Virginia Unmanned Systems Center at VIPC

Tracy Tynan

Director

Virginia Unmanned Systems Center at VIPC

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Connecting Innovators with Opportunity

Technology Takes Flight: Advanced Air Mobility (AAM)

Virginia Unmanned Systems Center at VIPC

- **Tracy Tynan** – Director, VA Unmanned Systems Center at VIPC
- **Nicholas Devereux** - Policy and Government Affairs, WING
- **John Eberhardt-** Chief Technology Officer at ATA LLC
- **Nick Sabo-** Manager of Winchester Airport
- **Chris Sadler** –Director of the Public Safety Innovation Center at VIPC

What is AAM?

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Advanced Air Mobility (AAM) is an air transport system concept that integrates new, transformational aircraft designs and flight technologies into existing and modified airspace operations.

Types of Advanced Air Mobility Vehicles in development

- **Small Unmanned Aircraft Systems (sUAS)**, also popularly known as drones or Unmanned Aerial Vehicles (UAVs), for videography, small package delivery and pick-up, transfer of medical supplies, etc.
- **Electric Vertical Take-Off & Landing (eVTOL)** designs focus in the areas of on-demand air taxis, airport passenger transfers, patient transfers, rooftop-to-rooftop cross-town trips, and more. Some eVTOL have onboard or remote pilots; others have "self-driving" automated navigation.
- **Electric Conventional Take-Off & Landing (eCTOL)** aircraft are used for short-range trips, small cargo deliveries, and passenger transfers from regional and rural airstrips.
- **Hybrid STOL** –vehicles that utilize a short runway, 100 feet+ and a hybrid fuel source of electric and jet fuel.

Types of Drones

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ELECTRA *Headquartered in VA*

Electra's hybrid eSTOL design delivers the flexibility of a helicopter combined with the superior operating economics of a fixed wing for clean, quick access to final destinations.

Electra's quiet, low-emissions eSTOL aircraft is currently designed to transport nine passengers and a pilot or 1800 pounds of cargo up to 500 miles in all weather conditions. Electra's technology delivers 2.5x the payload and 10x longer range at 70% lower operating costs than vertical takeoff alternatives.

800 units are on the order books.

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Aurora (now a Boeing Company) in Manassas

Aurora is proud to work with WISK . We are supporting Wisk as they design, certify, and bring a self-flying electric vertical takeoff and landing (eVTOL) aircraft

Centaur provides a versatile airborne sensing platform for a range of mission types including defense, intelligence, law enforcement, and environmental research. **Centaur can be operated from a remote ground control station, with or without an onboard pilot**.

Jaunt's *Journey* and Beta's *Alia*

Jaunt is interested in Virginia and has targeted 2026 for EIS, has 220 orders, with largest current customer being a provider in Canada called Vertiko Mobility.

- Based out of Dallas.
- The Jaunt Journey is the world's first aircraft combining helicopter and airplane flight capabilities.

Beta Technologies' electric Vertical Takeoff and Landing (eVTOL) aircraft to land on-property at UPS facilities in small and mid-size markets.

- 50-foot wingspan and a tall V-shaped tail
- Uses four propellers to lift like a drone and a fifth to fly forward like a plane.
- Can carry six people or three pallets of cargo up to 250 miles, powered entirely by rechargeable electric batteries.

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Investing in the Future

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Several states have committed significant resources to position themselves for growth in AAM

More than 10 “vertiports” are planned to connect major cities in Florida

North Carolina General Assembly awarded a $5 million grant for the design and development of an advanced air mobility system in Winston-Salem

An $8.2 million National Advanced Air Mobility Center of Excellence is under construction in Springfield, Ohio, and will open next year

Wisk Aero and the City of Long Beach are partnering to make AAM a reality in Southern California

United Airlines to Buy 200 Flying Electric Taxis to Take You to the Airport. Airline plans to buy vehicles from startup Archer for $1 billion

Current UAS State Policy Landscape

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Policymakers at all levels of government generally support expansion of the UAS industry.

However, they are concerned about the safety and privacy of their constituents.

