North Carolina
Geographic Information Coordinating Council

Minutes
November 19, 2015

PRESENT
Chair: Stan Duncan. Members: Bob Brinson (co-chair), Dean Grantham (for Allan Axon), Jon Beck, Jay Bissett, John Correllus, John Cox, John Dorman, Ryan Draughn, Dianne Enright, Sarah Wray (for John Farley), John Gillis, Chloe Gossage, Derek Graham, Matthew Helms, Bliss Kite, Sarah Koonts, Dan Madding, Tom Morgan (for Elaine Marshall), Doug Newcomb, Josh Norwood, Kevin Parrish, Anne Payne, Alex Rankin, Hunter Robinson, Allan Sandoval, Ron York
Staff: Tim Johnson, CGIA

ABSENT
David Baker, Marc Burris, Kathryn Clifton, Joanne Halls, Twyla McDermott, Linda Millsaps, Sharon Rosado, Richard Taylor, and Joseph Sloop

PROCEEDINGS

A meeting of the Geographic Information Coordinating Council was held in Room 1211 of the State Employees Credit Union in Raleigh, North Carolina. Chair Stan Duncan called the meeting to order.

Chair Announcements
Mr. Duncan welcomed the Council and invited comments on this alternative meeting location.

Mr. Duncan welcomed back John Correllus to the Council as the designated representative for the State Chief Information Officer. Mr. Correllus served on the Council for ten years starting in 2000. He is the Director of the Government Data Analytics Center (GDAC). He expressed his gratitude for another opportunity to serve on the Council. Mr. Duncan added that he looks forward to the Council working with GDAC on common goals and initiatives.

Mr. Duncan welcomed guests Kristian Forslin of the North Carolina Railroad Company, a GIS professional engaged in statewide GIS coordination, and Chelsie Mitchell, a graduate of Appalachian State University invited by Hunter Robinson.

Approval of Minutes
The minutes of the August 13, 2015 meeting were approved with no changes.

Technical Presentation
(See "NGAT Program Overview Nov 2015" PPT file at GICC website - http://www.ncgicc.org/GICCMeetings.aspx)

Mr. Duncan introduced Kyle Snyder, Director of the NextGen Air Transportation (NGAT) Center, at the Institute for Transportation Research and Education, North Carolina State University. He reports to the State Chief Information Officer and represents the state on a federal advisory committee. Mr. Duncan observed the timeliness of the presentation today in the context of news this morning of the City of Chicago's adoption of an ordinance specifying a no-fly zone for unmanned aircraft systems (UAS). Mr. Duncan noted the growing applications of UAS outside and indoors for capturing images.

Mr. Snyder introduced his colleague, Darshan Divakaran, who is heavily involved in NGAT research. Mr. Snyder's longtime interest has been in applying mathematics and computer science to air transportation. He was educated at Catawba College and the University of Tennessee and has worked for NASA, private aeronautical firms, Georgia Tech, the Association for Unmanned Vehicle Systems International, Middle Tennessee State University, and now NC State University over the last three and a half years. He has specialized in UAS software development and program development during the last 15 years of his career.

In 2012 no one had permission to fly UAS in North Carolina under FAA rules. NGAT was launched in 2012 with leadership by NCDOT Division of Aviation. The goal is to develop a UAS "ecosystem" for North Carolina, including research, design, development, testing, production design, manufacturing, training, and policies.

NGAT began UAS flight operations in March 2013 at the Hyde County Airport. NGAT now has 20 active Certificates of Authorization (COA) with weekly operations at one or more sites. The center was established as an NC State University Consortium of academia, industry, and government agencies in 2015, created to provide a research and application-oriented, technology transfer-focused organization for conducting aviation technology development, investigations, and field trials.

NGAT is also a core member of the Alliance of System Safety of UAS through Research Excellence (ASSURE) and, in May 2015, was selected for the Federal Aviation Administration (FAA) UAS Center of Excellence research program for 5 years.

Mr. Snyder explained that NextGen systems are being built here in NC, are needed here and will fly here, including commercial applications. North Carolina's challenge is to support and manage UAS. NextGen Air Transportation features include:

- Satellite Based Navigation and Surveillance (not radar)
- Digital Data Exchange (not voice)
- Automation Assisted Air Traffic **Management** (not Air Traffic Control)
- Improved Weather Decision Tools
- Reduced Aircraft Environmental Footprint
- Improved Connectivity for Situational Awareness
- Increased Airspace Capacity
    - More airport utilization
    - Rise of personal aircraft

- UAS integration

More efficient use of air space with better safety is a goal of NextGen communications. UAS have been a small but growing part of NextGen.

