N.C. Department of Information Technology

N.C. Geographic Information Coordinating Council

2018 Annual Report: Data-Driven Collaboration

Report to the Governor and to
the Joint Legislative Commission on Governmental Operations

Eric Boyette
Secretary and State Chief Information Officer

Alex Rankin
Chair

April 2019

Contents

Executive Summary

The Geographic Information Coordinating Council (GICC) is North Carolina's focal point for collaboration in geographic information and statewide mapping. The collection, preservation, presentation and analysis of economically and demographically important data drives collaboration and yields efficient and informed public policy decisions and provides information that drives economic expansion in the private sector. Providing reliable geographic information requires stakeholder engagement to obtain raw geographic data, establish standards, encourage data sharing, and to increase the value of geographic information systems to public and private business processes. The GICC advises and reports to the Governor and the General Assembly annually on strategic direction, responsibilities, and requirements for North Carolina's geographic information system technology and collaborative ways of meeting the needs of elected officials and management staff.

GICC is staffed by the Center for Geographic Information and Analysis (CGIA), and GICC's primary data-sharing program, *NC OneMap*, provides a coordination foundation for geographic information for North Carolinians from state, local, regional, and federal government, as well as for private business. Producers and consumers of geographic information are represented on GICC's committees and working groups where the plans, strategies, policies, priorities and initiatives related to geographic data and GIS technology are debated and developed. In its support role, CGIA's location in the N.C. Department of Information Technology's Government Data Analytics Center (GDAC) is advantageous, especially for the deployment of *NC OneMap* as a statewide data resource.

GICC has five priorities for 2018/2019: Improving the quality of data sets related to surface waters within the state; improving the municipal boundaries dataset so that annexations are incorporated seamlessly; investigating solutions to the lack of public access to utility infrastructure data; increasing local-to-state data sharing in support of Next Generation 911; and including additional priority data on *NC OneMap*. GICC'S committees and working groups are identifying actions that will accomplish these priorities.

The value of high-quality geospatial data—complete, consistent, current, well-documented—was recently demonstrated by the timely hurricane response and recovery which provided quick damage estimates, economic impact information, reliable visual references from aerial imagery, and "know before you go" information that guided recovery efforts and reduced time for post-storm surveying and engineering services. Geospatial data users reduce costs and provide real-time benefits for elected officials and the citizens of North Carolina.

For more information about GICC, including the latest meeting and contact information for GICC members and staff, go to: https://it.nc.gov/gicc.

Introduction

The N.C. General Assembly established the N.C. Geographic Information Coordinating Council in August 2001.[1] The Council is the State's focal point for collaboration in geographic information and statewide mapping and supports a host of state and local government programs and services. Governance of geographic information and technology relies on stakeholder engagement around geographic data, standards and data sharing, and demonstration of practical examples of the value of geographic information systems in public and private business processes.

The Council is charged with advising and reporting annually to the Governor and the General Assembly on strategic direction, responsibilities and requirements as North Carolina applies geographic information system technology in collaborative ways to meet the needs of decision-makers at all levels. CGIA, within GDAC in DIT, staffs the Council. The State Chief Information Officer and Secretary of the Department of Information Technology is responsible for supervision and support of the Council. N.C.G.S. §143B-1421(g) requires the Council to report annually to the Governor and the Joint Legislative Commission on Governmental Operations.

The Council submits this report to share its strategic focus on data-driven collaboration, outline priorities and challenges both in this year and beyond and update the Governor and the Commission on its accomplishments during Fiscal Year 2017-18.

About the Council

The Council meets quarterly to consider policies, issues, and initiatives. Council meetings took place on four occasions during FY 2017-18: on August 9, 2017; November 8, 2017; February 14, 2018; and May 9, 2018. Alex Rankin, President of CESI Civil-Geotechnical-Surveying, chairs the Council.

