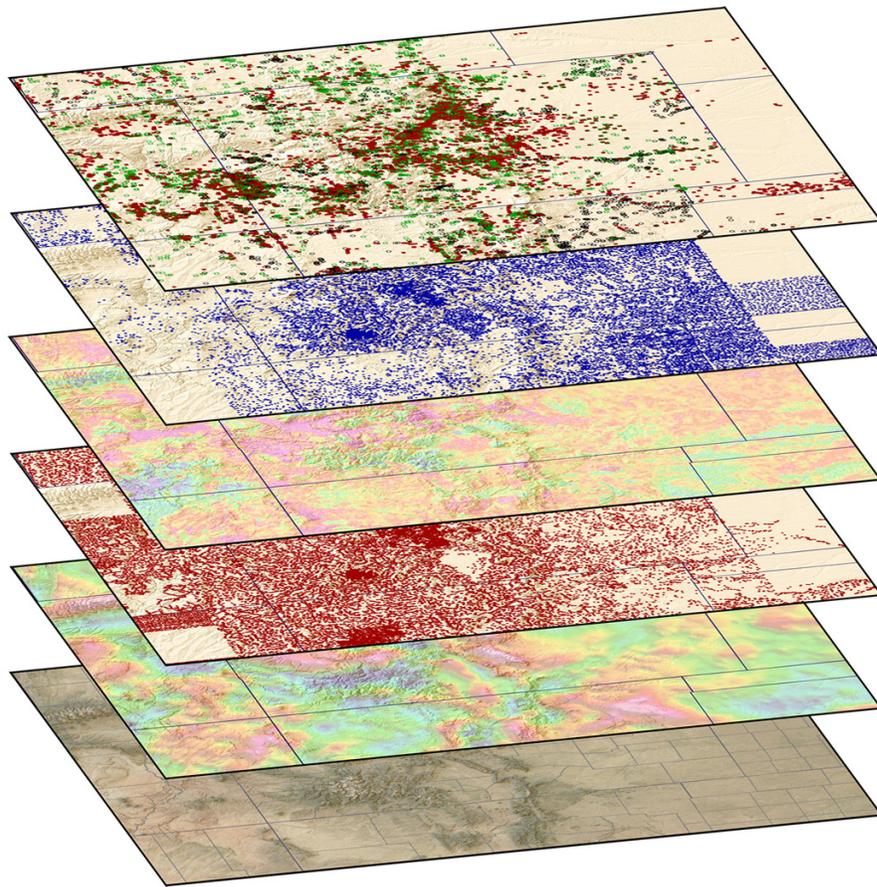


MAPPING A STRATEGY FOR GIS

REPORT #248, OCTOBER 2019



A LITTLE HOOVER COMMISSION REPORT
TO THE GOVERNOR AND LEGISLATURE OF CALIFORNIA

Dedicated to Promoting Economy and Efficiency in California State Government

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The Little Hoover Commission, formally known as the Milton Marks “Little Hoover” Commission on California State Government Organization and Economy, is an independent state oversight agency.

By statute, the Commission is a bipartisan board composed of five public members appointed by the governor, four public members appointed by the Legislature, two senators and two assemblymembers.

In creating the Commission in 1962, the Legislature declared its purpose:

...to secure assistance for the Governor and itself in promoting economy, efficiency and improved services in the transaction of the public business in the various departments, agencies and instrumentalities of the executive branch of the state government, and in making the operation of all state departments, agencies and instrumentalities, and all expenditures of public funds, more directly responsive to the wishes of the people as expressed by their elected representatives...

The Commission fulfills this charge by listening to the public, consulting with the experts and conferring with the wise. In the course of its investigations, the Commission typically empanels advisory committees, conducts public hearings and visits government operations in action.

Its conclusions are submitted to the Governor and the Legislature for their consideration. Recommendations often take the form of legislation, which the Commission supports through the legislative process.

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LETTER FROM THE CHAIR

October 24, 2019

The Honorable Gavin Newsom
Governor of California



The Honorable Toni Atkins
President pro Tempore of the Senate
and members of the Senate

The Honorable Shannon Grove
Senate Minority Leader

The Honorable Anthony Rendon
Speaker of the Assembly
and members of the Assembly

The Honorable Marie Waldron
Assembly Minority Leader

Dear Governor and Members of the Legislature:

The use of geographic information systems, commonly referred to as GIS, poses a tremendous opportunity for California's government to improve its services. Our Commission has studied the state's use of GIS, and is pleased to submit the attached report making recommendations about how to employ this important technology.

