

Challenges of Treating Information as a Public Resource: The Case of Parcel Data

Sharon S. Dawes, Meghan E. Cook, Natalie Helbig

sdawes@ctg.albany.edu, mcook@ctg.albany.edu, nhelbig@ctg.albany.edu

Center for Technology in Government, University at Albany/SUNY

Abstract

Land parcels are the foundation for many aspects of public and community life. This report presents the findings of a study of information about land parcels in New York State. It identifies stakeholders and their interests as well as the needs and issues associated with the uses of parcel data in the public, private, and nonprofit sectors. We describe the attributes of parcel data, discuss its value to a variety of stakeholders, present typical data flows across organizational boundaries, and illustrate a wide range of uses. We then present the main issues and policy challenges associated with treating parcel data as a collective public resource, and conclude with a set of policy principles for guiding future investments.

1. Introduction

Parcel information pertains to the smallest unit or lowest common denominator of land ownership. Parcels in land-oriented systems are roughly analogous to cells in an organism; they represent the basic building blocks of larger units and systems. In general, the land recording function which collects parcel data is undertaken exclusively by government. The concepts and uses for land recording systems can be traced back to the early Roman Empire and are often associated with property tax and property rights systems. The recording of deeds, for example, is one of the oldest and most important record-keeping functions of government.

Each country has some standard for land recording and most land records originate and are maintained at the local level of government. In the United States, a land record depends on documentation (such as a deed), which is evidence of land ownership and ownership transfers. Each state varies in its laws, the way land is recorded, and the terminology used.

According to the Federal Geographic Data Committee (Stage and Von Meyer, 2003), continuing technological changes, coupled with trends in selling and developing land, have opened up new ways of looking at and using land recording systems. For the past thirty years, local governments have made a variety of efforts to computerize their land recording systems ranging from basic word-processing to sophisticated web-enabled database applications across

multiple departments. The adoption of geographic information systems has been a growing trend. (National Academy of Science, 1980).

Parcel identification, description, and ownership information is collected as a function of real property laws and tax administration. Typically, deeds are recorded by county clerks as the official record of land ownership and ownership transfer. Assessors employed by cities or towns conduct real property appraisals for parcels located in their jurisdictions to establish their value for purposes of taxation. The information that originates with these real property recording and tax functions has great utility for many other uses from transportation routing, to emergency response, to the siting of new businesses, to the protection of green space. Over many decades, these secondary uses and their associated benefits have made parcel data a highly desirable information resource, but one that is not fully understood or managed for the maximum benefit of all stakeholders. One reason for this is the absence of a policy framework that considers the full range of costs and benefits and balances competing, and sometimes conflicting, values.

2. Values Surrounding Government Information

US government information policies traditionally try to balance the tensions among three intrinsic values (Weingarten, 1989): The first is the idea that government information is a *public good* in which government is responsible for the collection and creation of information and also for organizing and making it available to public users on request or through government-sponsored self-service programs. Examples include depository libraries or government-provided public access web sites such as Medline Plus at the National Institutes of Health or Envirofacts at the Environmental Protection Agency. These efforts represent government acting directly to make useful information available to private citizens, businesses and civic organizations.

The second approach treats government information as a *commodity* that can be freely bought and sold for its commercial value. In this view, the government's role is limited to basic data collection and rudimentary low- or no-cost dissemination while the private sector

is encouraged to organize it, enhance it with value-added services, and make it available for sale on the private market (Peyton, 1989). Examples are www.propertyinfo.com by REIData, Inc. a subsidiary of Stewart Information Services Corporation or the Online Computer Library Center (OCLC) a non-profit with the mission of furthering public access to the world's information and reducing information costs. Sometimes, state or local governments also treat information as a commodity and sell it as source of revenue.

The third value treats government information as a *necessity for governance*, including policy making, services, and management. This view takes an internal government perspective. It focuses on the information needed for decision making and program operations within individual agencies. It also includes the sharing of information across organizations within government or across levels of government in order to streamline services or coordinate policies or actions. Information sharing for law enforcement concerning arrests, warrants, and case dispositions is a common example of this kind of shared information use. In all three views, data protection (e.g., personal privacy, data confidentiality, security, intellectual property) play some roles evolved to. From its inception as a government necessity, parcel data has evolved through use to encompass all of these values.

Public policies are instruments devised by government to balance competing values such as the ones described above. Public information policies have evolved over time in response to new information forms, changing communication mechanisms, the information technology revolution, and changes in societal needs and political preferences. (Relyea, 1989). In many cases, policies lag behind practice, especially when practice is influenced by rapidly changing technologies. Parcel data is a case in point. It emerged in the context of a single public function – the recording of land ownership – but has evolved over centuries to become useful in scores of other applications that pertain in some way to physical places.