Council members represent state agencies, local government, education, private business, and federal agencies to represent a broad set of stakeholders and perspectives. The Council has three user-oriented standing committees: the Local Government Committee, the State Government GIS Users Committee, and the Federal Interagency Committee. Additionally, the

[1] *See* N.C.G.S. § 143B-1420 *et seq*.

GIS Technical Advisory Committee and the Statewide Mapping Advisory Committee are standing committees that address policy and technical issues from a collaborative perspective. In addition to more than 30 Council members, more than 50 individuals contribute to committees and working groups, representing state agencies, local governments, federal agencies, universities, and private organizations.

The Council (https://it.nc.gov/gicc) and *NC OneMap* (http://data.nconemap.gov) websites are widely used by committee members, the NC GIS community and the public to keep current on initiatives, meetings, opportunities and news about both the Council and *NC OneMap*.

Data-Driven Collaboration

Using geographic data to inform decision-making drives the collaboration of state, local, federal, and regional governments, as well as the businesses, educators, and citizens represented on the NC Geographic Information Coordinating Council.

Data-driven collaboration is more than representing locations of natural and manmade features on the earth in geographic information systems (GIS). Collaboration requires sharing information vital to wide-ranging public and private business processes. From responding to a hurricane or a wildfire to planning a highway extension, location matters and maps and analysis help us do more, save time, and reduce costs for the taxpayers of North Carolina.

Council members and their respective organizations identify, integrate, and publish data assets to improve citizen interactions. Data consumers may not know about essential data-driven collaboration behind the scenes, but they have ready access to a variety of online interactive maps to look up addresses and properties, view transportation routes, and explore opportunities to hunt, fish, or hike.

Adding Value

Two applications of GIS are critical to North Carolina. The Council continues to prioritize geospatial initiatives and data sharing that add value to (1) North Carolina's transition from Enhanced 911 emergency communications to Next Generation 911 to ensure accurate and quick response to emergency calls; and (2) preparations for Census 2020 to make sure every North Carolinian is counted.

1. Transitioning to Next Generation 911

In emergency communications, seconds matter. Citizens deserve quick emergency response; lives may be at stake. Public Safety Answering Points (PSAPs) currently use "Enhanced 911" systems for emergency communications. The legacy 911 systems depend on situs addresses to locate an address, whether automatically transmitted via a landline or spoken from a cellphone. Calls to 911 from a landline carry the address associated with the landline. In the case of a cellphone call, PSAPs may receive the location of the tower, the location of the caller, or a point in between, depending on such factors as terrain and technology of the caller's cellphone. As 911 calls originating from cellphones continue to increase, a new generation of 911 digital communications called "Next Generation 911" (NG911) is vital for North Carolina, and geographic data are essential for the new approach.

Required statewide geospatial datasets for NG911 include roads, addresses, and emergency service boundaries. The Council adds value to NG911 through two of its primary initiatives: *AddressNC* for statewide address points and Statewide Orthoimagery for base mapping and visual reference. See Figure 1 for an example of address points and imagery.

2. The 2020 Decennial Census and its Impact on North Carolina

The second critical application of geospatial data is Census 2020. The data-driven goal is to achieve a complete, accurate, defendable count of North Carolina residents in the 2020 Census to ensure that North Carolina is appropriately represented in the U.S. Congress and fair distribution of federal resources to the state and its cities and towns and citizens. This means producing a comprehensive list of residential addresses to receive a census form. The more residents that are counted in Census 2020, the more federal tax dollars return to North Carolina and its units of local government. The Census Bureau estimates the federal government spent $1,623 per North Carolinian, based on census data, in FY 2015. That can amount to more than $16,000 over 10 years for each additional resident counted in the 2020 Census.

Based on current data and population trends, the census likely will result in additional North Carolina representation in the U.S. House of Representatives. Since the number of available House seats is fixed, any increase in representation accorded North Carolina must be based on accurate and defendable population counts.

