

State of
Texas
GIS Solutions Group



Digital Parcel Data in Texas

Statewide Report – May 2017



Empowering People with Spatial Solutions

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1. Executive Summary

Property boundaries comprise the fundamental basis for land rights and transactional values that drive economic progress. For tracts of divided land, the bounding coordinates are commonly referred to as parcels. Property parcels are the essential unit for monitoring economic activity and future conditions for Texas. The lack of a unified compilation of parcel data hinders the state's ability to make accurate, timely decisions to protect individual rights and assure proper compensation in response to damages from natural disasters such as floods, fires, and hurricanes that qualify for federal disaster relief.

The catalyst for this study comes from the 2016 Geographic Information Officer's report which cites statewide parcel data as the most requested data set. Moving forward with this study fulfills the responsibilities of the state Geographic Information Officer (state GIO) to establish, disseminate, and support high priority geographic data for Texas¹, an open records state. The intent of this study is to perform an assessment of the status of parcel data for each of the 253 county appraisal districts, identify state and local benefits, and make recommendations for the next step toward the goal of a statewide database.

A team of nationally known and local subject matter experts were assembled to perform this study under the guidance of the state GIO, the GIS Solutions Group, and the Parcel Study Review Committee (PSRC), a committee comprised of state agency volunteers. Central to this study is the research approach taken by Applied Geographics, Inc. (AppGeo) and the state. Through a combination of state agency and county appraisal district surveys, one-on-one interviews, and inquiries into other successful state programs, the results were analyzed and compiled into this comprehensive findings and recommendations report.

KEY FINDINGS

- Digital property parcel data exists for 212 Texas counties (~84 percent).
- Texas does not have a statewide digital property parcel dataset, a program to aggregate such data, or a mandate to set a statewide standard.
- Approximately 90 percent of state agencies surveyed see benefits in a statewide property parcel dataset,
- Less than 50 percent of the local tax appraisal districts surveyed are convinced of the benefits.
- Three of the top 25 largest metropolitan statistical areas in the United States are in Texas (Dallas - #4, Houston - #5, and San Antonio - #25), contributing large percentages of the estimated 20 million parcels in the state.

KEY RECOMMENDATIONS

- Conduct outreach to local tax appraisal districts in the form of workshops on the benefits of a statewide parcel dataset.
- Develop incentive and quid pro quo plans for local participation. i.e., state-funded Google Imagery for local parcels.
- Conduct a pilot to better explore data integration and maintenance issues.
- Compare efficiencies of government-derived parcels to commercial datasets.
- Determine the need and cost feasibility for statewide taxing jurisdiction boundaries.
- Consider legislative designation of a lead office for the statewide parcel program.

¹ WATER CODE, Texas Legislature § CHAPTER 16. PROVISIONS GENERALLY APPLICABLE TO WATER DEVELOPMENT-16.021 (c) (1-5) (2011).

2. The Vision for Statewide Parcels

Land ownership with exact boundaries has played a key role throughout the economic and philosophical development of the United States. This notion holds particularly true in Texas where people have historically placed a very high value on property rights and ownership of land. Precise parcel boundaries date back to when Stephen F. Austin received a land grant in 1823 from the Mexican government to settle 300 families in the Tejas province of what was then Mexico. Very purposefully, *empresario* (Spanish for entrepreneur) Austin made sure that each parcel of land in his grant was surveyed. In 1845, the United States annexed Texas and neighboring empresarios had followed suit and measured out their land for settlement to solidify their rights and titles to the land. This foundation of measured land with associated title was a boost to economic activity and helped build a vigorous land market.² When considering the concept of place, ownership and boundaries become key descriptors to define a location, its extent, and use.

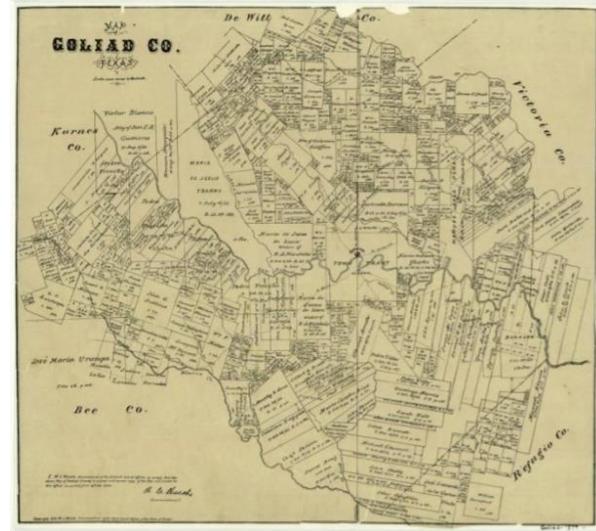


Figure 2-1. 1979 Goliad County Landowner Tracts.

2.1. Introduction

Land parcel databases, also known as *cadastres*, describe multiple aspects of a property, including the ownership, extent, and value. They are used as a tool to convey real property assets to the public, government agencies, and private sector, and to make numerous decisions related to zoning, site selection, and environmental assessment. Additionally, they represent the location of businesses, residences, and public land holdings. In other words, parcel data provides a valuable resource for decision making at many levels of government and business.³

2.2. The Need

Statewide land parcel information that describes and delineates property rights is needed to support economic development, emergency management, transportation projects, governmental efficiency, and other statewide and regional needs. Primarily in Texas, this information is compiled and managed at the local level by county appraisal districts, and yet, it is one of the least complete statewide datasets.

The need for a statewide digital parcel data system was revealed following a collection of state agency priorities from 13 of the largest users of GIS. As a result, the need for digital parcel data was listed as one of five priorities selected for the legislatively mandated Geographic Information Officer's (GIO) Report.⁴

² Andro Linklater, *Measuring America*, (New York: Penguin Group, 2002), pp. 219-220.

³ David Cowen, et al., *National Land Parcel Data: A Vision for the Future*. (Washington, D.C.: The National Academies Press, 2007, preface xi.)

⁴ Wade, Retiz and Aanstoos. "The Texas Geographic Information Landscape - Inaugural GIO Report." The Texas Water Development Board, December 2016, 23-24.

A search for digital land parcel information available from county appraisal district websites revealed direct access and download capability for 61 counties, typically as a feature of their Geographic Information System (GIS). The digital land parcel information for the remaining 193 counties could not be found or accessed from a public website, for one or more of the following reasons:

- Proprietary information
- Associated cost
- Data not digitized
- No GIS capability

A challenge seen in Texas is that gathering information about county appraisal resources can be formidable, due to the large size of the state and a wide range of technical capabilities across the appraisal districts. The operational surveys conducted by the Office of the Comptroller⁵ provide insight about the status of digital data across that state, and the status of counties with no GIS, but due to several non-responsive counties year to year, the degree to which parcel data is being used and maintained across the state is not known with certainty. The magnitude of the challenge to assemble and sustain a statewide land parcel dataset is large, as framed by the following considerations:

- A statewide dataset would be an aggregation of all parcel data across the 254 Texas counties, accessible in a standardized and agreed-upon format.
- It would need active contribution and participation by county appraisal districts (253 appraisal districts due to two counties joining as one appraisal district).
- There would need to be a sustainable data maintenance plan and life cycle to ensure ongoing economic and financial sustainability.

Statewide land parcel data is the most requested dataset from state agencies.

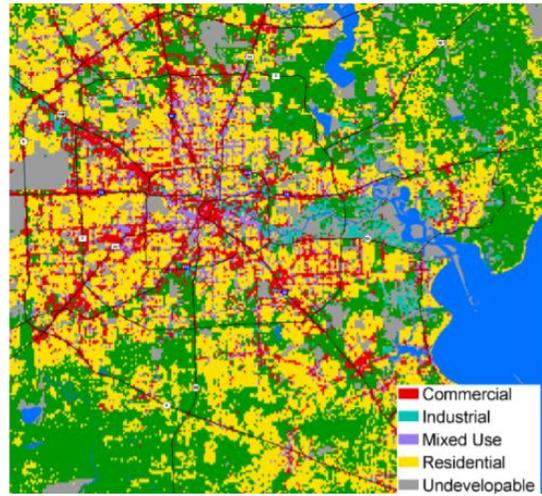


Figure 2-2: Land Use Characterization in Houston
www.h-gac.com

The conclusion reached by the state GIO was that additional research is needed toward the availability of digital land parcel information from county appraisal districts.⁶ Additionally, approaches and methods used by other states were deemed to be an important resource for Texas to gather insight into what worked in other parts of the nation and to evaluate common challenge approaches.

This study includes additional research on the status of digital land parcel data in Texas and other states, while also providing key recommendations and next steps for the state GIO to consider for making progress in Texas.

2.3. Vision

The notional vision for Texas is as follows:

Establish a statewide land parcel dataset for Texas to serve the needs and interests of all levels of government and the citizens and property owners of the state.

The dataset would contain both spatial and attribute data that describes and delineates property rights, and that is constructed as the composite of original, authoritative data contributed by the state's 253 county appraisal districts. This statewide dataset would be publicly available and would be updated on a regular, systematic basis. Achieving this vision will require the coordinated actions and willingness of numerous parties, including Texas state government and county parcel data custodians.

⁵ The Texas Office of the Comptroller conducts an annual survey of appraisal districts. The survey is published online <https://comptroller.texas.gov/taxes/property-tax/reports/>

⁶ Wade, Retiz and Aanstoos. "The Texas Geographic Information Landscape - Inaugural GIO Report." The Texas Water Development Board, December 2016, 23-24.

3. National Context

The need for parcel data exists at all levels of government. Extensive research and effort has been put forth to support the creation of a nationally consistent land records system. In recent years, a strong case has been made that several federal agencies require these data to support emergency response and housing issues. Although parcel data does exist across the nation, the available data is not entirely in digital form, in a common format, or consistently available. This fragmentation of land information has been a problem at the national level due to the widely varying range of availability and quality of land parcel data across the nation. Parcel data has been used by governments across the nation to improve the quality of life for their citizens, while areas lacking in such information have not.⁷ According to the National Land Parcel Study, “In some places, local government has been able to use land information to create jobs, improve the environment, distribute the tax burden equitably, and even save lives. Other, more remote, and less affluent counties or local governments have not profited from this range of benefits. At a state or national level, we have been unable to rely on basic parcel information because of its spotty availability and nonstandard format.”⁸

3.1. Summary of Federal Efforts

The argument that the federal government should take the lead in the coordination of digital parcel data goes back almost four decades. The critical role of cadastral information in decision making was recognized as one of the seven Federal Geographic Data Committee’s (FGDC) framework data themes. Numerous studies by federal oversight offices and scientific advisory committees have emphasized the federal government’s need for such data and recommended the creation of a viable program to implement a coordinated approach that would assemble authoritative data from local and state agencies. Parcel polygons and associated land record information are simply not like the other categories of framework data. The data for approximately 150 million non-federal land parcels is maintained by approximately 6,700 land records (cadastral or parcel) data stewards, including over 3,200 counties and equivalent units of local government. Unfortunately, the Bureau of Land Management, an agency within the U.S. Department of the Interior, that is the designated steward for cadastral data has never been given the authority or resources to put a comprehensive plan in action. Consequently, a recent report card gave the federal government a grade of D+ in the coordination of nationwide parcel data. At the same time, federal agencies that need parcel data spend millions of dollars every year in licensing fees to commercial firms. The clearest example of the federal need for parcel data is provided by the Department of Homeland Security (DHS) that is licensing parcel data to support Homeland Infrastructure Foundation Level Data (HIFLD). The highly restrictive license cannot be utilized by any other federal agencies (HUD, Agriculture, VA, Census, etc.) that in turn, purchase their own separate licenses.

While parcel data is an important resource to support emergency preparedness and response programs, it is the most appropriate way to monitor housing and mortgage issues. It must be emphasized that the collapse of the mortgage markets a decade ago drew attention to just how much the United States is out of step with other developed nations. Even though Zillow and other commercial web sites were providing nationwide real estate mapping systems, the federal regulatory agencies did not have a way to geographically monitor mortgage defaults. The absence of such a system brought considerable wrath from around the world. For example, an article published by Roberge and Kjellson state that “In effect,

⁷ Cowen, et al., *National Land Parcel Data: A Vision for the Future*. (Washington, D.C.: The National Academies Press, 2007).

⁸ Op. cit., *National Land Parcel Data: A Vision for the Future*

we believe that a good property rights infrastructure could have mitigated the effect of the land market crisis and thereby avoided the loss of many hundreds or even thousands of billion dollars.”⁹

Unfortunately, even after this disaster neither HUD nor the Consumer Financial Protection Bureau is prepared to champion an effort to create a national land parcel system.

