizens alike. These laws followed from utilitarian philosophers, who argued that representative government required "the widest participation in the details of judicial and administrative business; as by jury-trial, admission to municipal offices, and, above all, by the utmost possible publicity and liberty of discussion . . ." (Mill

2008 [1861]: 73). Under this reasoning, government agencies should be subject to different rules than are private corporations.

Second, access to technical data in particular often is necessary to hold government accountable for regulatory decisions. “We have to be able to see the data the same way the public agency sees the data when they make the decision,” said GIS consultant Bruce Joffe in an interview, “whether it’s a zoning variance or tax decision or anything else.” Joffe described a scenario in which a for-profit consultant might use public data to examine government decisions about property appraisal or zoning decisions (Joffe 2010b). In this way, making data available on request can help serve the public interest by ensuring consistent and fair decision making by government regulators.

Third, the release of government data can create public value. Derivative works could help citizens better take advantage of public services such as community centers, public transportation, or other public facilities where using them requires knowledge of location, hours, and eligibility. Data about street-sweeping schedules, zoning, and other regulations can help citizens avoid tickets and fines for unwittingly violations.¹ Increasingly, journalists are turning to government data to produce maps and conduct database-driven investigative reporting, and as a resource for reporting. In the past, large newspapers and media organizations had the resources to develop databases internally. As these entities struggle, and are replaced with smaller organizations, nonprofits, and citizen journalists, it may be more important to ensure government records are widely available at low costs so similar information can be available to the public.

Lastly, government agencies themselves stand to benefit from greater access to their information. Citizen users can provide assistance improving data quality and accuracy, as well as conduct analysis that may be useful to the government. Detailed feedback on data quality could result in improved property assessment or changes to data-collection and management techniques. Access to information can achieve policy goals, such as using spatial data to follow zoning or building regulations, or by shifting consumer behavior (Fung, Graham, and Weil 2007).

For these reasons and others, cities, states, and the federal government have launched initiatives to proactively disclose raw information in public data catalogs.² These Web sites also may have application programming interfaces that allow private applications to dynamically query government databases. These new technologies provide a variety of opportunities to strengthen the principle of open access to government information. Making data available through automated systems provides the government with the ability to ensure derivative applications are using updated data more easily and at lower costs than before. However, achieving this requires several steps: producing data, implementing and maintaining technical systems, and developing policies regarding data management, privacy, and public safety.³ These developments constitute a major shift from previous approaches to GIS data dissemination. Previously, governments commonly provided data for sale on CD or DVD discs in standard proprietary formats to a limited number of professional users.

The GIS community has long discussed the information needs of the public. Well before the Internet, Dangermond observed developing public GIS was necessary despite the difficulties created by the public’s diversity of interests and information needs (Dangermond 1988). Others have observed that the Internet could expand access to government information, which would reduce market uncertainty and “render redistributive decisions more transparent and place greater accountability on those who make and advise them” (Yeh and Webster 2004). Publishing raw data or APIs can help achieve these goals because it can support efforts by a range of private actors to make information available in a greater variety of convenient, context-sensitive ways that are difficult for government to achieve alone.

The federal courts generally have ruled databases are records and, therefore, are subject to disclosure under the Federal Freedom of Information Act. Some state courts, including those of Massachusetts, have agreed. However, access to data has been denied on several grounds. In *Sierra Club vs. Orange County*, a California Superior Court ruled in May of 2010 that a database containing property boundaries constituted “computer software” and, therefore, the county was justified for charging \$375,000 in a case still under litigation. Other courts have denied requests for data created through contracts with third-party vendors, such as in *Brown v. Iowa Legislative Council*. Because many small cities rely on contractors to create and manage public data, guaranteeing the spirit of access to government records may require amending existing freedom of information laws to ensure public access to particular types of data.

Governments are using new technology to make data available to citizens in new ways, such as raw formats, feeds, or through APIs. The datasets available and ways they will be accessed depend not only on technical infrastructure but also on the licenses, policies, and laws that must balance competing public values such as privacy and security. Through an empirical examination of current policies and exploration of the access to data in practice, this paper will provide needed analysis of the technical and legal issues for the next generation of government transparency.

STUDY DESIGN

The study encompasses an experiment in access to public information and an analysis of existing policy. First, an exploratory study was conducted to explore data availability in Massachusetts.

The Massachusetts Public Records Law requires that any person with custody of any public record shall permit it to be examined and provide a copy to any person for a reasonable fee within ten days of receiving a request. Exemptions include statutory exemptions, internal personnel rules and practices, personnel and medical files, any material naming an individual where the disclosure may constitute an “unwarranted invasion of personal privacy,” limited executive privilege for policy development, law enforcement or other investigatory materials, trade secrets, sealed bids, appraisals when agencies are purchasing or condemning property, educational testing materials, certain medical contracts,

the names of persons who possess firearms, home addresses and telephone numbers of certain government officials and their families, and records relating to security or safety of people or property. The Secretary of the Commonwealth guide to the public records law clarifies electronic records are public records, including GIS databases. The fees that can be charged for GIS data are limited to the actual cost incurred in copying the requested records. The guide states that although private surveyors or engineers may own nonfactual portions of GIS databases

... it is clear that the Legislature did not carve out specific exemptions from the Massachusetts Public Records Law allowing protected intellectual property in the custody of a governmental entity to be withheld from public dissemination.... As a precaution, records custodians of GIS records are encouraged to indicate on released GIS records that the information contained in the records may be subject to intellectual property protections. (Galvin 2009)

GIS data are created and managed by different departments within city and town governments, and no central listing of all municipal offices creating or managing GIS data is available. The departments that can manage GIS data include planning, assessing, engineering, public works, and others. Therefore, the request was sent to the city or town clerk listed in a directory published by the Secretary of the Commonwealth.⁴ City and town clerks serve as points of contact for many public records and generally are aware of the functions of government so thus could route the request. The list obtained from the Secretary of the Commonwealth had one primary drawback. Because the Election Division created it, for 13 large cities it lists not clerks but addresses for Boards of Elections, Elections Commissions, or Election Divisions. Letters were sent to these addresses for consistency and most were rerouted to the correct offices. In addition, the Web sites of the state's 20 largest cities were reviewed by population (including these 13) to collect data manually about the GIS data-access policies for these cities.