GIS connects data about people and programs with location-based information such as street addresses or zip codes, making important connections and patterns that might otherwise be difficult to detect. For example, GIS is used by the Governor's Office of Emergency Services to respond to disasters, by Caltrans to monitor highway improvement projects, and by the Employment Development Department to monitor and address insurance fraud.

The Commission found, however, that the state's use of GIS is inconsistent, and lacks centralization and coordination. To gain full advantage of this important technology, the Commission makes three recommendations that are outlined more fully in the attached report: that the state designate a state Geographic Information Officer to coordinate projects, promulgate standards, and manage shared resources; that the state create a GIS Advisory Council of governmental leaders and other stakeholders; and that the state use GIS to evaluate regional disparities in funding and the delivery of services.

With these changes, we believe that California – home to so many of our era's extraordinary technological advances – would better position itself to employ GIS as a benefit to our citizens and taxpayers for years to come. The Commission respectfully submits these findings and of course would be happy to help you address this issue.

Sincerely,

A handwritten signature in black ink, appearing to be 'PN' with a stylized flourish.

Pedro Nava
Chair, Little Hoover Commission



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MAPPING A STRATEGY FOR GIS

Government collects and uses an abundance of information about people, places, activities, and events to provide services to Californians. Often, this information includes common geospatial or location-based data, such as street addresses, parcel numbers, the location of roads and highways, ZIP codes, city limits or boundaries of a county or special district. When combined in geographic information systems (GIS), information can be viewed and analyzed in ways that reveal relationships, patterns and trends that might not otherwise be apparent.¹

Most of California’s executive branch agencies collect and use geospatial information to carry out their mission.²

Examples abound:

The Governor’s Office of Emergency Services uses GIS to help aid workers respond to disasters and to deploy assistance to affected communities.³

The Department of Forestry and Fire Protection monitors the condition of California’s forests, measures the impact of each fire season, and identifies communities at risk from wildfire.⁴

Caltrans uses GIS to plan and monitor state highway improvement projects, track the location of the state’s aviation facilities, and produce authoritative road maps that help provide real-time transportation information to the public.⁵

The Employment Development Department uses GIS technology to display California’s labor force and rates of unemployment, and recently incorporated GIS into its Unemployment Insurance online system, which helps to monitor and address insurance fraud.⁶

As vitally important as each of these applications is for helping state agencies function efficiently and effectively,

these and other GIS applications often are designed to solve a specific problem for a specific agency.⁷ However, the most complex, and potentially pervasive, problems facing our state require interagency information and cooperation. Addressing these broader problems will require coordinated input from policy and thought leaders across the executive branch, partners in local governments and elsewhere. Because GIS technology is capable of sorting through thousands of data points from many sources, states can use GIS as an important tool to inform policy and regulatory decisions for these complex problems.

BACKGROUND

The Commission launched its inquiry into California’s GIS capabilities indirectly, with the desire to understand more about regional disparities: where and how the state invests its dollars and how those investments impact communities across California. Commissioners envisioned a map to overlay these and other datasets to tell a story about the impact of our investments and where gaps and disparities remain. They learned a GIS platform that integrated data across the executive branch could approach these types of questions. However, this kind of tool is not yet available for California policymakers.

Despite California’s rich data assets and robust technological infrastructure, the Little Hoover Commission learned at its May 2019 meeting that the state lacks a strategy to realize the full potential of GIS through coordination and data sharing. California began more than a decade ago to develop a statewide GIS strategy encompassing requirements for leadership, a framework of data policies and standards, a platform for sharing resources, and a mechanism for partners to collaborate.⁸ While California has made important progress in some of these areas—particularly to make data open and accessible— the state still approaches its

GIS infrastructure in a federated environment, with little centralization or coordination across agencies. More work is needed to obtain comprehensive, authoritative data sets that can serve as a foundation for mapping the entire state. A dedicated GIS leader could help California pull together partners to work collaboratively across silos and develop—and execute—a strategy to leverage California’s geospatial information as a statewide asset.