Landsbergen & Wolken, (2001) contend that a lack of a policy architecture for information sharing, among other issues, inhibits full use of government information and interoperability of systems and services. Similarly, Dawes (1996) concluded that specific policies and legal structures are needed to promote information sharing among government agencies and to minimize the associated risks. These findings were affirmed in a later comparative case study that included stakeholder organizations outside government (Zhang & Dawes, 2005). Dawes (1996) recommended that information policies strike a balance between principles of stewardship (emphasizing data

quality and protection) and usefulness (emphasizing value and utility). To date, however, most government information policy studies have focused on the federal government, with scant attention to states and localities. In addition, no empirical study has evaluated the competing values inherent land records nor offered policy principles that address the needs and experiences of associated stakeholders. Accordingly, this study delves into the information sharing needs and concerns of the full set of stakeholders associated with parcel data within one state. We sought to understand the needs, concerns, and resources of these stakeholders both inside and outside government, to trace their current and desired policies and practices, and to develop a set of policy principles that would support equitable treatment and broader appreciation and use of parcel data across all sectors.

3. Methodology

The study was conducted from September 2004 through February 2005. The data consist of 35 interviews plus background information provided by the New York State Office of Real Property Services (ORPS), and official publications and web sites prepared by federal, state, local, nonprofit, and private sector organizations. The interviewees were selected to provide the investigators with an understanding of the logical, purposive flows of data from original data collectors to other organizations.

Under the state Real Property Law, ORPS shares authority and responsibilities with county and municipal governments. The study therefore began with the selection of five demographically, operationally, and geographically diverse counties in New York State. The Real Property Tax Official within each County was asked to suggest people to be interviewed who use or otherwise interact with that county's parcel data. Accordingly, interviewees were identified in public, private, and non-profit organizations that collect, prepare, and use parcel data created by the real property tax administration in each county. State agencies were also included in the study. They were selected by identifying agencies that collect and use parcel-level data as a major part of their responsibilities.. Face-to-face or telephone interviews were conducted with each person. Topics covered in the interviews included:

- Mission and programs of the organization
- Uses and potential uses of parcel data
- Collecting and obtaining parcel data
- Dissemination or supply of parcel data to others
- Value of parcel data to interviewees' programs
- Data sharing methods and policies
- Data management and maintenance practices
- Data forms and formats

- Data storage and preservation
- Costs associated with parcel data
- Issues and barriers associated with parcel data collection, use, and dissemination
- Data flow between the focus organization and others.

4. Findings

4.1 Definition(s) of Parcel Data

Interviewees in the study usually defined “parcel data” by describing how they use it to support their work. For example, planning departments said that parcel data is the parcel identification number but also the zoning codes, actual uses and boundaries, and physical characteristics. By contrast, real property tax administration officials referred to parcel data as parcel identification and location, information about any structures on the parcel, the parcel owner, and the assessed value. Some described parcel data as being the legal definition of the parcel (i.e., a deed), while others referred to the tax map characteristics. Taken as a whole, parcel characteristics identified by the interviewees can be grouped into eight categories.

- parcel identification
- parcel location
- ownership
- occupancy and use
- structures and improvements
- taxation
- physical geography
- infrastructure
- taxation

The category “parcel location” contains ‘parcel address’, which can be thought of as descriptive data (i.e., 123 Main Street) or spatial data (i.e., a set of coordinates), or both. Parcel identification and location attributes comprise the numbering scheme used to identify the parcel and the characteristics that describe its location on the earth as well as its location within the boundaries of a municipality, school, water, or other districts. Ownership attributes identify the owner and provide historical information about ownership. Occupancy and use attributes describe the type of current use as well as details about what people or organizations occupy the parcel. Structures and improvements present details about what is built on the property. Taxation attributes present tax rates, sales history, exemptions, and payment information. Physical geography describes the parcel in terms such as its soil type, size, and water features, while infrastructure attributes represent large-scale initiatives such as road and bridge placement, utility and power grids, and water and sewer lines.

4.2 Stakeholders

The study identified a wide range of individuals and public, private, and non-profit organizations that use and have interest in parcel data.. Table 2 describes the main stakeholder groups.

Stakeholders play three main roles with respect to parcel data: data collector, user, and supplier. A single stakeholder can play one or more roles.

Data *collectors* gather parcel information directly in the field. Examples are assessors appraising real property or surveyors mapping a parcel. Assessors are the primary collectors of basic parcel data regarding identification, description, location, ownership, structures, and some uses. Other stakeholder groups collect specialized information pertaining to their particular work but this is almost always done as a complement to, rather than a substitute for, the basic data collected by the assessors.