Potential use cases for UAS include emergency response, mapping/aerial photography, homeland security, agriculture, mining, forestry, wildlife resources, transportation, investigation, drug enforcement, anti-terrorism, law enforcement, first responder support, weather research, disaster analysis, airport planning, entertainment, and insurance assessments. Package delivery will be part of the UAS industry. Also, affordable imagery from UAS will also help archeologists. For example, USGS captured imagery from a UAS after a sand storm at White Sands National Park and discovered fossilized wooly mammoth footprints that would have been undetected before the next movement of sand if it weren't for the imagery.

Building the "ecosystem" for UAS will engage engineers in universities and the private sector. NC has skilled people ready to build an industry here and higher education institutions for training. In deriving value from UAS, data analysis and reporting may be more demanding than flying and maintaining aircraft. Research in NC is focused on airspace integration, agriculture, surveying, control and communications, and airworthiness analysis. For example, NGAT works with NCDOT Photogrammetry to analyze imagery and ground control points in the Lake Wheeler Farm test location.

NGAT is the only agency with approval by the State Chief Information Officer to fly UAS at this time. NCDOT Aviation Division has a legislative mandate to manage licensing and permitting of UAS, and the division has taken on responsibility and is working on procedures and rules to be issued in 2016. Mr. Snyder emphasized that NC wants the capability and wants UAS companies to grow here. There are nine sites for launching UAS, and there have been more than 550 flights. The FAA wants to know about air worthiness, safety, and crew credentials, plus the State Chief Information Officer wants to know the purpose of flights and data collection and how data will be managed. Images captured by NGAT are public records.

Mr. Snyder explained UAS in-flight operations. Typical flight times are about 15 minutes. Flights are "line-of-sight" (one-half to one mile) that can be flown without restriction. A half-mile circle would cover about 200 acres. Battery operated UAS have limited flight times. Current FAA rules limit UAS weight to under 55 pounds. UAS communicates wirelessly to aircraft-specific ground control connected to a field laptop (mission management) and transmitter (to send data to cloud storage). NGAT is constantly documenting lessons learned from flights. He showed some imagery examples over the Lake Wheeler Farm (ground control) to inform flight path overlap requirements, and over the Vernon James Research Center to inform soils analysis. Elevation models may be created from the data collected.

Test flights included using the small consumer grade "Inspire" aircraft to simulate a property insurance application where an adjuster could view and analyze the condition of the roof of a building. In an example of student housing at NCSU, cracks in a dormer are evident. With more data, a 3-D rebuild of the roof is planned.

The Center of Excellence has a large team, strategically assembled for collaboration. Command and control is the focus. Its research on Surveillance Criticality for SAA – Low Altitude

Operations is designed to develop a safety assessment process to determine the contributions of technology, pilots and controllers in aircraft separation assurance and collision avoidance.

In 2016, NGAT and NCSU will provide structure for FAA mechanism/reporting, training to meet NCSU and NCDOT requirements, standard operating procedures/best practices, data management, and SMall Aircraft Research Teams (SMARTeams). NGAT will coordinate with FAA on a submitted Section 333 Exemption Request, and a statewide COA request that will be submitted before the end of October (Class G Airspace, 700' altitude, 8 aircraft types (all less than 20 lbs.), daylight operations only). NGAT will enable (1) applied researchers to conduct approved operations, (2) safe airspace integration in NC, and (3) more performance data for researchers (ASSURE).

Today, UAS operations are limited, with COAs limited to public agencies, Section 333 Exemptions available to private/commercial operators, and Special/Restricted Airworthiness Certificates available from FAA. There are hobbyists with small unmanned aircraft and related restrictions.

In the not-so-distant future, there will be Line-of-Sight Operations (Part 107 Commercial Rule for small UAS operations, and public agency operations), Limited Operations (COAs for public agencies), and more hobbyists using relatively inexpensive UAS.

The future will feature Part 107 Line of Sight Operations, Limited Beyond-Line-of-Sight Operations, and NextGen integrated airspace. Mr. Snyder expects commercial package delivery will be widespread in the future.

With FAA approval for a state agency, NGAT self-certifies a crew, including a private pilot on team for every flight to meet NGAT safety standards. About 30 companies in NC have FAA exemptions, but must meet a requirement for a pilot's license. FAA is defining new requirements, due before the end of 2015. Registration numbers for aircraft are anticipated.