STRENGTHS:	WEAKNESSES:
• State/local governments generally support the growth of the unmanned systems industry. • Government agencies are quickly adopting the technology to support/enable services. • 15 state-level drone laws, with more states considering it.	• State/local governments continue to propose laws contrary to federal jurisdiction and regulation. • Overly restrictive privacy and trespassing laws are affecting airspace access. • Patchwork of laws confuses operators and jeopardizes air safety.
OPPORTUNITIES:	**THREATS:**
• Anticipated federal regulation on flights over critical infrastructure will delegate expanded role for state/local • UAS Traffic Management (UTM) systems will collaborate with state/local to determine air routes. • Advanced Air Mobility (AAM) will build on success of UAS to expand air service in communities	• Increased state/local authority without federal oversight could reduce airspace access. • Automation and robotics are perceived by some as threat to jobs. • Accident/incident would set back industry if not managed effectively.

Virginia Unmanned Systems Center at VIPC

For more Information about the Unmanned Systems Industry, please contact:

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Introduction to Wing

Virginia Association of Planning District Commissions (VAPDC)

July 2022

Safety

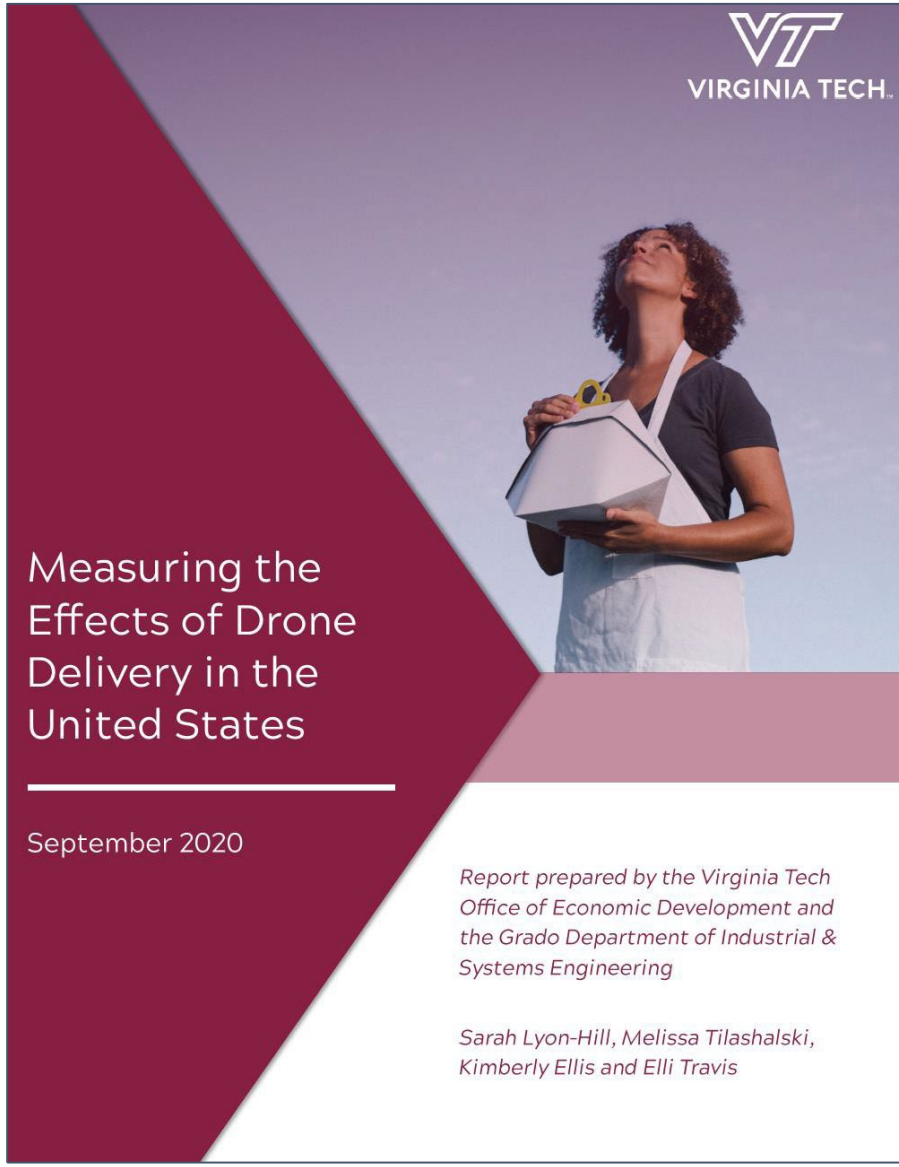
Wing's service makes communities safer

- Drone delivery is safer than alternative transport methods of getting goods to people
- A single metro area can avoid up to 580 car crashes per year