Using this list, a letter was mailed requesting three common GIS layers from the Commonwealth's 351 municipalities to discover which are available publically in electronic format, and what licensing or use restrictions accompany them. The requested layers were parcels, zoning, and wastewater-treatment facilities. No specific scale was specified. Given the heterogeneity of municipal spatial data, these three were chosen because they span regulatory, administrative, and infrastructure data. Although municipalities have differing motives to keep various datasets private as will described in the following sections, these three were diverse enough to elicit general data policies.

All towns with a GIS program had a parcel layer, which is a digital version of property boundaries used for assessing and planning purposes. Because municipalities track ownership for taxation purposes and possess subdivision authority, a state effort to digitize parcels relies on municipal cooperation. Therefore, the data are both of presumptive interest and also often are not

available from other sources. Many of the smaller towns did not have zoning data either because the town did not have a zoning ordinance or only had a small number of zoning districts. Similar to parcels, zoning is determined locally and frequently updated, so municipalities are the unique source of this data, which is important for real estate development, planning, and regional analysis. Finally, a layer containing locations of municipal wastewater-treatment facilities was requested to test for public-safety restrictions. However, it may not have been an ideal layer to request. Many municipalities connect to large regional treatment plants or do not have public sewer service at all. Some municipal officials thought the request was for engineering drawings or other technical information about the sewer system. The law requires the government to respond within ten days, and responses were received from 276 municipalities, or 78.6 percent of the total, in that time even though the original letter was not necessarily sent to the records custodian.⁵ The survey was supplemented by visiting the Web sites of the 20 largest cities and towns by population. Together, these large municipalities alone are home to roughly 35 percent of the state's population. These Web sites were reviewed for any GIS data policies, order forms, or data viewers.

To assess whether the municipalities that did not respond to the records request had GIS data or policies, in September of 2011 a nonresponse follow-up survey was conducted by e-mailing the city or town clerk from the Secretary of the Commonwealth directory.⁶ However, this should be considered a supplement to the original study, which also evaluated the response (or nonresponse) of public officials to public records requests. Data policies that were obtained through this survey were analyzed with the others.

Data was received at no charge from 56 municipalities and an additional nine reported in the follow-up survey that they do not charge for GIS data. These have the highest certainty of accurately obtaining license, disclaimer, or other policy information. It is possible municipal employees distributed the data without following standing policies regarding fees or licenses, but this was expected to be rare. Twenty-four municipalities from the public records request (and four in the follow-up survey) provided GIS data order forms, usually accompanied by a license, agreement, or other disclaimer. Others provided prices but no order forms. For these, as well as the municipalities who did not respond to either request, the licensing information may not be included in the dataset because the data was not purchased.

Second, 42 disclaimers, licenses, and policies collected through the research were reviewed. This included materials found on the Web sites of the 20 largest municipalities by population and any obtained in correspondence responding to the public records request or the nonresponse survey. Both data and disclaimers were obtained from several municipalities; most of the remaining accompanied standardized order forms. All the forms were reviewed and eight common provisions were identified, and then all policies were reviewed a second time, recording whether they contained each of these eight provisions and noting any special features. These results are reported in the following section.

PREVIOUS RESEARCH

Government data should be made available to citizens for a variety of normative reasons about the political and practical effects of transparency. However, access to raw data raises several issues: practical use of new datasets, the role of licensing, public-safety concerns, and respect for individual privacy. First, to answer the prescriptive question about how data should be published online, research is presented that describes how users of a new data portal used raw government data. These findings, based on demonstrated public benefits, should guide the development of geographic data policies. Second, research is provided on the prevalence of licensing of local geographic data and policy arguments concerning access and licensing. Third, empirical studies of the relationship between geographic data and public safety are presented. A large-scale study of public federal spatial data by the RAND Corporation completed after the September 11, 2001, terrorist attack is summarized, but no empirical studies of how homeland security exceptions were being applied at the local level were found. Finally, research and principles relating to individual privacy and geographic data are presented.

CITIZEN USE OF GOVERNMENT DATA

The large-scale distribution of raw government data is a relatively recent phenomenon. A study of data users on the United Kingdom's national data portal provides empirically grounded typology of data users that gives insights about how such systems should be designed (Davies 2010). The study proposed five general categories of how citizens used data. Although this study is concerned largely with tabular data, the findings can be extrapolated to other data types where citizens are presented with raw data instead of static formats. The five use types identified by Davies were:

- Data to fact: individuals seeking out an individual fact in the form of an individual number or value from a dataset, from online interfaces or downloaded spreadsheets.
- Data to information: transforming data into visualizations, articles, reports, or graphics.
- Data to interface: creating new interfaces to interactively access and explore one or more datasets, such as mapping mashups and interactive Web sites.
- Data to data: sharing derived data that is augmented, combined, or manipulated in some way.
- Data to service: where data is used “behind the scenes” in an automated service, such as routing requests to the correct government agency.⁷

This study confirms the hypothesized public benefits that may result from greater access to raw government data and provides an empirically grounded taxonomy of multiple ways citizens use government data.