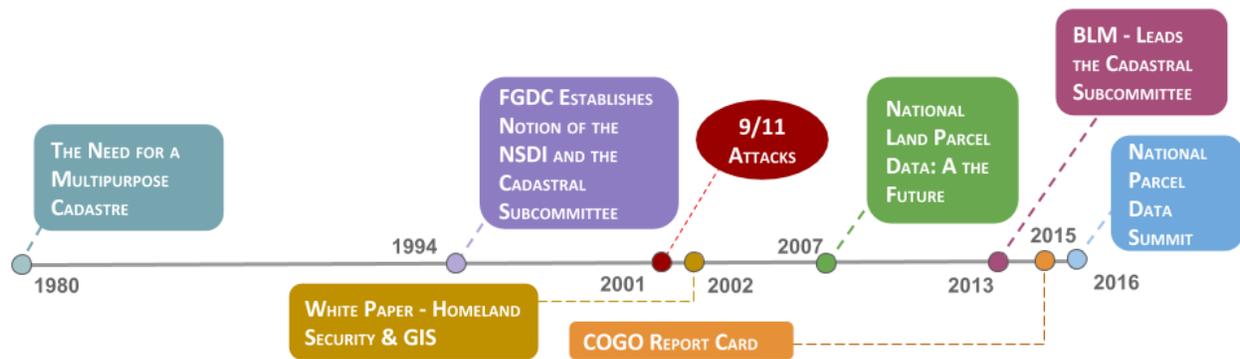


Figure 3-1: Timeline for Federal Interest in Parcel Data

DHS held a parcel summit in 2016 that brought together federal and state stakeholders. The summit provided an opportunity to showcase the progress of North Carolina and other states to assemble and standardize parcel data from hundreds of local governments and place them in the public domain. These examples clearly illustrated that it is possible to overcome many of the institutional and organizational obstacles that have thwarted efforts to assemble a comprehensive parcel database. Recommendations from the summit include the creation of a National Parcel Coordination Office that would oversee a national parcel data business plan. This plan would include grant programs and other incentives to compensate states that would coordinate parcel data within their state. While no specific program has emerged, at least there is renewed interest from one of the most influential federal agencies.

3.1.1. Background and Overview

For more than three decades the federal government has wrestled with how to collect and maintain a national parcel database (Figure 3-1). In fact, before the Federal Geographic Data Committee (FGDC) was established in 1990, and before the notion of a National Spatial Data Infrastructure (NSDI) in 1994, there was widespread agreement about the critical role of parcel data in a host of decisions related to the use, value, and ownership of property. Furthermore, the landmark 1980 NRC study, *Need for a Multipurpose Cadastre*, stated:

“The major obstacles in the development of a multipurpose cadastre are the organizational and institutional requirements,” not technology.¹⁰

That study illuminated the value of parcel data as an integral part of an integrated system of land information and property rights. It was clear from the beginning that unlike other spatial data, parcels should be developed and maintained at the local level, but fostered at the federal and state levels with coordination, standards, and funding programs. Over the past three decades almost every developed country has used that report and two related studies as a blueprint for establishment of a national land records system. Unfortunately, the US federal government has yet to adopt a national perspective on parcel information.

⁹ Roberge and Kjellson. “What Have Americans Paid (and Maybe the Rest of the World) for Not Having a Public Property Rights Infrastructure?” *Surveying and Land Information Science* 69, no. 3 (September 2009): 135–142.
¹⁰ National Research Council. *Need for a Multipurpose Cadastre*. (Washington, DC: The National Academies Press, 1980. p 102)

Twenty-seven years after the publication of the *Need for a Multipurpose Cadastre*, the NRC published a second study on the same challenges, *National Land Parcel Data: A Vision for the Future*. It reiterated many of the same recommendations of the 1980 study, but in the context of the new millennium. Foundationally, it stated that:

“Almost every aspect of government and business can be associated with a land parcel... Americans’ strong sense of identity and self-determination is closely tied to land ownership. Uniquely among developed countries, we trust our local government to manage our rights in the land—from recording documents to controlling land uses.”¹¹

Even after The National Geospatial Advisory Committee (NGAC) endorsed all the recommendations, and urged the US Department of Interior (DOI) to proceed with implementation, no federal action was taken; and since the publication of the report in 2007, most of the progress in parcel data has been at the local level, incorporating digitally into GIS and often linking to Computer-Aided Mass Appraisal (CAMA) systems. Hundreds of counties now provide web based search and mapping systems that enable anyone to locate specific parcels and a wide range of use, value and ownership information. As highlighted in this report, a growing number of states have tackled statewide aggregation.

A national parcel-based property rights dataset is envisioned as the national “cadastre” theme of the National Spatial Data Infrastructure (NSDI). Cadastre is defined as follows:

Past, current, and future rights and interests in real property including the spatial information necessary to describe geographic extents. Rights and interests are benefits or enjoyment in real property that can be conveyed, transferred, or otherwise allocated to another for economic remuneration.¹²

The cadastre theme leader at the federal level is the BLM. In conjunction with the FGDC Cadastral subcommittee, BLM has provided guidance for the creation of standards and the framework for establishing an accurate base for parcel data. The subcommittee authored one of the first FGDC standards for a data theme and has provided excellent use cases and surveys of the status of parcel data. The Geographic Coordinate Database, a collection of geographic information representing the Public Land Survey System and other official surveys, is available at a BLM website. Nevertheless, the recent Report Card on the US National Spatial Data Infrastructure, published by the Coalition of Geospatial Organizations (COGO), gave the federal government a D+ grade in the stewardship of the Cadastre Theme. It must be noted that the report grade does not reflect negatively on either the BLM or the FGDC Cadastral Subcommittee.

“The grade reflects that the federal government is unwilling to adequately address the needs of Federal agencies for parcel data, even when the recent financial crisis dramatically illustrated the disastrous consequences of not monitoring such information. Therefore, until the FGDC supports a comprehensive approach to assembling parcel information from local stewards, it should acknowledge that the United States does not have a program to create and support a Cadastral data theme.”¹³

Most strikingly, this situation continues to exist following a clear failure of the federal government to monitor the collapse of mortgage markets. In fact, even after sharp international criticism for the lack of oversight of mortgage markets, both the Department of Housing and Urban Development (HUD) and the Consumer Financial Protection Bureau (CFPB) have declined the opportunity to take a lead role in implementing a parcel-based national mortgage database.

¹¹ David Cowen, et al., *National Land Parcel Data: A Vision for the Future*. (Washington, D.C: National Academies Press, 2007). 9.

¹² Federal Geographic Data Committee. “NGDA Cadastre Community.” *Geoplatform.gov*, 2006.

¹³ Bossler, et al., “Report Card on the U.S. National Spatial Data Infrastructure - Compiled for the Coalition of Geospatial Organizations.” February 6, 2015, 16.

While the federal government has failed to establish a program for the creation and maintenance of a critical framework theme of the NSDI, numerous federal agencies continue to license commercial parcel data (see Figure 3-2). In fact, USASpends.com lists 12 federal agencies that are licensing CoreLogic Data for \$25 million per year. These include the Departments of Agriculture (DOA), Housing and Urban Development (HUD), Department of Treasury (DOTR), Justice (DOJ), Health and Human Services (HHS), Commerce (DOC), Energy (DOE), Veterans Affairs (VA), Defense (DOD), Small Business (SBA), Environmental Protection Agency (EPA), and Securities and Exchange Commission (SEC).

In 2016, the FGDC Homeland Infrastructure Foundation Level Data (HIFLD) Subcommittee and DHS convened a National Parcel Summit in Reston, Virginia. The agenda of the summit was to identify federal use cases for parcel data, and to make recommendations on how to achieve progress at the federal level.

In brief, **federal use cases** identified at the summit included the following:

The Department of Homeland Security has taken a renewed interest in parcels. DHS and FGDC Homeland Infrastructure Level Data convened a National Parcel Summit in 2016 that resulted in a new set of recommendations at the national level.

- Emergency preparedness, response, recovery, and mitigation (e.g., DHS interest in parcels for inclusion in the HIFLD dataset for First Responders)
- Economic sustainability and financial resilience
- Mortgage and financial systems (e.g., HUD interest in parcels as a potential for the Home Mortgage Disclosure Act (HMDA) early warning system)
- Energy extraction and winds/solar energy
- Water, soil, and nature conservation

Recommendations from the summit included the following:

- Conduct a pilot production program
- A National Parcel Coordination Office should be established to develop a top-down funding model to support a bottom-up aggregation and production process.¹⁵
- Secure partnership funding across parcel-interested federal agencies to fund a one-time grant for developing state ‘open parcel data’ strategic and business plans.
- Award grants competitively over a three-year period, with the first year focused on working with grantees to implement best practices and shareable resources for subsequent efforts.
- Set grant program rules and evaluation criteria, including expectation that the grant work plan will be completed within a year of initiation.
- The governor of each state must designate a lead state agency for parcel coordination.

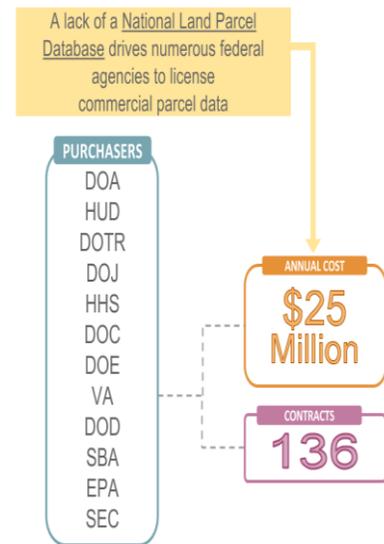


Figure 3-2: Federal Expenditures for Commercial Parcel Data www.usaspending.gov

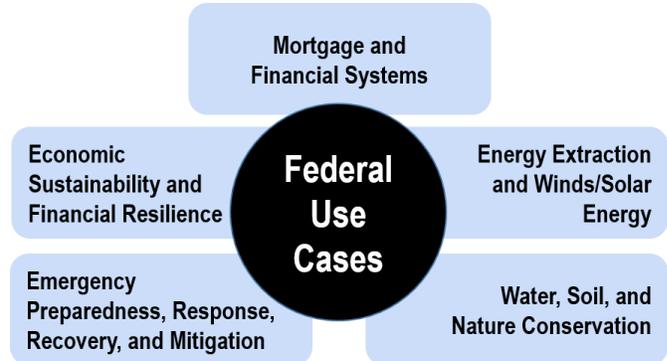


Figure 3-3: Federal Use of Cases for Parcel Data¹⁴

¹⁴ Cy Smith, et al., “Leadership for a National Parcel Data Set,” June 2016.
¹⁵ Op. Cit., Cy Smith, et al.

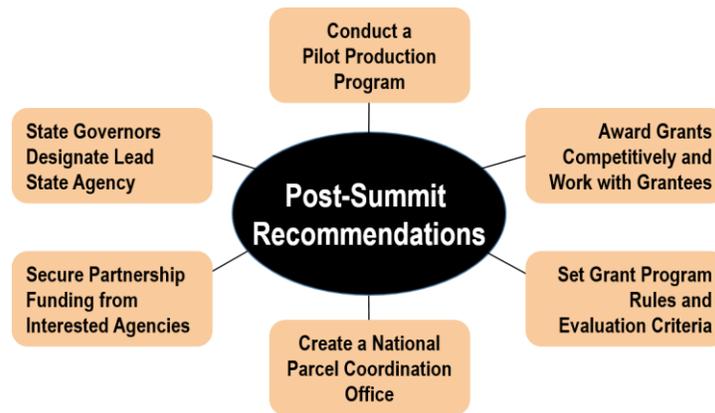


Figure 3-4: Current Recommendations for Federal Land Parcel Data Coordination¹⁶

3.2. Other National Trends and Reference Points

3.2.1. National States Geographic Information Council (NSGIC) Advocacy Agenda

NSGIC is concerned with the creation of intelligent maps and databases that enable public and private entities to make better informed and timelier decisions in a wide array of governmental areas. NSGIC also supports the National Spatial Data Infrastructure (NSDI) through recommendations for technology, policies, criteria, standards, and people necessary to promote geospatial data sharing throughout the public and private sectors and academia.

NSGIC has listed cadastral data as a key framework layer for the NSDI, and according to the 2015 flyer Geospatial Data Act of 2015 “Government agencies are creating the same data many times over in different forms and formats, and not effectively sharing information to the best advantage of the taxpayer. The states are the ‘middle man’ in this fury of activity and they clearly see the lost opportunities to coordinate Federal efforts for the benefit of local governments, while knowing that they can also roll -up local government data for use by Federal agencies. Doing so, would be the definition of good government.”¹⁷

The impact and utility of GIS technology and data are profound. Location is the single thread that is common to all data. In the not-too-distant future, nearly every governmental unit will adopt geographic or location-based database schemes to tie governmental information systems together for improved data administration. Simply put, GIS can enhance the usefulness of data and return on investment in public information. NSGIC advocates the benefits of geospatial technologies and data that can be achieved only through intergovernmental and private sector cooperation, coordination, collaboration, and partnerships.¹⁸

3.2.2. Commercial Data Brokers

Clearly, there is a demand for parcel data. At least two companies (Core Logic Solutions and Digital Map Products) have invested substantial resources to create almost complete versions of standardized parcel data and associated real estate attributes. Commercial brokers build their proprietary data by harvesting data directly from local governments, by paying licensing fees when needed, or by creating their own duplicate versions. These brokers have established services that provide access to about 150 million parcels. The services provide a simple way for companies to acquire information about the use, value,

¹⁶ Cy Smith, *et al.*, “Leadership for a National Parcel Data Set,” June 2016.

¹⁷ National States Geographic Information Council. “Geospatial Act of 2015,” March 2015.

