



NSGIC

GEO-ENABLED ELECTIONS

State Representatives Baseline Survey Report

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Project Introduction

History

In the United States, elections are decentralized, meaning no two states administer elections the same way. This variation between how states administer elections is seen both positively and negatively depending on who is reviewing and when the review is happening. Local control is seen as providing the flexibility in the system for experimentation and innovation but also may result in a looser adherence to requirements. The role of the election official, from the early years of this nation, was important. The role has become even more important since the National Voter Registration Act (NVRA) of 1993 and the Help America Vote Act (HAVA) of 2002. Both of these acts required the states to adopt additional responsibilities. Albeit the changes in process and technology, the primary responsibility of the election official is properly storing voter information and ensuring a voter receives the correct ballot.



David McNew / Getty Images

Until most recently, the conventional approach for updating and maintaining voter precinct assignments for elections was through the use of a voter address list lookup table. The Help America Vote Act (HAVA) of 2002 required and provided one-time funding toward a process to create state-level voter databases, including addresses and precinct assignments. The address list approach typically consists of a statewide table with one record for each portion of a

named street name in a community assigned to a specific voting precinct. Address ranges are kept for each record to define a valid range of addresses, and are used to define where precincts begin and end along a single street. The address list tables were difficult to build and maintain, and did not align well with other ongoing data needs of either local or state government. Another significant drawback to the address list approach is that it is not visual, and therefore it is difficult to find errors and omissions.

With HAVA implementation support, states had sufficient funding to create the address tables. Unfortunately, the updating and maintaining of these was not funded. Moving forward, each state had to determine methods and processes for updating and maintaining their election data. Election data is spatial in nature, and there is a distinct and important role for geographic approaches to elections-related location information. In fact, voters receiving the correct ballot depends on this.

Geo-Enabled Elections

In the fall of 2017, the National States Geographic Information Council (NSGIC) launched an effort to identify best practices for the use of GIS in supporting election systems management and citizen engagement. At the onset of this project, GIS technology, in most cases, was relatively new to state elections implementations. This project brings together GIS leaders in state government, local elections officials and state elections offices, national GIS and elections organizations, and federal partners to identify opportunities to integrate GIS into elections systems across the country. The GIS model is expected to significantly enhance accuracy, transparency, and efficiency of representative government.

NSGIC's Geo-Enabled Elections project is underwritten in part through a foundation grant by the Democracy Fund Voice, a nonpartisan organization that advocates for and supports work that strengthens and sustains American democracy. This survey is just one of several project outcomes; others are the election officials survey report, the best practices guidance, and case studies to highlight a few.



WHAT IS GIS?

Geography and geographic information systems (GIS) play a primary role in elections. A geographic information system (GIS) is a digital framework for collecting, managing, visualizing, and analyzing data as a series of digital map layers. While humans are most comfortable using addresses to communicate location, computing worlds prefer geographic coordinates, and a GIS can transcend these competing preferences.

In the context of elections management, a GIS can be called upon to find and store locations of voters, polling places, and the boundaries of precincts, elected districts, and various local government jurisdictions. Additionally, other supporting information such as demographics and aerial photography can be easily integrated to analyze elections, maximize data quality and meet other needs.

Lastly, a GIS can provide 'smart map' capabilities that provide public stakeholders with efficient answers to location-specific questions such as 'who are my elected officials' and 'where are ballot drop-off locations nearest my home (or work),' as it provides not only a visual depiction of our world, but it also provides an environment for storing important, pertinent, and relevant information.

Survey Mission

The Geo-Enabled Elections NSGIC State Representatives Baseline Survey was sent to the NSGIC state representatives in February 2018. The purpose of the survey is to provide the Geo-Enabled Elections project team with a baseline of each state's position in the wide spectrum of geo-enabling their election databases and systems, plans and processes, and roll outs and implementations. This information helped to inform the project and provides critical information in building a best practices guidance.

The Report

The remainder of this document reports on the survey process and results of the NSGIC Geo-Enabled Elections State Representatives Baseline Survey. Presented first are main takeaways from the survey results. Next, for those interested in the survey process, you can learn about the participants responding to the survey, the methodology employed, as well as complications encountered throughout the response period. Next, delve into the details by reading the results for all categories of the survey including addresses, precincts, and other data. Finally, review the "I do not know" section for detailed analysis as to why some respondents chose the "I do not know" response.