A recent report completed by the Pew Internet and American Life Project finds U.S. citizens also are increasingly turning to government Web sites to obtain data and information. To

evaluate the claims of transparency advocates, the study surveyed Americans on whether they had accessed four types of government information online. The types of information accessed and the percent of Americans include: read legislation (22 percent), look up campaign donations (14 percent), see how stimulus money was being spent (23 percent), or “visit a website that provides access to government data, like data.gov or recovery.gov or usaspending.gov” (16 percent) (Smith 2010). Although the survey did not investigate exactly which Web sites citizens accessed and whether users had similar expectations for state and local Web sites, it suggests that citizens increasingly turn to government Web sites as sources of unprocessed information.

LICENSING

The licensing of geographic data was investigated by identifying previous research, as well as conducting interviews with knowledge of management of local geospatial data in Massachusetts. A license of geographic information is “a transaction or arrangement (usually a contract, in which there is an exchange of value) in which the acquiring party obtains information with restriction on the licensee's rights to use or transfer geographic information” (National Research Council 2004: 275). In a data context, a license also can provide the data provider rights to guarantee these restrictions. Public agencies that have licensed data include Louisville and Jefferson County Information Consortium in Kentucky, Hennepin County in Minnesota, and the Maryland Department of Natural Resources (National Research Council 2004: 86-89). The National Research Council found most government officials refrain from imposing data licenses, and argued for “minimal restrictions” in data use in licenses (National Research Council 2004: 86). To comply with the terms of licenses increasingly used by local governments, the library at the University of Wisconsin-Milwaukee developed sublicenses and a CD-based distribution protocol to ensure access to library users but prevent copyright infringement (Day and Maene 2006).

In general, for copyrightable works, licensing also can be used to define a middle ground between the default protections of full copyright and releasing creative works into the public domain. The organization Creative Commons has created a variety of licenses, tailored for digital content, that allow certain types of redistribution and reuse. Geographic data contains facts, which cannot be copyrighted, with database design and structure, which could be subject to copyright. Because of this ambiguity, Creative Commons created the CC0 license for creators of data who seek to place data “as nearly as possible” into the public domain. Institutions that have chosen to apply this license to their data include the Wisconsin View consortium that distributes satellite imagery of Wisconsin, and a variety of libraries and non-U.S. government agencies (Creative Commons 2011). Although Massachusetts courts have not clarified the extent to which municipalities can claim copyright over GIS databases, or what licenses are allowed under the public records law, Creative Commons licenses provide models for how licensing can be used to explicitly allow certain types of sharing and reuse or unambiguously enter data into the public domain.

Licensing and related practices such as memorandums of understanding (MOUs) can be viewed as merely legal instruments or in a broader context of interorganizational information sharing. Using the interorganizational relation theory suggested by Azad and Wiggins (1995), these practices may encourage data sharing because they improve efficiency and stability and reduce risk in organizational relationships. A recent study of GIS data sharing within and between organizations found “organizations tend to regulate their relationship more than the contents of their exchanges,” finding policies, MOUs, and agreements were more common than licensing, contracts, and copyright agreements (Nedovic-Budic and Warnecke 2011). A variety of research on data sharing has focused on theories explaining the motivations and structures for information sharing and the need for empirical research exploring the balance of transparency, privacy, liability, and other legal concerns in geographic information sharing (Onsrud and Rushton 1995: 497).

In an interview, a staff attorney at the Massachusetts Secretary of the Commonwealth Public Records Division said whether a license violated the public records law would have to be decided on the basis of the specific facts of a case. Staff at the MIT Rotch Library GIS Laboratory reported being able to obtain data from Massachusetts municipalities without licenses. However, they routinely negotiate licenses for data from commercial providers and out-of-state cities such as New York City. When conducting these negotiations, they usually seek to avoid statements of liability and ensure sufficient flexibility so the data are useful for library users (Sweeney 2010). Technology to restrict use of electronic files is referred to as digital rights management (DRM). Researchers have developed a sophisticated technical approach to manage the rights for multiple spatial data users called “geoDRM” (Joffe and Bacastow 2004). This technology is not yet widespread, and technical measures of managing rights continue to evolve. For example, as of April 2009, Apple’s iTunes music store phased out a file format with DRM protection.

PUBLIC SAFETY

Another concern surrounding data access is public safety. In particular, access to information could aid individuals or groups planning to commit a criminal act, including an act of terrorism. In the wake of September 11, 2011, the RAND Corporation conducted a large-scale analysis of publicly available federal geographic information (Baker et al. 2004). The study methodology took a “supply” and “demand” approach. Terrorists demand certain information but can draw on a wide range of sources including private data, personal reconnaissance, and human intelligence. In this context, digital geographic information is only useful if it provides information that is “demanded” to complete the criminal act and is unique, that is, not easily accessible by other means. The study concluded that fewer than six percent of 629 datasets examined appeared useful to potential attackers, but less than one percent were both useful and unique (Baker et al. 2004). Joffe argues homeland security considerations should be a reason for public agencies to register data requestors, but

agencies should take a context-specific approach. In particular, he reported that the criteria for the information to be withheld, the infrastructure information should refer to specific “choke points” and also not be available from any other public domain source. “It’s a recommendation, but it’s referred to frequently at the [Federal Geographic Data Committee]” (Joffe 2010b).⁸ The three layers requested—parcels, zoning, and wastewater facilities—do not meet the criteria suggested previously for data with obvious public-safety concerns.