OTHER STATES DEMONSTRATE STRATEGIES FOR GIS DATA SHARING, COORDINATION

Every state approaches its geospatial infrastructure differently, but findings from a 10-state review conducted last year by the Idaho Geospatial Council offer insights into models for consolidating and streamlining statewide GIS resources:⁹

- Most states employ a dedicated Geospatial Information Officer (GIO) or other generally recognized leader to coordinate with partners inside and outside of state government.
- Support for the GIO most commonly comes from the General Fund, but states also use other state funding or charge state agencies. Researchers noted the states that charge agencies cited certain disadvantages, such as the fact that it can be hard to justify having only some agencies pay for exploring new technologies that could benefit the entire state government.
- Functions of GIOs vary across the states, but include an array of tasks such as improving data discovery; collecting, standardizing and disseminating shared datasets; supporting enterprise GIS services; and promoting GIS use in public policy. Facilitating coordination is the most common role.
- Consolidating infrastructure can create efficiencies. Colorado saved \$450,000 over five years by consolidating infrastructure, licensing, and software. North Carolina paid \$16 million for statewide LiDAR (Light Detection and Ranging)—high quality imagery which includes elevation as well as latitudinal and longitudinal information. Producing similar imagery for each county would have cost an estimated \$100 million.

THE VALUE OF A GIO

The State GIO is a critical position, according to the National States Geographic Information Council, a D.C.-based organization that promotes coordinated, impactful, and cost-efficient application of GIS to best serve the nation. Among other benefits, a strong State GIO can “maximize the value of spatial data through data sharing, leverage accessible public data to expand economic investments and growth, serve as an advocate to local governments and state agencies to integrate geospatial technology into their business practices, act as a portal for professional communications related to geospatial technology, and legally enter into grants, memorandums of understanding, or contracts to save money on geospatial procurement.”

Source: National States Geographic Information Council. April 2018. “Value of a GIO.” <https://nsgic.memberclicks.net/assets/docs/Library/Value%20of%20a%20GIO.pdf>. Accessed July 31, 2019.

- Consolidating and disseminating standardized location data—such as parcels, address points, structures, and county road centerlines—also can create efficiencies. For example, consolidated current address data allowed emergency crews in Oregon to save properties and lives during a major wildfire. Idaho, which does not yet have standardized parcel data, estimated that consolidation could save the state in time and money. Multiple agencies use parcel data and at least one agency paid \$8,000 per year to purchase parcel data from a third-party vendor. State employees in various agencies spend hundreds of hours a year to purchase and standardize parcel data for use.

Oregon and North Carolina present two examples of how other states coordinate the use of GIS:

OREGON

Under the purview of the State Chief Information Officer, Oregon’s Geospatial Enterprise Office acts as the state’s point of contact for geographic information and GIS. That office provides leadership to promote use of the

technology across state government, develops and maintains a digital library housing hundreds of spatial datasets, shares information about GIS initiatives, coordinates GIS activities for state agencies and manages the state's enterprise license for GIS software.¹⁰ The Legislature recently mandated geospatial data sharing among public bodies and established the Oregon Geographic Information Council, with representation from state, local, and federal government agencies as well as tribes. The council provides statewide guidance for sharing, coordinating and managing geospatial data.¹¹ (See box for additional information on Oregon's GIO and its benefits for the state.)

NORTH CAROLINA

The North Carolina Center for Geographic Information and Analysis provides GIS systems and coordination services for the entire state, as well as local governments. Additionally, it staffs the North Carolina Geographic Information Coordinating Council, which creates GIS-related policy, advises the governor and

legislature on strategic direction, facilitates cooperation among government agencies and the private sector and resolves GIS technical issues.¹² An ongoing project the council implements is NC OneMap, the web-based portal through which GIS data is available to all levels of governments and the public. Development of the project helped shape the state's vision for standards and practices around GIS data.¹³

A CASE STUDY: THE GIO AS A TAXPAYER INVESTMENT

Oregon's Geospatial Information Officer leads an office of four staff members with a budget of approximately \$1 million a year, but the benefits to the state represent a significant return on investment.

Principally, the GIO contributes leadership and coordination to the GIS efforts of various state agencies as well as external partners, such as local government agencies and private organizations. This is done in close working relationship with ESRI, a California-based company that is a leader in the GIS field. The Oregon Geospatial Enterprise Office pays ESRI approximately \$1.1 million per year for a shared license that covers all state agencies use of the company's software and includes access to its web-based GIS tool. As a result, state agencies' share of the web-based GIS tools alone amounts to about \$70 per license, which the state estimates is less than 15 percent of the cost if agencies made individual arrangements for GIS use.

