

# NCGA: House Committee on UAS

## The NC UAS Program Overview

**1/21/2014**

Kyle Snyder,  
NGAT Center Director



**NC STATE UNIVERSITY**

# Agenda

- Background
  - NextGen
  - UAS technology
  - Overall market
- NGAT Center
  - Overview
  - History
  - Structure
  - Research
  - Statewide integration
- Building a UAS Ecosystem
- Infrastructure
- Flight Operations
- Current Plans



# NextGen Aircraft



**Boeing 787-8**  
**197 ft Wingspan**  
**Weight 500,000 lb**



**General Atomics MQ-9, Reaper**  
**66 ft Wingspan**  
**Weight 10,500 lb**



**HondaJet**  
**40 ft Wingspan**  
**Weighs 9,200 lb.**



**Cirrus SR22**  
**38 ft Wingspan**  
**Weighs 2,300 lb.**



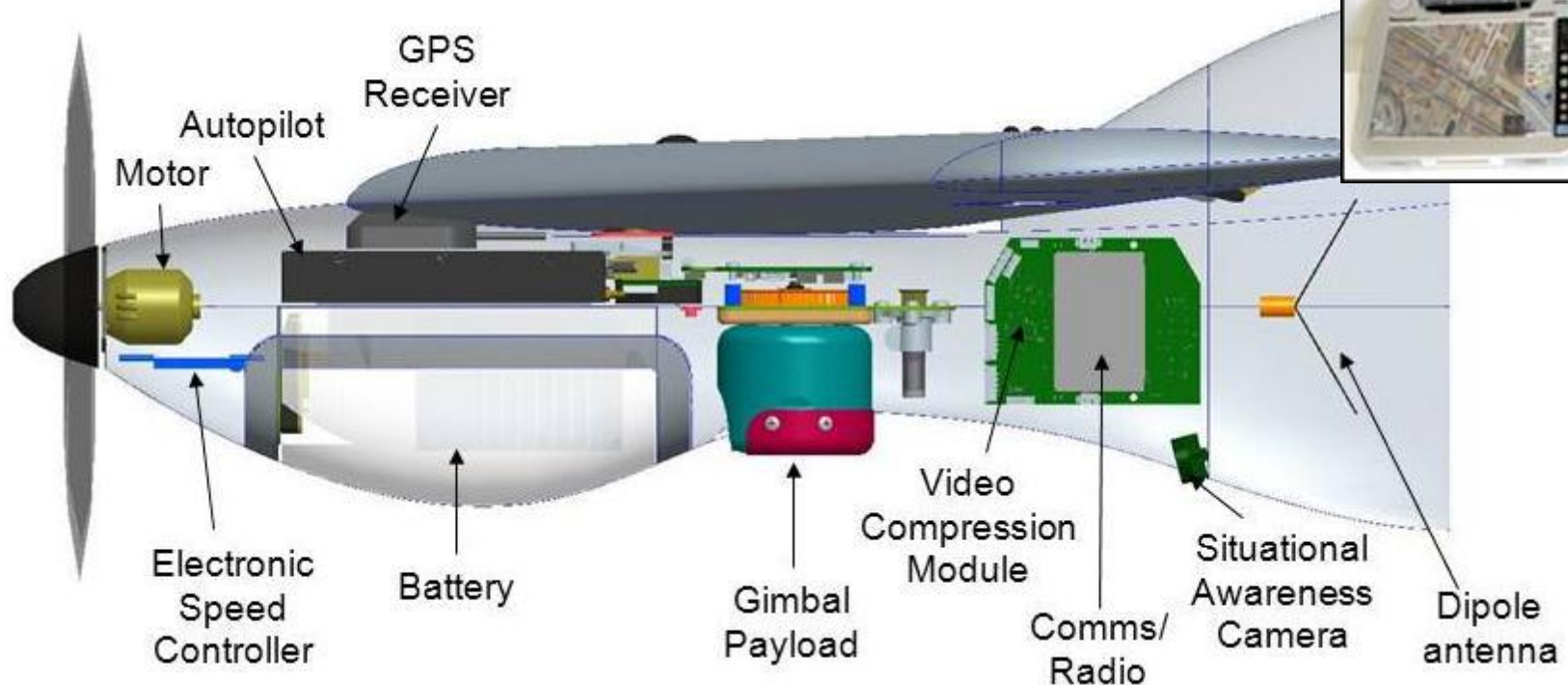
**Terraugia**  
**30 ft Wingspan**  
**Weighs 1500 lb.**