Table 2. Stakeholder Groups
Assessors – municipal (city or town) officials who collect parcel data.
County Real Property Tax Services (RPTS) – the hub for real property tax administration in NYS counties.
State Office of Real Property Tax Services (ORPS) – the state-level office designated to guide tax administration and pursue statewide tax equity
Other Local Agencies – such as planning departments, emergency response services, public health agencies, and water authorities.
Other State Agencies – government organizations addressing such areas as transportation, homeland security, environmental protection, and health and human services.
Data Re-sellers – private companies that add value to public data and sell it to other entities such as insurance companies, real estate brokers, and consulting firms
Private Sector Users – such as realtors, engineering firms, and lien and tax collectors.
Non-Profits – provide services such as environmental planning and economic development.
Community Groups – civil society organizations such as those for senior citizens.
Property Owners – own and pay taxes on parcels.
Property Occupants – people or businesses who live in or work on a parcel they may or may not own.

Parcel data *users* include all those who employ the data in their work. Data users include almost all stakeholder groups including state agencies, county and municipal governments, non-profit organizations and many private sector companies. All use the data to carry out functions such as planning, economic development, infrastructure management, and buying and selling land.

Parcel data *suppliers* distribute data collected (by themselves or others) to users. The most frequent data

suppliers are the County Real Property Tax offices, NYS ORPS, and private data re-sellers.

4.3 Uses of Parcel Data

Public, private, and non-profit organizations, as well as individuals use parcel data for many purposes such as resolving disputes over boundary lines, making disaster recovery plans, assessing property for equitable taxation, marketing products to targeted populations, routing school buses, and buying and selling land. Although each use is different, all rely in some substantial way on the core parcel data collected at the municipal level.

Every organization interviewed uses parcel data to perform particular functions. The intended use determines the specific data attributes needed. For instance, an emergency response organization must have accurate and up-to-date occupancy and structure information in order to know the number of individuals living on a property and the location and placement of a building; but, it may not need to know who owns the parcel or the details of the tax history. Conversely, an environmental protection organization may need detailed location and physical geography data for a specific region but may not need parcel identification numbers or the sales data.

The following highlights illustrate the broad range of parcel data uses across public, private, and non-profit organizations.

Real property assessment and taxation. Parcel data is the foundation for real property tax administration, which requires specific data established by law. Assessors are required to collect and use this data to establish a fair assessment for every property. By using parcel identification, ownership, structure and use, physical geography, and taxation data, assessors are able to make accurate assessments of individual parcels. The county real property offices use parcel data to create county tax maps and county-wide assessment rolls, and the state agency uses parcel data to create the final tax assessment roll as well as equalization rates.

Buying and selling private land. Private land sales occur daily. Some sales are single transactions between two parties, while other sales are more complex and involve multiple individuals and organizations. The most important characteristic of a land sale is the ownership rights to a parcel. Part of the mission of one business is to purchase tax liens at auctions, which will be profitable real estate transactions and therefore, add to the company's economic viability. The organization uses parcel identification data, parcel location data, ownership data, structure and improvement data, as well as taxation data to determine what properties (or tax liens) they will bid on at auctions and at what price.

Directing emergency response. Public safety is a cornerstone of community development and sustainability. Dispatchers at the 911 call and command center use parcel data for almost every incident. Dispatchers have several different computer applications on their terminals. One is a phone number and addressing system, another houses a GIS application. The dispatchers use many different attribute categories including identification, location, and ownership information to make decisions about emergency routing and can even instruct personnel on exactly how to enter the property safely. Dispatchers also use occupancy and parcel use attributes to determine how many people live in a unit or how the parcel is being used at the time of an incident. Structural and improvement data tells them whether the incident involves a one or a two-story house for example, or who they have to notify to turn off utilities like gas or water.

Transportation routing. State and local roadways and sub-divisions change frequently over the course of a year. These changes affect different sectors ranging from the trucking industry to homeowners. Parcel identification, location, and ownership information is needed to handle different demands associated with transportation management. These include routing of oversized truckloads to avoid low bridges and limited access highways, creating and updating bus routes for school districts, directing emergency vehicles to the scene of an event, and creating priority routes for snowplows during bad weather. Some utilities use parcel data to coordinate their maintenance fleets using infrastructure data, structures and improvements, and parcel location data.

Facilities siting. Towns and cities are capitalizing on better location information to plan for smart growth or increase their ability to attract businesses and jobs. Companies wishing to establish or relocate often have very specific site requirements. Using GIS capabilities and parcel identification, parcel ownership, infrastructure, and physical geography data, localities can provide options that help them compete for these businesses and the jobs they provide.

In another instance, a town was faced with designating an adult business zone. The town planning department used parcel identification and location data, planning and zoning codes, and GIS capabilities to run scenarios of possible zones for these businesses that were appropriate distances from churches, schools, and residential areas.