The Council formed a working group for Census Geospatial Data in 2013, chaired by the Governor's Census Liaison, Bob Coats, in the Office of State Budget and Management. The Census Bureau is relying on geospatial data, including orthoimagery, to verify a large percentage of residential addresses. The Council adds value by making its resources available, especially *AddressNC* updates for address verification and Statewide Orthoimagery for visual reference.

Beyond the census, the Council's strategy is to maintain the foundational address data as changes occur. Under this approach, authoritative data provided by local governments is being combined and maintained in standard format and made available to the many state agencies that often seek the same information from localities. Eliminating redundancies and providing a standardized data platform benefits local governments and state government agencies. Maintaining these foundational datasets will also support the Office of State Budget and Management's State Demographer in annual population estimates.

Figure 1. Address points and orthoimagery, City of New Bern example

Strategic Direction for the Council for Data Driven Collaboration

The Council spent parts of three quarterly meetings discussing and clarifying elements of strategic direction to guide the work of the Council in 2018 and beyond. The following set includes accomplishments, tasks, and priorities.

Elements, organized by four goals, are each stated with status, a proposed lead committee and tasks to include in committee work plans for 2018-2019.

Goal 1. Improve and/or expand statewide geospatial data

1.1. Promote free and open discovery of and access to geospatial data created and maintained by local governments.

Status: Local government data distribution policies vary from open data access to offline copies by request
Lead: Local Government Committee
Tasks: Summarize business needs and value; promote through professional organizations

1.2. Find solutions for consumers to discover and gain access to public geospatial datasets that local governments currently withhold from public access for concern about homeland security.

Status: Local government policies vary
Lead: Statewide Mapping Advisory Committee
Tasks: Research and clarify federal, local, and public utility policies; summarize business needs and value versus risk; define alternative geospatial datasets (e.g., corridors, easements, service areas) and their appropriate uses and disclaimers; start a conversation with local data managers

1.3. Continue to support initiatives that compile and maintain statewide geospatial datasets that are priority data themes of the Council

Status: Priority statewide datasets available to the public include AddressNC, NC Roads, NC Parcels, Statewide Orthoimagery, county and municipal boundaries, LiDAR elevation, surface waters, and geodetic control.
Lead: Statewide Mapping Advisory Committee
Tasks: Prioritize efforts to improve municipal boundaries and surface waters; sustain working groups to advise data programs and projects; support Next Generation 911 and AddressNC and the local government role in data sharing

1.4. Find solutions to make data sharing local-to-state more efficient to meet the needs of multiple statewide datasets and not place undue burden on local geospatial data managers.

Status: NC Parcels, NC Roads, and other datasets have achieved full participation by local governments, but use a variety of processes at different times
Lead: Statewide Mapping Advisory Committee
Task: Maintain data content standards
Assist: State Government GIS Users Committee
Task: Define common data requirements from multiple state agencies
Assist: CGIA and Next Generation 911 Project Team
Task: Define data requirements and a workflow in collaboration with contractor and the Local Government Committee

1.5. Request all state agencies to make the Council's priority geospatial datasets discoverable and accessible through the NC OneMap Geospatial Portal.

Status: most, but not all, priority datasets are discoverable and accessible through the first-stop state geospatial data portal
Lead: State Government GIS Users Committee
Tasks: Identify priority datasets currently not discoverable and accessible through NC OneMap and find solutions with host agencies

1.6. Promote geospatial metadata for standard documentation.

Status: Metadata standard is in place, training materials are prepared, and implementation in more GIS operations will add value
Lead: Statewide Mapping Advisory Committee

Task: Metadata Committee—reach out to local governments, promote online videos, and provide onsite training

Goal 2. Support applications of geospatial data

2.1. Support creation of services that publish results through online applications that include vehicle routing and address validation, from single requests to batch processing.