To complete his presentation, Mr. Snyder shared a list of online resources (see presentation file).

In discussion, Mr. Robinson asked about "bad guys" who violate rules and use UAS for destructive purposes; the more sophisticated the UAS, the more valuable for valid purposes, but the more harmful it could be in the wrong hands. Mr. Snyder commented that standards committees are well aware of the issues. Technical security measures include tweaking the geo-referencing system to prevent flights within five miles of an airport without permission (consistent with rule), but a virtual shield is still a concept only. It is a challenge for policy, ethics and morality to keep pace with evolving technology.

Mr. Newcomb asked if NGAT's COA includes military airspace. Mr. Snyder confirmed that it does and explained, for example, the airspace over Hyde County Airport is managed by the US Marine Corps installation at Cherry Point, and NGAT notifies the base about flights. He is exploring options for cooperating with other bases. To his knowledge, there is not a map of all (federal, state, and local) restricted airspaces. FAA claims all airspace and "loans" it to the Department of Defense and others, meaning air space partnerships between parties (e.g., a university and a military base) are not valid.

Mr. Dorman, NC Emergency Management, described his agency's eagerness to get going with UAS, and has discussed partnering with other state agencies to take advantage of the capability once it gets approved. Chris Estes' report to the General Assembly, "Unmanned Aircraft Use in North Carolina" (March 2014) included a proposal for a governance board to oversee a UAS program. Mr. Snyder explained that the General Assembly did not act on the plan or proposed governance structure. Legislation enacted after the report directed NCDOT to take on responsibility for permitting and licensing. Other states that have initiated a UAS program have established an oversight committee and recommend doing so. Mr. Snyder offered to help state agencies coordinate oversight. Mr. Dorman added that law enforcement agencies need clear guidance on what is permissible under the law. Mr. Snyder suggested that communication is essential and added that NCDOT is working on communications as part of its program.

Mr. Johnson asked what NCDOT division or person has taken on the mandated responsibility for permitting and licensing. Mr. Snyder responded that the Aviation Division, headed by Bobby Walston, is leading the program. Chris Gibson is the UAS Program Manager.

Mr. Newcomb inquired if NGAT has done an assessment of various software tools applicable to UAS. Mr. Snyder has proposed that as a topic of discussion for a conference. The concept is to run a core dataset through commercial and open source packages and ask an analyst to assess the strengths and weaknesses. NGAT does not have experience with all available packages.

Jeff Essic, NCSU Library, asked if data from flights, e.g., imagery or videos, are available for consumers. Mr. Snyder answered that the data are public records but not yet available for distribution. He is looking to a consortium, including the Research Triangle Institute as a member, and a data usage committee to develop ways to share data. NGAT has intentions to get the survey data generated with NCDOT Photogrammetry and metadata to a website for access.

Mr. Duncan described a Wall Street Journal article about a Chinese company opening a flagship manufacturing facility in California to produce UAS priced from $400 to $3,500. Mr. Snyder added that retail stores already have UAS on their shelves for recreational users. There is an open source community to support hobbyists and students learning to operate a small UAS as a test platform. FAA is expecting around 1 million UAS to be sold over the holidays in the $400 to $1,000 range. However, for a commercial venture, a business platform should start with an aircraft like the Inspire aircraft starting around $3,500. He expects more technological advances in aircraft and cameras to generate more value for commercial applications.

Mr. Duncan observed that there is public concern about UAS related to privacy. UAS are now affordable, accessible tools for citizens to invade the privacy of others and do things they should not do. This can relate to businesses, too. For example, North Carolina has had publicized issues with UAS involved in private surveillance of livestock operations. He sees a challenge in protecting privacy while applying UAS for beneficial purposes including economic development. Mr. Snyder added that there are laws relating to tracking cars, unapproved sharing of information, and other privacy concerns. The aircraft is not the problem, it is how the data are used. The State has done a good job in not restricting aircraft and focusing on the data side of the technology. NCDOT plans to assure that users understand NC laws related to UAS. Laws prevent UAS from sneaking up on someone, considering the landowner permission needed for takeoff and landing and line-of-sight restrictions in flight.

Mr. Dorman expressed concern that it will be hard to keep laws current with the technology. For example, in a scenario where a local government responds to a 911 call using a UAS, some unrelated violation on private property in the vicinity of the emergency call may be apparent from images captured. Are the images admissible evidence? Legal issues may limit the use of data from UAS technology.