Planning and prioritizing environmental initiatives. Environmental restoration of old industrial sites, brown fields, or wetlands have been a major economic focus for local governments. One project was jointly conducted by a state agency, county government, and a non-profit organization to help

identify, document, and prioritize restoration projects within the county. In this project, content experts from local, state, and the private sectors came together to develop criteria for prioritization while data about each location within the county was obtained showing parcel identification, location, physical geography, occupancy and use, and surrounding infrastructure. Using GIS capabilities, the criteria were integrated with the parcel data to show the highest priority restoration locations.

Infrastructure management. Infrastructure, parcel identification, location, occupancy and use data, as well as structures and improvements data are all used to determine where fire hydrants should be located. In one regional effort, a non-profit research organization worked with a regional consortium to determine which municipalities owned fiber optic capabilities and where the lines were located. Parcel location, identification, ownership, occupancy and use data, in addition to infrastructure data was used to determine rights of ways and who should be contacted for permission to look at the land. A county health department initiated a special project to determine weak areas in their water supply infrastructure. Using infrastructure data, parcel location, occupancy and use, and physical geography data, the agency identified areas where potential contamination could occur.

Notification and outreach. Outreach to individuals is fundamental to transparent and accountable governments and organizations. For example, people who reside near roadways are notified by state and local transportation and highway departments about spraying for pesticides and herbicides. Officials use parcel identification, ownership, occupancy, as well as location data, to inform residents of the spraying activities in a precise and timely manner.

Outreach to property owners and occupants is also done for social and community purposes. One community group regularly asks its local assessor's office for mailing labels for all senior citizens in the town so they can do mailings about bus trips, courses, and events of interest to seniors.

Parcel data enhancement and distribution. When a potential buyer or seller walks through the door of a realty office, the realtor needs up to date information about property within their selling area. One data reseller caters to this need by gathering parcel data from several municipalities and counties, enhancing it for easy use, and providing the data in a variety of formats (online and on CD) to anyone who is willing to buy it. Realtors take advantage of this value-added service which collects and integrates the data and then provides them with report and query mechanisms as well as the ability to generate mailing labels.

4.4 Benefits of Parcel Data

The wide range of uses illustrated above underscores the fundamentally versatile and valuable nature of parcel data and explains why it is so beneficial to so many different stakeholders. Every organization we interviewed regarded parcel data as a crucial resource. Nearly all of the interviewees indicated that without parcel data, their work would either be greatly hindered or not possible at all. However, because parcel data use is so deeply intertwined in these various functions and programs, it is difficult to quantify its direct economic value.

The more detail that goes into parcel data, such as ownership, zoning, and tax information, the more uses it serves and the more valuable it becomes.

Municipalities rely on the data for economic development. Through the use of GIS applications, town planners are able to delineate the layout of the region and forecast how new building projects will affect the area. One town planner said that by better use of parcel data, through a GIS application, the productivity of their town planning board increased dramatically. The application allowed them to more easily answer questions about wetlands, zoning, and acreage, and focus more on advanced planning activities, such as scenario building.

The value of parcel data is greatly enhanced by county real property tax offices when they turn descriptive data into tax maps used by many organizations. Parcel data is also essential to many other county functions, such as marketing, demographic studies, allowing citizens to challenge assessments, and providing tax roles to school districts. For counties who sell parcel data, the value includes an economic return in the form of direct revenue.

Parcel data also benefits the private sector. Like County RPTS and assessors, the majority of the private companies who participated in this study would either be greatly hindered or unable to function without it. Parcel data helps in design, engineering, and scenario building and reduces development and planning time, which saves money and supports better decisions by companies and their clients. One private sector interviewee stated, "It is not an option to *not* have parcel data. If we could not get it from others, we would have to collect it ourselves."

For non-profit organizations, parcel data has become more mission-critical over time. For example, as environmental and community development organizations gained expertise in using information technology to carry out advanced planning techniques, parcel data rose in importance for many services.

Parcel data is invaluable to state agencies because it supports a wide range of public services, such as transportation, environmental protection, and homeland security. One state agency said that although they could