The GIO's work in coordinating use of the software carries more specific programmatic benefits as well. For example, the Geospatial Enterprise Office built a common operating picture for first responders to use when responding to emergencies or disasters. The tool allows first responders from different state and local agencies to see the same information, such as the location of an emergency, the boundaries of wildfires, or the extent of weather events. Because all responders use the same tool, they are better able to plan and coordinate, creating, for example, common evacuation routes that can save lives. This multi-agency coordination would have been far more difficult without the leadership of the GIO.

This sort of coordination does not require a major new bureaucracy. Oregon's GIO leads a staff of four people, including him, and the office budget (excluding the payments to ESRI) is approximately \$1.2 million per year. That budget even includes seed money for data development, purchasing or building foundation data sets that all state agencies and other partners can utilize. Even accounting for the vast difference in population between the two states, the likely size of a dedicated GIO office in California would not represent a major budgetary or personnel initiative.

CALIFORNIA'S FEDERATED APPROACH TO GIS MISSES OPPORTUNITIES TO SHARE DATA, LEVERAGE RESOURCES

Without the coordination and leadership of a visible, empowered State GIO to implement a statewide strategy, many of the problems identified more than a decade ago persist. California's departments and agencies largely have continued to pursue GIS projects independently, exacerbating disparities in leadership and capabilities across the state. No coordinated strategy currently exists to help define what types of data should be shared and how, limit duplication of effort, or ensure compatibility among geospatial data stewards and users.

LEADERSHIP

In 2009, shortly after California's newly appointed State Chief Information Officer issued a strategy to enhance the use of GIS, California appointed its first State Geographic Information Officer and created a GIS program within the agency-level Office of the Chief Information Officer. An earlier report from the Chief Information Officer envisioned the role of State GIO as providing leadership to ensure the state receives the benefits associated with geospatial data: "increased data access and sharing, reduced duplication and costs, development of GIS standards, GIS center of expertise, public outreach, and increased collaboration."¹⁴ The role of the State GIO was not defined in statute. Instead, California statutes codify implementing geographic information systems among the duties of the State Chief Information Officer.¹⁵ Additional statutory clarity regarding the role of the State GIO could help ensure continuation of leadership and statewide coordination through changes in administration.

Early momentum tapered, and GIS leadership diminished as the state focused on other important efforts. After several reorganizations of the state's information technology functions, state leadership for GIS is now blended within a broad portfolio of other important innovative services in the Department of Technology, under the Government Operations Agency. Significantly, the California Chief Technology Innovation Officer, responsible for overseeing the 125-person staff in the department's Office of Enterprise Technology, also serves as the State GIO. The office is critical for cultivating digital

innovation within the state through agile practices, open data, GIS, and web-based services.¹⁶

The dual responsibility held by California's State GIO gives short shrift to the type of GIS leadership and coordination called for a decade ago and that California critically needs today.¹⁷ Indeed, there is a sense in the GIS community that there is no statewide leadership on GIS and some are not sure whether the state has maintained the position of a State GIO.

TECHNOLOGICAL INFRASTRUCTURE

Following the creation of the State GIO, California initiated but never finalized efforts to establish a statewide Enterprise License Agreement for GIS services, as many agencies had procured their own software.¹⁸ Today, many departments contract with private sector companies to build GIS infrastructure. ESRI, a leading GIS company based in Redlands, California, produces the GIS mapping software most commonly used across the state today.¹⁹ In practice, this means departments and agencies continue to dedicate individual resources to renew contracts, build data sharing platforms, and design tools for users to access geospatial data and other data assets. Further consolidating this technological infrastructure could potentially create savings for the state and reduce duplication of effort.

GEOSPATIAL DATA GOVERNANCE

GIS relies on quality, accessible data to produce sound analytical tools for decision-makers. Over the last several years, leaders in the Government Operations Agency and elsewhere have made moves to improve data accessibility through a statewide open data strategy. As a result, geospatial data and maps currently produced by the state are more accessible than before through centralized open data publication platforms managed by the Department of Technology, as well as individual departments and agencies.²⁰ In March 2019, the Department of Technology took another step toward greater centralization of California's open data assets through Technology Letter 19-01, which defines the statewide open data portal, data.ca.gov, as the state's centralized data repository.²¹

Technology Letter 19-01 also announced California’s open data policy—a move to improve data standardization across the state. The open data policy requires agencies to build IT solutions to maximize interoperability, describe information using standard metadata, create data inventories, prioritize collection of data sets through stakeholder engagement, and establish data sharing agreements to ensure data privacy, confidentiality, and security.²² Data standardization will make it easier for California agencies to share and use common data.