PRIVACY

Another concern surrounding data availability is individual privacy. Geospatial data can impact privacy in two ways: The dataset could contain personally identifiable information or it can be combined with other sources to invade privacy through a “mosaic effect.” Among the three datasets requested in this study, only the parcel data contained personally identifiable information. This data could be used to identify place of residency (for owner-occupied units only) or estimate personal wealth. Not only are property records public, many registrars of deeds have moved to make this data electronically available. A variety of actors rely on the accessibility of property ownership information for the smooth functioning of the property market, for fairness in property assessment for taxation, and a range of policy efforts such as code enforcement. Despite containing personal information of owners, these systems, according to Monmonier, were “less controversial” for they are linked closely to fairness in assessing and use by sellers in deciding on a fair market value (Monmonier 2002: 8). Datasets containing personal information can be anonymized through a range of techniques to aggregate, remove, or obscure information, which vary in the level of privacy provided and usefulness of resulting data.

The mosaic effect is a term adopted from military intelligence. It refers to cases when data that appears innocuous in isolation can amount to a privacy breach when combined (Vijayan 2004). Although this is a theoretical possibility with government data, it is unclear whether it would necessarily be undesirable from a normative point of view. Local infrastructure or environmental data in combination with demographics has been used by environmental justice advocates to reveal environmental inequality, such as in Maantay’s careful analysis of industrial zoning in New York City (2002). Detailed GIS maps of private residences and municipal water utility pipes played a key role in the Zanesville lawsuit, where the Ohio Civil Rights Commission successfully sued the city of Zanesville and Muskingum County for denying a black neighborhood water service for more than 45 years (Johnson 2008). Data managers should remain alert to the potential for harmful examples of the mosaic effect, given the specific context at hand.

Popular concepts of personal privacy also are shifting. Individuals are voluntarily posting huge amounts of personally identified data to social networking and other Web sites. In these cases, people give up privacy for social benefits. Some of these are ephemeral, such as meeting up with friends through geosocial

networking. Others are more profound, such as in the case of individuals who post detailed medical information on the Web site Patients Like Me in hopes of finding cures for rare disorders, identifying treatment side effects, and aiding medical researchers.⁹

In response to these developments, the Federal Trade Commission has developed Fair Information Practice (FIP) principles under its consumer protection mandate, which have been adopted by the European Union and the Organization for Economic Cooperation and Development. The 2000 version of the FTC policies included the following core principles: (1) notice/awareness, (2) choice/consent, (3) access/participation, (4) integrity/security, and (5) enforcement/redress (Federal Trade Commission 2000). The privacy policy adopted by the U.S. Department of Homeland Security in 2008 added three principles to the FTC's original five. *Purpose specification* means it is DHS policy to explain the purpose of collecting personally identifiable information, *data minimization* means the amount collected and time maintained should be minimized, and *use limitation* means information should be used solely for disclosed purposes (Teufel 2008).

It is unclear how these emerging principles, concerning personally identifiable information, relate to the infrastructure, environment, and other local GIS data this paper is concerned with. It suggests developing policies with the full participation of the citizens and seeking locally appropriate balances between competing values. It may also suggest novel approaches that respect individual choice while advancing the general interest in accurate and complete data. These could include inviting the citizens to voluntarily submit updates to property data or subscribe to notification services when the data are updated each year.

RESULTS

Data Access and Costs

Data was requested from 351 cities and towns; responses were received from 278, or 78.6 percent (see Table 1). Among the respondents, the average number of days before receiving a response was 6.8. From this data and the nonresponse follow-up survey, it could be determined if any GIS data was available for 282. Of these, 181 had at least one of the layers requested, and 101 reported they did not have GIS data available. Of those with data, it was possible to obtain data at no charge from 56, or 16 percent of the cities and towns in the state, which constituted 20.3 percent of the respondents. Of these, 45 e-mailed the data, five sent it through other services¹⁰, and four had established public Web sites where it could be downloaded.

Four municipalities had established public Web sites where GIS data could be downloaded: Boston, Brewster, Northampton, and Amherst. Of these three, Boston had parcels but not zoning or wastewater-treatment plants available on the public Web site. Amesbury provided the data through the Web site ArcGIS.com; however, to obtain the universal record locator (URL) where the data was required clicking a link that could only be opened in the proprietary ESRI ArcMap software. Northampton's GIS Coordi-

Table 1. Summary of public records request results

	Number	Percent of All	Percent of Respondents
Massachusetts Municipalities	351	100.0%	
Responded to records request	311	88.6%	100%
E-mail	217	61.8%	69.8%
Telephone	61	17.4%	19.6%
Letter	25	7.1%	8.0%
Follow-up	35	10.0%	11.3%
No GIS data	101	28.8%	32.5%
Online GIS viewer	88	25.1%	28.3%
GIS data (at least one layer)	181	51.6%	59.9%
			Percent with Data
Disclaimer or License	45	12.8%	24.9%
GIS Data Order Form	28	8.0%	15.5%
Number with cost	68	19.4%	37.6%
Provide data at no cost	66	18.8%	36.5%
E-mailed (requested)	45	12.8%	24.9%
Download	4	1.1%	2.2%
Provided other way	5	1.4%	2.8%
Reported in follow-up	12	3.4	6.6%

nator James Thompson said the data has been posted to the Web site for more than three years. At the time of the study, the data included 14 Shapefiles and 23 Keyhole Markup Language (KML) files, including parcels, zoning districts, water features, and open space. The policy was adopted after layoffs reduced the size of the GIS department, and the city decided this would be a low-cost way of satisfying requests. According to Thompson, Northampton does not license GIS data because it considers it against the Public Records Law. His only concern with the policy was that the town did not have detailed information about how many people were downloading and using the data (Thompson 2010).