**Super Swiper**  
**6 ft Wingspan**  
**Weighs 9 lb.**

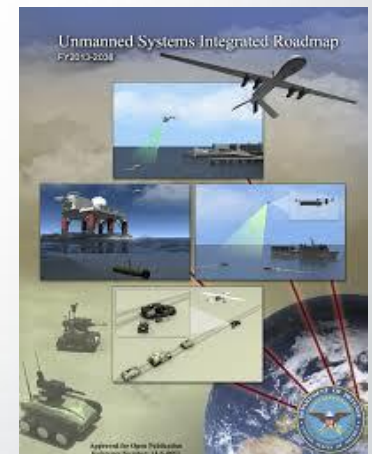
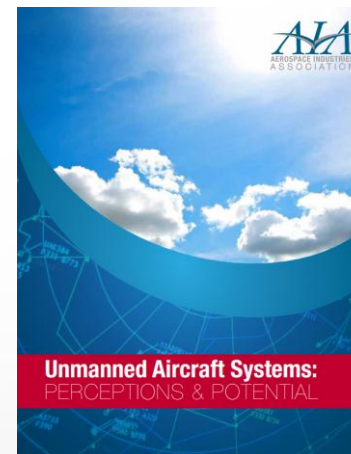
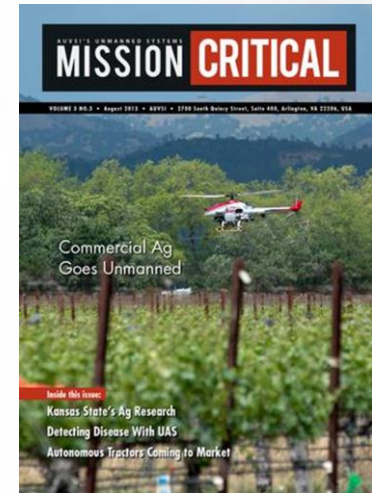
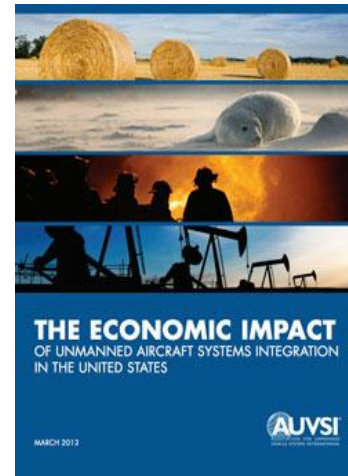
# UAS Component Breakdown

- 1- Camera/Gimbal
- 2- Propulsion
- 3- Ground Control Station
- 4- Flight Control System
- 5- Communication System
- 6- Airframe



# UAS Market

- Jobs
  - 100,000 nationally by 2025
  - 785 by 2017 | 1,160 by 2025 in NC
  - \$11B annual spending over next decade
  - \$89B total spending over next decade
- Education / Training
  - Traditional Colleges /Universities
    - Aerospace Engineering
    - Aviation Operations
    - Technical
  - For-profit
  - Manufacturers
  - DOD
- “More than 25,000 “field” or agriculture robots will be sold by 2015 — about the same as robots for military use, according to the International Federation of Robotics.”