Main Takeaways

GENERAL

The Geo-Enabled Elections NSGIC State Representative Baseline Survey engaged NSGIC state representatives in coordination with election entities to obtain requested information about the geo-enabled status of state election systems and data. Participants invested significant time and effort to complete the questionnaire. The survey led to collaboration between participants, greater awareness of GIS election focused topics, and fostered positive attitudes.

ADDRESSES

Promoting best practices for the use of GIS for elections requires a review of the methods by which states validate and verify addresses. Additionally, best practices should be developed to identify common methods for compiling address information, for validating voter-supplied addresses, and for leveraging GIS-based systems to make election geography and related information readily available (e.g. web applications and application programming interfaces (APIs)).

Increasingly, states are using address information from driver's license and state identification card systems to validate voter addresses or to add voters to registration systems. This is especially valuable where enhanced address validation has been implemented in compliance with the requirements of the 2005 RealID Act. Advocating for coordination between state agencies (e.g. state elections department and the department of motor vehicles) and encouraging integration of the voting system and other systems is needed (perhaps with facilitation by the state GIS office and/or state information technology agencies).

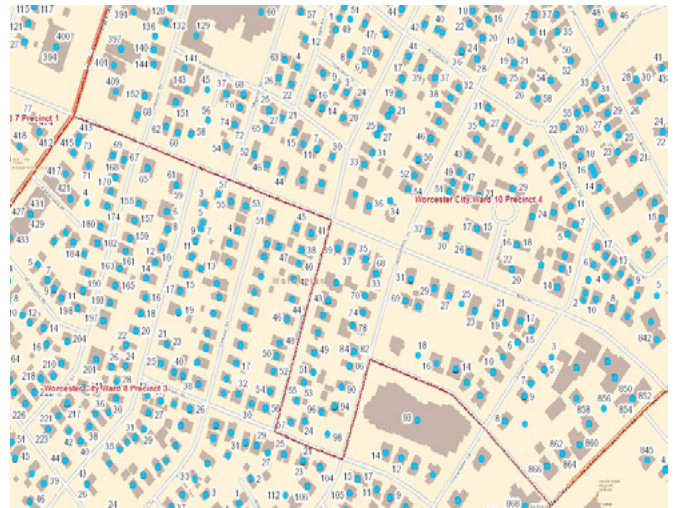
Some states reported using United States Postal Service (USPS) Coding Accuracy Support System (CASS) certification to validate voter addresses. This is potentially problematic because it confirms a mailing address against a database of mail delivery points. CASS certification simply certifies addresses are clean enough for bulk mail delivery discounts. And, a CASS certified address may not be the same as the physical address, as many addresses in the United States do not use city-style addresses to receive mail. This means CASS certification cannot validate the physical addresses that are supplied by many voters, especially those in rural areas, in order to determine precinct and ballot assignment. Similarly, CASS certification itself does not produce geographic coordinates for addresses.

PRECINCTS

Only about half of the states surveyed maintain a statewide GIS layer of voting precincts. As this is a prerequisite for geo-enabled elections, the importance of states developing and maintaining this GIS layer should be emphasized. Likewise, states may benefit from a best practice or voting precinct data governance guidance document.

Related to this, the majority of states have yet to develop a simple content standard that defines the structure into which local voting precincts could be compiled into a seamless statewide map layer. Further investigation could also assess the value of a consistent, national standard and perhaps be informed by or help to inform a parallel, national effort to systematically describe elections. The NIST-EAC Election Modeling Working Group established a geography subgroup to investigate how election officials currently manage spatial data. They identified seven high level processes that most jurisdictions perform, and described current practices. For example, one such process is maintaining precinct boundaries. Voting precinct data should follow the same process as other robust state spatial data infrastructure (SSDI) layers (for example, roads, parcels, and major civic boundaries); these SSDI layers originate from local government and roll up to state government.

State GIS offices, where resourced adequately, are a logical partner for elections offices seeking to set standards for and work with local government on developing and maintaining a GIS layer of voting precincts and its attributes. Additionally, in order to eliminate uncertainty about which precinct contains any given address location, any standard for voting precincts must include a



Map showing precinct and address data

statement of the necessary horizontal accuracy for precinct boundaries. Also needed are procedural standards that describe periodic examination of the spatial relationships between precincts and other local and state boundaries and also residential structures through the use of aerial photography.