Mr. Dorman also raised the issue of data captured by aerial cameras qualifying as authoritative data with specified accuracy and therefore needing to be sealed by a licensed surveyor. His understanding is the public safety data or multiple parcel data should be treated like the data captured by digital sensors on piloted fixed wing aircraft or surveyed on the ground.

In response to a question from Mr. Helms, Mr. Snyder explained security protocols applied before launch. Broadband interference can be factor.

Ms. Kite's question about the coolest or most surprising thing Mr. Snyder has seen brought up the footprints of the wooly mammoth visible in White Sands National Park. Also, from NGAT work, capturing data to represent the student housing that revealed cracks in the building was surprising.

In response to a question about local government regulation of UAS, Mr. Snyder confirmed that North Carolina counties and municipalities have authority to enact ordinances that regulate UAS operation in their jurisdictions. The 2014 legislation includes a provision permitting local governments to pass additional regulations if necessary. Also, federal restrictions by the National Oceanic and Atmospheric Administration (NOAA) and US Fish & Wildlife Service may apply in coastal areas.

In a scenario in which a public safety answering point requests funding from the NC 911 Board to purchase UAS, Mr. Snyder suggested the Board direct the local agency first to NCDOT Aviation Division to discuss plans and requirements. Second, an oversight organization, not yet in place, would need to know about plans and keep local officials informed.

Committee Reports

Statewide Mapping Advisory Committee (SMAC). Ryan Draughn, SMAC chair, reported that the SMAC had a productive meeting on October 14. SMAC approved a recommendation from the NC Board on Geographic Names to name a waterbody in Cary "Maynard Pond." SMAC assigned two of its working groups to update Council adopted data content standards for parcels and street centerlines (both approved in 2005). The Working Group for Seamless Parcels and the Working Group for Roads and Transportation will apply experience in the NC Parcels Project and NCDOT's road integration projects, respectively, to refresh the standards.

Also, the Metadata Committee, chaired by Sarah Wray, is making progress. Ms. Wray added that the Metadata Committee is moving ahead on updating recommended practices applying ArcGIS software, the most prevalent GIS software in state and local government. Dr. Mulrooney and NC Central University (NCCU) students have updated the user guide for ArcGIS. NCDOT has updated a sample metadata file as well. Outreach occurred at fall conferences, with good receptions and more volunteers to support the effort. NCDOT plans to pay for a graduate student intern from NCCU to help coordinate curriculum, training materials and sessions. Ms. Wray confirmed that Minnesota and

other states are interested in NC's work, and Virginia has materials that are adaptable to NC's metadata training.

Mr. Draughn called on Gary Thompson for an update on the 2022 Reference Frame issue. Mr. Thompson is working with Tim Johnson to establish a working group to review and make recommendations regarding the National Geodetic Survey's proposed 2022 Reference Frame to replace horizontal and vertical datums now in use. A working group charter is under development. He added that the "LightSquared" issue (plans by a private company to use frequencies related to Global Positioning Systems, apparently resolved in 2014 after much comment including a recommendation from the Council to not let LightSquared developments impinge on GPS) may be resurfacing. Letters are not needed at this time.

At Mr. Duncan's invitation, Mr. Thompson also gave a brief update on reestablishment of the North Carolina-South Carolina border. He confirmed that survey work is complete and legislation was introduced in both states to minimize the impact on citizens in locations along the border where adjustments in the boundary line changed the state of 19 residences or split 50 properties. Neither state passed the legislation in their respective 2015 sessions. Discussions about property tax issues and title language are in progress. Mr. Duncan emphasized the need for a facts-based solution.

Local Government Committee (LGC). No report.

State Government GIS Users Committee (SGUC). Dianne Enright, SGUC Vice-Chair, reported that SGUC again coordinated GIS Day in Raleigh (yesterday) with Wake County and the City of Raleigh GIS units. The open house event at the City of Raleigh Museum was attended by about 130 people and had good participation by local governments and state agencies (Agriculture and Consumer Services, Wildlife Resources Commission, State Property, Environmental Quality, Commerce, Public Health, and CGIA). Poster winners were from The City of Raleigh (stormwater drainage and the built environment, and food truck locations) and Wildlife Resources Commission (trout fishing). Interactive displays were available as well. Next year the intention will be to involve more students in the event. Mr. Duncan described the Hendersonville GIS Day (today) that involves three schools.