# UAS Applications



Border Security

Arctic Research

Firefighting

Flood Monitoring

Crop Dusting

Mining

Farming

Aerial Photography

Real-estate

Communications

Industrial Logistics

Pollution Monitoring

Storm Research

HAZMAT Detection

Asset Monitoring

Event Security

Port Security

Construction

Cargo

Broadcasting

Search & Rescue

Volcanic Research

Pipeline Monitoring

Filmmaking

Crowd Control

Aerial News Coverage

Wildlife Monitoring

Forensic Photography

Power line Surveying

Damage Assessment



# The UAS Landscape

- FAA
  - No commercial operations allowed
    - 2 Restricted Type Certificates granted for Arctic ops
  - Certificate of authorizations (COAs) are waivers
    - 5 types
    - 537 active, Academia now #1
    - Airworthiness + Location + SOPs
  - Test Site decision 12/30/13
    - ND, NV, NY, AK, TX, VA
  - “NextGen” transition over next 10 years
  - Privacy responsibility by default
  - More interest in autonomy
  - Nov 2014- FAA Release of small UAS NPRM (Part 107)
  - Sept 2015- Congressional integration goal
- DoD
  - Drawing down from theater
  - Contract services for UAS management/operations
  - Many systems of multiple sizes
  - Returning interest in autonomy
- Industry
  - Global
  - Traditional contractors, start-ups
  - Services, manufacturing, integrators, components
  - Needs multi-disciplinary talent!
- Academia
  - Developing degree, certificate, private (for profit) training programs
  - Sponsoring COAs for wide range of research
- Hobbyists = recreational

## NGAT Center: Overview

*Mission: to discover, evaluate, implement, and disseminate advanced air transportation technologies at the regional, national, and international level to improve the capacity, safety, and environment surrounding air transportation.*

### Goals:

1. Unify the UAS/RPA community across NC.
2. Develop a complete UAS lifecycle support capability native to NC for statewide integration.
3. Position NC as a NextGen early adopter for FAA evaluations, technology fielding, and user deployment.
4. Serve as a regional Knowledge Center for UAS and air transportation modernization activities.
5. Secure a position on the winning 10-year FAA UAS Center of Excellence team.

# NGAT Center: Brief History



# NGAT Center: Structure

- Organizational
  - Leadership: NGAT
    - ITRE → ORIED → NCSU
    - DOT-Aviation Division
    - State CIO
  - Staff
    - NGAT Center Director- Kyle Snyder
    - NGAT Flight Operations Manager- Tom Zajkowski
    - NGAT Airspace Consultant- Randy Breedlove
- Funding
  - To Date
    - NCDOT- approx. \$1,000,000
    - GoldenLeaf- \$200,000
    - NC State- \$100,000
  - Planned
    - NC Legislature (via NCDOT)- \$2.5M (2014, 2015)
    - Memberships- \$100,000 (2014)
    - Sponsored Research
      - NCDOT- \$250,000 for Inspection Tool
      - NSF NRI- \$200,000/yr for 3 years for Training and Autonomy Research
      - FAA UAS Center of Excellence- \$50,000 (2014), \$250,000 (2015)



# NGAT Center: Business Model

## From North Carolina

- NCDOT- \$1,000,000
  - Labor for program development, airspace research
  - Support for UAS Test Site Proposal
- NCSU- \$100,000
  - Labor support for program development, airworthiness inspections
- UAS Test Site Program Development (2014-2015) (\$2.5M from NCGA in July 2013)
  - Infrastructure/facilities development- ~\$1M
  - Services to support flight operations (flight crew, range crew, engineering)- \$1M
  - Program Management- marketing, recruitment, coordination- \$0.5M

## From Golden Leaf

- \$200,000- Equipment for Operation: Fly Gull Rock research

## Industry Membership Program (Full- \$25K, Associate- \$5K)

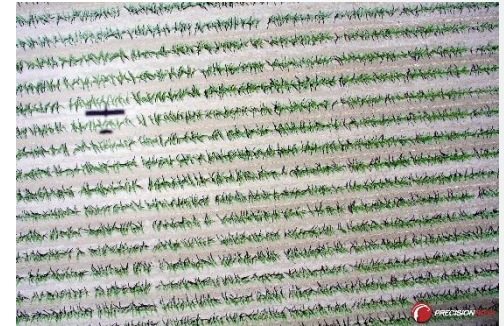
- \$100,000 membership dues in 2014
- Access to flight test facilities
- Ability to sponsor research directly with university
  - \$100,000 (2014), \$500,000 (2015)
- Shared IP rights
- *Access to incubator\**

## UAS Services

- *Pilot Program test and evaluation*
- *Airworthiness Analysis for all future operations by state agencies*
- *Sponsored Research*