Implementation of the open data portal and policy will be important to help California agencies share common data in a centralized location, accessible to users at all levels of government and in the private sector. This progress helps fulfill a recommendation the Commission made in its 2015 report, *A Customer-Centric Upgrade for California Government*, and is laudable.

However, some problems around standardization and data development persist. For example, while the burgeoning open data strategy provides some guidance on data standardization, there are still no statewide policies and standards specific to geospatial data, and agency stewardship for geospatial data is not clearly defined. If two agencies produce and share conflicting data, those in the GIS community say they do not know which should be used as the standard. Further clarification around geospatial data definitions and responsibility could reduce duplication of effort for the state and provide assurance to users that the data they use in their work is authoritative.

Problems also arise from having minimal or incomplete data. For example, if boundary data is not clearly defined and managed, city, county, or park boundaries might not line up, making it difficult for insurance companies to use GIS to analyze zones for rates or for emergency management agencies to plan evacuation routes.

Additionally, most data collected by state agencies is single-use, meaning it is produced for a specific business need by one department. This piecemeal approach to data collections leaves gaps in information across the state. For example, some wealthy counties or regions may have resources to purchase expensive LiDAR for a particular project. This type of data is collected through

remote sensing systems that can be used to measure the distance of an object from the earth’s surface, such as vegetation height, across wide areas²³ and is helpful for a variety of purposes—whether monitoring tree health, planning transportation routes, or responding to emergencies. But California lacks a formalized mechanism for multiple agencies to partner to jointly buy large, expensive data sets and there is no cohesive strategy for developing comprehensive regional or statewide datasets. This opportunistic approach to data collection may leave federal matching funds or other grant money on the table.

Going forward, it will be important for state agencies to know what geospatial data is collected, what is being duplicated, and where gaps in the data exist, as well as develop a plan to fill those gaps.

COORDINATION

In many states, GIOs provide statewide coordination and regularly engage with GIS leaders in partner agencies at the state, local, and federal levels and with those outside of government. These groups meet for a variety of purposes: to develop standards and policies, share best practices, provide state policy updates, discuss technical issues, or prioritize statewide projects.²⁴

Several organizations exist to facilitate collaboration among California’s broader GIS community—local, state, and federal government; academia; nonprofits; the private sector; and professional associations. These types of collaborative bodies are important for sharing information and cultivating partners for initiatives of statewide interest, driving strategy and creating consensus around data governance, and addressing the legal and policy issues that can arise when sharing geographic data. But there is a sense in the California GIS community that there is too little communication and participation from the State GIO. While some states have codified multi-stakeholder participation into GIS governance, California has not required the formal creation of such a body.

Despite the lack of a formal statewide GIS coordinating body, one burgeoning project demonstrates the potential of multi-agency collaboration. Born out of the need to increasingly access data from other agencies, managers

in the Central Valley Water Board envisioned a tool to leverage the state's open data assets to inform natural resource management decisions and address questions about the cumulative effects of activities that cross agency jurisdictions. For example, Water Board officials have noted that access to a multi-agency technology platform could help them better understand how a particular road construction project fits into a larger effort, like a timber harvest plan. With more holistic information, instead of focusing singularly on the impact of road construction, an analyst might look for opportunities to incorporate mitigation measures to thin out underbrush and prevent a catastrophic fire.

The project, CalMAIN (California's Multi-Agency Information Network) currently is in a beta phase, with 10 partner agencies working to define the project's scope before developing a multi-agency Memorandum of Understanding and seeking project funding.²⁵ With this, and similar projects, a dedicated State GIO could help coordinate partners, facilitate project development and testing, identify and secure funding, and shepherd the project through completion.

DATA FOR WATER DECISION-MAKING: A MODEL FOR COLLECTIVE DATA DEVELOPMENT?

"Without basic information on where, when, and how much water is available and being used, as well as physical, chemical, and biological measurements of water quality, we cannot improve how we manage our water resources."