***Federal Interagency Committee (FIC*).** Doug Newcomb, FIC chair, reported that FIC met in Asheville in August featuring a presentation on forest threats by the US Forest Service. The efforts include a systematic assessment of vegetation health using satellite imagery updated every eight days. Change detection is effective in locating areas of concern for forest health. The Forest Service also gave a presentation on acidity in mountain streams and reported that conditions have improved since Clean Air Act regulations related to acid rain took effect. FIC also met on October 27 and learned more about the Environmental Protection Agency's land cover mapping (from National Agriculture Imagery Program imagery) and about field data collection related to the Asian Gypsy Moth by researchers in the federal Department of Health and Human Services. Also, FIC identified an issue concerning Census boundary data and boundaries used in transportation planning related to Federal Highway Administration funding that will be addressed by FIC.

GIS Technical Advisory Committee (TAC). Dan Madding, TAC chair, reported the TAC is working on a document for recommended practices for mobile devices and geospatial data. The draft is based on work by the Urban and Regional Information Systems Association (URISA), but needs to be refined to reflect practices in this state. The committee is seeking more information from users of GIS-related mobile applications; Mr. Madding invited contact.

Management and Operations Committee (M&O) and NC OneMap Governance Committee. To begin his report, Mr. Duncan called on Bob Coats, the Governor's Census Liaison, for an update on preparation for Census 2020. The redistricting program will begin with release of QGIS software in December to assist local governments with the Block Boundary Suggestion Program as well as redistricting. The deadline for the redistricting phase is May 2016. Boundary and Annexation Survey updates will be included in local processes in parallel. Meanwhile, the Census Bureau now has an open data portal. The Census Bureau and the State Data Center hosted a "hackshop" event in Wilmington, NC on November 6-7 on the topic of emergency response and open data. Hope Morgan of NC Emergency Management was one of the subject matter experts guiding local application developers in creating tools to create new ways to display information. The exercise produced some useful apps and a better understanding of possibilities to supplement state and local emergency management data systems. Mr. Coats looks forward to planning similar events across the state.

Mr. Morgan added that the Boundary and Annexation Survey is being improved by the Boundary Quality Assessment and Reconciliation Project (BQARP) in which North Carolina is assisting the Census Bureau. Municipal boundaries and annexations in 20 to 25 counties have been processed to date. The reconciliation can be complex; for example, since 2000, Mooresville has had about 300 annexations. The Secretary of State is changing its workflow regarding receipt of annexation information from municipalities to be sure NCDOT receives information to update the Powell Bill municipal boundaries.

Mr. Duncan emphasized the value of achieving a full population count within correct jurisdictional boundaries, and the value of accurate locations of business operations within jurisdictions to assure fair tax collection and distribution.

Mr. Duncan added that M&O Committee has worked to produce a concise Annual Report that reflects legislation passed in 2015 and focuses on accomplishments and plans. Highlights include progress on implementing a new metadata standard and completion of a four-year cycle of statewide orthoimagery and approval by the NC 911 Board for another four-year update.

Statewide Orthoimagery Program Update

Tim Johnson provided a brief update on the Statewide Orthoimagery Program. CGIA is preparing the portable drives containing 2015 imagery products to be delivered to Public Safety Answering Points at regional meetings in mid-January. The project is in the midst of the Qualifications-Based Selection process for contractors to acquire imagery in 2016 in the coastal region. Contracts will be negotiated by mid-December. Flights over military bases are being well coordinated with military branches and General Wilson, the new Secretary of Military and Veterans Affairs for North Carolina, enabling flights over the entire 27-county coastal region.

NC OneMap Update

No report.

GICC Member Announcements

Mr. Newcomb announced that the Open Source Geospatial Foundation decided to hold its North American conference for open GIS next year in Raleigh, May 2-5. A call for presentations and information about the conference are available https://2016.foss4g-na.org//.

Ms. Wray announced that Raleigh is hosting the GIS in Transportation Symposium April 4-7, 2016. Abstracts for presentations are invited as soon as possible. She is the local liaison for the national conference sponsored by the American Association of State Highway and Transportation Officials.

ADJOURNMENT

There being no other business, the meeting was adjourned at 2:56 PM. The schedule for 2016 meetings will be finalized and distributed soon.

Presentations and reports are on the Council Website: http://www.ncgicc.org/GICCMeetings.aspx. Click on "GICC Meetings" and navigate to November 19, 2015 and the column on the right for presentations and documents presented during the meeting in a downloadable zip file.