A number of municipalities also referred to private consultants or Regional Planning Agencies (RPA), independent state agencies established under Commonwealth law responsible for regional planning, mapping, and analysis. One consultant and the RPAs provided the data at no cost; however, several consultants charged fees similar to the towns that had ordering systems.

Two towns, Rockport and Rowley, refused the request to provide access to the data in digital format. In a letter, Rockport Director of Public Works Joseph P. Parisi, Jr., stated, "The Town of Rockport does not provide this information to the public in electronic format," and went on to offer the information in a variety of printed maps (Parisi 2010). Also in a letter responding to the request, Rowley's Principal Assessor reported that the request had been considered at a Board of Assessors meeting and the group "voted at that meeting to allow MVPC the permission to release only the hard (paper) copies of the Assessors maps and not the digitized parcel data" (McFadden 2010). In the nonresponse survey, Marshfield MIS Director Ron Menard said in an e-mail the town only provided the data through a viewer or by contract to vendors who require the data to do work for the town. The Secretary of the Commonwealth Guide to the Public Records Law states:

“The statutory definition of “public records” does not distinguish between traditional paper records and records stored in the computer medium. Rather, it provides that all information made or received by a public entity, regardless of the manner in which it exists, constitutes “public records.” Computer cards, tapes or diskettes are all independent public records that are subject to the same requirements of the Public Records Law as are paper records. Therefore, a records custodian is obliged to furnish copies of nonexempt portions of computerized information at the cost of reproduction, unless otherwise provided by law.” (Galvin 2009: 27)

It is not known how the courts would resolve the issue.

To provide citizens the ability to view local GIS information, 88 towns provided online data viewers. As discussed in the policy section that follows, these viewers provide some access to government GIS data, but because they do not allow the data to be extracted, they prevent a wide range of potentially beneficial activities including advanced research, applications, or desktop mapping.¹¹

Table 2. Distribution of data costs

	Number	Percent
No charge	66	49.3%
\$0-\$50	35	26.1%
\$51-\$100	12	9.0%
\$101-\$200	13	9.7%
\$201-\$300	5	3.7%
\$301-\$400	2	1.5%
\$401-\$500	1	0.7%

Sixty-three municipalities charged a fee for some access to the data (see Table 2). The fee structures ranged from a customized quote for the requested data, prices for standard packages of data delivered on CD, or prices per layer requested. Among the towns charging fees, the prices ranged from \$5 (Bourne) to \$453 (Mansfield), with an average of \$102. Under the Public Records Law, fees must be limited to the actual cost of duplication, and any “per hour charge for . . . processing may not be greater than the prorated hourly wage of the lowest paid employee who is capable of performing the task.” In addition, the regulation urges, “in the interest of open government, all records custodians are strongly urged to waive the fees associated with access to public records.” In a section specifically regarding copying GIS data, the Secretary of the Commonwealth provides the guidance that “Fees assessed for these records cannot serve as a deterrent for access or as a means of generating revenue” (Galvin 2009: 3).

LICENSING RESTRICTIONS AND DATA POLICIES

Forty-two disclaimers, release agreements, policies, and other documents collected from city Web sites of the state’s 20 largest cities and obtained through the data request were reviewed. These

fell into three main categories: short disclaimers contained on Web sites or order forms, longer licenses and release agreements, and two memorandums of understanding. After a preliminary review, eight common provisions of these documents were identified; these are summarized as follows (see Table 3) with the number of policies in which they appear.

Table 3. Common data license or agreement provisions

Provision	Number	Percent
Data provided without warrantee	34	79.1%
Municipality indemnified and held harmless	22	51.2%
Restrictions on reuse	14	32.6%
No claim to data updates	13	30.2%
Data not for legal purposes	12	27.9%
Request for credit on data products	11	25.6%
Request for disclaimer on resulting data products	8	18.6%
Right to on-site inspection	2	4.7%
Total	42	100.0%

A group of data release agreements contained nearly identical formats, with the exception of an item concerning restrictions on reuse that only appeared on three. In addition, Beverly, Brookline, and Weymouth used a memorandum of understanding to request copies of derivative data products from users. This section will discuss four of these common provisions: indemnity statements, credit and disclaimer requirements, restrictions on redistribution, and on-site inspection.

Twenty of the statements require the recipient of the data to indemnify or hold harmless the municipality. In negotiating licenses for data, the MIT Libraries said the university seeks to avoid this kind of language because of the potential to create liability. Possible violations could include unwitting violation of copyright, a liability produced by reselling the data, or claims made by representations related to financial transactions (Finnie-Duranceau 2010).

Ten of the documents required a credit to the city to appear on derived data products and seven of these also requested a disclaimer. Although a reasonable request for conventional maps, this type of disclaimer may have to be displayed on secondary pages on a Web site or application. For example, Beverly’s memorandum of understanding requires a 59-word disclaimer to appear on any derivative maps in at least an eight-point type font. This disclaimer takes up a sizable portion of a smartphone screen, which might be required if the data were reused in a smartphone application.