– AB 1755 Stakeholder Working Group Synthesis Report, January 2018

Recognizing the value of open and authoritative water data, lawmakers in 2016 enacted a bill to strategically coordinate and build California's water information infrastructure. AB 1755 required the Department of Water Resources, in consultation with the California Water Quality Monitoring Council, the State Water Resources Control Board, and the Department of Fish and Wildlife to create and maintain a statewide integrated water data platform capable of integrating existing water and ecological data managed by federal, state, and local government agencies and academia. The legislation specified that these departments must develop protocols for data sharing, documentation, quality control, public access, and promotion of open-source platforms and decision support tools.

Since enacted, the Department of Water Resources and its partners have held a series of workshops to engage stakeholders from multiple sectors in defining outline data needs, began developing a strategic plan, and established a technical working group to develop system requirements and standard operating procedures. A progress report by stakeholders in 2018 commented on the importance of good governance in implementing lawmakers' vision and cautioned that "developing quality data and information systems in a useful and usable form requires not only resources, but also substantial commitment to the process of building relationships and working with stakeholders." To date lawmakers approved more than \$10 million in one-time and ongoing support from the Water Data Administrative Fund and the Environmental License for these efforts.

Sources: Alida Cantor, et. al. January 2018. Data for Water Decision Making: Informing the Implementation of California's Open and Transparent Water Data Act through Research and Engagement. Center for Law, Energy & the Environment, UC Berkeley School of Law, Berkeley, CA. 56 pp. www.law.berkeley.edu/datafordesign. Accessed July 31, 2019. Also, Chapter 506, Statutes of 2016. AB 1755 (Dodd): The Open and Transparent Water Data Act. Also, Alida Cantor, et. al. January 2018. Data for Water Decision Making: Informing the Implementation of California's Open and Transparent Water Data Act through Research and Engagement. Center for Law, Energy & the Environment, UC Berkeley School of Law, Berkeley, CA. 56 pp. www.law.berkeley.edu/datafordesign. Accessed July 31, 2019. Also, Department of Water Resources. Budget Change Proposal. FY 2017-18. Open and Transparent Water Data Act (AB 1755). https://esd.dof.ca.gov/Documents/bcp/1718/FY1718_ORG3860_BCP1427.pdf. Accessed July 30, 2019. And Budget Change Proposal. 2019-20. Open and Transparent Water Data Act (AB 1755). https://esd.dof.ca.gov/Documents/bcp/1920/FY1920_ORG3860_BCP3174.pdf. Accessed July 30, 2019. Also, Governor's Office of Planning and Research. Budget Change Proposal. FY 2018-19. Open and Transparent Water Data Act (AB 1755). https://esd.dof.ca.gov/Documents/bcp/1819/FY1819_ORG3860_BCP2471.pdf. Accessed July 30, 2019.

CALIFORNIA MUST DESIGNATE APPROPRIATE LEADERSHIP TO APPROACH GEOGRAPHIC INFORMATION AS A STATEWIDE ASSET

As long as California continues to deploy its GIS investments in a patchwork approach, the state will fail to realize the full benefits of the technology. California should reaffirm its vision for coordination and ensure that the right leadership, technology infrastructure and strategies for data governance are aligned to empower Californians and their government through geographic resources.

Doing so would strongly increase the state's capacity to employ GIS to assess where state spending occurs, how the delivery of services varies geographically, and how policy outcomes vary from region to region. By examining data through a geographic lens, the state will have a platform to analyze whether or not all Californians receive services as intended. In turn, policymakers will be better able to decide how to address these regional differences, whether through the reallocation of funding, personnel, or other program capacity.

Recommendation 1: Lawmakers should designate and empower a State Geographic Information Officer to serve as California's GIS leader, responsible for coordinating the state's GIS projects, promulgating standards for data collection and sharing, and managing shared data resources.