Environment

Wing drones are electrically powered, offering zero emissions capability

- 94% lower emissions/package than car delivery
- A single metro area can avoid up to 294M miles in road use, easing traffic congestion & saving



Economic Opportunity

- **Connect local businesses** with 4 times as many customers
- **Increase sales** for local businesses by 50-250%
- Potential to be least expensive form of delivery in cities -- could be used by nearly everyone of any means

Equity & Removing Barriers

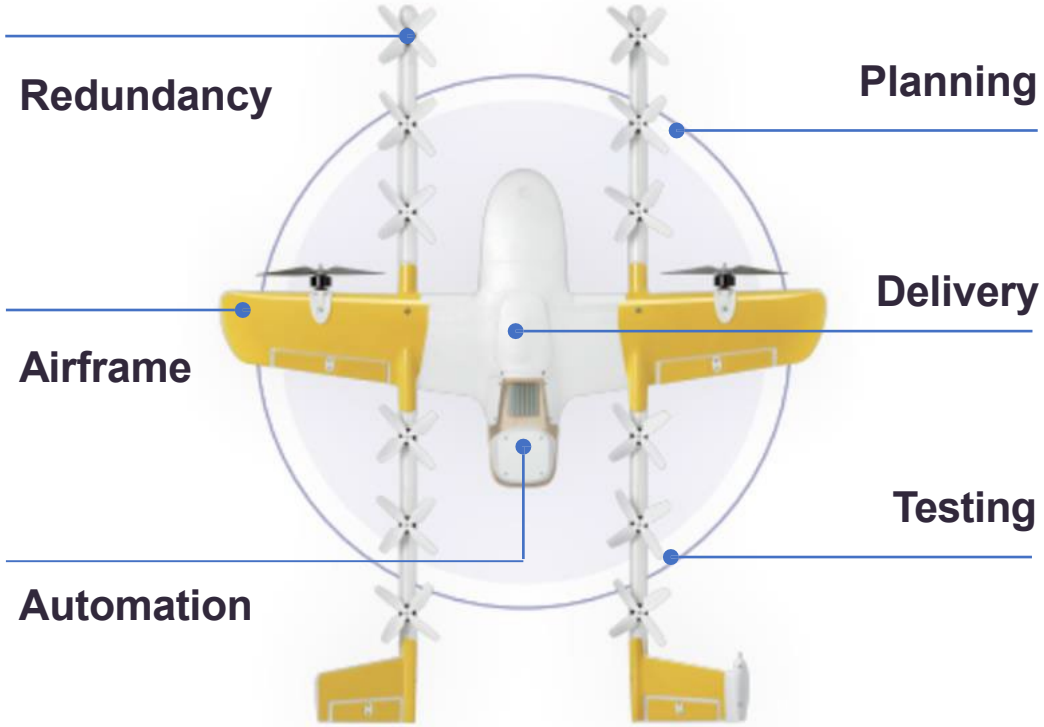
- In a single metro area, can **improve access to medicine and food** for 66,000+ residents with mobility challenges

Currently operating on three continents

- Over 250,000 deliveries to thousands of real customers
- Use of service grew 500% in 2020, more again in 2021