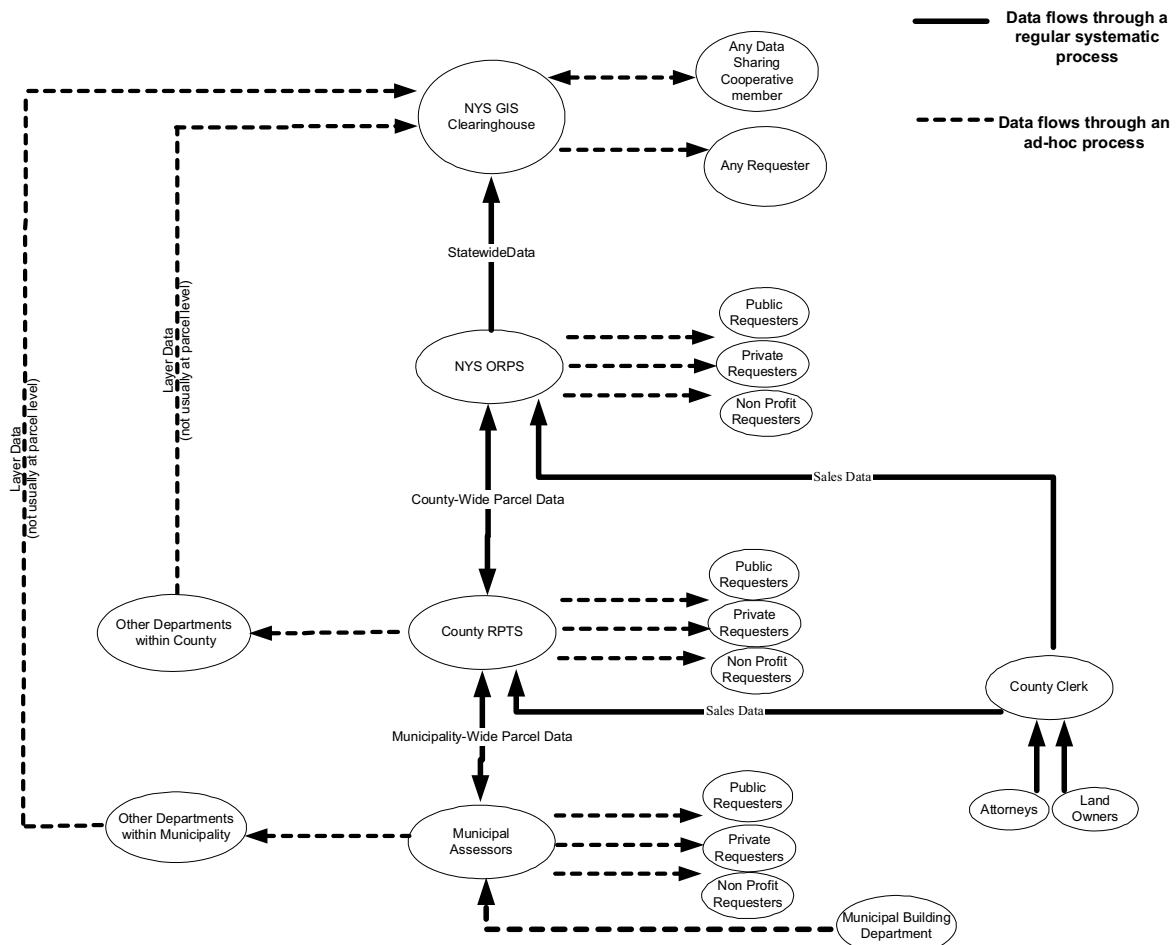
try to carry out their core functions without parcel data, the lack of it would lead to inaccurate and haphazard decisions. Another reported that in addition to the work they do inside the agency, they field about 20 calls per day with questions that need some type of parcel information for an adequate answer.

4.5 Typical Flow of Parcel Data

An important part of this study involved tracing the flow of parcel data among disparate users and uses. Figure 1 depicts the typical flow of parcel data which can be characterized by both regular and ad-hoc processes. The regular process is embedded in the real property tax system where data flows predictable and systematically from one unit of government to another, as shown by the solid arrows in Figure 1. However,

Tax Service (RPTS) and copies of the sales information to the state Office of Real Property Services (ORPS). As part of this regular process, assessors collect and update the parcel data for their municipalities by field work and send it to their County RPTS offices. Assessors also receive construction and improvement information directly from municipal building departments. Assessors merge sales, ownership, inventory, improvement, and assessment information and submit it annually to the county RPTS which prepares tax maps and annually submits assessment rolls to ORPS at the state level. Systematic data exchanges occur among all three levels of government to communicate changes and corrections for purposes of real property tax administration. Once a year, ORPS sends statewide data (geographic centroids

Figure 1. Typical Flow of Parcel Data in New York State



other important data flows tend to be one-by-one, ad-hoc transactions between individual requesters and various data sources. These are represented by the broken arrows in the figure.

In the regular data flow, the County Clerk sends deeds and sales documents to the County Real Property

and selected parcel attributes) to the NYS GIS Clearinghouse.

While the regular data flow represents the real property tax function, the ad-hoc data flow exemplifies access and use of parcel data for all purposes other than real property tax administration. At each stage of this

ad-hoc process, any number of individuals or public, private, or non-profit organizations request parcel data. Requests are usually directed to assessors, County RPTS offices, or ORPS, with counties receiving the largest proportion. These requests are not made on a systematic basis, but rather depend on the varied and changing needs of the individual requesters. Typically, each request is treated as a separate transaction.