¹⁸ National States Geographic Information Council. “About NSGIC,” January 2017.

and ownership of property without having to conduct detailed searches through local records. As noted, the federal government is a major consumer of these data. There is a market in Texas for the parcel data services provided by several companies (see section 7 - Commercial Parcel Vendors) who offer such GIS services as parcel data development, maintenance, and web viewing applications for a significant number of county appraisal districts.¹⁹

3.2.3. Citizen Engagement and Crowd-Sourced Data

Parcels represent the definitive spatial features regarding the use, value, and ownership of property. Because the ownership of property comes with sets of privileges and responsibilities, the parcel is the authoritative unit for monitoring activity and conditions. Online applications provide an easy way for citizens to acquire information about property ownership and value. At the same time, they also provide a way for citizens to report conditions. An excellent example is the effort by Loveland Technologies to enlist citizens to report on the conditions of property in Detroit²⁰. Through citizen input, Loveland has developed a much more accurate picture of actual property conditions, compared to the depictions of widespread blight reported in the media. This information is helping to keep people in their homes and improve conditions in neighborhoods. A similar parcels-based venture, originally called Opportunity Space and now re-branded as Tolemi, provides property data and analytics for city governments, including Pittsburg, Texas (<https://pittsburg-tx.opportunityspace.org/>).

3.3. Parcel Stewardship and the International Association of Assessing Officers

The International Association of Assessing Officers (IAAO) is a nonprofit, educational, and research association organized of government assessment officials that focuses on the administration of property tax. The IAAO has published several articles centered on the standardization of parcel data. A 2013 publication based on the findings of the FGDC Cadastral Subcommittee provides an excellent taxonomy of levels of state stewardship for parcel data. The levels provide pathways for the development of statewide standardized cadastral data-addressing not only the data itself, but also organization, data access, and state-level coordination needs. For the lower levels of state stewardship, the data have been assembled into one place with a single point of contact, thus eliminating the need for those who require parcel information to contact each county or parcel producer separately. The benefits of having disparately maintained data content converted to a standard set of attributes, with the ability to be combined into a single dataset, are achieved in the higher levels of stewardship.

The FGDC Cadastral Subcommittee recognizes that state stewardship will evolve and develop over time as parcel datasets are completed, partnerships with local parcel data producers (data managers) are established, and data management capabilities at state agencies are developed. Some of the key characteristics of the spatial and attribute data at each level are summarized in the following table.²¹

¹⁹ National States Geographic Information Council. "About NSGIC," January 2017.

²⁰ Loveland Technologies. "Detroit." Makeloveland.com. January 2017.
<https://makeloveland.com/us/mi/wayne/detroit#b=neighborhoods>

²¹ Von Meyer and Jones. "Building National Parcel Data in the United States: One State at a Time." IAAO's Fair & Equitable, July 2013. 4.

Table 3-1: IAAO Published Levels of Statewide Parcel Stewardship

<p>Level 1: Inventoried</p>	<p>Data inventory is complete, county contacts are established, and the state has begun implementing its strategy to create a sustainable parcel stewardship program.</p>
<p>Level 2: Assembled</p>	<p>Data producers (counties) provide data sets to the state on a yearly basis, and the state aggregates or assembles the local data but does not change or modify the local data.</p>
<p>Level 3: State Standardized</p>	<p>Data producers provide data sets to the state, and the state standardizes the local data, cross-walking local attribution to a state standard.</p>
<p>Level 4: Local Standardized</p>	<p>Data producers provide data sets to the state with a standardized set of parcel attributes connected to the parcel geometry.</p>
<p>Level 5: Reconciled</p>	<p>Data producers provide complete data sets to the state with a standardized set of parcel attributes connected to the parcel geometry. The geometry is reconciled and tied to a common cadastral reference with no overlap or gap between jurisdictional boundaries.</p>

4. State Approaches

Texas does not have a parcel-based statewide property rights dataset. While it has numerous countywide datasets of this nature, there is no consistent statewide resource. A considerable and growing number of states have developed, or are in the process of developing, statewide parcel programs through a variety of approaches and funding mechanisms. This study evaluated programs in Massachusetts, Montana, North Carolina, Tennessee, Arkansas, Virginia, and Vermont, and how each state approached their challenges. Nationwide parcel stewardship status can be found in Figure 4-1.

4.1. Parcel Stewardship Rankings by State

The table below ranks each state by the IAAO levels of parcel stewardship discussed earlier in Section 3.3 of this study. As a set, they represent a good distribution of the different levels of stewardship achieved at the state level across the country.

Table 4-1: Levels of IAAO Parcel Stewardship Maturity for Study States

	MT	MA	NC	AR	TN	VA	VT
Level 1: Inventoried							
Level 2: Assembled							
Level 3: State Standardized							
Level 4: Local Standardized							
Level 5: Reconciled							

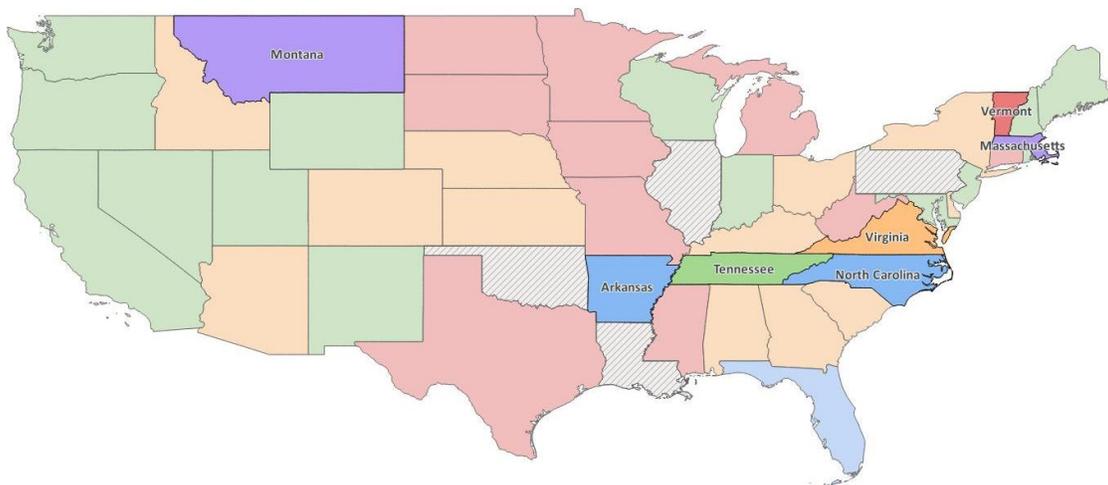


Figure 4-1 : Levels of IAAO Parcel Stewardship Maturity in the Continental United States. The States covered in this study are labelled and highlighted for emphasis.

A comprehensive list of states and maturity level can be found in the Report Supplement – Section 4.

4.2. State Approaches to Statewide Parcels

Seven states: North Carolina, Arkansas, Tennessee, Virginia, Massachusetts, Montana, and Vermont were evaluated as part of this study. While there are numerous states across the nation that have statewide programs, the states evaluated for this effort were chosen to provide the State of Texas with context for a variety of approaches to statewide parcels, as well as success factors and challenges faced by each state.

The statewide parcel approach table breaks down each state program into core components and responsibilities. When compared side by side, it becomes evident that a variety of approaches have been effective across the country. The largest variations in approach are seen at the production and maintenance levels where states leverage a variety of local, regional, state, or third-party resources.

The common core stewardship responsibilities that each state in the study manages at from a centralized state level are:

- Funding
- Coordination
- Data Distribution

A process of qualitative and comparative analysis was used to analyze a variety of program components for each state. This matrix breaks down program collaboration with regard to the essential components needed to establish and maintain a statewide land parcel dataset.

Table 4-2: State Approaches for Statewide Parcels Data Stewardship

Entity	Funding	Coordination	Standards	Authoritative Data	Data Distribution	Production	Maintenance
North Carolina							
State							
Local							
Regional							
Third-Party							
Arkansas							
State							
Local							
Regional							
Third-Party							
Tennessee							
State							
Local							
Regional							
Third-Party							
Virginia							
State							
Local							
Regional							
Third-Party							
Massachusetts							
State							
Local							
Regional							
Third-Party							
Montana							
State							
Local							
Regional							
Third-Party							
Vermont							
State							
Local							
Regional							
Third-Party							

4.2.1. North Carolina - Level 4: Local Standardized

The North Carolina Geographic Information Coordinating Council approached statewide parcels with the goal of long-term sustainability in mind. The state realized that the investment would be sound only if it was intuitive and repeatable. An extensive outreach program, designed to secure buy-in from the local data producers, enabled the state to acquire authoritative parcel datasets from most of the counties.

Planning, Development, and Implementation
\$430,000

Annual Budget
\$76,000

However, without consistent standards in place, 100 variations existed across the state. The resulting standardized approach was to design an enterprise system. It consisted of a parcel transformation application that would validate and accept the parcel polygons, and then crosswalk the parcel attributes to transform them into a consistent format without requiring the data authors to modify existing procedures. The standardized data is published through NC OneMap, the geospatial data portal for North Carolina.

The state has realized many benefits from the program beyond the creation of a complete, consistent, statewide resource. The data is freely available to download or as web services, reducing costs for agencies and the public; the program eliminated at least four duplicative processes of data acquisition, reducing time and costs for agencies and data producers; and the program has informed decision-making for site selection, highway planning, identification of land ownership, public safety, and conservation efforts.

The dataset is the most-accessed vector data available on NC OneMap. While built for governmental use, feedback from consumers revealed that the downloadable parcel data, web map services, and web feature services provide a valuable base map connecting property ownership to the land for the utility industry, engineers, surveyors, attorneys, foresters, etc. It is one of the first layers imported for disaster planning and relief. In addition to benefits to consumers, some counties have reported they plan to update their data in the parcel transformer more frequently and point all parcel data requests to NC OneMap, spending less time on data transfers and more time on supporting county business processes.

Table 4-3: North Carolina Program Components

Business Drivers	Potential value to the state: reduce duplication, quick and reliable data source, fair and equitable allocation of public funds
Coordinating Office	NC Geographic Information Coordinating Council Statewide Mapping Advisory Committee Workgroup
Funding Mechanism	EPA grant Cost sharing
Standards	Standardized at the state level through NC OneMap Statewide participation of 100 counties No spatial quality standards
Success Factors	All counties had existing digital parcel data Pilot program leveraged to create enterprise system Online parcel translator tool - streamlined process for county data contributors Mitigated/Reduced burden on county data providers
Challenges	15 disparate CAMA systems in existence across the state One-third of the state was charging for parcel data
Years Active	2 year - planning, 2 years - development, less than 3 years - active
Level of Maturity	4 - Local Standardized

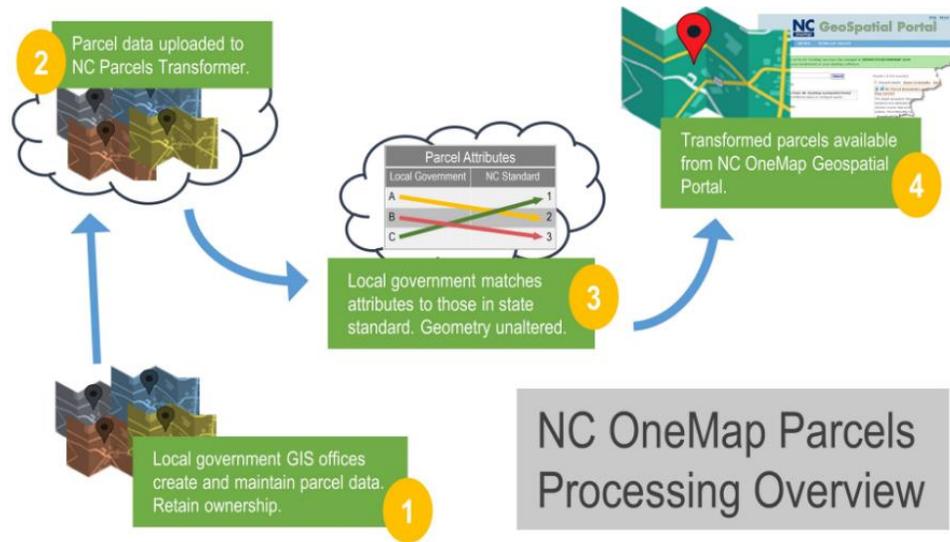


Figure 4-2: The North Carolina Parcel Translator Workflow

4.2.2. Massachusetts - Level 5: Reconciled

The State of Massachusetts has had a digital parcel data standard in place for several years, but in 2010, funding was secured to substantially improve the statewide parcel dataset and implement the MassGIS-Level 3 Standard for Digital Parcel Files. The implementation of the “L3” standard puts Massachusetts among the states that have achieved the most robust and mature levels of parcel data stewardship.²²

Table 4-4: Massachusetts Program Components

Business Drivers	High quality mapping of address point locations
Coordinating Office	Massachusetts Office of Geographic Information
Funding Mechanism	Next Generation 9-1-1 Emergency Call System
Standards	L3 - strict spatial and attribute standards (through funding in 2010)
Success Factors	Ongoing outreach and communication Reconciliation of CAMA vendors
Challenges	Property assessment is done at the municipal level, 351 towns in total Broad range of technical expertise across urban and more parochial municipalities Overlapping/disputed municipal boundaries
Level of Maturity	5 - Reconciled

4.2.3. Montana - Level 5: Reconciled

Montana was one of the first states to implement a GIS-based statewide database. Montana’s Spatial Data Infrastructure (MSDI), as recognized by the Montana Land Information Advisory Council, consists of 13 layers, with the cadastral layer being one of the most mature. Montana’s parcel layer, while largely shaped by the property assessment process, provides value, and supports data usage well beyond land valuation and taxation.²³

The program was transferred to the State Library where the data is used for a variety of public information programs, including **Montana Hunting Companion** that informs hunters and fisherman of land ownership and accessibility for recreation.