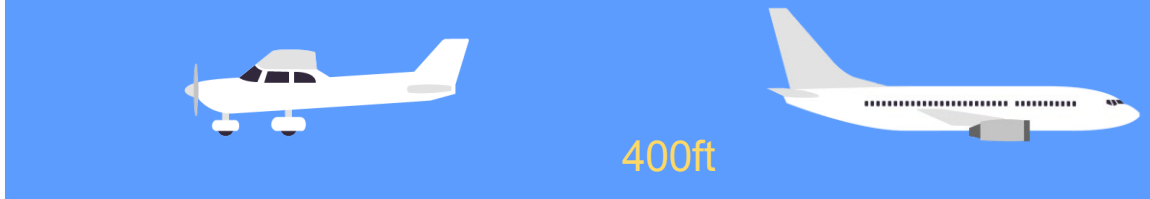
Safety is Wing's first priority

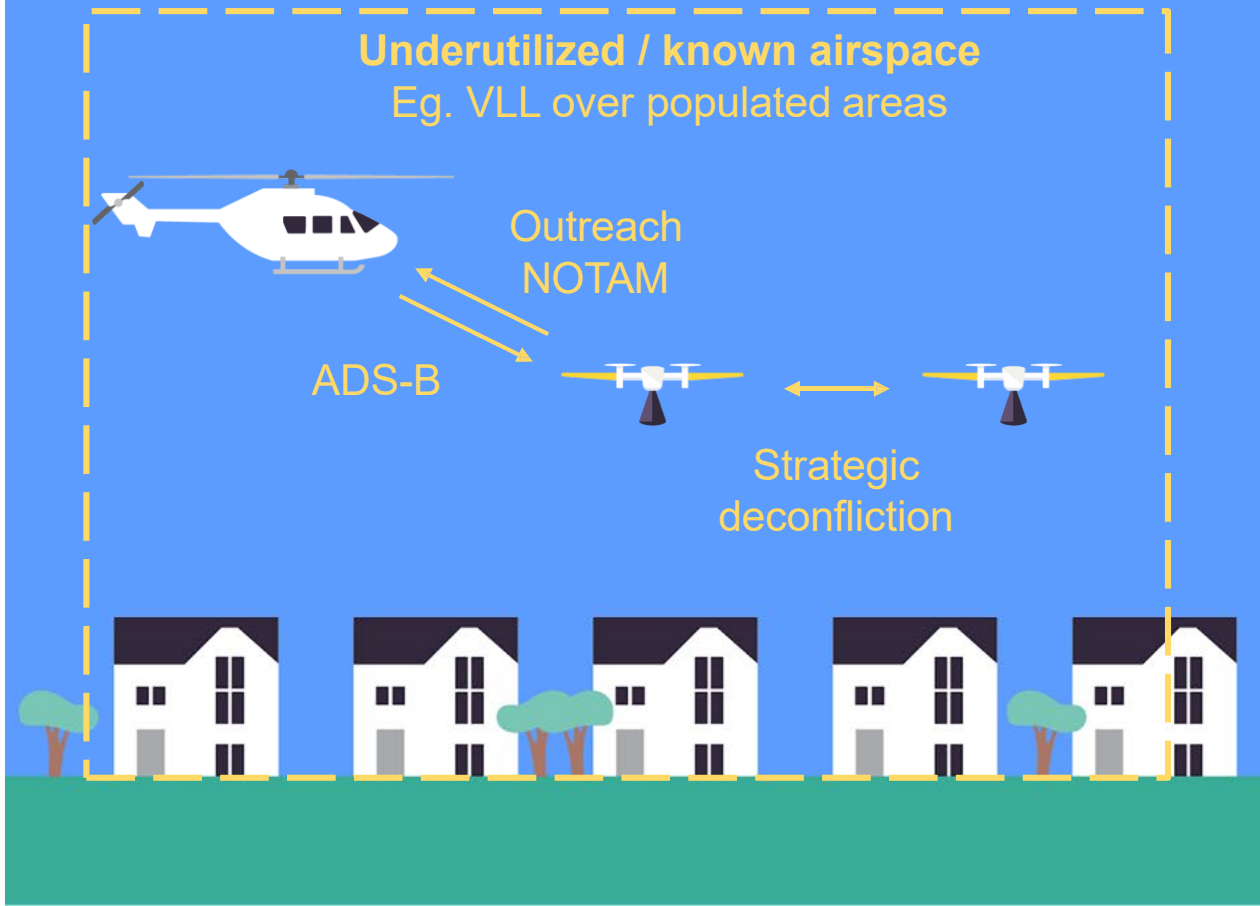
Safety on the ground



Length ~ 4.3ft **Wingspan** ~ 3.3ft **Weighs** ~ 10.6lb
Carries ~ 3.3lb **Cruises** ~ 65mph **Delivers** ~ 6mi away

Safety in the air





Wing

Our top priority is safe, responsible and secure operations

Survey of residents in Wing's first US city after a year of operations (Virginia Tech, 2021)

Benefits Highlighted During Pandemic

- Demand for our service surged:
  - Delivery volumes roughly <u>five times</u> that of pre-COVID levels.
  - New customer sign-ups increased by 350%
- We forged new partnerships to bring products to people at home:
  - Delivery of library books for Montgomery County Public Schools; Girl Scout cookies; etc
  - At one point, our partners were doing up to 25% of their sales through drone delivery.