Status: New initiative
Lead: Statewide Mapping Advisory Committee
Task: Assist in analysis of business requirements and benefits for application development and geospatial services related to NC Roads and AddressNC
Assist: Local Government Committee
Task: Help promote local government data sharing for statewide datasets for roads and address points

2.2 Support other applications that derive business value from geospatial data assets and analytics.

Status: Ongoing initiative
Lead: State Government GIS Users Committee
Task: Identify common opportunities and requirements
Assist: Local Government Committee
Task: Identify common opportunities and requirements

Goal 3. Collaborate for more integration of geospatial data in information technology for expanded benefits

3.1. Identify opportunities to collaborate on GIS solutions in state departments and divisions not directly represented on the Council to add value to state business processes.

Status: State agencies reached out to the Department of Insurance to advise on adoption of desktop GIS in 2017-2018
Lead: State Government GIS Users Committee
Tasks: Survey state agencies to learn more about GIS needs and opportunities; collaborate with the Department of Information Technology on optimization of IT resources.

3.2. Identify opportunities to collaborate and inform municipalities engaged in "Smart Cities" initiatives about potential for GIS in information technology solutions.

Status: New initiative
Lead: Technical Advisory Committee
Tasks: Engage local government and university resources to research and identify potential applications of GIS in support of "Smart Cities" initiatives
Assist: Local Government Committee

Goal 4. Collaborate with all parts of the GIS community in North Carolina

4.1. Identify opportunities to collaborate on geospatial data and technical solutions on a regional basis, engaging councils of government.

Status: Ongoing efforts
Lead: Local Government Committee
Task: Representatives participate on SMAC and working groups to identify opportunities for regional solutions

4.2. Reach out to jurisdictions with the least resources to find ways to add value with geospatial data and applications.

Status: CGIA supported the Local Update of Census Addresses program on behalf of a few local governments that did not participate directly in the program
Lead: Local Government Committee
Tasks: Identify jurisdictions in need, priority business needs and data needs, and practical ways to assist; engage professional organizations in outreach and solutions
Assist: Statewide Mapping Advisory Committee

The Council will continue to provide leadership, oversight, and structure to ensure success for data-driven collaboration. The following is a summary of accomplishments for 2017-2018.

Accomplishments 2017-2018

Collaboration for Imagery Quality and Efficiency

Accomplishment: The Statewide Orthoimagery Program completed phase 2 of the second four-year cycle, funded by the NC 911 Board, and acquired imagery for phase 3, the Northern Piedmont and Mountains region. Next year the program will complete phase 3 of 4 in the second cycle of updates and acquire imagery for phase 4 to refresh the Southern Piedmont and Mountains region.

The Statewide Orthoimagery Program, funded by the N.C. 911 Board, delivers a consistent, complete, and current visual reference for emergency communications and a wide range of purposes. The program updates a quarter of the State's counties each year on a rotating basis with high-resolution, consistent, and accurate orthoimagery. See Figure 2.