²² The Level 3 Standard is a parcel standard established by the MassGIS Office, and is not related to the IAAO levels described in the report.

²³ Von Meyer and Shiebold, *Statewide Practices for Land Records in GIS*, (Study, January 2013.)

When it was completed in 2003, Montana’s was the first statewide cadastral dataset. Stewardship was set up under the Montana Basemap Service Center (MBSC) with funds appropriated by the Montana Land Information Act (MLIA).

Table 4-5: Montana Program Components

Business Drivers	Bureau of Land Management needs for federal lands Management of Statewide Cadastral data and related infrastructure Data sharing
Coordinating Office	Montana Department of Revenue Montana GIS Program Montana State Library
Funding Mechanism	Private Sector (2 companies, \$5k per year for 4 years) 2005 Land Information Act - \$1 document transaction fee ²⁴
Standards	Strict spatial standards for rural aliquot parts and subdivided urban areas
Success Factors	Support from the BLM for federal lands across the state Appraisal centralized to state CAMA database Public-Private partnerships
Challenges	“Data Holes” required intensive process of data development Consolidation of rural aliquot parts and subdivided urban areas Sustained funding Some counties still require assistance with parcel maintenance
Years Active	12 years - from planning to current
Level of Maturity	5 - Reconciled

4.2.4. Virginia - Level 2: Assembled

Through the statewide coordinating organization, the Virginia Geographic Information Network (VGIN), has a process in place and is the legislated authority to create statewide GIS data standards for base mapping layers, which it has done for administrative boundaries, road centerlines, and address point Next Generation 9-1-1 data layers. Additionally, the state has implemented data maintenance processes to keep these data current on a quarterly basis. Parcel collection and inventory, however, has not fully matured to the state standards for a variety of reasons, the largest of which is a lack of incentive and the funding-based priority placed on other base map layers.

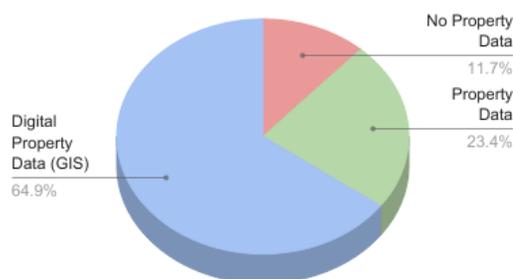


Figure 4-3: Counties by Property Data Type

Virginia’s Geographic Information Network (VGIN), has identified the completion of a standardized, statewide parcel dataset as an item in their five-year GIS Strategic Plan since 2010. However, other framework data layers have taken priority given the heavy emphasis on Next Generation 9-1-1, which funds VGIN in its entirety. Other core administrative boundaries, road centerlines, address points, and building footprints have taken priority.

²⁴ State of Montana, Montana State Library, *A Report to the 64th Montana Legislative Session as Provided for by MCA 90-1-404(L) and MCS 5-11-210*, (Report, December 1, 2014.)

Table 4-6: Virginia Program Components

Business Drivers	Fulfillment of statewide cadastral map coverage
Coordinating Office	Virginia Geographic Information Network (VGIN)
Funding Mechanism	Local real estate assessment needs, Next Generation 911 Emergency Call System
Standards	Statewide, aggregated data available as services and download
Success Factors	Ongoing outreach and communication
Challenges	Property assessment is done at the municipal level; 134 independent localities in total Demonstrating the business need for a statewide program Split parcels between jurisdictions Edge matching and reconciliation at the boundaries Lack of a statewide parcel data standard
Years Active	Planning for standards since 2010
Level of Stewardship	2 - Assembled

4.2.5. Arkansas - Level 4: Local Standardized

The State of Arkansas was an early adopter of the notion for a statewide parcel database. The state realized that economic, natural resources, agricultural, political, and demographic activities, and trends share the common attribute of being referenced by a geographic location. In 1994, the state put forth a set of recommendations, published in 1994 to the governor’s office, describing the need for support funding for a coordinated effort to develop a statewide parcel base map. These recommendations were accepted and the Arkansas Legislature ultimately passed various legislative acts that directly supported the parcel program through its constituent organizations and county assessor offices.

Arkansas provides a contrasting approach toward parcels to both North Carolina and Massachusetts. The Arkansas GIS office created its statewide layer through a robust communication and outreach program that began in the late 1990s. The state GIS office took a step-by-step approach that leveraged partnerships between the Arkansas Assessment Coordination Department, the counties, and Esri (Environmental Systems Research Institute). The program was initially launched by providing a computer and an Esri software license to all 75 county appraisal offices. While there were a few counties that chose not to participate or take advantage of the resources provided to them, many counties embraced the state’s efforts and now have robust parcel data, created in large part through the partnering efforts between the GIS office and the county appraisers.

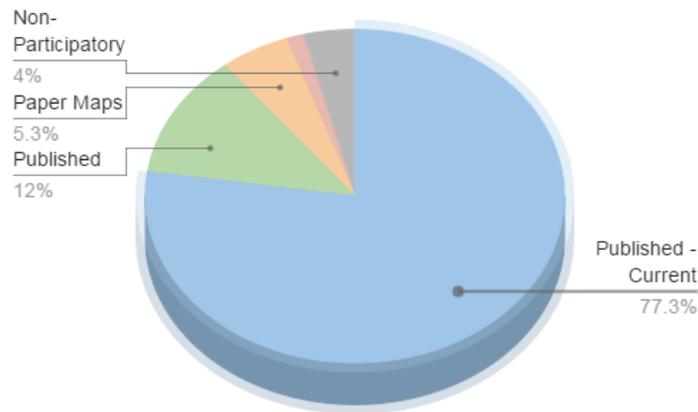


Figure 4-4: Parcel Status

Table 4-7: Historical Legislation with Regards to Parcels in Arkansas

Year	Legislation	Result
1997	Act 436	Created the <i>Arkansas Assessment Coordination Department (AACD)</i>
2005	Act 1892	Allocated 1 percent of the certified surplus funds in the state <i>Property Tax Relief Fund</i> to the county assessor offices
2006	Amendment 79	Created the <i>Real Property Tax Relief Assistance Guide</i> for county assessors
2009	Act 244	Established the <i>Arkansas Geographic information Systems Board</i>

Table 4-8: Arkansas Program Components

Business Drivers	Improved land records for the state Reduction of redundancy and expense State Mapping and Land Records Modernization Advisory Board
Coordinating Office	The Arkansas Assessment Coordination Department (AACD) Arkansas Geographic Information Offices (AGIO) Arkansas Geographic Information Systems Board
Funding Mechanism	State budget and matching funds by counties Property Tax Relief Assistance Program (1 percent) ²⁵
Standards	State set standard used by many but not all counties Standardized at the state level through the Arkansas GIS office for production
Success Factors	Comprehensive communication and outreach through grassroots approach Provided technology tools and training to counties
Challenges	Extensive travel and outreach is time consuming Lower levels of technology adoption in some counties
Years Active	~8 years planning; 15 years active
Level of Stewardship	4 - State Standardized

4.2.6. Tennessee – Level 3: State Standardized

Tennessee has had a statewide parcel program in place for several years for their 95 counties. The effort began in 1996, with a pilot program launched through the Comptroller of the Treasury, to develop technical specifications for a statewide parcel-mapping program.

The benefit to Tennessee that was realized in the initial years of the program is described in the National Association of State Chief Information Officers (NASCIO) report as “the intangible and unexpected improvement in communication by and between various levels of government are a benefit to citizens who have entrusted these organizations with their tax dollars. And these benefits are expected to increase as individual local GIS implementations mature and grow. No longer will different organizations be producing duplicate base maps, but they will be able to concentrate on their organization's specific mission, and maximize the application of GIS towards those goals.”²⁶

²⁵ State of Arkansas. Acts of the 85th General Assembly. www.arkansas.gov 2005. http://www.arkansas.gov/acd/laws_regs/act_summaries_2005.pdf

²⁶ NASCIO. “Tennessee Geographic Information System (GIS) Base Mapping Program.” 2001, 5.

Table 4-9: Tennessee Program Components

Business Drivers	Tennessee GIS Base Mapping Program
Coordinating Office	Office for Information Resources, GIS Services Comptroller's Office of the Treasury
Funding Mechanism	Years 1 & 2 - Tennessee General Assembly Shared funding through stakeholder agencies
Standards	Standardized at the state level through the Comptroller of the Treasury - Office of Local Government
Success Factors	Data sharing mentality supported among local governments Hybrid maintenance approach for complete buy-in Pilot program and phased implementation Initial common base map Technology tools and training provided to counties
Challenges	Intensive data development process
Years Active	5 years - research and pilot program; 16 years active
Level of Maturity	3 - State Standardized

4.2.7. Vermont - Level 1: Inventoried

The State of Vermont is in the process of building a statewide parcel database. Vermont approached their parcel implementation through a careful planning process that included a Return on Investment (ROI) study and the development of a sound business plan that included data maintenance and lifecycle practices that would ensure a sound, long-term investment.

Vermont's approach engaged stakeholder agencies to provide input and resources to support the program. The planning process included a partnership between the Vermont Center for Geographic Information (VCGI) and the Vermont Agency of Transportation (VTrans), who had begun modernizing their Right of Way (ROW) inventory. VTrans had determined that parcel data was a critical element for the success of their project and was identified as the key state agency stakeholder group. This partnership became a catalyst that led to state legislation, specifically Act No. 158²⁷, which was related to the transportation capital program and miscellaneous changes to transportation-related law. Section 35 identifies the intent to create a federally-funded statewide parcel base map over the course of three years, supported by shared funding from agencies that would also benefit from the program.

Currently, the interest in statewide parcels for Vermont has gained momentum beyond transportation planning. The Vermont Department of Fish and Wildlife has also begun investigating opportunities to accelerate the program, as the data would greatly benefit them as an additional analysis layer within their environmental planning and modelling business processes.

²⁷ Act 158. General Assembly of the State of Vermont, Vermont Legislature, *An act relating to the transportation capital program and miscellaneous changes to transportation-related law*, 36-41.

Table 4-10: Vermont Program Components

Business Drivers	Land ownership, ROW holdings for the Transportation Department
Coordinating Office	Vermont Center for Geographic Information Vermont Agency of Transportation
Funding Mechanism	Shared funding through Vtrans and the ROW Modernization Funds (FHWA/USDOT)
Standards	State standardized No spatial quality requirements
Success Factors	Single statewide CAMA database Comprehensive planning process in place
Challenges	Property assessment is done at the municipal level, 251 towns in total Broad range of technical expertise across urban and more parochial municipalities Creating a sustainable maintenance cycle Overlapping/disputed municipal boundaries
Years Active	In planning and implementation process since 2015
Level of Maturity	1 - Inventoried

5. State of the State

A major goal of this report is to characterize the state of digital parcel data in Texas. The process included conducting a statewide survey of appraisal districts, referencing publicly available statewide data resources, and surveying parcel data consumers conducted by the Parcel Data Steering Committee.

Digital parcel data exists at the local level to some extent for 221 Texas County Appraisal Districts, approximately 87.3 percent of the state.

5.1. Survey Resources

5.1.1. The Office of the Comptroller Annual Operational Survey

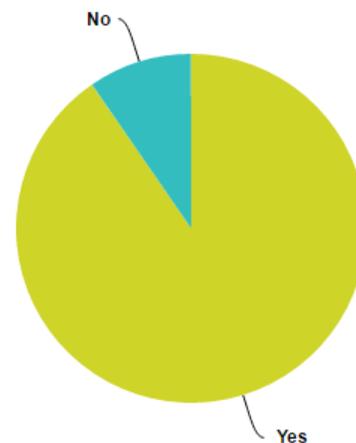
The Texas Office of the Comptroller requires an annual report on the administration and operation of appraisal offices, authorized through Tax Code Section 5.03(b).²⁸ The operational survey is sent to the 253 Texas appraisal districts to collect benchmark data that appraisal districts can use in assessing how they compare to other appraisal districts, as well as details on appraisal district operations and other information useful to the Texas Legislature, other policy makers, and taxpayers. The operational survey is published annually on the Comptroller's website and provides baseline data over several years to evaluate funding and availability of appraisal district GIS programs across the state.

The 2015 Operational Survey received responses from 230 Appraisal Districts, a 90.9 percent response rate.

Two additional surveys were conducted in November 2016 to collect quantitative and qualitative information from the county data providers and the state agency data consumers.

Does your appraisal district have digital (GIS) parcel data?