Wing

FLIGHT INFORMATION EXCHANGE

Introduction

AAM, Virginia, and the Virginia Flight Information Exchange

21 July 2022

AAM and VA Communities

- AAM has the potential to revolutionize aviation in the Commonwealth
- Provide new local services to residents (delivery, inspection, public safety)
- AAM / UAS are COMING and your community needs to get ready for integration ("Drone Ready Community")
- What does community groundspace configuration look like? As vehicles like sUAS and EVTOL move off airport, how does a community integrate these? Who has the knowledge?
- While most GA airports don't manage the airspace, they can help configure the groundspace (take off and landing areas, identification of sensitive infrastructure, recommended safety procedures, hazard identification)
- Groundspace configuration is similar to other zoning and planning
- YOU are the experts!

AAM and the Commonwealth

- **AAM Work Group** led by DOAV and VIPC developing policy a roadmap for how the Commonwealth can invest in UTM/AAM in a way that delivers meaningful infrastructure and services
- **VA-FIX** – Virginia's ASDSP that is already providing ground-based public services in support of UTM/AAM development
- **VirginiaTech / MAAP** - Developing operations, policies, and procedures for sUAS package delivery, sUAS site inspection, detect and avoid, and UTM implementation, active engagement in the FAA rulemaking process
- **Smart Communities Virginia** – VIPC program supports the development and installation of sensor networks across the Commonwealth