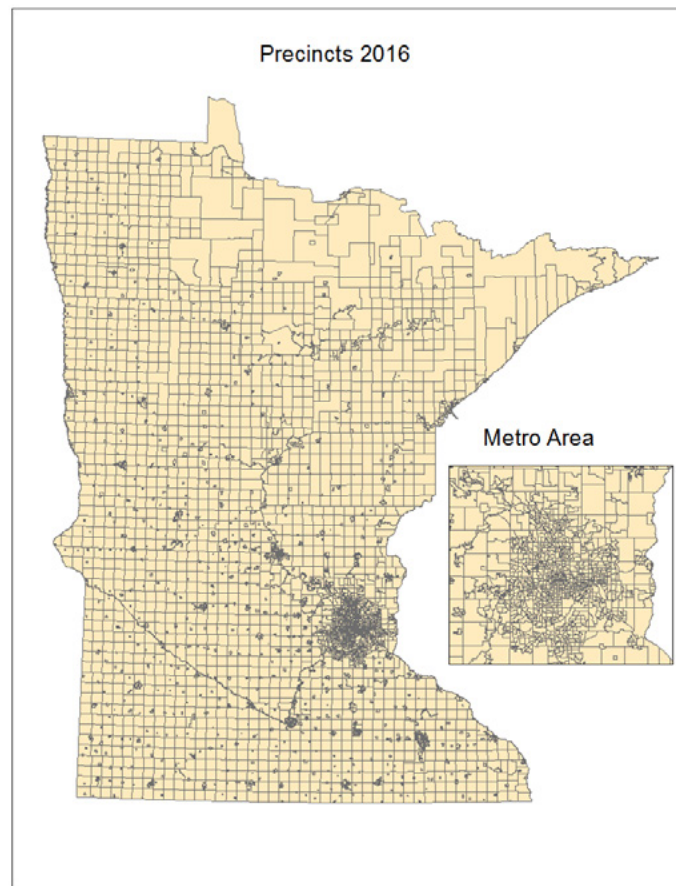
Understanding in detail the obstacles each respondent encountered may be valuable in providing context to the “I do not know” responses. The survey may have introduced unfamiliar, uncertain, or conflicting terminology which ultimately contributed to the “I do not know” response rate. Causes for this type of response should be investigated more thoroughly, and may highlight the need to generate a data dictionary containing common terminology pertaining to precinct data.

OTHER DATA

Details of moving the boundaries of state-level elected office districts was mostly known; three-quarters of state GIS representatives knew this happens during the regular decennial redistricting process or as an ad hoc district update process that would also require state-level action, usually with formal state-level legislative, judicial, or executive branch action.

A majority (three-quarters of states) have contextual data in the form of city and county boundary data that the state manages, updates, and stores. This begs the question, if this can be the norm here can it be the norm for other election data too?

A majority (three-quarters of states) also have boundaries for state elected officials in GIS form and accessible online; however, the entity managing and updating this data in geographic or other form was often unspecified.



2016 Voting district map from Minnesota Legislative Coordinating Commission

The Survey

SURVEY PARTICIPANTS

NSGIC is the national geospatial organization for state geographic information officers (GIOs), GIS coordinators, and senior GIS leaders from state agencies. For more than 25 years, NSGIC has provided a community for geospatial professionals to come together and connect in an effort to collaborate, create, and share ideas to advance geospatial awareness and thinking.

NSGIC members lead the way in creating relevant and pertinent location-based information resources that equip public and private leaders to make informed and timely decisions. NSGIC provides a forum for best practices and sharing of challenges and successes, and opportunities to work together to contribute to and advocate for a robust national spatial data infrastructure.

The majority of states and territories in the United States are represented by NSGIC, with up to 40 states represented at each NSGIC conference, with higher numbers at the annual conference in the fall and lower numbers at the winter midyear meeting. Many NSGIC state representatives are geographic information officers or serve in that role with a different job title (e.g, director of state GIS office) within their state. Other state representatives are GIS coordinators from various state agencies or members of state GIS councils. In April 2018, NSGIC published a briefing paper illustrating the [Value of the GIO](#).

NSGIC state representatives perform an important function as liaisons between NSGIC and the GIS communities within their states. To NSGIC, state representatives communicate the status of and represent the geospatial interests of public and private sectors and academia in their state. To their colleagues in state and local governments, NSGIC state representatives share information procured from NSGIC sources, including that of federal initiatives and advocacy efforts, and state-level GIS activities. State representatives also participate in NSGIC issue-oriented and operational committees and working groups.

State representatives, in consultation with other members from their states, cast votes for official organization business.



NSGIC Geo-Enabled Elections Steering Group

METHODOLOGY

On February 9, 2018, the Geo-Enabled Elections project team distributed the survey to NSGIC state representatives. The 25-question survey was sent as a form (link) and a PDF in an email. The PDF version allowed state representatives to print, share, and keep a copy of their completed survey.