5. Analysis and Discussion

5.1 Stakeholder interests

Parcel data is used in many ways by many different people and organizations. Virtually every individual, community, and organization has some interest to be considered. The nine stakeholder types described earlier constitute the major groups identified in the study. The interests of these groups coincide with respect to their mutual desire for accuracy, timeliness, and consistency of parcel information. However, important differences exist among them regarding data sources and access methods, as well as cost and revenue considerations.

Table 3 shows both the areas of common agreement and the areas of divergence among these key stakeholder groups.

Stakeholders	Interests							
	Consistency	Accuracy	Timeliness	Revenue	Low or No Cost Retrieval	Online Access	Choice of Format	One Authoritative Source
Assessors	x	X	X		X			
County RPTS	X	X	X	X				
State ORPS	X	X	X		X	X		
Other Local Agencies	X	X	X		X	X	X	X
Other State Agencies	X	X	X		X	X	X	X
Data Resellers	X	X	X	X		X	X	
Private Sector Users	x	X	X		X	X	X	X
Non Profits	X	X	X		X	X	X	X
Community Groups	X	X	X		X	X	X	X
Property Owners	X	X	X		X	X	X	X
Property Occupants	X	X	X		X	X	X	X

Accuracy, timeliness, and consistency. All stakeholder types have a strong interest in high quality data, generally characterized as data that is factually accurate, up-to-date, and consistent from time to time and place to place. These general agreements, however, mask a great deal of variation. The interviews demonstrated that accuracy, timeliness, and consistency are important to everyone, but at different levels and for different reasons. Some of these differences are illustrated below.

An engineering firm is planning a residential subdivision. To this company, “accurate” means highly

detailed survey grade information. By contrast, a town attempting to designate a rough boundary for a new municipal park in an area that has not changed ownership in decades would say an area bounded by certain streets is “accurate” for this purpose.

A tax collection organization needs parcel data updates only when the final tax assessment roll comes out because their core mission is to collect delinquent taxes and the preliminary tax roles do not help them do their job. However, a realtor may need to know the current tax status of a property, how much the taxes are today, and who the taxes are paid to. This information could change daily depending on the number of homes the realtor is handling within a given time period. The difference in the frequency of the transaction (i.e., annual versus daily) determines how each user defines “timely.”

Digital, on-line, and single point of access. Most stakeholders strongly prefer that parcel data be available in electronic format, online, from one authoritative or trusted source, and in a variety of formats, which they can select to meet their particular needs. These features add convenience, flexibility, and efficiency to information search, access, and use. They also add confidence that data is authentic and well-documented so it can be used in appropriate ways. These interests are typically less important or not shared by the organizations that collect the basic data – assessors and county real property tax offices.

Revenue generation. The greatest conflict among stakeholders occurs over the question of parcel data as a source of revenue. Here, county real property tax offices and private sector data resellers have markedly different interests than those of all the other stakeholder types. The private sector re-sellers would not exist but for the opportunity to package and sell parcel information to a variety of customers. County RPTS offices are increasingly treating parcel data as a revenue source and charging a wide range of fees for county-level data, including tax maps, even to other government agencies. These fees appear to vary widely from place to place and even from situation to situation. By contrast, most municipal assessors, all state agencies, and nearly all public, private, and civic users endorse a philosophy that the data is a public good and should be made available to requesters at no more than the cost of reproduction or distribution.

5.2 Issues of data collection & reporting

The value of parcel data begins to be built at the point of data collection. The study showed three issues associated with data collection reduce this value from the very start: inconsistent numbering and indexing systems, inconsistent terminology, and factual errors.

All counties are required to have a parcel identification system which usually consists of a

complex number denoting the section, block, and lot for a given parcel with respect to a historical land survey. However, counties and some municipalities can and do adopt different numbering and indexing systems and some systems work in such a way that the history of parcel sub-divisions cannot be traced by the use of the ID numbers. The lack of a uniform identification system statewide causes great difficulty for users who need to integrate data of different types, or match up parcels across the boundaries of different jurisdictions. Similarly, different municipalities and counties may use different terms to describe the same attribute leading to confusion about whether information from different jurisdictions is comparable.

In addition, the information that is reported about property sales is criticized by nearly every county and assessor. Most contend that buyers, sellers, and their attorneys pay little attention to the accuracy of the required report which is filed with the deed in the County Clerk's office. Because no enforcement mechanisms exist, these errors proliferate.

In addition, assessors report difficulty in obtaining complete and accurate property information because property owners can deny them access to buildings. In these cases, appraisals reflect the assessor's best judgment rather than direct, detailed observation of the property. Errors are therefore introduced into the property record from the earliest point.