Answered: 167 Skipped: 7



STATEWIDE COUNTY APPRAISAL DISTRICT SURVEY

AppGeo conducted a survey of 253 parcel data providers on behalf of TNRIS to determine:

- Availability of digital parcel data in the state;
- Established contact list to be used in future outreach efforts; and
- The potential benefits of a statewide dataset to the county appraisal districts.

174 districts responded to the survey, or a 68.7 percent response rate.

²⁸ State of Texas, Office of the Comptroller. "Property Tax Survey Data and Reports," 2016.

TEXAS STATE AGENCY STAKEHOLDER SURVEY

The Parcel Data Committee conducted a survey of 22 parcel data consumers, to identify:

- Agencies using parcel data in their business processes;
- Current data collection methods; and
- Value and use cases for parcel data across state agencies in Texas.

22 agencies with GIS departments were included in the survey, 16 state agencies responded, or a 72.7 percent response rate.

5.2. Survey Findings

The counties of Texas are the primary authoritative source of land parcel data in Texas; however, in some cases, parcel and appraisal data are aggregated on a regional level through other levels and offices of government. There are 254 counties in the state, with 253 county appraisal districts operating as the official office of record for land and property appraisal and taxation. The difference in the total number of counties and the total appraisal districts corresponds to Potter and Randall counties, which operate under a single appraisal district.

State agencies depend on parcel data to inform a variety of business processes. The state agencies see great value in a statewide parcel dataset, as it would save them time and money and improve the performance of agency missions. State offices that depend on parcel data for their business processes either purchase data through private vendors or are unable to acquire the necessary data for areas where publicly available parcel data is lacking across the state.

The local county parcel data providers are less sure of the value of a statewide parcel dataset, but see a strong need for defined jurisdictional boundaries. The potential benefit of a statewide dataset to the county tax offices would be access to property valuations with their adjacent appraisal districts which would enable streamlined analysis and response to public requests.

Current challenges identified in Texas include a lack of standardization of parcel data across the state and a lack of funding and incentive to create and maintain a statewide parcel dataset.

According to the statewide appraisal district survey conducted by AppGeo, 150 of the 253 county appraisal districts are using GIS technology for mapping and viewing their parcel data (59.6 percent). Less than half of these districts are currently willing to contribute to a statewide parcel dataset, and most want more information about the benefits they might get as compared to what it might cost them.

Additionally, 64 appraisal districts (36.9 percent) reported they use vendor services to create or maintain all or a portion of their digital parcel data.

According to the 2015 survey conducted by the Texas Office of the Comptroller, 209 appraisal districts report having GIS data (82.6 percent of the respondent counties).

Aggregated totals of respondent appraisal districts from the Statewide Appraisal District Survey and the Comptroller Operational Survey show that 221 county appraisal districts manage their own digital parcel data, purchase data services from commercial vendors, or use a combination of data maintenance approaches.

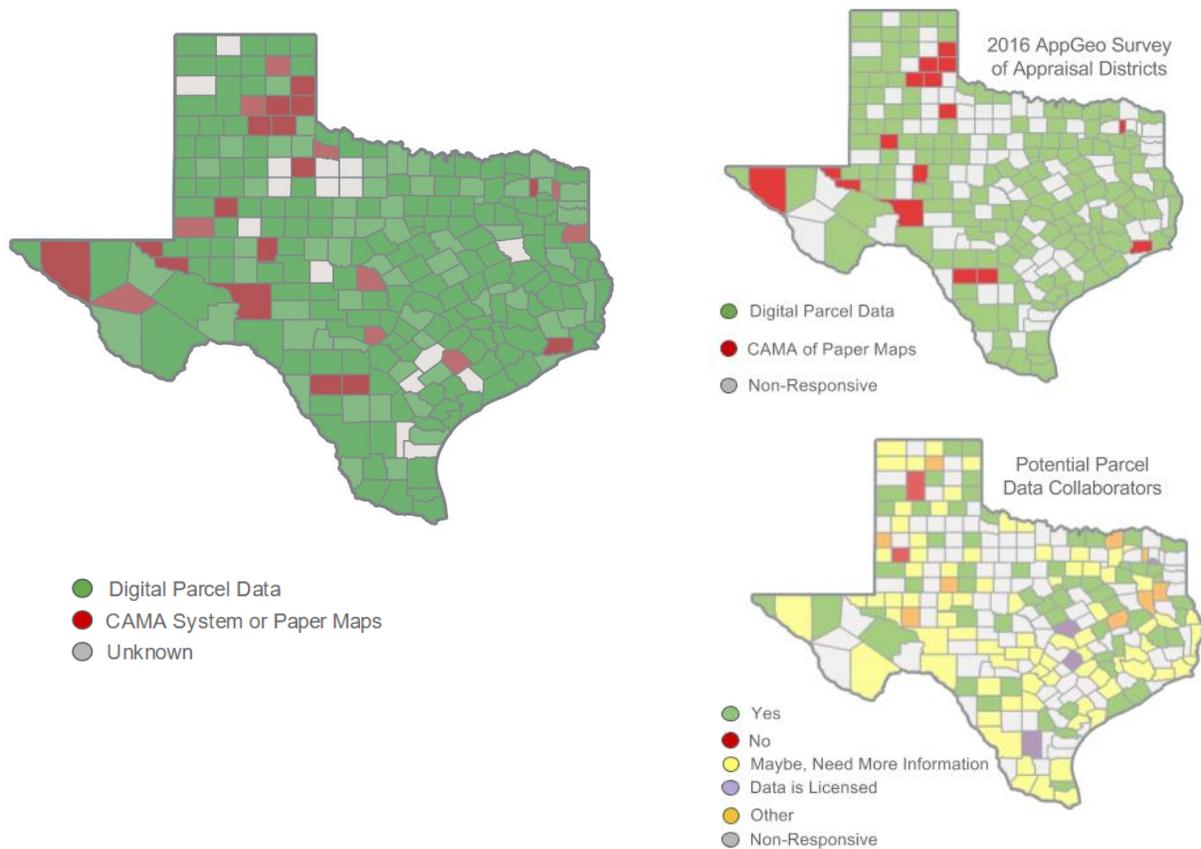


Figure 5-1: Additional survey findings can be found in the report supplement, sections 1 and 2.

5.3. Multi-State Comparisons by Key Factors

According to the 2015 operational Survey conducted by the Texas Office of the Comptroller, Texas has an estimated 20 million parcels and following the 2010 Census, the second largest population in the nation. Vast proportions of those population and parcel densities are found within urban areas. The variation in urban and rural landscapes across the state creates a unique distribution of parcel density and population size. In other words, there are very urban areas of the state and very rural areas of the state, which creates two distinct approaches to parcel data collection and maintenance.

5.3.1. Quantitative Comparisons

Collecting vast amounts of parcels is an immense task; however, when the total number of parcels is compared to the total population in the state, it becomes evident that Texas is similar to other states in terms of distribution of the parcel inventory across the population, as well as the number of local jurisdictions.



Figure 5-2: Parcels per Capita State Comparisons

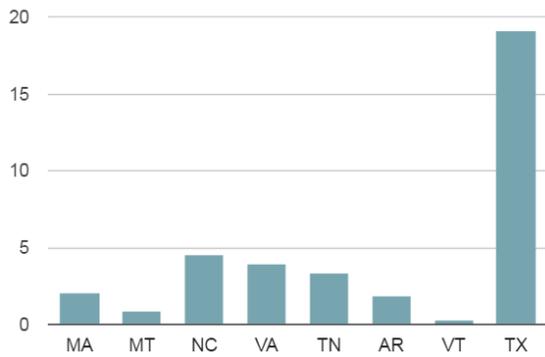


Figure 5-3: Estimated Number of Parcels in Millions

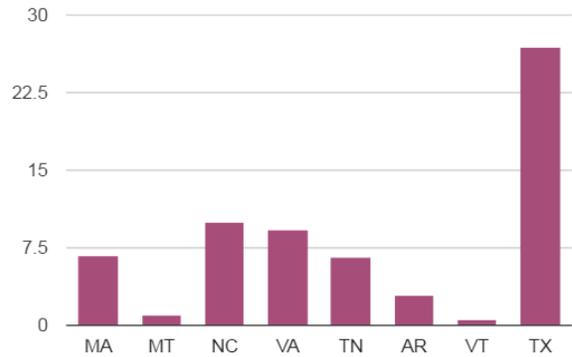


Figure 5-4: 2014 State Populations in Millions

When looking at such factors as average land area by parcel, Texas is similar to the smaller states in terms of population and geography that were evaluated for this study. This might be related to the fact that three of the top 25 largest Metropolitan Statistical Areas (MSAs) in the U.S. are in Texas:

- Number 4 - Dallas
- Number 5 - Houston
- Number 25 - San Antonio

Urban areas tend to have smaller parcels, and many more of them. It is also indicative of the fact that Texas does not have a lot of federal lands, as compared to other western states, such as Montana.

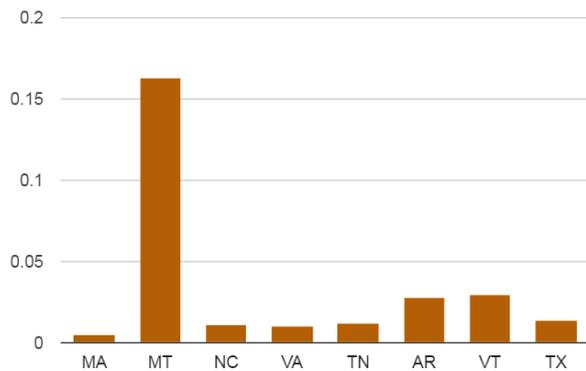


Figure 5-5: Total State Land Area (Square Miles)

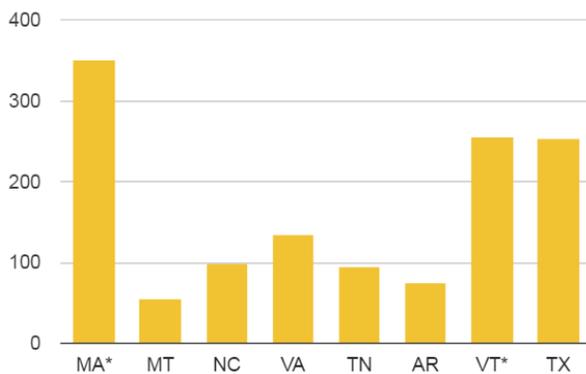


Figure 5-6: Authoritative Data Sources by County or Municipality*

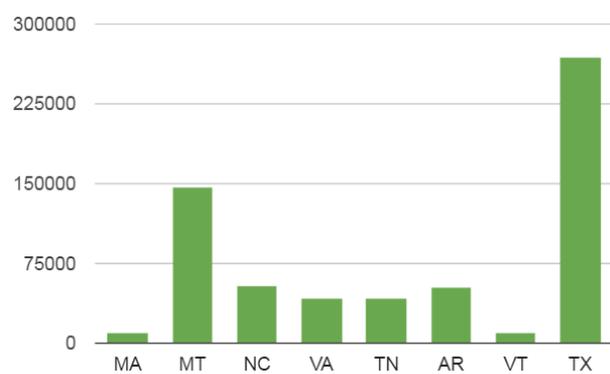


Figure 5-7: Average Land Area per Parcel (Square Miles)

5.3.2. Qualitative Comparisons -- Texas Level 1 (IAAO): Inventoried

Texas has performed a preliminary inventory of the state, established a contact list, and documented potential collaboration partners across the state. Additionally, because a large portion of appraisal districts currently distribute data themselves, a partial inventory has been performed based on what is discoverable on the Web, pushing the maturity rating to slightly higher than 1.

