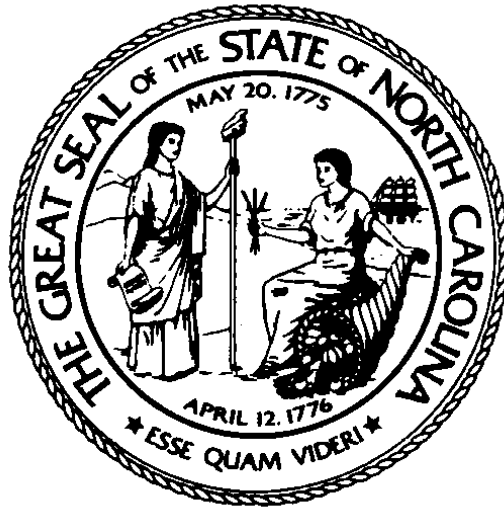# N.C. Department of Information Technology

N.C. Geographic Information Coordinating Council

2017 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

Stan C. Duncan
Chairman

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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 2016-17.

About the Council

The Council meets quarterly to consider policies, issues, and initiatives. Council meetings took place on four occasions during FY 16-17: on August 22, 2016; November 9, 2016; February 9, 2017; and May 10, 2017. Stan C. Duncan, retired from local and state government, 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 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

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

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

Priorities for Data Driven Collaboration

North Carolina's wealth of statewide geographic data is consumed by state, local, regional, and federal governments; private businesses; educational institutions; and the public to answer questions and make informed decisions efficiently and effectively.

Local data producers leverage their investments by sharing data for statewide standardized datasets. The state has invested in comprehensive data where economies of scale save time and money. The Council and its collaborators have created and implemented four critically important and supportive, foundation-level programs that benefit governments, private businesses and citizens: *AddressNC*, the Statewide Orthoimagery Program, *NC Parcels*, and the *NC OneMap* Geospatial Portal.

The Council will continue to provide leadership, oversight, and structure to ensure success for each program. The following is a summary of these and other Council priorities and related accomplishments and plans.

Collaboration for Locations

Accomplishment: AddressNC update is in progress with a funded project managed by CGIA.
Plan: Update the statewide address point dataset in 2018, develop a maintenance plan, apply address points to address ranges in road centerlines maintained by NCDOT, and share address points in support of Census 2020.

The *AddressNC* program helps local governments maintain a complete, consistent source for statewide address points. Accurate geographic data representing locations of homes, businesses, and public buildings are vital for emergency communications, broadband services, real estate, transportation planning, vehicle routing, and more.

The *AddressN*C database relies on state-local collaboration to integrate local authoritative data into a standardized statewide resource, benefitting NG911 and many other business processes. Addresses associated with business entities are also essential for identifying points of sale for statewide tax collection by the N.C. Department of Revenue. Jurisdiction boundaries and address points in GIS enable fair tax collection and distribution back to local governments.

Collaboration for Imagery Quality and Efficiency

Accomplishment: The Statewide Orthoimagery Program completed phase 1 of the second four-year cycle, funded by the NC 911 Board, and acquired imagery for phase 2, the Eastern Piedmont region.
Plan: Complete phase 2 of 4 in the second cycle of updates, and acquire imagery for phase 3 to refresh the Northern 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.
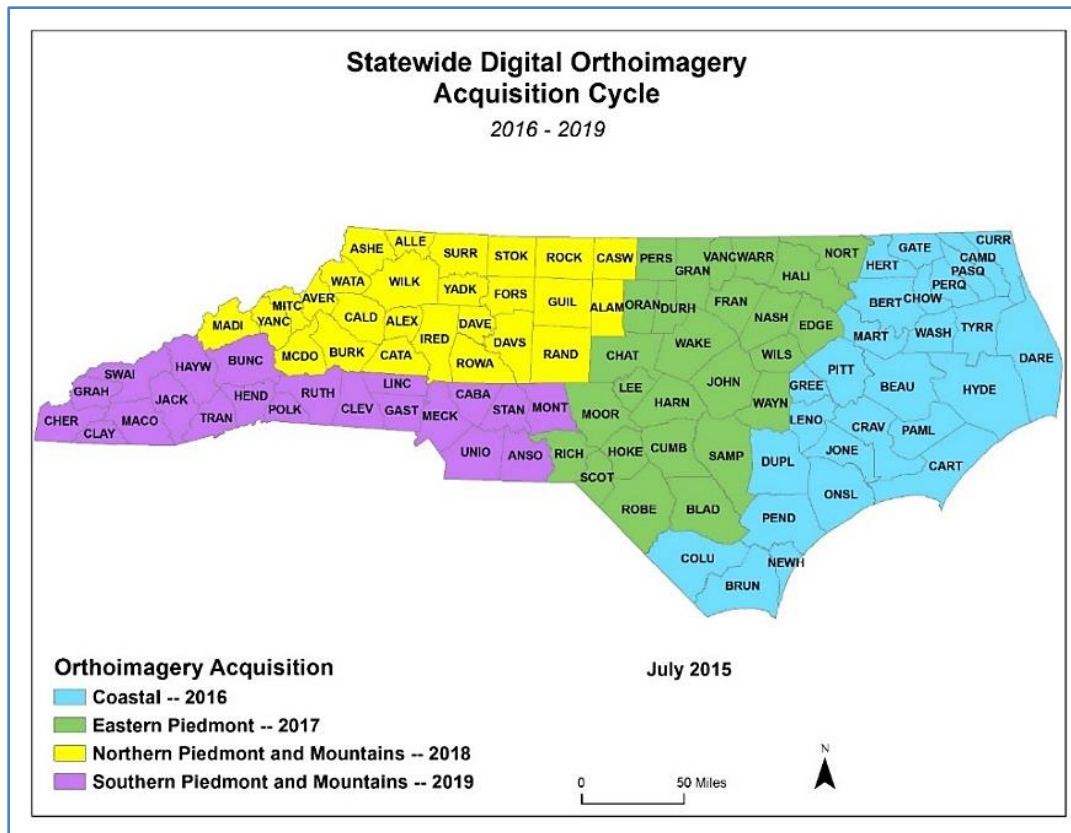
Figure 2. The second of four phases of imagery acquisition (in progress)