The State Geographic Information Officer should be a full-time position, working closely with the Chief Data Officer position which is currently housed within the Government Operations Agency. The State GIO should:

- Develop and implement a state GIS strategic plan in consultation with key stakeholders, such as the GIS Advisory Council.
- Analyze the geospatial data collected statewide to identify gaps or areas of duplication.
- Develop geospatial data standards to ensure compatibility across the State enterprise and define responsibility for data stewardship and the maintenance of authoritative data sets.
- Address legal and policy issues for use and distribution of geospatial data.
- Coordinate California's GIS projects and identify opportunities for cross-agency partnerships for geospatial data development and sharing.
- Work with agency partners to identify funding opportunities and price sharing schemes that encourage adoption and continued investment in GIS.
- Negotiate and manage a master contract for California's GIS services to allow the State of California to operate as a single GIS customer, driving down costs for individual departments and agencies to purchase and apply the technology.
- Develop and strengthen ongoing relationships with private-sector GIS providers, local governments and other partners.

The Legislature should apply a reasonable sunset to the designation of a dedicated, full-time State GIO, helping to protect against the creation of a new agency or office that would live on permanently without review.

Additionally, the state should develop specific metrics to assess the work of the State GIO, both in ongoing reviews and at the expiration of the sunset clause, when the Legislature will need to consider whether to extend the sunset. The Commission does not intend the following to serve as a definitive or exhaustive list, but such metrics might include:

- The number or percent of state agencies involved in using the shared resources provided by the State GIO.
- The extent of the development of standards for data sharing among multiple agencies, and/or the number of data-sharing agreements in place.
- The number of customer data requests from state agencies, and the speed of response to those requests.

Recommendation 2: Lawmakers should formalize a California GIS Advisory Council, comprising state GIS users, to advise the State Geographic Information Officer.

The California GIS Advisory Council should include representatives from local, state, and federal government organizations, as well as academia, nonprofits, professional associations and industry to advise the State Geographic Information Officer on issues of policy and implementation.

- The advisory council should form an executive committee to recommend the scope of common data to be included in the statewide GIS platform, determine policies and rules around defining GIS data standards and responsibilities, identify strategies for sharing within the statewide GIS platform, and recommend strategies for funding collaborative GIS projects.
- The advisory council should form a technical committee of GIS experts and technologists to discuss agency technical needs and strategies to deploy GIS technology collaboratively.

Recommendation 3: The state should use GIS to evaluate regional disparities in funding and the delivery of services within California, and to assess the potential nature of policy prescriptions to address such differences.

All state agencies should thoughtfully employ GIS in evaluating governmental spending and program outcomes across all regions of the state, including in policy domains such as education, health care, economic development, transportation and environmental concerns.

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17. Note: Regarding GIS, the department functions much as a consultant to other state entities, providing a range of services such as map services, geocoding, hosting web-based applications, for a set monthly fee. While this cost recovery funding model may be effective for recovering expenses associated with building out specific GIS projects, it is insufficient for absorbing costs associated with developing statewide coordination around GIS.
18. Scott Gregory, Deputy Director, California Department of Technology. July 24, 2019. Personal communication with Commission staff.
19. Scott Gregory, Deputy Director, California Department of Technology. March

5, 2019. Personal communication with Commission staff.

20. California Department of Fish and Wildlife. CDFW GIS Clearinghouse. <https://www.wildlife.ca.gov/Data/GIS/Clearinghouse>. Accessed July 23, 2019. Also, California Natural Resources Agency. Open Data. <https://data.cnra.ca.gov/>. Accessed July 23, 2019. Also, Department of Water Resources. April 2018. Strategic Plan for Assembly Bill 1755, the Open and Transparent Water Data Act. <https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/AB-1755/Strategic-Plan-for-AB1755.pdf>. Accessed July 30, 2019.

21. California Department of Technology. March 2019. Technology Letter 19-01: Open Data. <https://cdt.ca.gov/wp-content/uploads/2019/03/TL-19-01.pdf>. Accessed July 30, 2019. Includes references to Government Code, Sections § 6250-6270, § 11545, § 11546.

22. State Administrative Manual. Open Data Policy Requirements, 5160.1. https://www.dgsapps.dgs.ca.gov/documents/sam/SamPrint/new/sam_master/sam_master_File/Chap5100/5160.1.pdf. Accessed July 30, 2019.

23. The National Ecological Observatory Network. The Basics of LiDAR – Light Detection and Ranging – Remote Sensing. <https://www.neonscience.org/lidar-basics>. Accessed July 31, 2019.

24. National States Geographic Information Council. January 7, 2019. “Information Sharing & Priority Setting: The Rhythm of State GIS Coordination.” https://nsgic.memberclicks.net/index.php?option=com_content&view=article&id=235:information-sharing---priority-setting&catid=20:site-content. Ac-

cessed July 23, 2019.