# NGAT Center: UAS Research

- Operational Safety
  - Airspace Integration- manned and unmanned sharing airspace
  - Communications, procedures, technologies (sense and avoid)
- Training
  - Education requirements
  - Licensing and certification standards
  - K-12 STEM integration
- Policy (**collaboration with SCIO**)
  - National and state requirements
  - Data management
  - Privacy protection
- Applications
  - Agriculture- aerial imaging (crop health), aerial application
  - Small area surveys- mapping, 3D modeling, remote sensing
  - Wildlife/herd management
  - Public Safety- infrastructure inspections, emergency response
  - Cargo delivery
- Scientific
  - Autonomy development- robot-vehicle collaboration, human-machine collaboration
  - Data (imagery) analytics



# NGAT Center: Statewide Integration

- Dept. of Public Safety
  - Emergency Management- preparedness, response
  - GIS- mapping, surveys
  - Search / Search and Rescue
- Dept. of Environment and Natural Resources
  - Forestry
  - Agriculture
  - Wildlife Resources
- Dept of Transportation
  - Small area surveys, Photogrammetry
  - Construction and Structures- Infrastructure inspections
- NC National Guard
  - Counterdrug
- State Bureau of Investigations
  - Law Enforcement
- Commercial Industries
  - Survey
  - Aerial Photography
  - Contract services