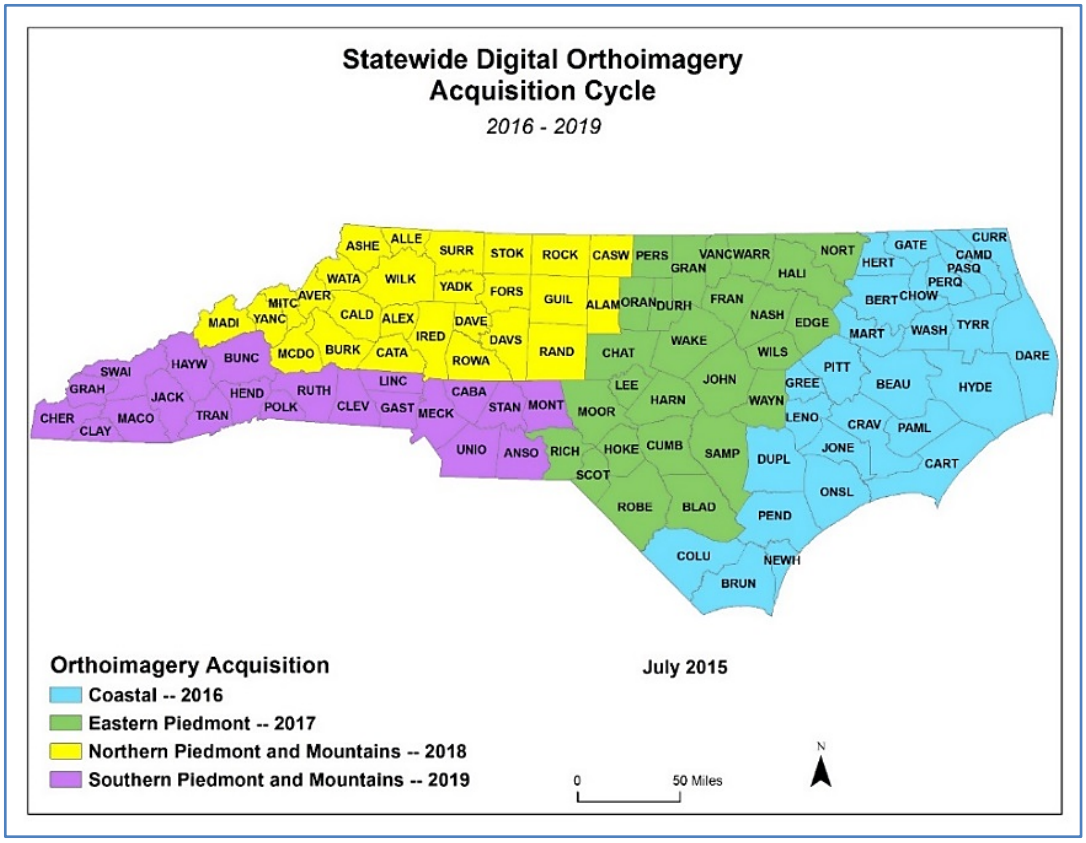

Figure 2. Statewide imagery acquisition cycle 2016-2019

In addition to providing imagery that is packaged by county, the program distributes to each county imagery from the surrounding seven miles beyond the county's boundaries, including imagery from neighboring states in some cases.

If each county acquires address data from neighboring counties to go along with imagery, PSAP operators will be more likely to (a) recognize an address via cellphone as outside their primary response areas, (b) confirm that address, and (c) transfer the call as quickly as possible to the appropriate PSAP in the adjoining jurisdiction. This should save seconds and minutes, and ultimately lives.

The CGIA has managed the Statewide Orthoimagery Program since 2012, in collaboration with the Council, its committees and working groups, and the following partners:

- the N.C. 911 Board;
- the N.C. Department of Transportation's Photogrammetry Unit;
- the Land Records Management Program in the Department of the Secretary of State;
- the Geodetic Survey in the N.C. Department of Public Safety; and
- local government PSAPs and GIS Units.

The Statewide Orthoimagery Program has archived 18.6 terabytes of imagery with State Archives to ensure that future generations have a complete historic picture of North Carolina.

Prior to the statewide effort, the 911 Board had received $24 million in requests annually from local governments for orthoimagery projects. Based on project experience from 2012 to 2015, the four-year statewide approach will cost approximately $14 million, saving as much as $82 million for statewide acquisition. About 79 percent of the cost is for services by private contractors, contributing to the state's economic vitality by sustaining private jobs in photogrammetric services. The statewide collection means counties do not need to spend time and money on imagery procurement and related budget proposals, contracting, and project management. For many rural counties, the four-year State cycle provides imagery more frequently than counties could afford otherwise.

The imagery is available to state, local, federal, and regional government agencies, as well as the private sector, the academic community, and private citizens as map services and downloadable files from *NC OneMap*. Benefits include saving time in locating and responding to emergencies, saving time informing business decisions, knowing the date the imagery was captured and its resolution and accuracy, and avoiding the cost of erroneous information from out-of-date or less accurate imagery and map features. An example of orthoimagery with date of capture is shown in Figure 3.