Eleven of the documents contained restrictions on reuse. Three of these allowed redistribution with written consent of the municipality. Reading’s license contained a provision discouraging redistribution, urging data users to refer others to the city to obtain the most accurate data. Finally, Boston specifically granted a limited right for third parties to “have and use the GIS Data solely to assist the Licensed User’s business needs and for no other purpose.” Several of the licenses restricted reuse of the data to the “internal purposes” of the requestor. For example, this provision appears in Chelsea’s agreement:

“Digital data received are to be used solely for internal purposes. Secondary distribution of these data is not supported. Data is intended for the sole use of the Requestor. It is not to be distributed or resold to other agencies, organizations, companies or individuals without the prior express written consent of the City Manager. Data may be enhanced, analyzed, manipulated or output by the duly authorized agents of the Requestor but only for the purposes and use of the Requestor.” (City of Chelsea 2009)

It is not clear whether such provisions would restrict organizations whose “internal” purposes included making the data available to users in modified or limited formats. These provisions could produce a chilling effect, dissuading innovative reuses such as interactive Web sites, journalistic information, and applications. Cities or towns that want to encourage reuse may avoid this restriction.

Two documents provided the municipality a right of on-site inspection to see that the terms of the license were being followed:

- “The Licensee shall agree to allow an agent from the Town of Greenfield to an on-site inspection, if the Town determines that it is necessary, to ensure that the Licensee is complying with the terms of this License.” (Town of Greenfield 2010)
- “The Agency agrees to on-site inspections for the duration of the use of the Data by agents of Yarmouth to ensure that the Agency is in compliance with the terms of this agreement.” (Town of Yarmouth 2010)

Both licenses prohibit use of the data other than a specific use designated on the agreement and also prohibit redistribution of the data to any other party.

Finally, Amherst has chosen to share data through ArcGIS.com, a Web site designed to allow users to share geospatial data and services. The Web site provides a place for data owners to indicate the data owner and any disclaimers. However, it also required users to agree to two Terms of Service, one for all Web sites of the parent company (ESRI) and one for the ArcGIS.com Web site. This Web site allows users to define the copyright and restrictions that apply to any data they upload. However, this approach may result in requiring citizens to agree to a private company’s lengthy terms of use to access the public records of a municipality. In addition, absent a clear description on the data, the content may be eligible for resale and licensing under the ESRI Terms of Use “Commercial License” provision. Finally, the site works to complement ESRI’s proprietary mapping software. For example, clicking to download the public data downloads an XML file containing data in the proprietary “pkinfo” format. Advanced users can extract the URL to the data with a simple text viewer; however, others will have to use the company’s free viewer or mapping software to access the data. This is akin to a photograph-sharing site showing only thumbnails on a Web site, requiring one to use the site’s proprietary image viewer to access the full-quality photographs.

PUBLIC SAFETY AND PRIVACY

The Massachusetts Public Records Law exempts a number of categories of data from public disclosure, including personally identified medical information, standardized examination answers, records of active law-enforcement investigations, among others. This list includes the following exemption for disclosure for data that, if released, could endanger public safety:

“(n) records including, but not limited to, blueprints, plans, policies, procedures and schematic drawings, which relate to internal layout and structural elements, security measures, emergency preparedness, threat or vulnerability assessments, or any other records relating to the security or safety of persons, buildings, structures, facilities, utilities, transportation or other infrastructure located within the commonwealth, the disclosure of which, in the reasonable judgment of the custodian, subject to review by the supervisor of public records under subsection (b) of section 10 of chapter 66, is likely to jeopardize public safety.” (Public Records Law)

The study could not determine the full extent of how the public-safety considerations were affecting access to public data. The location of wastewater-treatment plants did trigger several responses. The towns of Concord, Falmouth, and Natick said as a matter of policy they did not disclose information about the water utility system. Salem’s standard GIS data layer listing noted the city engineer would release the following layers on a “case-by-case basis”: fire hydrants, sewer, water distribution system, drainage/stormwater system.

Copyright

Two towns claimed data they possessed were exempt from disclosure under the Public Records Law because of copyright. Sherborn wrote claiming Boston Edison owned the copyright of its parcel data. Lincoln’s parcels were created by a private organization and then licensed back to the city for use for planning purposes. The town now is exploring creating its own parcel layer. The Secretary of the Commonwealth’s guide specifically addresses intellectual property concerns, instructing that copyright should not preempt the Public Records Law (Galvin 2009). The guide instructs government custodians to release the data with a warning that its contents may be subject to intellectual property protections.

CONCLUSIONS AND POLICY RECOMMENDATIONS

Statewide Data Policy

A clear argument exists for why municipalities should provide data to its citizens. The Public Records Law covers computer records, and legal restrictions on the data may prohibit or chill desired uses such as journalistic analysis, new applications and Web sites, and

derivative analysis. Some data simply must be available to hold government accountable and support a range of positive uses. However, pragmatic considerations mean the municipalities who create data may not be well suited to manage it. Several towns possessed only badly out-of-date data or possessed data but were unsure how to access the GIS system and extract data because staff with these skills had been laid off. Many municipalities, with populations of a few thousand or less, have limited or part-time professional staff. Addressing these problems and ensuring the sustainable creation and management of property data is an ongoing concern in Massachusetts.