5.3 Issues associated with data use

Almost every person interviewed expressed a desire for better quality data. Most users spend considerable resources obtaining, improving, and standardizing parcel data before they are able to use it for their own needs. Much of this cost is associated with an organization's need to supplement, verify, correct, or integrate basic data collected by others. Even when the data they begin with is of high quality, however, it may not be sufficiently detailed or readily comparable with other sources, or derived from systems that are technically compatible.

One of the most obvious issues for data users is the inverted relationship between geographic coverage and the timeliness, detail, and completeness of parcel data. At the point of basic data collection, generally at the municipal level, parcel data is most up-to-date and contains the most detail regarding a variety of attributes. However, assessment data is reported only once a year and some municipalities do not report all of their parcel inventory and improvement data to the County RPTS offices, and subsequently to ORPS. At the county level a new kind of information is maintained in the form of tax maps, but the county tax maps and assessment rolls are not as detailed as the information in the municipal assessors office. When ORPS supplies data files to the statewide GIS

Clearinghouse, the files generally contain about 25 attributes and usually the parcel centroid.

Thus a user seeking statewide information from a single source has access to only the smallest amount of information, while a user whose purpose is limited to single town can make use of the greatest amount of information. As a consequence of this paradox, any use which requires regional or statewide information also requires the user to make many separate requests from different data suppliers. Usually requests go to counties where the tax maps and associated attribute data offer relatively good basic coverage for most applications. However, this process is time-consuming, costly, and unpredictable because counties do not follow uniform procedures or policies for dealing with data requesters. These problems and expenses add to the cost of many projects and can sometimes cause users to abandon their projects.

In addition, most uses require data from other sources or require data that is more detailed than that collected in the process of real property tax functions. For example, most engineering uses require survey quality data, which tax maps do not provide. Such users did not expect that county or municipal data should meet this standard, but they believed that their own data investments should be devoted to expanding or supplementing this basic data, not to acquiring it (or correcting it) in the first place.

Interviewees also mentioned incompatible technologies as a barrier to more effective data use. For example, not all parcel maps use the same mapping projection, which is a mathematical model for converting locations on the earth's surface in a way that allows flat maps to depict three dimensional features. Although some technologies convert files originating from different mapping projections easily, there are still others that do not preserve the integrity of shape, or the accuracy of area, distance, or direction.

5.4 Issues associated with data management

Data management associated with real property tax functions works in a relatively standard way all over the state. However, parcel data management outside of tax functions varies widely and the typical arrangement is best described as *ad hoc*. Users of parcel data must make many individual data requests to different data sources. A few local governments have data management strategies in place that address the needs of external users, but in most places requests are handled on a one-by-one basis. At the same time almost no feedback mechanisms exist between data users and data collectors, so that the investments that users make in data improvements are not built back into improvements in the original data sources.

Note the lack of update and feedback mechanisms in the typical data flow in Figure 1. Nearly all the

arrows point in only one direction – from the data source to a requester. Many users obtain data from municipal, county, and state sources, but (with the notable exception of the statewide GIS Data Sharing Cooperative) users are neither expected nor allowed to return data corrections, enhancements, or other improvements to the data sources. When users obtain annual or other updates from their data sources, they can actually make the situation worse because the data they have improved can be replaced by some of the same old errors that still exist in the source files. The difficult choice is to forgo the updates in order to keep their own corrections, lose some of their corrections in order to obtain updated files for other records, or engage in very costly and time consuming matching and integration activities.

5.5 Issues regarding supply and distribution

Data supply and distribution methods and costs vary widely from time to time and place to place. Some of the costs are associated with fees charged by various localities or private data suppliers for the data itself, although there are no standard policies about fees. Interviewees reported wide variation in fees and data sharing policies across and within the levels of government. For example, some sources require a formal data sharing agreement or contract to be signed before providing data, while others provide it on request. Some require formal Freedom of Information Law requests, others treat these requests as routine. Similarly, costs of data sets vary. For example, some offices charge only for reproduction or no charge at all while others have price lists or subscription fees. Some local governments reported obtaining significant revenue from the subscription sale of parcel data, while state agencies and most local governments charge little or nothing. Consequently a range of approaches is in use including:

- Single transactions at no or low cost to requesters
- Single transactions at revenue-generating cost to requesters
- Standardized access mechanisms such as web sites at no or low cost to users
- Standardized subscription services that offer restricted access for an annual fee

This variety of access methods and philosophies causes confusion and adds both direct and indirect costs for many users, although it generates some cash flow for certain data suppliers. Conflicting views on this topic are a major barrier to achieving a readily usable statewide parcel data resource.