25. CalMAIN (California’s Multi-Agency NPS Information Architecture) project fact sheet and list of agency leads. On file.

Little Hoover Commission Members

Chairman Pedro Nava (*D-Santa Barbara*) Appointed to the Commission by Speaker of the Assembly John Pérez in April 2013 and reappointed by Speaker of the Assembly Anthony Rendon in 2017. Government relations advisor. Former State Assemblymember from 2004 to 2010, civil litigator, deputy district attorney and member of the state Coastal Commission. Elected chair of the Commission in March 2014.

Vice Chairman Sean Varner (*R-Riverside*) Appointed to the Commission by Governor Edmund Brown Jr. in April 2016 and reappointed in January 2018. Managing partner at Varner & Brandt LLP where he practices as a transactional attorney focusing on mergers and acquisitions, finance, real estate and general counsel work. Elected vice chair of the Commission in March 2017.

Dion Aroner (*D-Berkeley*) Appointed to the Commission by the Senate Rules Committee in April 2019. Partner for Aroner, Jewel, and Ellis. Former State Assemblymember from 1996 to 2002, chief of staff for Assemblymember Tom Bates, social worker for Alameda County, and the first female president of Service Employees International Union 535.

David Beier (*D-San Francisco*) Appointed to the Commission by Governor Edmund G. Brown Jr. in June 2014 and reappointed in January 2018. Managing director of Bay City Capital. Former senior officer of Genentech and Amgen, counsel to the U.S. House of Representatives Committee on the Judiciary.

Cynthia Buiza (*DTS-Los Angeles*) Appointed to the Commission by Speaker of the Assembly Anthony Rendon in October 2018. Executive director of the California Immigrant Policy Center. Former policy director for the American Civil Liberties Union, San Diego, and policy and advocacy director at the Coalition for Humane Immigrant Rights of Los Angeles.

Bill Emmerson (*NPP-Redlands*) Appointed to the Commission by Governor Edmund G. Brown Jr. in December 2018. Former senior vice president of state relations and advocacy at the California Hospital Association, State Senator from 2010 to 2013, State Assemblymember from 2004 to 2010, and orthodontist.

Assemblymember Chad Mayes (*R-Yucca Valley*) Appointed to the Commission by Speaker of the Assembly Toni Atkins in September 2015. Elected in November 2014 to represent the 42nd Assembly District. Represents Beaumont, Hemet, La Quinta, Palm Desert, Palm Springs, San Jacinto, Twentynine Palms, Yucaipa, Yucca Valley, and surrounding areas.

Senator Jim Nielsen (*R-Gerber*) Appointed to the Commission by the Senate Rules Committee in March 2019. Elected in January 2013 to represent the 4th Senate District. Represents Chico, Oroville, Paradise, Red Bluff, Yuba City, and surrounding areas.

Assemblymember Bill Quirk (*D-Hayward*) Appointed to the Commission by Speaker of the Assembly Anthony Rendon in 2017. Elected in November 2012 to represent the 20th Assembly District. Represents Hayward, Union City, Castro Valley, San Lorenzo, Ashland, Cherryland, Fairview, Sunol, and North Fremont.

Senator Richard Roth (*D-Riverside*) Appointed to the Commission by the Senate Rules Committee in February 2013. Elected in November 2012 to represent the 31st Senate District. Represents Corona, Coronita, Eastvale, El Cerrito, Highgrove, Home Gardens, Jurupa Valley, March Air Reserve Base, Mead Valley, Moreno Valley, Norco, Perris, and Riverside.

Cathy Schwamberger (*NPP-Calistoga*) Appointed to the Commission by the Senate Rules Committee in April 2018 and reappointed in January 2019. Associate general counsel for State Farm Mutual Automobile Insurance Company. Former board member of the Civil Justice Association of California and the Capital Political Action Committee.

Janna Sidley (*D-Los Angeles*) Appointed to the Commission by Governor Edmund Brown Jr. in April 2016. General counsel at the Port of Los Angeles since 2013. Former deputy city attorney at the Los Angeles City Attorney's Office from 2003 to 2013.

“Democracy itself is a process of change, and satisfaction and complacency are enemies of good government.”

Governor Edmund G. “Pat” Brown,
addressing the inaugural meeting of the Little Hoover Commission,
April 24, 1962, Sacramento, California