Figure 3. N.C. orthoimagery example in the City of Lincolnton, capture April 1, 2015

Collaboration for Land Information

Accomplishment: Collaborated with all 100 counties to maintain a complete statewide parcel dataset.

North Carolina is one of the leading states in maintaining border-to-border land information online as standardized parcels. In a collaborative project involving all 100 counties and the Eastern Band of Cherokee Indians, the Council realized a longtime goal to compile and publish statewide standardized parcels (boundaries and property information) and is maintaining the resource. Combined with statewide aerial imagery, address points, and other foundational geographic data, informative views of the landscape are readily accessible to all counties, the N.C. General Assembly, state agencies, private businesses, educators, and the public. A sample of parcels, address points, and imagery is shown in Figure 4.

Figure 4: Imagery, parcel boundaries, and address points from *NC OneMap,* Town of Cornelius

The *NC Parcels* Program received an international award as a "Distinguished Enterprise System" from the Urban and Regional Information Systems Association in 2016.

Statewide parcel data informs decisions in economic development, emergency management, transportation planning, land development, utility management, public health, and forestry, among other applications. For example:

- Businesses are benefitting from the collection of parcels across county boundaries. For example, Duke Energy uses parcels to determine land ownership when creating and maintaining utility rights-of-way and when engineering new transmission lines.

- Current parcel data for all counties are available from *NC OneMap* in the event of a natural disaster that might interrupt county data operations, and N.C. Emergency Management used this parcel data to assess damage from Hurricane Matthew.
- The U.S. Census Bureau is applying parcel boundaries to improve census geography in support of a complete, accurate, defendable count of NC residents.

Parcel boundaries indicate patterns of land ownership as shown by the pink lines over statewide aerial imagery in a Mitchell County location (Figure 5). Consistent, complete, current, accessible parcel boundaries with information about location, use, size, and value saves time and money for public and private business processes. As always, counties are the authoritative sources of the most current and detailed parcel data. For detailed research on specific properties, data consumers are directed to online county map viewers and county geographic information system (GIS) contacts.

Figure 5. Parcel boundaries over orthoimagery, Spruce Pine, NC

Collaboration for Public Access to Geographic Information

> ***Accomplishment:*** CGIA managed a database of statewide geographic data and provided reliable online access to the public from secure servers; CGIA and collaborating agencies updated and expanded the content of *NC OneMap* Geospatial Portal.

NC OneMap, managed by CGIA, is a primary initiative of the Council that ensures public investment in geospatial data and services will continue to generate benefits for a wide range of public and private purposes. Through the *NC OneMap* Geospatial Portal, users can discover relevant datasets, determine their suitability, and download data or stream data through a web

service directly into a desktop or web application. Keyword searches and searches by spatial extent make it easy to find content in a user's area of interest.

NC OneMap is effective because of its extensive content (283 downloadable datasets and 147 live map services) and collaboration with other agencies to deliver data to consumers.
As data moves from desktops to smart phones and tablets, consumption of geographic data continues to grow. Significant investments have been made in North Carolina's geographic data at the local and state levels to serve the business needs of government.

In 2017-18, the Council's Management and Operations Committee continued to monitor the status of priority datasets for *NC OneMap* and their respective action plans to support quantity and quality. The *NC OneMap* Geospatial Portal features datasets and web services hosted by CGIA, as well as data and services hosted by other public agencies linked to the portal. New datasets and web services added to the portal included 2017 imagery for the 26 counties in the Eastern Piedmont project area. *NC OneMap* maintains web applications to enable data consumers to view maps and get information through a web browser. One displays land parcel boundaries with standard descriptive information, and another displays orthoimagery flight lines to enable look-up of the flight date for imagery in any location in the state.

The Council and CGIA will continue to make geospatial data readily discoverable and reliable to apply in ways that benefit public and private entities in a broad range of activities that contribute to health, safety, knowledge, communities, natural resources and economic vitality in North Carolina.