The Commonwealth's Office of Geographic Information (MassGIS) Strategic Plan for Massachusetts's Spatial Data Infrastructure identified the availability of parcel data as a problem for policymakers concerned with infrastructure, emergency response, public health, and other issues (Massachusetts Geographic Information Council Strategic Plan Steering Committee 2007). This plan resulted in a limited grant program to encourage data development and the promulgation of parcel data standards. However, without mandates or incentives, not all towns participate in the program. Northampton, with a sophisticated local GIS program, does not participate in the statewide parcel program. In addition, local towns have no incentive to adopt MassGIS's standards for how this data should be structured. The lack of this type of coordination limits the ability of data users to create analysis or work across town boundaries. In addition, despite advances in technology, only a tiny number of towns supported direct downloading, and many continue to burn CDs although other means are possible with the spread of broadband Internet. MassGIS, on the other hand, provides both direct data downloads as well as data through a Web-mapping service (WMS) API.

The steps necessary to fully resolve this issue are beyond the scope of this paper. The Massachusetts experience with parcel data suggests that data intermediaries, such as Regional Planning Agencies and MassGIS, may be better equipped to establish data standards and provide data to users in raw formats and through technically innovative APIs. However, parcels and zoning are the result of administrative processes conducted by the towns. So long as municipalities perform these functions, they must be directly regulated and funded to create and update data that meet statewide standards.

MUNICIPAL POLICY RECOMMENDATIONS

Municipalities that have GIS datasets should make them available for free, online, and with legal restrictions designed to balance normative values of transparency with privacy and control of the data. These recommendations differ somewhat from existing policy templates, including the Open Data Consortium Project's Model Data Distribution Policy (2003). Given the variety of data types and government agencies, any data policy or infrastructure should be adapted to local needs and conditions.

The data prices found in this study were both insufficient for

cost recovery but high enough to dissuade individuals or non-profit users. Municipalities should eliminate the fees and focus on developing alternative revenue sources for GIS and reducing the costs of satisfying requests. The topic of whether governments should charge for GIS data has been extensively discussed in the GIS community. To explore the issue and provide a model data-sharing policy, a diverse group of public and private GIS professionals formed the Open Data Consortium Project. According to this group, few municipalities make money from data sales. The group suggests GIS operations could be supported through surcharges on increased economic development, increases in tax revenue enabled by access to more precise information, or specific taxes or fees (Joffe 2010a). The Massachusetts Public Records Act restricts fees for public access to data to the costs of duplication. Distributing data through the Web, versus through mailed CDs or order systems, would reduce the cost of duplication further. In the early period of the World Wide Web, posting GIS data files to municipal Web sites was rare for a variety of practical reasons. Widespread adoption of broadband and declining hosting costs have eliminated technical restrictions on online data sharing. Increasingly, as Davies (2010) shows, diverse users are seeking raw government data for research, analysis, or development of public applications.

Sixty-five municipalities provided data through GIS data viewers. These tools, which operate in the browser window, allow visitors to view GIS data. Sometimes they contain other functions such as generating a list of abutters, printing a map, or adding annotations. Only two of these viewers, operated by Amherst and Boston, allow users to extract data in original GIS data formats.¹² In addition, many of these were not linked to from the primary city or town Web site and were discovered only in response to data request or through Internet searches of primary vendors.¹³ If citizens can find them, these viewers serve the needs of some visitors; however, they do not allow the multiple uses described that require access to raw data. Because their data extraction functions often are confusing or difficult to find, all municipalities should post links to commonly requested GIS data in both standard ESRI and open formats such as KML on a normal page on municipal Web sites. This approach, adopted by Northampton, can reduce staff time needed to satisfy requests and respond to the growing community of citizens interested in raw GIS data.

Finally, municipalities should place legal restrictions on public data that sensibly balance competing values. Some of the provisions, such as reminders GIS data are not considered legal property definitions, or provided without warranty, may not have negative effects on data reuse. The Public Records Law could be amended to make statements of "indemnification and hold harmless" unnecessary. However, some of the practices may have unintended negative effects. A requirement that derivative products contain a small credit may be a reasonable way to remind users of the original source. As discussed previously, lengthy disclaimers may impede the development of innovative Web sites or mobile applications. Most troubling, restrictions on reuse or the right of on-site inspection are contrary to the spirit of the law.

Municipalities should not restrict the purposes for which public data can be used. Users using out-of-date data can be avoided by bundling data files with clear dates and perhaps following the lead of Reading and including text encouraging users to obtain recent data from the municipality.

FROM PUBLIC RECORDS TO OPEN GOVERNMENT

Citing utilitarian philosophy, government reformers have advocated for laws that provide access to government records through public records and freedom of information laws. These laws establish the presumption that all records, except certain types, should be available to citizens on written request. New technologies provide the capability to automate and enhance this practice, enabling citizens to e-mail requests and governments to send electronic records. In the study, although the default practice still was mailed CDs for most municipalities, many were happy to send the files by e-mail after this option was suggested in the request. Beyond automating the existing request-based public records paradigm, the Internet makes possible a new paradigm based on proactive disclosure of government information: open government.

Changes to the federal FOIA in the 1990s and recent federal initiatives also follow this new approach. In response to the expansion of the Internet, Congress enacted the Electronic Freedom of Information Act Amendments (E-FOIA) in 1996. With the intention to encourage proactive disclosure and reduce the number of FOIA requests, the law mandated that federal agencies post documents commonly requested by citizens and information about how to submit a FOIA request on their Web sites. In a review conducted in 2007, the nonprofit National Security Archive found only one in five federal agencies had posted the required documents and FOIA Web sites were confusing, disorganized, or nonexistent (National Security Archive 2007). After his election, President Barack Obama has rhetorically connected efforts to create new online sources for government data with reforms to how FOIA requests are handled by federal agencies (Obama 2008).