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 NC 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 (April 1, 2015)

Collaboration for Land Information

> *Accomplishment:* Collaborated with all 100 counties to produce and maintain a complete statewide parcel dataset.
>
> *Plan:* Continue updating parcels semiannually for currency.

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 (2015)

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.
Plan: Expand the content and improve the usability of *NC OneMap.*

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 (287 downloadable datasets and 151 live map services) and collaboration with other agencies to deliver data to consumers. For example, NC Division of Water Resources uses the *NC Parcels* web service from *NC OneMap* to map locations of wells qualified for testing near coal ash facilities.

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 2016-17, 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 2016 imagery for the 27 counties in the Coastal 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 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.

Collaboration for Consistency

Accomplishment: The Council provides direction and oversight to the Metadata Committee to develop training materials and hold training sessions to demonstrate how to apply the new metadata standard. The Council held in-person training sessions for local and state government geospatial data managers.
Plan: Continue to apply the new metadata standard through training state and local data managers, update state standards for street centerlines and promote all Council adopted standards and practices.

Consistency and documentation are key data quality factors, in addition to completeness, currency, and reliable online access. The Council and its collaborators publish priority datasets with the most value and document the data to inform consumers. Documentation of geospatial data is called "metadata." The Metadata Committee is training local data managers to apply the State and Local Government Metadata Profile based on ISO standards to locally managed geospatial datasets. This is a vital step to improve data quality across the state, thereby building integrity in data access by public and private interests.

Up-to-date standards and recommended practices continue to be valuable for GIS data managers in state and local governments. Revisions to the data content standard for and roads will benefit from the practical application of standards in respective statewide projects.

Technical Assessments and Developments

Accomplishment: The Technical Advisory Committee issued a guide to using mobile GIS.
Plan: Participate in enterprise data management, improve geospatial data, and share knowledge.

The Council and its committees identified priorities for technical assessments and developments to inform the GIS community in 2017-18 and beyond.
- Find the best ways to improve geospatial data representing statewide streams and waterbodies.
- Assess the potential for open-source software solutions for state and local government GIS.
- Share knowledge on unmanned aircraft systems and potential applications for state and local governments and private GIS practice with attention to GIS practice and professional land surveying (PLS) collaboration.
- Apply GIS analysis to data analytics where location and geographic patterns add value.
- Participate in enterprise data management through the Data Division of the Department of Information Technology.

Governance for Geographic Information

Accomplishment: The Council met regularly and engaged committees and working groups in carrying out initiatives.

Plan: Continue 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 mid-2016, the Council began 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. Held a successful biannual N.C. GIS Conference in February 2017.

Plan: Continue to be the focal point for knowledge sharing and communication for the GIS community.

Quarterly Council meetings feature a technical presentation to inform Council members about investments in and applications of geographic data and technology. Some key topics addressed

in 2016-17 included unmanned aircraft systems, the *AddressNC* project and preparation for Census 2020, Next Generation 911, GIS applied to Hurricane Matthew response and recovery, and the value of GIS described by Council members. In addition, 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 15th biannual N.C. GIS Conference in February 2017 provided a valuable forum for education and networking for GIS professionals across North Carolina. More than 900 participants attended the two-day conference, including government employees and officials at all levels, private sector community, and education community.

The keynote speaker, Keith Masback, Chief Executive Officer of the National Geospatial Intelligence Foundation, challenged the attendees to work to continue to be relevant as technology and applications evolve. John Correllus, the State's Chief Data Officer, and Stan Duncan, Council Chair, presented the "State of GIS in North Carolina." The program had 49 sessions with 178 speakers. Presentations are available online. The Herb Stout Student Awards brought 21 students from 12 college campuses, including Wake Technical Community College. Local government winners of Herb Stout awards were the City of Raleigh, Catawba County, and Forsyth County.

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 N.C. Society of Surveyors, the Mountain Region GIS Alliance, and the N.C. Arc Users Group. Nationally, the Council and committee members were among North Carolina participants in the Esri International Users Conference and the Urban and Regional Information Systems Association GIS Pro conference. CGIA represents North Carolina in National States Geographic Information Council activities, and staff attended a national summit for metadata.

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 .