Note: the role of geospatial data and collaborators in Hurricane Florence response and recovery took place after the fiscal year and will be described in the next annual report.

Collaboration for Consistency

> ***Accomplishment:*** The Council provided direction and oversight to the Statewide Mapping Advisory Committee and its Working Group for Roads and Transportation to update the data content standard for road centerlines.

Consistency and documentation are key data quality factors, in addition to completeness, currency, and reliable online access to priority datasets. Up-to-date standards and recommended practices continue to be valuable for GIS data managers in state and local governments. The working group revised the data content standard for roads to integrate the road centerline standard of the National Emergency Number Association for compatibility with geospatial data specifications for Next Generation 911. The Council adopted the revised standard in May 2018.

Technical Assessments and Developments

> ***Accomplishment:*** The Technical Advisory Committee issued a guide to open source GIS software with a focus on informing local and state government GIS practitioners about tools for desktop mapping and analysis, database management, and web services.

Governance for Geographic Information

> ***Accomplishment:*** The Council met regularly and engaged committees and working groups in carrying out initiatives. It continues to be the focal point for engagement in collaboration opportunities, as envisioned by the General Assembly.

The Council, CGIA, and *NC OneMap* provide a coordination foundation for governance of geographic information that engages stakeholders from state, local, regional, and federal government, educational systems, and private business. Producers and consumers of geographic information are represented in committees and working groups that inform plans, strategies, policies, priorities and initiatives related to geographic data and GIS technology. In its support role, CGIA's location in DIT's Government Data Analytics Center (GDAC) is advantageous, especially for *NC OneMap* as a statewide data resource. As a board housed in DIT, the Council will continue to emphasize data standards, data sharing, and data quality to support analytics where location and revision date are key factors. Within the DIT framework, the Council will continue to coordinate geographic data and enterprise initiatives and support enterprise data management.

In 2017-2018, the Council continued a process of defining the current practice of GIS professionals in consideration of changes in geospatial technology that enable greater accuracy in the digital representation of such features as roads, buildings, fire hydrants, and timber stands. The challenge for GIS governance is for the Council to clarify differences between the practice of GIS and the practice of professional land surveying, in collaboration with the N.C. Board of Examiners for Engineers and Surveyors, in ways that meet the respective responsibilities of the Council and the Board. A working group of the Council defined use cases and practical decision points to help guide GIS practitioners and will continue to collaborate with the Board in the coming months.

Sharing Information and Knowledge

> ***Accomplishment:*** Continued to build a technical knowledge base and communicated with professional organizations and consumers. Began planning for the next biannual N.C. GIS Conference in February 2019.

Quarterly Council meetings often feature a technical presentation to inform Council members about investments in and applications of geographic data and technology. In May 2018, the Council heard presentations on public and private uses of unmanned aircraft systems (UAS). Other topics discussed included the national Geospatial Data Act of 2017 and the National Agriculture Imagery Program. The Council's standing committees build the GIS community's knowledge base by hosting technical presentations that demonstrate tools and techniques and convey strategies and lessons learned in support of public business processes. The committee structure is vital for sharing data and getting information to the Council.

The 16th biannual NC GIS Conference will again provide a valuable forum for education and networking, achieving a true sense of community and collaboration among GIS professionals across North Carolina. The conference will take place February 27 to March 1, 2019 at the Benton Convention Center in Winston-Salem. Planning was underway as the fiscal year ended. Attendees include government officials at all levels, members of the business community, college students, and education professionals.

In addition, the Council promoted its initiatives in numerous venues around the state. Staff, along with Council and committee members, presented at meetings sponsored by the 911 Board, the N.C. Property Mappers Association, the Mountain Region GIS Alliance, and the N.C. Arc Users Group. Nationally, CGIA represents North Carolina in National States Geographic Information Council activities.

For more information about the Council including the latest meeting information and contact information for Council members and staff, please visit the website at https://it.nc.gov/gicc.