6. Conclusion: treating parcel data as a collective information resource

The study documented the many ways in which parcel data is fundamentally important to a wide range

of stakeholders. These stakeholders are public, private, and non profit organizations, as well as individuals. They use parcel data for many purposes of personal, commercial, and civil value. While the study findings amply demonstrate these potential benefits, they also reveal the key difficulties of treating parcel data as a collective information resource:

- The flow of parcel data has developed around a single planned purpose (tax administration) but it has evolved to include many additional purposes served mostly by ad hoc arrangements. Few formal policies exist to serve these additional purposes and when they do exist, they vary widely from one jurisdiction or situation to another.
- Parcel data has intrinsic value for most stakeholders who believe their work would be greatly hampered or made impossible if the data were not available to them.
- All stakeholders, whether data collectors, suppliers, or users, endorse the need for data quality, timeliness, and consistency
- Most data is collected at the municipal level and most municipalities are small and lack the budgetary resources to expand their roles as data suppliers.
- Many data suppliers give the data freely to requesters. However, certain local governments and private data resellers can and do derive financial benefits by selling parcel data and they depend on these sales as an ongoing source of revenue.
- Data users often spend considerable resources to improve the quality of the data they receive from suppliers by making corrections, updates, and enhancements to the data, but almost no mechanisms exist to return and incorporate these improvements in the data sources.
- Under law, authority and responsibility for parcel data is distributed among many organizations at the state, county, and municipal levels. As a consequence, changes in the treatment of parcel data will require a high degree of consensus.

In addition, the findings show how information values play out in both cooperative and competitive ways. Stakeholders operate in an environment where all three government information values are simultaneously present. Much of the benefit of parcel data lies in its usefulness for many different government functions, thus it has the character of a necessity for governance. Clearly, parcel data also contributes to economic and social well-being across the public, private and nonprofit sectors and therefore constitutes a public good. At the same time, its wide and varied usefulness gives it economic value that leads to its treatment as a commodity in the market.

Because no comprehensive policies exist to govern its use across this broad spectrum of possibilities, information sharing is unpredictable and consumes more resources with lesser results than might otherwise be the case. This leads us to ask what policy principles could lead to a consensus that strikes a balance among these competing values and guides future discussions, decisions, and investments in this and other valuable public data.

The study suggests five policy principles that governments could adopt to achieve these multiple kinds of value from parcel data and similar information resources:

Promote broad recognition of data needs, value, and uses by different stakeholders. Each stakeholder approaches parcel data with a different set of needs generated by specific missions and goals. Taken together, however, all these individual needs add up to a comprehensive picture of parcel data attributes and value across many domains. Careful stakeholder analysis and engagement could generate broader appreciation for the many ways people think about, use, and benefit from parcel data. Such an appreciation could set the stage for active collaboration and joint investments.

Adopt core data standards. A common parcel identification scheme would allow data users to more easily integrate and merge data from multiple counties and municipalities. Such fundamental standards would allow users to save resources by reducing the effort required to obtain and refine or correct data before it can be used. They could also potentially reduce the number and frequency of requests made of each county and municipality. At the same time, it will take resources and incentives to help municipalities and counties adopt and apply standards.

Promote convenient access to authoritative sources. Many users prefer a single authoritative source for all parcel data, but many would also be satisfied with multiple sources (both public and private) that follow uniform standards and policies. In addition, most users want ready access to electronic parcel information, ideally on the web and via a self-service process. Depending on their needs, users want tabular, graphical, and GIS formats. However, many users are willing and able to convert data into their preferred format, as long as the data is available electronically. In addition, readily available logical subsets and more frequent updates would make parcel data more useful and more usable, thus generating greater value for each of the individual users.

Devise feedback mechanisms that connect data users to data sources for ongoing data improvement. By providing data users the opportunity and a mechanism to communicate data errors and

enhancements back to the source, the overall integrity and quality of parcel data can improve with increasing benefit to all future users. However, municipalities will need both resources and incentives to change their operations in order to add continuous data feedback and correction to their existing processes.

Experiment with balanced approaches to the costs and benefits associated with enhanced collection, use, and supply. Costs related to collection, use, and supply of parcel data are complex and difficult to measure. Benefits are relatively easy to describe but equally difficult to quantify. Some possible approaches include formal data sharing consortia, pooled financing of new systems, low-cost dissemination or convenience fees and ways to distribute them to those who must invest in new technologies or work processes. New private sector data services that go beyond some agreed upon scope of government activity should also be promoted.

The most far-reaching of these ideas would probably be matters for the legislature to consider, but many of them could be tried under existing law. In sum, progress toward treating parcel data as a collective information resource will depend on the willingness of all stakeholders to discuss, experiment with, and evaluate policies and practices that balance values, costs, and benefits for all.

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