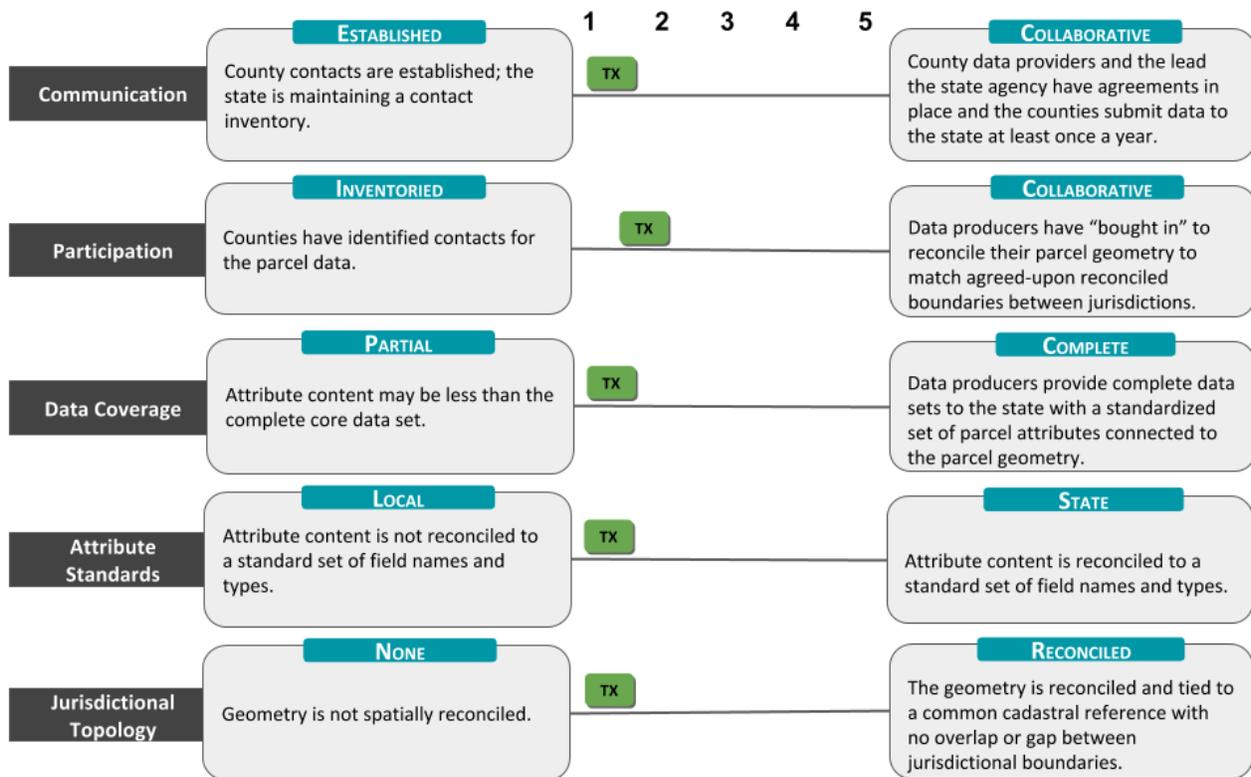


Figure 5-8: Current Parcel Data Stewardship Maturity Level (IAAO)

6. Value of Statewide Parcels in Texas

Geographic parcel map data, collected directly from county appraisal districts, is the best non-survey digital source of property boundary information. It is not a legal document in the sense that a surveyed plat map and deed are legal documents. Nonetheless, it is a very useful representation of land tracts and an excellent resource for visualizing and detecting changes in population and housing patterns, as well as the impact of natural disasters on property in a given area. When combined with parcel attributes for ownership, property value, and land use, these data sets become a valuable resource for a variety of purposes across the state.

6.1. Statewide Value-Generating Uses of Parcel Data

Four specific areas where a statewide parcel database would generate value to Texas governments and citizens have been selected. These are used to describe scenarios where centralized access to parcel data would help the state prepare for and respond to disaster, create favorable economic policies, meet the needs of a growing population, and reduce government spending.

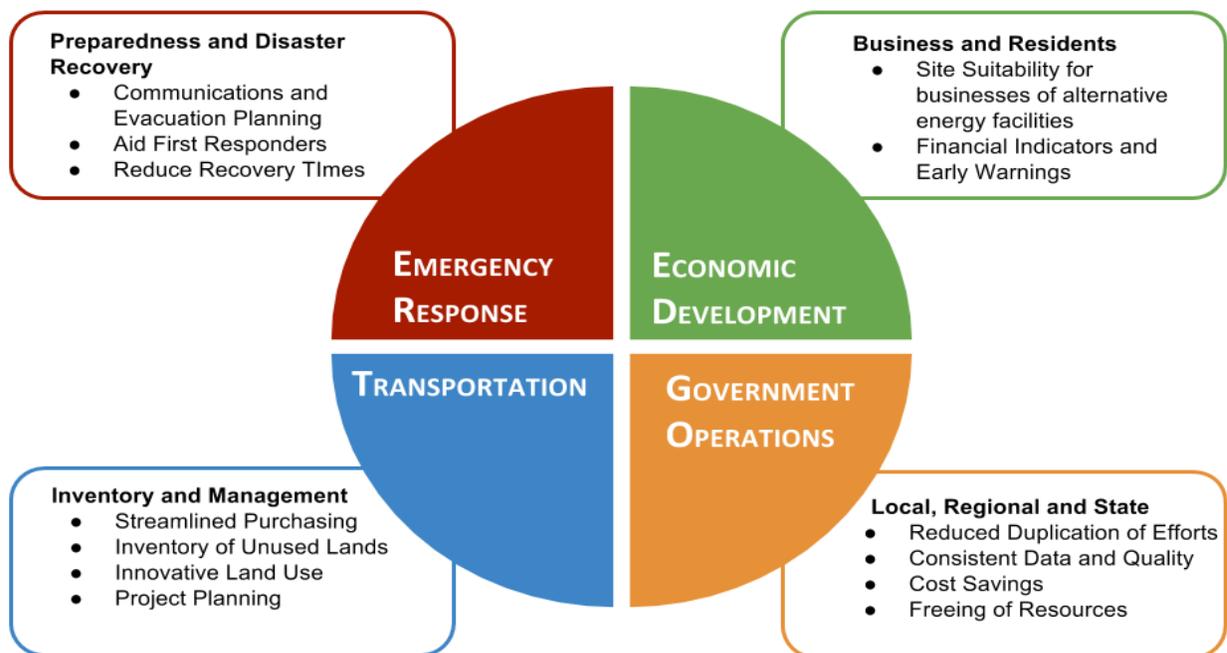


Figure 6-1: Use Cases for Statewide Parcels in Texas

6.1.1. Emergency Management

Emergency management efforts are supported and streamlined through access to comprehensive cadastral and land management data. The following use cases support emergency management efforts by leveraging parcel data to inform:

Situational Awareness: Quickly estimates the number of real properties within a defined area to scope a disaster and response needs to support victims. This can include delineating the area of impact.

Damage Assessment: When estimating the damage to homes and businesses accurately, the link between parcel maps and appraisal data is valuable for determining the dollar impact of damages, which is an important consideration for disaster declarations by the governor or the president.

Site Selection: It is important to be able to identify places for carrying out response operations such as incident command/field offices, debris pile placement, critical supplies and equipment storage,

helicopter landing zones, and parking for emergency workers. Locating these areas on private property can result in legitimate claims by private landowners for payment from responsible parties especially when government-owned alternative land is nearby.

Grant Applications: Parcel data can be an important ingredient on maps used to support the application process for grant funding assistance. For example, showing the location of a property relative to damaged areas can result in more assistance money coming to the state for mitigating damages (e.g., post-hurricane Ike assistance).

Prior to and following a disaster event such as a hurricane or wildfire, a centralized parcel database could support the following activities:

- Evacuation planning
- Damage assessment
- Communications and information gathering
- Stormwater management
- Emergency response
- Environmental health and safety

The coastal flooding from Hurricane Ike in 2008 and the widespread damage incurred during the Bastrop Wildfires of 2011 highlighted the need for on-demand access to accurate parcel data.

The inability to access locally stored data immediately following a disaster is a roadblock to recovery.

6.1.2. Economic Development

The National Land Parcel Study, published in 2007, describes the notion that:

Access to online government content presents a more transparent form of government and thus supports a competitive advantage that one local government may have over the next. The potential for people in very different places to access, view, and manipulate the data using the same interface has real promise in terms of driving new markets, encouraging employment mobility, and influencing the way we think about the information elements of accountable government.²⁹

“Organized and accessible land records will play an important role in what is becoming known as the global knowledge economy. The emergence of this knowledge economy has created a very competitive local government environment and is changing the way governments attract and retain businesses in their community. No longer can governments rely on “bricks-and-mortar” type incentives, but they must find creative ways to market and promote their community. To this end, an organized land parcel data system allows government to assess and communicate the impact of changes in a more effective manner.”

-David Cowen, et al., National Land Parcel Data: A Vision for the Future. (Washington, D.C: National Academies Press, 2007.)

²⁹ David Cowen, et al., National Land Parcel Data: A Vision for the Future. (Washington, D.C: National Academies Press, 2007.)

Access to statewide parcel data creates a **competitive economic advantage for the state** to attract new business through:

- Real estate and development
- Accurate site assessment
- Efficient property information searches
- Streamlined permitting

Regionally, **parcel data supports local governments and communities** through more efficient:

- Taxation
- Research and information
- Property valuation and real estate markets

6.1.3. Transportation

Parcel data plays a large role in the identification and management of lands owned by the state, both in the Right of Way (ROW) and other transportation facilities that might not be in the ROW. Accurate ownership information assists the state in identifying surplus lands to either be used for new projects or sold for an economic benefit to the state.

In addition, parcel data informs planning projects through site assessment analysis by identifying land use characteristics and desirable parcels for transportation projects. Accurate ownership information provides a mechanism for streamlining communication and purchasing to support those efforts.

The transport of people and goods across the state of Texas is dependent upon a vast transportation network of highways, roads, and railroads. Parcel data is a key part of the transportation equation as it supports:

- Management of state lands and the Rights of Way (ROW)
- Roadway data maintenance and asset management
- Planning and site assessment
- Permitting and environmental quality
- Land purchasing
- Identification of excess ROW
- Communications and information gathering
- Innovative use of state lands

Five out of the 11 fastest growing cities in the U.S. are in Texas. This creates a transportation and congestion problem that requires the inventory and purchase of tracts of lands to expand existing highway capacities or to build new roadways to **support the growing population of the state** (e.g., the I-35 Corridor between San Antonio and Dallas currently has over 150 construction projects in various stages of planning, purchasing, and construction).

6.1.4. Government Operations

State agencies in Texas are currently collecting parcel data in a variety of different ways resulting in numerous, non-standardized sources for parcel data. This results in considerable time spent researching, requesting data from appraisal districts or data aggregators, and processing data to fit their needs.

Parcel data supports government business functions for all levels of government from local tax offices to the federal government. The benefits of centralized access to parcel data and attributes by government agencies are realized by the citizens they support through:

- Improved public services
- Fair and equitable taxation
- School district funding
- Delineation of tax districts
- Reduced government spending on purchasing, collecting, and aggregating data
- Operational savings through reduced field visits

State and regional government collection and aggregation of parcel data from local tax offices create duplication of efforts across the state, inefficiencies within offices, and results in a greater demand on the local offices to respond to and fulfill data requests. A centralized parcel database would increase efficiency for all levels of government in Texas, effectively creating **cost savings through the freeing of resources for other business needs.**

6.1.4.1. County Appraisal Districts

Access to parcel data information along jurisdictional boundaries would increase available valuation information to local tax offices and reduce duplicative efforts between districts that share a boundary, have overlapping parcel properties or school districts, or are responding to information requests from citizens who own property in multiple counties. Additionally, identification of disputed boundaries and local agreements between the appraisal districts on their jurisdictions would reduce the incidence of double taxations for properties across the state.

The appraisal districts would realize cost savings through reduced time and effort spent fulfilling data requests for state agencies, other tax districts, and citizens.

Appraisal districts that rely on income received through record requests from private companies could still realize income as the frequency of updates to the statewide dataset would be less than the interval at which many vendors seek to obtain updated data.

6.1.4.2. Special Purpose Districts

Hundreds of special purpose districts exist in the state of Texas. These districts are taxing units such as community colleges, hospitals, or utility districts where taxes and fees are legally collected. There is currently no statewide geographic boundary in existence for these districts. Local and state governments could realize additional value from a statewide parcel dataset in terms of defining these boundaries down to the property level.

6.1.4.3. Regional and Municipal Government

Parcel data is the elemental building block showing property ownership and in turn supports almost all local departments: schools, conservation and recreation, health, planning and zoning, public works, police, fire, clerk's offices, building and inspections and tax assessors, etc.

Parcel data connects citizens to government through information and services by spatially intersecting parcels and thus ownership, with other key data layers. Parcel data effectively provides a means for planners and policy makers to visualize the impacts or benefits of their public policies with regards to the citizen and land.

Digital parcel data is used by government and contractors to create a wide variety of geographic baes layers for analysis.

- Open space
- Land ownership
- Land use
- Zoning
- Historic districts
- Valuation
- Student distribution
- Addresses
- Voting districts
- Permit activity

State and regional government collection and aggregation of parcel data from local tax offices create duplication of efforts across the state, inefficiencies within offices, and results in a greater demand on the local offices to respond to and fulfill data requests. A centralized parcel database would increase efficiency for all levels of government in Texas, effectively creating **cost savings through the freeing of resources for other business needs.**

6.1.5. Value to Business and Residents

The value of parcel data extends well beyond government offices. It serves as a resource for the private sector, environmental groups, and the real estate market by providing insight into:

- Site selection for new businesses
- Environmental impact mitigation for development and construction
- Resources for consulting firms, foresters, surveyors, real estate agents, and engineers
 - Reducing costs
 - Increasing productivity
 - Enabling standardized tools
- Comparisons of for-sale properties

6.2. Return on Investment (ROI)

There are many potential use cases that would provide ROI for statewide digital parcels, as the previous section indicates. While it was beyond the scope of this study to enumerate the costs and benefits related to each use case, the basic approach that could be taken as part of a pilot program is described in this section. Generally, quantifying the costs is easier than the benefits because they tend to be more tangible and a function of labor and technology costs. Benefits, however, include both tangible and intangible gains, and tend to be more subjective, reflecting the bias of the institution conducting the analysis. Nonetheless, once the investment is made in a statewide digital parcel dataset, it will continue to accrue benefits, both intended and unintended. To offset the possibility of an optimistic bias, it is strongly recommended that a very conservative approach be taken to estimating benefits.