The original deadline for the survey was the start of the NSGIC Midyear Meeting in Salt Lake City, February 27, 2018. The completion of the survey was an investment of time and often required the collaboration of multiple people and offices in state government. For example, in one western state, the NSGIC state representative briefly reviewed the survey and recognizing her knowledge on the subject matter was limited, sent the survey on to the election policy and planning analyst at the secretary of state's office. This type of collaboration on the survey was common.

Multiple conversations with NSGIC state representatives completing the survey led the Geo-Enabled Elections project team to determine the deadline was much too soon. The amount of collaboration, networking, conversations, and communication by NSGIC state representatives with their election colleagues was great and intense. The survey completion deadline was extended to the end of April 2018.

The majority of survey responses were received prior to the NSGIC Midyear Meeting. It was necessary, during the two-and-a-half months the survey was open for responses, for the project team to contact NSGIC state representatives who had not completed the survey to encourage them to do so.

In mid-March, the team sent a survey completion reminder to those representatives who had not filled out the survey. This resulted in an additional handful of responses to the survey. Not satisfied with this response, the project manager began a phone campaign to encourage the remaining NSGIC state representatives to complete the survey. The phone campaign resulted in 10 additional responses. The project team was satisfied with the seventy-five percent completion rate of the survey.

COMPLICATIONS

Dissemination of the survey was straight forward, and collection of the survey responses was the same. Minor and expected complications did arise, and the project team met them head on with positive messaging and good communication.

Approximately two-thirds of NSGIC state representatives completed the survey, with a satisfactory response rate. A brief list of reasons the response rate is not higher, based on phone calls and email correspondence with NSGIC state representatives, follows.

Anonymity Concerns

Once the survey was disseminated, the project team began receiving questions concerning the level of detail that would be shared both within NSGIC and outside the organization. Representatives also questioned whether individual states would be highlighted or pointed out, negative or positive, as part of the survey report.

The team addressed concerns by confirming that the final report summarizing and synthesizing the responses from the survey would protect individual state anonymity, and information shared would be presented in summary form as aggregate information.

Uncomfortable with Project Goal

As the Geo-Enabled Elections project team analyzed the survey response rate, it explored the potential for misunderstanding or fundamental disbelief in the project's goal of geo-enabling elections and creating far better transparency in elections. While this was not communicated specifically, it was identified by the project team as a potential underlying feeling or belief within the survey participants and those assisting the completion of the survey.

Lack of Capacity, Motivation, and Resources

Completing the survey required an investment in time and energy. Often, it was difficult to identify and establish communication with the correct contact to obtain the needed information, and the information and data was hard to find and obtain.

One state representative shared that initial reactions from election employees to assist in the completion of the survey was positive. When this same state representative had repeated issues contacting the same election employee, it became unclear if the survey would be completed. After weeks without communication, the election employee contacted the state representative to share that his or her management made the decision not to participate. The reason for this result is not confirmed, but it is possible that it involved a lack of resources and capacity needed to complete the survey.

Challenging Political and Electoral Climate

Completing the survey required the collaboration of multiple people and offices in state government. This proved particularly challenging for some states experiencing tense political and electoral pressures within their state legislatures and state governments.

Several state representatives shared that they could not complete the survey as they did not have an electoral employee they felt comfortable contacting to collaborate with and complete the survey. This situation was not common.

Results

The data collected by this survey provides NSGIC with a baseline of where states are in the spectrum of geo-enabling their election processes and databases. The survey questions were divided into three categories: addresses, election precincts, and other data. The survey results, summarized below, are divided into these same categories.

ADDRESSES

When citizens register to vote, they must provide their physical address. A voter's address determines his or her voting precinct, where his or her votes will be tallied, and the candidates or questions on the voter's ballot. This information is often called the ballot style.

The NSGIC survey results show 17 of 31 respondents confirm voter registration addresses against a database of known addresses such as a driver's license or state ID database, a statewide point address data set, a master address database used for 911 call routing, or a commercially available address database. Four respondents confirm voting addresses by mailing a postcard to the address (see discussion below of CASS certification).

Thirteen respondents verify addresses but not their exact spatial location against the United States Postal Service Coding Accuracy Support System (CASS), against a statewide road network with address ranges on street blocks, or against a statewide street or address range list within an elections system.