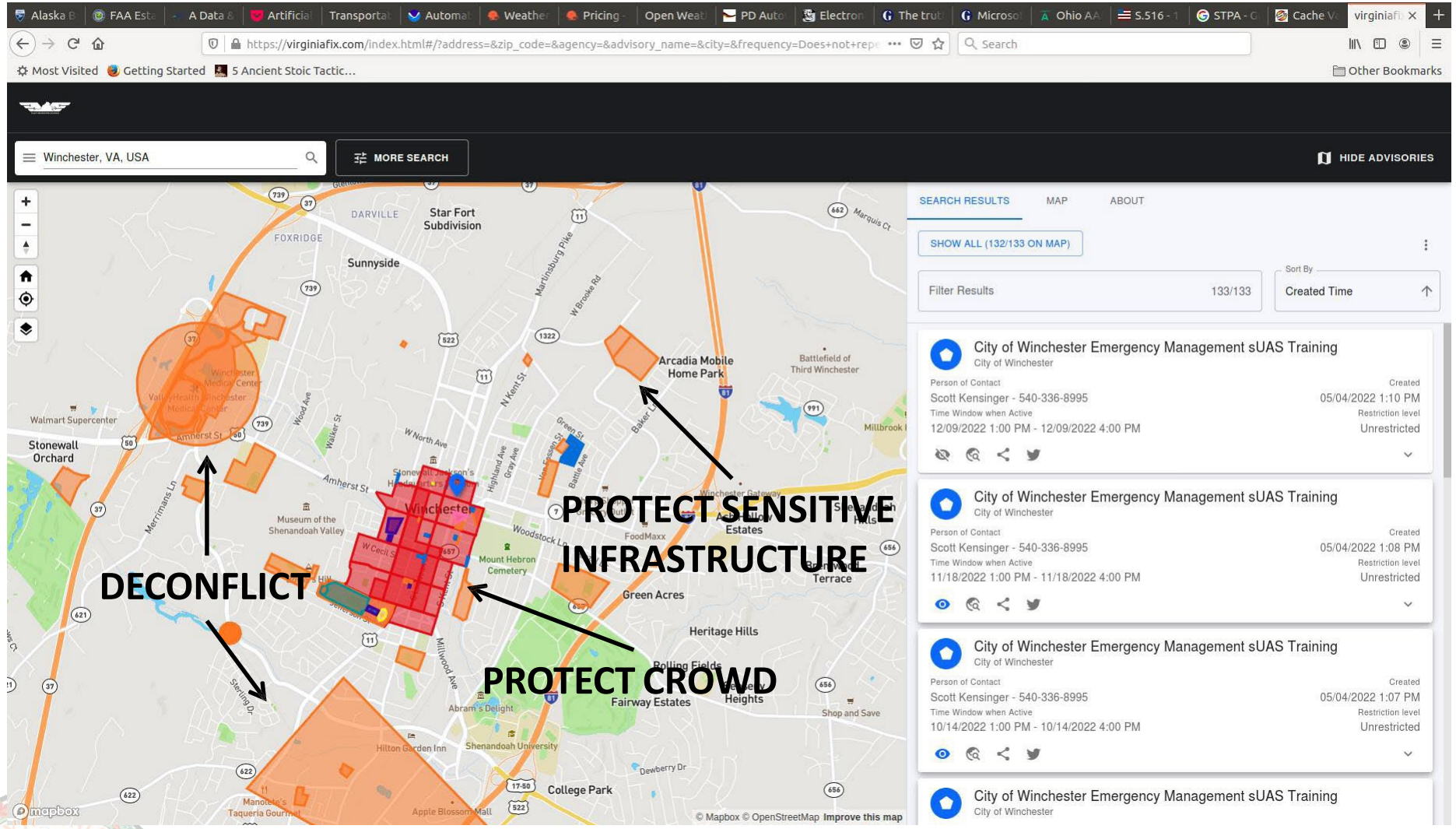
A Drone Ready Community

- A Drone Ready Community is one that provides information and resources necessary for safe, efficient, effective remote flight as a public service
- A Drone Ready Community can achieve different levels of maturity in terms of the types of UAS capabilities they can support, and these levels of maturity are a function of both information and educational services
- This matters to local communities because unmanned aviation – unlike much of traditional manned aviation – is a highly local activity
- Public infrastructure should support the development of enhanced private service suppliers to enhance information create new services
- Gathering, publishing, and developing community assets is that communities can take a step toward Advanced Air Mobility
- Stakeholders engage with each other, and with the community through the data and the data governance process
- **Drone Readiness balances safety, local equity, and industry growth**

What is VA-FIX?

- VA-FIX facilitates open information sharing and public data for unmanned operations
  - Sharing occurs between local agencies, private operators, and the public to support a common baseline
- Public Aeronautical Information Service (AIS) fills in gaps between manned aviation charts and street maps
  - Can also support other kinds of data sharing and syndication, such as sensors, or other transit or smart cities data
  - Can be used to support other initiatives through public data sharing
- Meant to be a basic capability to support public data sharing and publication to other agencies and industry
- Supports next generation Smart Mobility, Regional Air Mobility
- Asset can be consumed by UAM/AAM providers as part of base configuration data in their UAM/UTM configurations
  - DOAV provides a common, central point for configuration data
  - Intent to demonstrate value of data integration with a local use case

Example: Winchester



FLIGHT INFORMATION EXCHANGE

Virginia: By the Numbers

- 55+ state and local agencies collaborating
- Created over 20,000 NAVAIDS
- 800+ active advisories today
- 7 of the FAA's 15 approved "USS" providers onboarded (AirMap, AirSpaceLink, Aloft, ATA, DroneUp, Skygrid, Wing)
- MOAs signed between Virginia, North Carolina, and Alaska
- New resident services such as package and medical delivery being created

Apple Blossom Fly In

- Goal: Demonstrate information sharing between participants (Common Operating Picture) as a means to support safe, effective operations and take steps towards federated UTM
- Operations occurred 4/30/22; concurrent with Shenandoah Apple Blossom Festival
  - 1 commercial delivery corridor under plain vanilla Part 107 with 2 pilots
  - 4 public safety team sites operating under Part 107, with 9 pilots
  - Recreational/hobbyist 44809 sites operating through AMA/AUVSI with 5 pilots
  - 107 media ops conducted with 1 pilot
- 17 pilots in 7 teams flying 7 TOLA sites over 4 hours conducted 40+ operations with no incidents in an area < 1 sq mi
- Clear configuration on the ground and Common Operating Picture created effective, successful procedural deconfliction
- Integrated Common Operating Picture through VA-FIX and USS providers
  - Ground Configuration
  - Flight Plans
  - Crewed Traffic
  - Uncrewed Traffic
  - Environmental and Weather Sensors