***Any state agency  
operation requires  
approval from SCIO***



# Building a UAS Ecosystem in NC

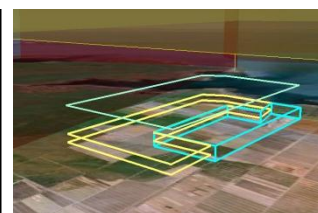
User Capability Requirements



Initial Design and Development



Testing



Sustainment / Maintenance



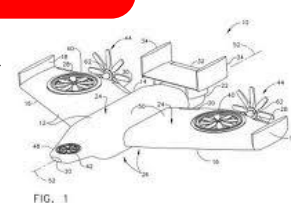
Fielding



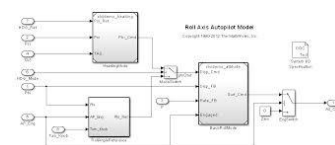
Manufacturing



Production Design

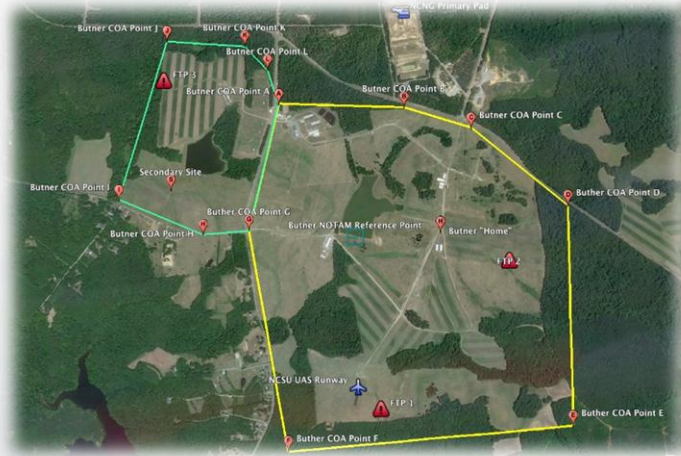


Training



# Current UAS Flight Locations

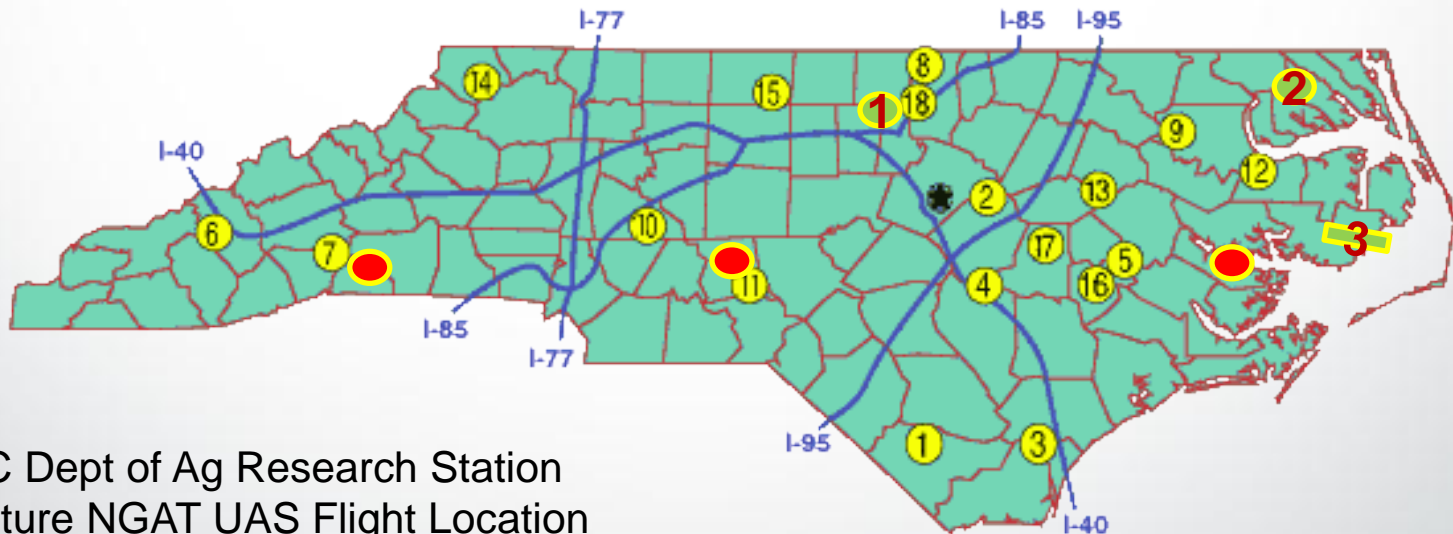
1- Butner



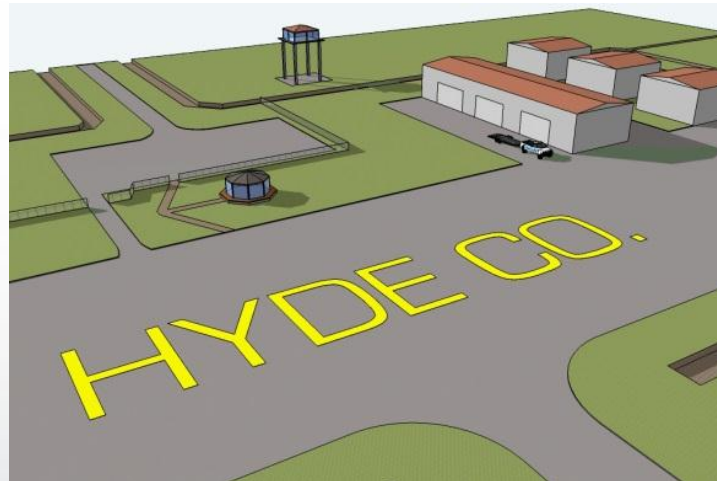
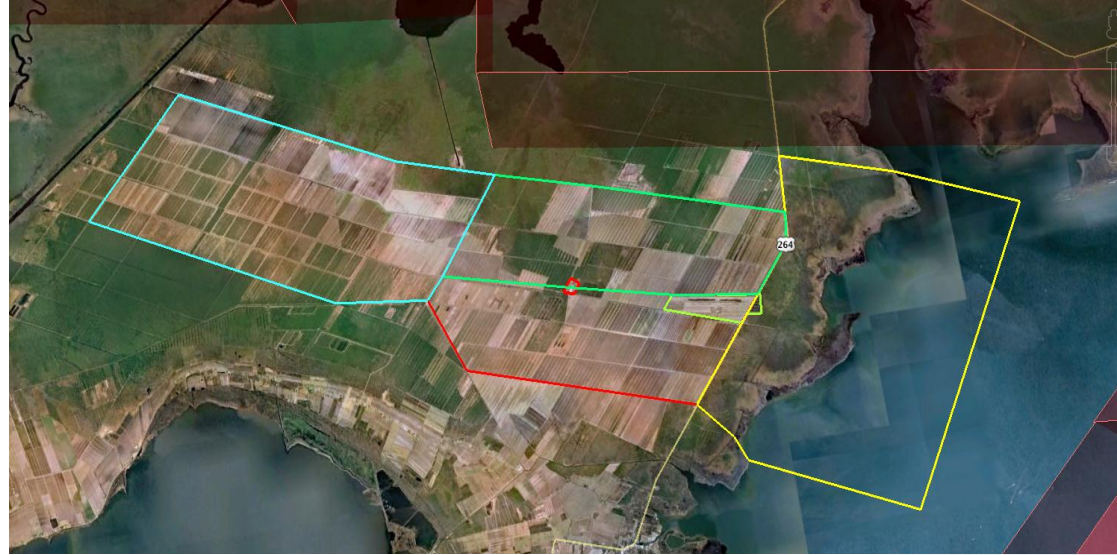
2- Caratoke (Moyock)