CASS certifies the address for mail delivery based on the address, zip code, and postal community. There are three reasons why CASS certification may be problematic for validating voter address. First, without the zip code, CASS

certification cannot distinguish between duplicate addresses in the same political jurisdiction where the postal community is a sub-area within the political jurisdiction.

Second, CASS certification can be problematic when there are overlaps within the street and address range information used in CASS. For example, CASS may show 1 – 5 Main Street as being valid for Postal Community "A", zip code 12345, and also show 1 – 99 Main Street as being valid for Postal Community "B", zip code 67890. So CASS will certify addresses, 1, 3, & 5 Main Street in two ways but not necessarily in the same political jurisdiction.

Finally, CASS certification can be problematic when carrier routes split a street, with one route being the odd addresses and the other being the even addresses on the other side of the street. So in cases where there is a municipal boundary down the middle of the street or along the edge of the right-of-way, CASS certification could be misleading.

Confirming an address against a street network with address ranges on street blocks confirms that the address could exist, but does not guarantee that it does exist. In other words, just because 33 Main Street is within the range (say 1 - 87) for known addresses on a block of Main

Street, it does not guarantee that number 33 actually exists. While confirming that an address exists will usually suffice for correctly assigning it to a precinct, for complete certainty on that assignment, an addresses' exact location is important; it is that geographic location that determines the voting jurisdiction.

In reviewing questions one and three, approximately half of the states responded that they validate against the driver's license/state identification card database. In a later question, fifty-seven percent of respondents indicated that they have a shared geocoding service or API. This suggests a need for further exploration of the prospect for tighter integration between driver license and state identification card databases and a master address database accessible via an API.

Approximately one third of the survey respondents said that their state's election database allows for storing a standardized address in addition to the voter's address of record. As the existing database structure may not allow for storing a second address, an alternative to consider would be storing the unique identifier of the standardized address. So, for example, if that standardized address was from a master address database (MAD), then storing the unique ID from the MAD in the elections database would easily facilitate linking a voter address to its standardized form.

PRECINCTS

An essential element in geo-enabled elections is statewide voting precinct information in a GIS data format. Just over half of the survey respondents indicated they maintain statewide mapping of precincts. It would be useful to determine if this correlates with the percentage of states that have developed the statewide layers needed for the state spatial data infrastructure.

A striking and encouraging response from the survey was that of the respondents who do maintain statewide mapping of voting precincts, forty percent also maintain a GIS layer of sub-precincts. However, the majority of states either do not or did not know if they have a content standard for attributes of statewide voting precincts.

The survey asked if states specify in state statute a process for updating voting precincts; seventy-seven percent replied in the affirmative. Having standard attributes for voting precincts would, in turn, make a spatial query web service or API more useful. Forty percent of survey respondents report such a service or API is currently available. Exposing election jurisdictions via a web mapping service based on an address sent to the web mapping service is an area that warrants further exploration.

The survey asked if there is a minimum and maximum size (# of voters or # of people) for a precinct. The answers were varied with a large number of "I do not know" responses. Additionally, more than sixty percent of respondents reported no formal constraints on the geographic size of a precinct.

The survey also inquired about how precinct boundaries are quality checked against elected official districts. Survey responses were diverse and inconclusive.

OTHER DATA

Other statewide GIS data layers -- especially city, county, school, and special district boundaries -- are essential for statewide mapping of precinct boundaries. A substantial majority, eighty-two percent of survey respondents, confirmed their states keep up-to-date GIS layers of city and county boundaries, essential for computer-based mapping of precincts. Besides its value to the SSDI, keeping this data set current is important for geo-enabled elections. However, the project survey also shows that the existing horizontal accuracy of city and county boundary mapping varies considerably. Survey results further show that the update frequency for statewide mapping of city and county boundaries varies considerably.

A final encouraging finding from the survey is that a substantial majority, seventy-nine percent of respondents, confirm their mapping of state-level district-based elected offices are accessible online in a GIS format.

"I do not know" Answers

The "I do not know" answer option is a general response that indicates the responder's lack of knowledge or inability to obtain adequate information to answer the respective question. This catch-all response option exists throughout the survey in all three categories.

Below is a summary of the "I do not know" responses aggregated based on frequency for each of the three categories: addresses, election precincts, and other data. Any questions with fewer than five responses of "I do not know" are not reported on in this section.

QUESTIONS WITH 10 OR MORE "I DO NOT KNOW" RESPONSES

Addresses

- ▶ Question 2: Does the state elections database allow a standardized or corrected address to be stored in addition to the address of a record that was provided on the voter's registration or other sign up mechanism?
- ▶ Question 6: Please estimate the percentage of counties that have implemented vote centers. Please note, a vote center is defined as a polling place that combines multiple precincts allowing voters to choose at which location to vote.