Lessons Learned –Data Needs

- Information components support the balance between operational safety, community integration, and industry efficiency and growth
- What types of data assets and integration can support community readiness?
  - Groundspace configuration data such as hazards, obstacles, and obstructions
  - Public safety data such as operations and public safety sensitive or restricted areas
  - Take-off and landing area rules (preferred, notification required, permission required, and prohibited)
  - Sensitive infrastructure (cell towers / power lines) to assist with safe flight operations and compliance with regulations
  - Hazardous ground conditions such as chemical and oil plants and storage facilities
  - Sensor data to provide situational awareness of environmental conditions
  - Surveillance information describing objects in the air, including crewed and uncrewed vehicles, and other relevant information, to assist USS/UTM providers managing airspace operations
- Identifying and adding assets to VA-FIX has naturally led to a conversation of readiness

Thank you!

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REGIONAL AIR MOBILITY: AN AIRPORT'S PERSPECTIVE

NICK SABO, A.A.E.

EXECUTIVE DIRECTOR
WINCHESTER REGIONAL AIRPORT

BACKGROUND

- **Before RAM There Was SATS**
  - NASA's Small Aircraft Transpiration System (SATS) FY 2001-2005
  - Operational capabilities envisioned by 2025:
    - Aircraft guided primarily by GPS navigation
    - Most public airports would accommodate SATS operations
    - New materials and engine and airframe designs
    - Aircraft will be used for trips ranging from 150 to 1200 miles

A COMPELLING IDEA

- **National Plan of Integrated Airport Systems (NPIAS)**
  - There are approximately 19,000 private & public airports in the US
  - Of these, 3,304 qualify for federal funding through the Airport Improvement Program (AIP)
  - Only 396 (11%) handle commercial service
  - 30 airports handle 70% of all commercial service
  - Yet 99.7% of the population live within 30 miles of a NPIAS airport
- **Marchetti's Constant**
  - Average time someone spends commuting each day

CONCEPT OF OPERATIONS

- **Methodology**
  - Adhere to existing Federal Aviation Regulations
  - Piloted initially; convert to autonomous flight in the future
  - Leverage technology to reduce operating expenses
- **Focus on Airports**
  - … as opposed to waiting for specialized infrastructure (e.g., vertiports)
  - Airports are certificated by FAA or licensed by state agency, have zoning in place, and routinely handle fixed wing and rotary-wing aircraft
  - For NPIAS airports, grant obligations apply; must be open to all aeronautical users

BUSINESS CASE

- **New Aviation Capability**
  - Commercial passenger service, cargo operations, or other aeronautical applications (e.g., tourism, medical transport, etc.)
- **Conduit for New Economic Development**
  - Importance of educating local leaders on technology & opportunities
  - Primary resource for integration of unmanned systems
- **Workforce Development**
  - Create pathways for job seekers into aerospace industry

LOCAL CONSIDERATIONS

- **Airport Planning & Infrastructure**
  - Utilities (e.g., electric, high speed data)
  - Aircraft parking areas (“aprons”)
  - Terminal facilities and passenger waiting areas
  - Passenger vehicle parking
  - Aircraft hangar designs
  - Alternative fuels availability
  - Renewable energy