In theory, more than one person or agency can benefit from a given supply of parcels simultaneously, unless there is something excluding them from doing so. A person using parcel data for an emergency management application, for example, doesn't diminish its value to someone who wants to use it for economic development, etc. Once the initial investment is made, the marginal cost of supplying each new user is essentially zero, especially with modern Internet-based distribution. In fact, it would be economically inefficient to exclude additional users. Allowing broad use by many users is rational utility maximization, which increases ROI and the positive net benefits. In socioeconomic terms, this can also be viewed as a Pareto-improvement, where there are gains and no losses.

In Texas, a substantial investment has been made in parcel data at the local level. In 2015, appraisal districts that reported their budget to the Office of the Comptroller spent \$3.2 million across the state

on GIS technology, services, and web applications. There is a perception of positive net benefits of digital parcel data at the local level, otherwise, the counties would not be using it. However, the counties are primarily focused within their own jurisdictional boundaries, and not necessarily on statewide objectives. If the state was to leverage the existing investment made by the counties, it would be less costly than starting from scratch, and that would be a benefit to the state. If the state can provide support and streamlined access to parcel data to support the appraisal districts need for access to tax and property information that cross districts or fall along jurisdictional boundaries that would be a benefit to the counties. This thinking could become the basis for a practical win-win approach, so that everyone gains something positive.

6.2.1. An Approach to ROI for Statewide Parcels

The methodology described in this section has been applied successfully in other states. Basically, out of all the potential value-generating use cases, a subset with statewide applicability is selected to quantify. This is a conservative approach, and can be done in conjunction with a pilot study. A fair assumption can be made that, if all potential use cases were enumerated, the accruing benefits would be notably larger than for just a subset.

Here are the basic steps, in brief:

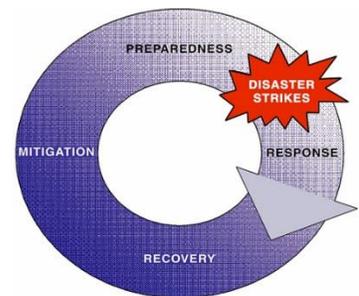
- Select a subset of use cases that are relevant across the state for in-depth study and characterization (e.g., emergency management, economic development, transportation, and government operations)
- Identify specific stakeholders for the selected use cases and gather input on the value of digital parcels from the specific informants for each use case.
- Calculate benefits for each use case using Cost-Benefit Analysis (CBA) methodology, including discounting and opportunity cost, and scale-up using a model for statewide implementation.
- Combine the calculated benefits and statewide digital parcel costs into the ROI calculation.

6.2.2. Likely Benefits from Using Statewide Parcels

The earlier examples of value-generating uses for statewide digital parcel data are further examined here, in the context of how to quantify benefits. A potential breakdown for future quantification as part of a pilot is provided below, grouped under major subject areas:

6.2.2.1. Emergency Management

- Damage assessment (e.g., communication and outreach to property owners, information gathering, and loss estimation)
- Emergency response (e.g., evacuation planning, access to property, and staging areas for heavy equipment)
- Public health and safety (e.g., hazardous spill notification)



Source: National Academies Press
(<https://www.nap.edu/read/11793/chapter/5#48>)

6.2.2.2. Economic Development

- Reduced time hunting for property information for site selection
- Streamlined permitting
- Improved ability to compete with neighboring states for new business
- Innovative uses of state land
- Support for tourism and recreation economy
- Taxation considerations, including incentivizing new business
- Accurate and complete alternatives for site selection, and planning and development



Source: www.zillow.com.

6.2.2.3. Transportation

- Communication and information gathering
- Planning and site assessment
- Data maintenance and asset management
- Utility relocation and construction
- Encroachment detection and enforcement of rights
- Environmental health and safety
- Support for the permitting process
- Owner identification for land acquisition projects
- Transparency of projects to the public
- Marketing of surplus land (sales and leasing)



State Owned ROW Parcels
Source: Applied Geographics, Inc, 2017.

6.2.2.4. Government Operations

- Enforcement of rights and collection of fees
- Response to inquiries and complaints; dispute resolution
- Operational savings for code enforcement through reduced field visits
- Improved service to citizens
- Improved regional services to counties
- Reduced time/effort in collecting and aggregating data at regional level
- Property valuation and identification of “comparable” properties



Source: www.victoriaadvocate.com.

There are many ways to use, view, and analyze parcel data. Figure 6-2 shows ownership, valuation, and land attributes for a parcel of land in Galveston, Texas, displayed through a web viewing application. The parcel data has been overlaid with census and flood data, two common layers of analysis when considering economic and environmental conditions at the local and state levels. Parcel viewers such as the one shown can be powerful tools for local governments for decision making, planning, and analysis of policies or services to the citizens of their communities.

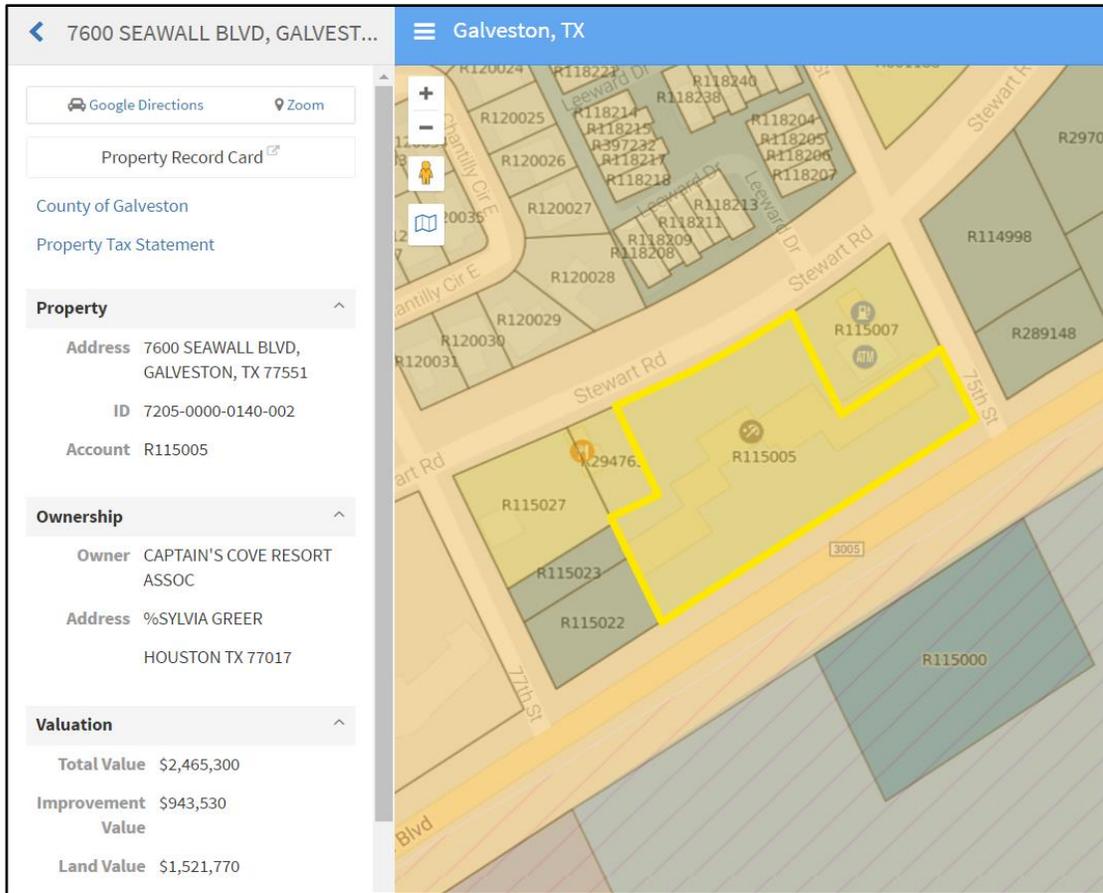


Figure 6-2: Property Attributes by Parcel in Galveston, TX. Source: Applied Geographics, Inc., MapGeo Parcel Viewer

7. Commercial Parcel Vendors

Numerous public-private partnerships exist across the state between county appraisal offices and commercial parcel data vendors. The commercial sector provides a valuable resource to appraisal districts that are lacking in-house technologies to support a parcel database, or for districts that are comfortable using third-party resources to fulfill their assessment responsibilities. While this does increase the number of counties using digital parcel data, licensing restrictions also inhibit many counties from freely distributing or sharing their parcel data.

The county appraisal district survey revealed that 62 appraisal districts use a commercial GIS vendor for assembling their parcel data. These public-private relationships should be respected and understood as a part of the existing data lifecycle. Vendors could realize additional benefits through increased county need for parcel data maintenance services and web viewing applications, which in turn supports economic development.

Beyond parcel data maintenance services, companies such as Digital Map Products Inc. (DMP), and CoreLogic create, collect, and purchase parcel data statewide. DMP holds inventory polygons for 201 Texas counties and CoreLogic also has large holdings of parcel data in Texas (see Table 7-1) served through their ParcelPoint product. The data covers 246 of the 254 counties in Texas and carries attributes for the following:

- Actual parcel boundaries
- Parcel centroid defined by actual latitude/longitude coordinates
- APN or tax ID number
- Property address or SITUS
- Ownership information³⁰

Table 7-1: Identified Parcel Data Vendors in Texas

• BIS Consultants	• Pictometry
• 1519 GIS	• True Automation
• Eagle Appraisal	• Tyler Technologies
• Pritchard & Abbot	• Sidwell Company
• Harris Govern	• ESRI
• United GeoTechnologies	

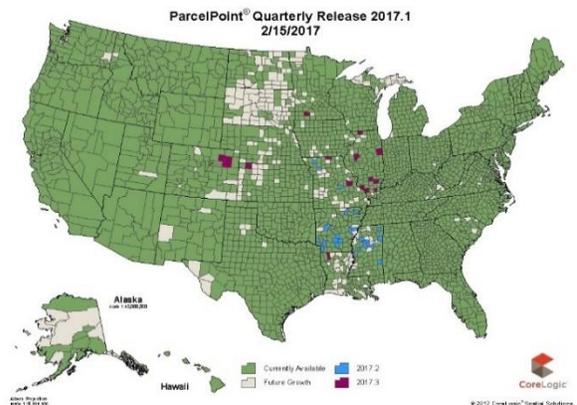
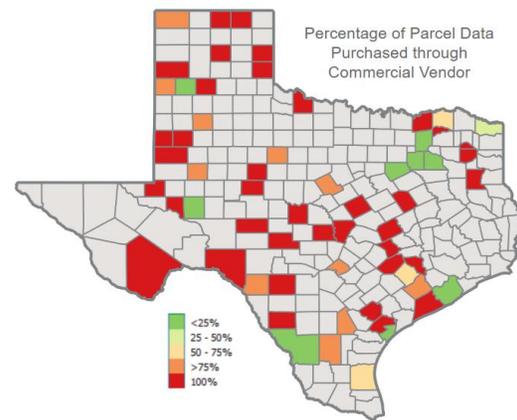


Figure 7-1: ParcelPoint National Parcel Data Coverage

³⁰ CoreLogic. "ParcelPoint." 2017.
<http://www.corelogic.com/products/parcelpoint.aspx>