Election Precincts

- ▶ Question 4: Estimate the percentage of cities who maintain a GIS layer of voting precincts.
- ▶ Question 17: Is the state the designated authority participating in the U.S. Census Bureau Voting District Project?

For these questions, the calculated percentage ranged from nearly one third to approximately fifty percent of respondents had no knowledge or had significant uncertainty. The lack of response to Question 2 (Addresses) is confounding as basic data management practices should be in place to allow address validation. The remaining questions in this grouping may illustrate the lack of readily available information in the public domain and/or communication to state GIS representatives on key election items such as:

- Quantity of counties implementing vote centers
- Entities maintaining key GIS voting precinct layers
- The designated state representative for the U.S. Census Bureau Voting District Project

There may be value in further investigating and identifying obstacles encountered by respondents.

One factor that may have attributed to the “I do not know” response rate is the brief response period of the survey. The “I do not know” answers may be indicative of hard to find answers or the need to poll multiple entities for information. For instance, estimating the percentage of cities in a state that maintain a GIS layer of voting precincts may require polling every county or city, and would require valid contact information for each jurisdiction.

Additionally, the survey did not include a definition section, and it may be possible that the question on “voting centers” and on “Census Bureau Voting District Project” introduced unfamiliar, uncertain, or conflicting terminology which ultimately contributed to the “I do not know” responses. Causes for this type of response should be investigated more thoroughly, and may highlight the need to generate a data dictionary containing common terminology.

QUESTIONS WITH FIVE TO NINE “I DO NOT KNOW” RESPONSES

Addresses

- ▶ Question 3: Does your state use address records from the drivers license/state identification card database to validate or otherwise enhance the voter registration database?
- ▶ Question 4: Some states have integrated the driver license and state identification card application process and/or address change processes for these systems to voter registration. Please check all that apply for those eligible to register to vote.

Election Precincts

- ▶ Question 3: Please estimate the percentage of counties who maintain a GIS layer of voting precincts.
- ▶ Question 5: Does your state have a content standard for the attributes of statewide voting precincts?
- ▶ Question 8: Are there formal constraints on the geographic size of a precinct (a minimum or maximum area)?
- ▶ Question 11: Is the process for updating voting precinct boundaries specified in state statute?

For these questions, the calculated percentage ranged from approximately twenty to thirty percent of respondents with no knowledge or significant uncertainty. The lack of response to Question 3 (Election Precincts) is perplexing as data ownership, stewardship, and data standards are basic governance principles that should be publicly known. For example, eight states did not know if a content standard existed defining statewide voting precinct attributes; however, five of those eight reported statewide mapping of voting precincts. The “I do not know” response suggests that a large portion of states do not build or maintain statewide voting precincts. There may be value in further investigating the responsible state data steward(s), understanding the relevant stakeholders who generate the data, and identifying obstacles encountered by respondents. The lack of detailed information may indicate the need for a voting precinct data governance guidance document.

One factor that may have attributed to the “I do not know” response rate is the brief response period for the survey. The “I do not know” answers may be indicative of hard to find answers or the need to poll multiple entities for information in a short period of time. In fact, the majority of states have several counties which maintain a GIS layer of voting precincts; coordination with these counties is difficult in a truncated time period.

Next Steps

The Geo-Enabled Elections project is a two-year project with the primary focus of creating best practices for geo-enabling elections at the state level with certainty that many of the best practices can be implemented at the county and city level, as well.

Over the summer of 2018, the project team will focus on several activities including:

- ▶ Dissemination and circulation of the NSGIC Geo-Enabled Elections State Representatives Baseline Survey Report
- ▶ Broadening interaction with the elections officials and directors communities, including presentations at the annual conference of the International Association of Government Officials (iGO) and the National Association of State Election Directors (NASED)
- ▶ Bringing US election officials into the project through a brief survey and interview activity
- ▶ Developing a first draft of the Geo-Enabled Elections Best Practices Guidance

For More Information

To learn more about NSGIC and its advocacy and geospatial advancement work, visit the [NSGIC website](#).

To learn more about the Geo-Enabled Elections project, [visit the project summary page](#). This page is updated regularly with new information.

With questions regarding the project, please contact Jamie Chesser, NSGIC geospatial programs manager and Geo-Enabled Elections project manager jamie.chesser@nsgic.org.



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