3- Hyde County



- NC Dept of Ag Research Station
- Future NGAT UAS Flight Location



# Gull Rock Test Site (GRTS)

## Economics\*

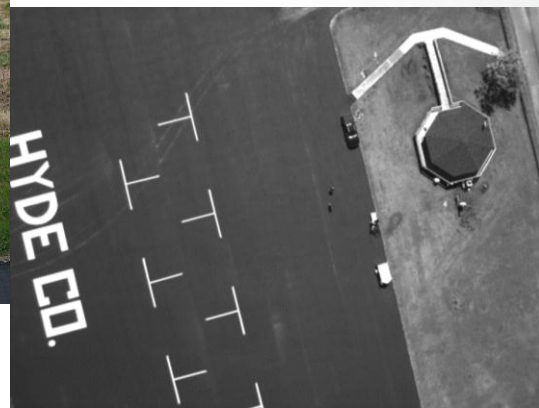
- Section 1: Test Site Impact to Hyde County
- Section 2: Test Site Impact to **NC** in 2025

\* Data from the GRTS Proposal: Economic Impact Volume. Analysis provided by NC Department of Commerce.

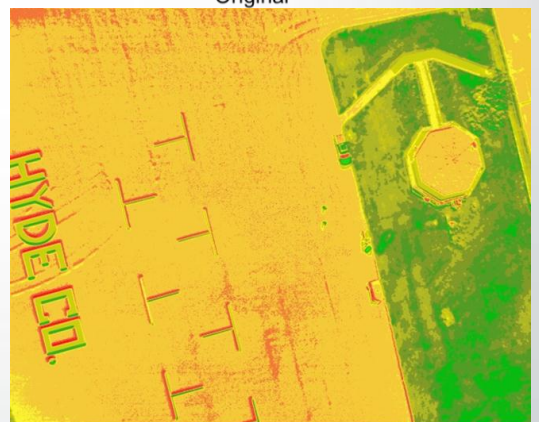
Analysis Results: Economic Impacts of Gull Rock Test Site on Hyde County				
		Employment	Labor Income	Value Added
Start Up	Direct Effect	19	\$638,536	\$723,019
	Indirect Effect	1	\$43,986	\$83,566
	Induced Effect	2	\$46,039	\$125,443
	<b>Total Effect</b>	<b>21</b>	<b>\$728,561</b>	<b>\$932,028</b>
Annual Operation	Direct Effect	9	\$1,026,228	\$1,127,801
	Indirect Effect	2	\$82,940	\$124,530
	Induced Effect	3	\$72,939	\$198,281
	<b>Total Effect</b>	<b>13</b>	<b>\$1,182,107</b>	<b>\$1,450,612</b>

Analysis Results: 2025 Projected Range of Gross Domestic Product			
Expansion Scenarios			Total Effect on GDP
1	Services and MFG	Services & MFG Baseline	\$24,882,000
		5 companies	\$74,410,000
		10 companies	\$148,820,000
		20 companies	\$606,193,000
2	Services	Services Baseline (213 jobs)	\$24,173,000
		5 Companies	\$64,994,000
		10 Companies	\$129,987,000
		20 Companies	\$483,459,000
3	Manufacturing	MFG Baseline (21 jobs)	\$1,883,000
		5 Companies	\$9,416,000
		10 Companies	\$18,832,000
		20 Companies	\$37,665,000