8. Recommendations for Texas

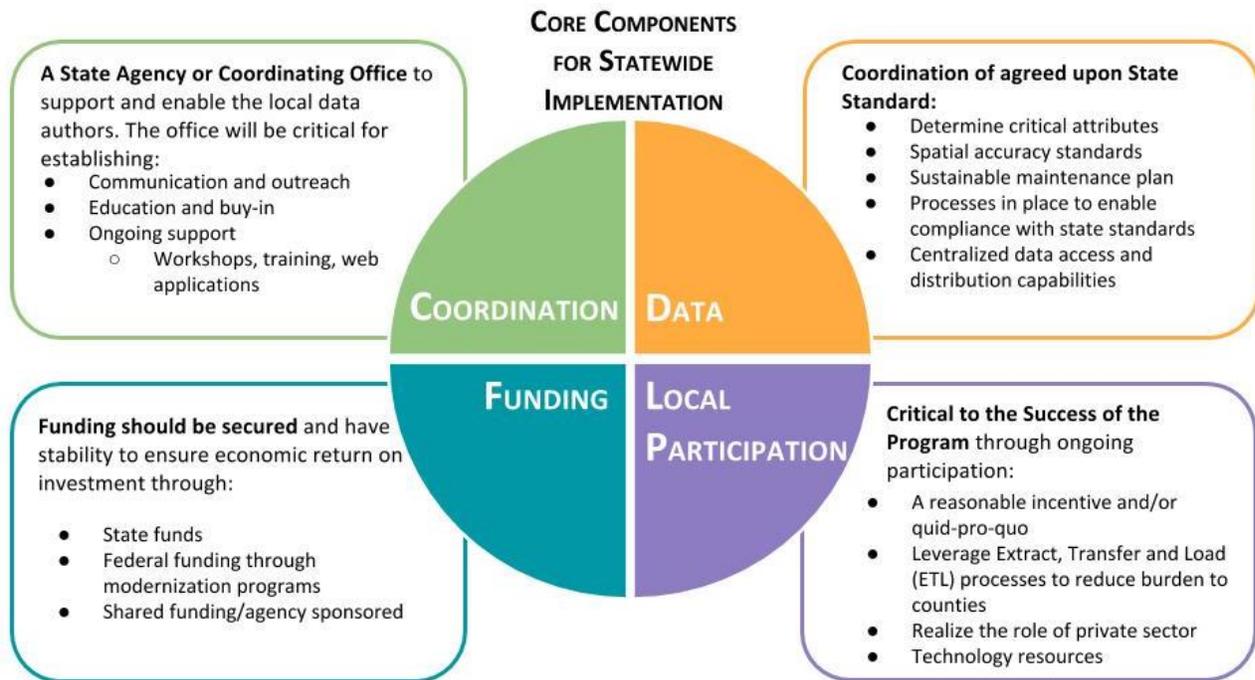


Figure 8-1: Key Components of Successful Statewide Parcel Data Programs

8.1. Achieving the Vision for Statewide Parcels in Texas Requires:

- A Texas Parcels **Pilot Program** to better understand data integration and maintenance issues for adjacent counties, and the costs and benefits
- **Additional outreach** to county appraisal districts in the form of **face-to-face workshops and webinars** on the potential win-win from a statewide property parcel dataset
- Seek **Legislative designation of a lead agency** or partnership (e.g., Office of the Comptroller/TNRIS)
- A reasonable **incentive and/or quid pro quo** for local participation in a statewide program; specifically, providing state-funded Google Imagery access to county appraisal districts in return for parcel data
- **Comparison of government-sourced parcels to commercially-sourced parcels** in terms of cost and use constraints
- Appropriate **data sharing agreements/memoranda of understanding**
- Data and database **standards and guidelines**
- State **government sponsored efforts to collect, aggregate, and harmonize county data** into a standard, statewide data set
- **Centralized data access and distribution capabilities**
- **Consider the current legislative session initiatives** and frame some scenarios for policy guidance
- **Allow flexibility for issues to align with the legislative environment** and present items that could be converted into statute
- Leverage the **local and state needs for defined taxing jurisdictions and special purpose districts** across the state
- State initiatives should **benefit to local and private sector stakeholders**

8.2. Approach to Estimating Cost

A key element to an estimation of program and implementation cost for Texas is the recommended pilot program. A pilot program will assist the state to quantify the cost of implementation, including technology purchases, staffing resources, and other budgetary considerations that can be scaled-up to a statewide level based on what is learned from the pilot.

8.3. Next Steps

Comprise a prioritized subset of the recommendations, listed in Section 8.1 above.

- A Texas Parcels Pilot Program to better understand data integration and maintenance issues for adjacent counties, and the costs and benefits
- Additional outreach to local tax appraisal districts in the form of face-to-face workshops and webinars on the potential win-win from a statewide property parcel dataset
- A reasonable incentive and/or quid pro quo for local participation in a statewide program
- Comparison of government-sourced parcels to commercially-sourced parcels in terms of cost, use constraints, and public-private partnerships

Description of the recommended Parcel Pilot:

- Choose two or more adjacent counties based on the following criteria:
 - Contains an interstate and state highways that traverse the jurisdictions
 - Contains a river or coast
 - Contains a mix of urban and rural land use
 - Includes willing participants
- The Texas coastal counties are the recommended area of interest for the pilot program as they meet the above criteria through the following:
 - Interstate highways and active transportation construction projects including the construction and designation of Interstate Highway 69 along the coast (Figure 8-3).
 - Counties are on or adjacent to counties along the Texas Gulf Coast
 - The coastal counties include the largest metropolitan area in Texas - Houston, as well are rural counties with significantly smaller populations and land use distributions.
 - The coastal counties include willing county participants, as well as counties whose potential participation status is unknown. This sets the stage for workshops and outreach functions that would inform the level of outreach needed at a statewide level.
 - Emergency management stakeholders such as the Texas General Land Office (GLO), the Texas Department of Public Safety (DPS), and the National Office of Atmospheric Administration (NOAA) would benefit from the pilot program through increased access to the parcel data used for analysis and response measures.

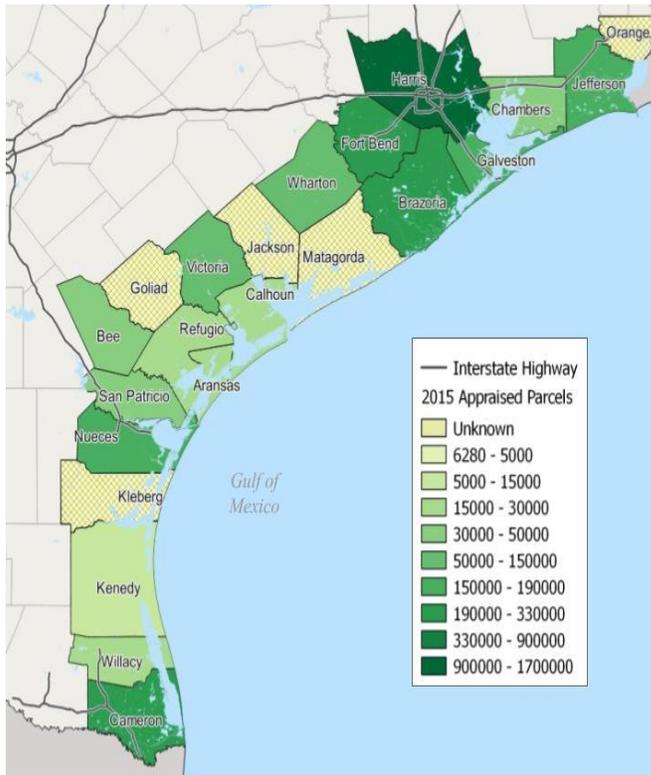


Figure 8-2: Texas Gulf Coast – Potential Pilot County Candidates



Figure 8-3: Proposed IH-69 Corridor
(Source: I-69 Advisory Committee, 2011 Report)

- While documenting the process throughout, achieve the following milestones:
 - Conduct a workshop for participants on the overall purpose
 - Establish data sharing agreements between the participating counties and the state
 - Identify jurisdictional boundary discrepancies and potential local agreements
 - Obtain the available digital property parcel and CAMA data
 - Assess the quality of these data (e.g., parcels and CAMA)
 - Identify standardization and match issues for parcels along the boundaries
 - Identify maintenance issues (e.g., volume of changes, frequency, and cost)
 - Define use cases identified in the study (e.g., emergency management, economic development, transportation, government operations)
 - Determine the state stewardship goal (IAAO), in terms of statewide considerations
 - Create a shareable data set of digital property parcel information and host it on a state server for dissemination as proof of concept

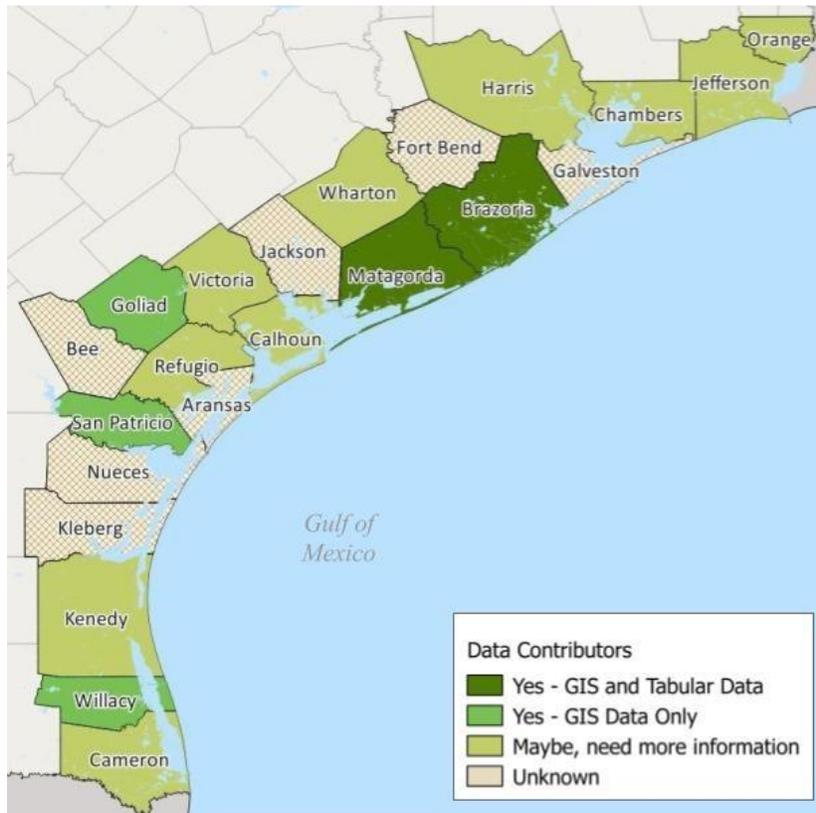


Figure 8-4: Texas Gulf Coast – 2016 Appraisal District Survey Data Contributors

- Perform Return on Investment (ROI) analysis for the pilot area, and develop a model to scale-up to statewide costs and benefits.
 - Select a subset of use cases that are relevant across the state for in-depth study and characterization, e.g., Emergency Management, Economic Development, Transportation, and Government Operations.
 - Identify specific stakeholders for the selected use cases and gather input on the value of digital parcels from the specific informants for each use case.
 - Calculate benefits for each use case using Cost-Benefit Analysis (CBA) methodology, including discounting and opportunity cost, and scale-up using a model for statewide implementation.
 - Combine the calculated benefits and statewide digital parcel costs into the ROI calculation.



9. Appendices

9.1. Steering Committee Members

Name	State Agency	Role
Richard Wade	TWDB/TNRIS	State Geographic Information Officer (state GIO)
Felicia Retiz	TWDB/TNRIS	Deputy GIO
Scot Friedman	Texas General Land Office	GIS Manager
Michael Ouimet	Texas Department of Public Safety	Manager, Critical Information Systems
Dan Erwin	Texas Department of Transportation	Land Surveyor/GIS Specialist
Stephanie Long	Texas Parks and Wildlife	GIS Systems Coordinator
Emily Koller	Texas Historical Commission	Planner
William Kohrenken	Texas Comptroller of Public Accounts	GIS Programmer

9.2. Document Revision History

Version	Delivery Date	Document Name
Version 1	02/17/2017	2016-1115_TexasStatewideParcelData Report – DRAFT v1.docx
Version 2	03/30/2017	2016-1115_TexasStatewideParcelData Report – DRAFT v2.docx
Version 3	04/13/2017	2016-1115_TexasStatewideParcelData Report – DRAFT v3.docx
Version 4	4/19/2017	2016-1115_TexasStatewideParcelData Report – DRAFT v4.docx
Final		2016-1115_TexasStatewideParcelData Report – FINAL.docx

9.3. Glossary of Terms

Term	Definition
AACD	Arkansas Assessment Coordination Department Office of oversight for county assessment created in 1997.
AGIO	Arkansas Geographic Information Office Outreach effort raised awareness of the value and use of GIS data to the agency and local governments.
BMSC	Montana Basemap Service Center
BLM	Bureau of Land Management
Cadastre	A register of property showing the extent, value, and ownership of land for taxation.
COGO	Coalition of Geospatial Organizations
CAMA	Computer-Aided Mass Appraisal
CFPB	Consumer Financial Protection Bureau
CAMP	County Assessor's Mapping Program (AR)
DHS	Department of Homeland Security (U.S.)
DOA	Department of Agriculture (U.S.)
DOI	Department of Interior (U.S.)
DOR	Department of Revenue (NH)
DOT	Department of Treasury (U.S.)
DMP	Digital Map Products A company that has invested resources to create almost complete versions of standardized parcel data and associated real estate attributes.
ETL	Extract, Transform and Load A process commonly use in databases to combine three data processed into a single programming tool to process and format data.
FGDC	Federal Geographic Data Committee
GIS	Geographic Information Systems
GIO	Geospatial Information Officer
HHS	Health and Human Services
HIFLD	Homeland Infrastructure Foundation Level Data
HMDA	Home Mortgage Disclosure Act
HUD	Department of Housing and Urban Development (U.S.)
IAAO	International Association of Assessing Officers
MSAs	Metropolitan Statistical Areas

Term	Definition
MLIA	Montana Land Information Act
MAPP	Montana Automated Parcel Program Built to mathematically combine information from ORION CAMA database and PLSS and automatically derive the parcel boundaries from them.
MSDI	Montana Spatial Data Infrastructure
NGAC	National Geospatial Advisory Committee
NRC	National Research Council
NSDI	National Spatial Data Infrastructure
NSGIC	National States Geographic Information Council Advocates the benefits of geospatial technologies and data that can only be realized through intergovernmental and private sector cooperation, coordination, collaboration and partnerships. (https://www.nsgic.org/about-nsgic)
Parcel	Distinct, continuous portion or tract of land, that is owned or meant to be owned.
ROI	Return on Investment
ROW	Right of Way
SPD	Special Purpose District
SEC	Securities and Exchange
TNRIS	Texas Natural Resources Information Systems A division of the Texas Water Development Board
PLSS	Public Land Survey System Part of the U.S. Bureau of Land Management
VTrans	Vermont Agency of Transportation
VCGI	Vermont Center for Geographic Information
VGIN	Virginia Geographic Network

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