A similar approach should be taken by municipalities to make electronic records public. The simplest step, posting data without privacy or security concerns to a Web site, allows citizens to access the files without the hassle and expense of submitting a formal request. The request process may incur more expenses than can be offset through legally allowed fees. During this study, although most requests received a response with minimal effort, many were routed to several departments or triggered responses from city attorneys, incurring real costs for taxpayers.

Other researchers have begun to explore the different components of a transparency paradigm adapted to new technology. Scholars have urged the development of government technical systems that can be opened to citizens as “FOIA 2.0” (Kubicek 2008). Legal scholars have approached the issue from the perspective of tensions created with individual privacy or inadequate conceptions of public records in a digital world. Solove (2002)

argues that new technology means we must rethink the regulation of public records and proposes limiting access and uses of certain information rather than making public records unavailable to the public. Other scholars argued laws should be amended to take into consideration unique characteristics of electronic records, such as e-mail and file metadata (Holcomb and Isaac 2008).

New technology may mean that summary statistics from previously restricted databases could be easily computed, and will continue to introduce new issues about how to ensure electronic data and records are organized, preserved, and made transparent in ways that balance competing principles. To navigate these tensions, Dawes (2010) proposes two metaprinciples: stewardship and usefulness. Stewardship includes attention to accuracy, validity, security, and preservation of data, and the idea that “every public official . . . is responsible for handling information with care.” Usefulness “recognizes that government information is a valuable asset” and promotes access to and use of government information for a variety of purposes (Dawes 2010). Although this study concerns three datasets determined a priori to be useful, this issue is nontrivial as cities seek to decide which data they publish proactively. As observed earlier, transparency can directly advance the accuracy and validity of data, components of stewardship.

Although government data retains a political dimension, increasingly data resources are functioning as infrastructure, a resource that can serve a wide range of public and private purposes. In response to a request submitted under a longstanding state law, the majority of Massachusetts municipalities responded in the spirit of the Public Records Law, offering to send the requested data. The evolving discussion about Federal government transparency suggests that shifting to an open government paradigm for Massachusetts GIS data will require changing norms and practices at the local and statewide levels. Local diversity means it may be difficult for state policymakers to mandate proactive disclosure of useful data, (to use Dawes’ principle) as communities had different data depending on their unique infrastructure, geography, and history. In the Federal government, E-FOIA mandates disclosure of often-requested data but is not upheld consistently. The Obama Administration has mandated Federal agencies contribute “high-value” datasets to the Data.gov Web site, but the resulting datasets have been criticized for not being the most useful to citizens. Despite the greater availability of some data, some groups have gone to extraordinary lengths to obtain government data they believe to be more useful than what is posted on official Web sites (Long and Burnham 2010).

This study documented both problems with compliance with the existing public records law and a range of issues affecting access to information not fully addressed by the existing law such as distribution technology, costs, licensing, and data structure and management. Open government will require not only moving beyond a narrowly conceived “right to view” records but also an ongoing discussion of a range of practical, ethical, and legal considerations such as file formats and distribution technology, balancing openness with privacy and public safety considerations,

and appropriate data policies and licenses. Together, the result will be a new paradigm of transparency, achieving greater government accountability and producing new value for the government and the public alike.

About the Author

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Chris Brown, GIS Analyst, Metropolitan Area Planning Council

Christian Jacqz, Office of Geographic Information, Commonwealth of Massachusetts

Bruce Joffe, Open Data Consortium Project

Holly St. Clair, Director of Data Services, Metropolitan Area Planning Council

Lisa Sweeney, GIS Laboratory Program Head, MIT Rotch Library

James Thompson, GIS Coordinator, City of Northampton

Donald White, Attorney, Public Records Division, Massachusetts Secretary of the Commonwealth

Endnotes

- 1 For example, an “Apps for Democracy: Community Edition” competition hosted by the District of Columbia resulted in applications that mapped bicycle infrastructure, delivered real-time crime and other alerts to cell phones, and mapped neighborhood amenities. Data retrieved from <http://www.appsfordemocracy.org/application-directory/>.
- 2 These include the federal Data.gov, city data Web sites New York City, Portland OR, Seattle WA, Washington DC, and similar efforts in Canada, the United Kingdom, and Australia.
- 3 For a discussion of technical considerations of public data portal software, see Robert Goodspeed, *Open Government Strategy for the City of Boston*, available online and from the author.
- 4 Available online at <http://www.sec.state.ma.us/ele/eleclck/clkidx.htm>.
- 5 The request was sent on Monday, November 8th, or 29 days before the close of the data collection period on December 7, 2010. As described later, because 59 municipalities contacted me on Tuesday, November 9th, I have reason to believe most received the letter within two days.
- 6 This survey asked whether the city or town “has geographic information system (GIS) data and software used by municipal staff?” and “If you do, if the municipality receives requests for GIS data do you have a standard licensing agreement, order form, or pricing policy?”
- 7 Adapted from Davies 2010, p. 3.
- 8 The Federal Geographic Data Committee (FGDC) is an “interagency committee that promotes the coordinated development, use, sharing, and dissemination of geospatial data on a national basis,” and has generated influential policies and practices for GIS data for the federal government and U.S. government agencies in general.
- 9 See www.patientslikeme.com.
- 10 Such as DropBox or YouSendIt.
- 11 A searchable directory of links to these online viewers is available on the author’s Web site at <http://web.mit.edu/rgoodspe/www/>.
- 12 See Appendix B for URLs and data layers available.
- 13 Many were discovered through a domain-specific search of the hosting server of a major consultant that provides GIS services to dozens of Massachusetts municipalities.