## NGAT 2013 Flying



Original



NDVI

## Where Are We Now? (1)

- NGAT
  - COAs
    - 5 active
    - 9 under development
  - OFGR 2014 Research Schedule under development
  - FAA UAS Center of Excellence Proposal (RFP FYQ1 2014)
  - Membership Program launch spring 2014
  - 2014 Workshop TBD
  - UAS Education Assessment Initiative to start spring 2014
- Existing Companies
  - Blue Force Technologies
  - Precision Hawk
  - Bird Aerospace
  - Vx Aero
  - Bosh Global Services
  - Academi
  - L-3 STRATIS
  - Carolina Unmanned
  - Aerobot Services
  - Duncan Parnell
  - VetDS
  - HondaJet\*

## Where Are We Now? (2)



- Interested Companies

- Bosh Precision Ag
- Simulyze
- VTOL Dynamics
- **KSI Video**
- **Olaeris**
- ESUS Inc
- Terra Flight
- Dunan Systems International
- Adaptive Aerospace Group
- Raytheon
- L-3 Unmanned Systems
- Aerovironment

- Why

- **Workforce**
- Infrastructure
- Natural resources / Location
- Knowledge- domains, regulations, how to be successful
- **Leadership-**
  - People
  - Desire
  - Integration

# For More Information



Contact:

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*It is not really necessary to look too far into the future;  
we see enough already to be certain it will be magnificent.  
Only let us hurry and open the roads.*

- Wilbur Wright

# The Next 24 Months

UAS COE Proposal Dev

FAA UAS Center of Excellence Research

NSF Training and Autonomy Research Project (Hyde, Butner)

Governance  
Plan Due to  
NCGA

NC DOT UAS Inspection Tool Research Project (CF Lab, PRG COA, Butner COA)

NC EM Exercise Dev

NC EM Exercise Dev

1<sup>st</sup> Results Report

2<sup>nd</sup> Results Report

OFGR@ Hyde

OFGR@ Hyde

Membership  
Program Dev

Hyde Flight Ops

Butner Flight Ops

Caratoke Flight Ops

UAS COE RFP  
Released

UAS COE  
Industry Day

UAS CoE  
Proposals Due

UAS CoE  
Announcement

sUAS NPRM Release

NGAT-FAA  
Strategy Session

Jan '14

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Jan '15

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NGAT Spring  
Reception

AUVSI Conference  
Orlando, FL

NGAT Fall  
Reception

NGAT Public  
Demo Day

NC UAS Workshop  
Raleigh, NC

AUVSI Conference  
Atlanta, GA

NGAT Fall Reception

Anticipated FAA Activities

Goldenleaf Foundation  
Operation: Fly Gull Rock  
Related Activities

NGAT-Member  
Research Activities

NGAT State  
Integration Research

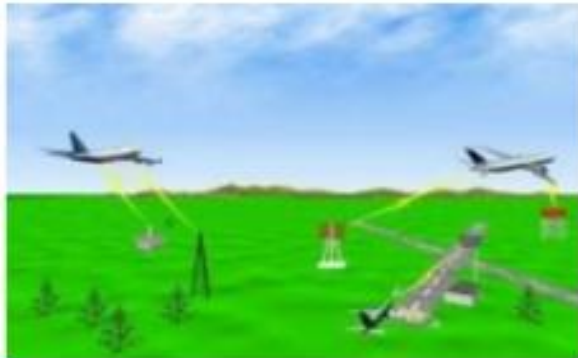
Sponsored Research

NGAT Events

# NextGen: Improving Efficiency and Capacity

## Today's National Airspace System

Ground-based Navigation and Surveillance  
Air Traffic Control Communications By Voice  
Disconnected Information Systems  
Air Traffic "Control"  
Fragmented Weather Forecasting  
Airport Operations Limited By Visibility Conditions  
Forensic Safety Systems



## NextGen

Satellite-based Navigation and Surveillance  
Routine Information Sent Digitally  
Information More Readily Accessible  
Air Traffic "Management"  
Forecasts Embedded into Decisions  
Operations Continue Into Lower Visibility Conditions  
Prognostic Safety Systems



*The transition to NextGen has already begun.*



Federal Aviation  
Administration