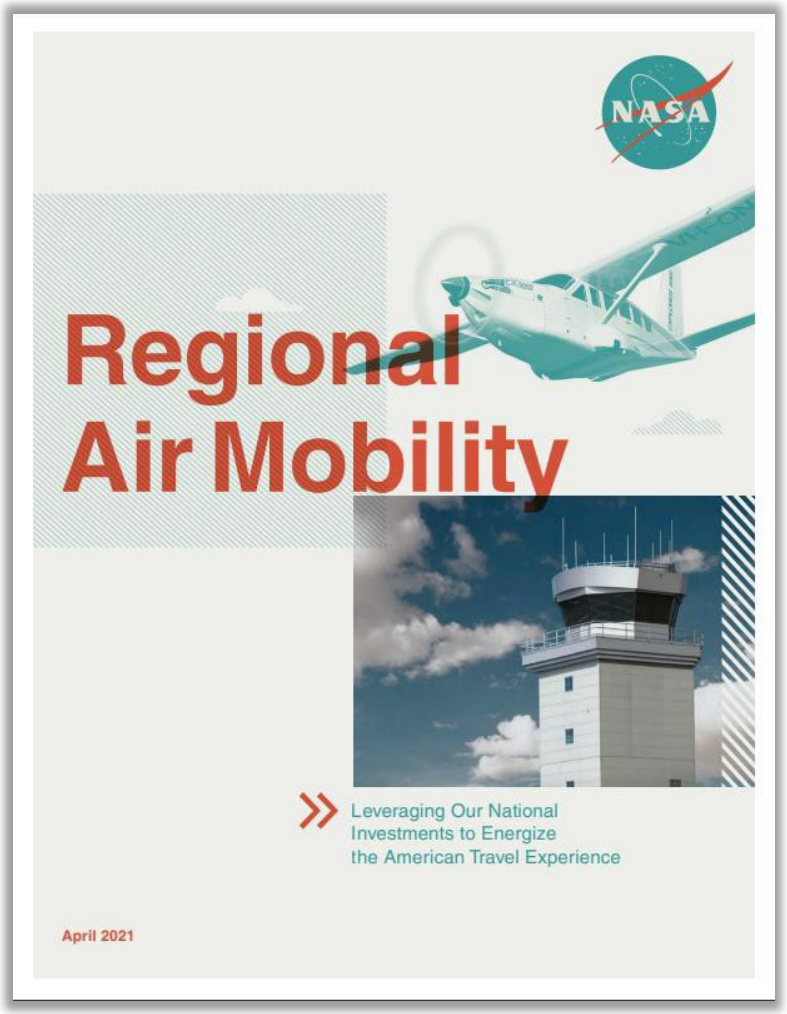
LOCAL CONSIDERATIONS

- **Zoning**
  - May be covered; airports must have local zoning to receive DOAV funds
    - Protects for incompatible land uses, height of structures, radio interference, etc.
    - No new zoning necessary to leverage RAM operations
  - Unmanned systems require new thought
    - Various sizes, weights, and capability
    - May not require an airport at all

CHALLENGES

- **Confusion**
  - *Continue to educate yourself and community on industry trends and opportunities*
    - *NASA Report on Regional Air Mobility (April 2021)*
- **Competition for Limited Resources**
  - *Incorporate RAM concepts into airport planning processes (e.g., Airport CIP Meetings)*
  - *Leverage existing grant opportunities*
- **Uncertainty About the Full Implementation of RAM Vision**
  - *Forge partnerships with local airport and discuss opportunities for your area with key stakeholders*

THANK YOU



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AAM and Public Safety

AAM is not just in preparation for commercial use…

Package Delivery


Wind Farm Inspection


Construction Documentation


Tower Inspection


Agriculture Spraying

Taxi Service


Solar Panel Inspection


Bridge Inspection

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AAM is for Public Safety too…

- Medevac Helicopters land almost anywhere, and at anytime
- Search and Rescue helicopter missions require low level flights over various terrain
- Law enforcement flies wherever crime occurs or other missions require (i.e. tracking a vehicle)
- Firefighting aerial ladder trucks (230’)

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Public Safety Agencies Use of Drones…

Drone missions are becoming more and more normal for everyday fire, rescue and law enforcement incidents

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Future of Public Safety…

- Drones as a First Responder's
- AED, Narcan, Insulin, Epi Pen, and other emergency medication delivery
- Special rescue equipment delivery to remote areas (cliffs, boats, areas cut off by floods, etc.
- Air travel for first responders
- Patient transportation
- Firefighting

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Imagine…

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We Better Get Ready!!!

Emergency Response Vehicle circa 2000

Emergency Response Vehicle circa 2020

Emergency Response Vehicle 2030???

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