



Virginia Unmanned Systems Centera CIT

COMMONWEALTH OF VIRGINIA UNMANNED SYSTEMS STRATEGIC PLAN ZUZI

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OUR VISION

"The vision of Virginia's multi-domain unmanned systems (UxS) community is for the Commonwealth to embrace and deploy these innovative technologies in a proactive and responsible manner by facilitating support for continued growth of UxS pursuits in academia, government and industry, thereby improving the lives of Virginia citizens."

OUR GOAL

Drive Growth, Acceptance and Adoption of Unmanned Systems in Air, Land, Sea and Space Domains Across All Regions Of The Commonwealth

AIR • LAND • SEA • SPACE



Virginia is home to a rich and diverse unmanned systems community representing all of the industry's domains: air, land, sea, and space. It provides numerous opportunities such as

- First responders using UAS to search for a lost hiker
- •Defense use of maritime systems to ensure fleet security and warfighter effectiveness
- •The development of self-driving semi-truck systems with international partners
- •World-class spacecraft launch facilities

Yet each of these domains in some way relies on common support mechanisms and robust operational infrastructures. This includes a high-tech workforce pipeline, technology commercialization from research organizations, vice labs, investment capital for entrepreneurs, an innovation-friendly regulatory environment, effective marketing and promotion, and established professional networks.

The strategies contained in this document aim to continue and expand Virginia's leadership in the UxS industry.

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Commonwealth of Virginia Unmanned Systems Strategic Plan

Unmanned Systems (UxS) are changing many aspects of our daily lives through four domains: air, land, sea, and space. In the air domain, Unmanned Aircraft Systems (UAS) are transforming search and rescue operations, agricultural research, public safety operations, construction and inspection, aerial photography, responses to the COVID-19 pandemic and even package delivery. In the ground domain, advances are being made in automated vehicles, including trucks for long distance cargo transport, and fully automated shuttles to address traffic congestion, and last-mile connections. In the maritime realm, unmanned systems are used for defense and commercial purposes, like gathering oceanographic science data, conducting port security, and operating unmanned cargo ships. Unmanned and autonomous systems are also supporting space exploration, including missions to the moon, Mars and to the far reaches of the galaxy.

The Commonwealth of Virginia is strategically positioned to be a leader in the UxS industry and the emerging unmanned systems economy. The benefits to Virginians will include new job creation, additional revenue, and numerous business opportunities.

The Virginia Unmanned Systems Center at CIT believes this is especially true of the aerial sector, which already includes UAS-related assets such as a Federal Aviation Administration (FAA)-designated test site and UAS Integrated Pilot Program (IPP). The FAA has recently introduced the BEYOND (BVLOS- *Beyond Visual Line of Sight*) program- which will continue the efforts of the IPP and is focused on expanded beyond-visual-line-of-sight operations. It will provide ongoing research opportunities at several military, commercial, and research institutions, and a number of UAS manufacturers and service providers that call Virginia home. In a broader sense, the Commission's report generally recommended Virginia's UxS community to:

- Maintain a dedicated in-bound focal point, which would serve as a central contact for those seeking to do business or partner with Virginia UxS-related organizations, companies, test sites, academic institutions and related industries;
- **2.** Implement marketing of UxS capabilities and outreach for partnering campaigns;
- **3.** Target financial incentives to startups, commensurate with efforts that other states are making to encourage the industry in their localities;
- 4. Maintain a supportive policy environment; and
- 5. Enhance educational offerings

The Commonwealth's value proposition includes ready access to several test facilities, excellent roadways, numerous universities, users in other industries, and receptive customers. However, the key to greater success will be the growth of market demand for these new unmanned

technologies. This requires the continuing education of the public as to the uses and benefits of UxS. Our collaborative efforts across all regions of the Commonwealth have fostered jobs, revenue and other business opportunities, initiatives and programs. Continuing strong promotional efforts will further enhance Virginia's reputation in the industry and lead to additional recruitment of companies. Our ongoing commitment to the development of UxS educational curriculums will continue to cultivate a skilled workforce which is essential to industry expansion.

In May of 2017, the Virginia Unmanned System Center at CIT was launched to assure the Commonwealth would have an opportunity to lead this burgeoning industry. As a result, in 2019 and 2020, **Business Facilities Magazine** recognized Virginia as the "#1 State for UAS Business." This was accomplished through coordination of academic institutions, greater support from industry and the entrepreneurial community, integration of Commonwealth investment funds, increased collaboration across Virginia's regions and organizations, and progress in federal policy, which enables more routine commercial UAS operations.

Underpinning all of these efforts was the substantial support of the Commonwealth's administration, which included the office of the governor.

"The Future of Unmanned Business in Virginia is Bright." ~Governor Ralph Northam

In response to this progress, the Commonwealth has achieved recognition as a national UxS industry leader. This document represents an update to the 2017 Virginia Unmanned Systems Commission's strategic plan. The initial plan has been transformed to reflect current activity, and broadened to include domains other than aerial, as was the focus of the earlier (Commission) strategy.

"Virginia is #1 State for UAS Business" 2019 & 2020



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STRATEGY 1:

Provide Leadership and Promote the Growth of the Virginia UxS Industry

Provide and share information:

- **1.** CIT's Virginia Unmanned Systems Center is the Commonwealth's "Go-To Resource" and facilitator for UxS information, opportunities and partnerships. Ongoing efforts include:
 - a. Collaboration, networking and community engagement among regions and organizations including: three regional chapters of the Association for Unmanned Vehicle Systems International (AUVSI), Unmanned Systems Association of Virginia (USAV), Virginia Economic Development Partnership (VEDP), Virginia Aviation Business Association (VABA), Virginia Institute for Spaceflight and Autonomy (VISA), Virginia Aerospace Business Association (VASBA), Wallops Island Regional Association (WIRA), the Commercial Drone Alliance (CDA), and regional technology councils. These efforts also include higher education institutions and key state agencies such as Virginia Department of Transportation (VDOT), Virginia Department of Aviation (DOAV), Virginia Department of Public Safety and Homeland Security (DPSHS), federal, defense, and civilian government agencies, and others
 - **b.** Establishment of an advisory board comprised of key industry leaders, experts, and academics to recommend and incorporate industry strategies that promote growth and acceptance.
 - **c.** Continuing coordination of industry messaging among stakeholders, which can be articulated to numerous audiences: the public, community leaders and local government policy makers, business executives and educators
 - **d.** Maintain statewide information including the online UxS Virginia Company Directory, Speakers Bureau and interagency coordination
 - **e.** Update evolving inventory of key assets and regional capabilities across Virginia to include all UxS domains (*See Appendix B*)

Invigorate continued industry growth and expand the customer base access to UxS technologies/solutions:

- **1.** Provide investment or incentivize private investments in infrastructure to help stimulate business growth, potentially to include items such as:
 - a. Virginia Flight Information eXchange (VA-FIX)
 - **b.** UAS Traffic Management (UTM)
 - **c.** Physical infrastructure, e.g. broadband, data services, test range capabilitiessuch as radar and collision avoidance technologies

- 2. Promote industry friendly public policies
- **3.** Identify and support "pilot programs" in collaboration with industry to demonstrate UxS capabilities that can lead to commercialization of unmanned technologies such as:
 - **a.** Support of the FAA BEYOND program, which is focused on establishing Beyond Visual Line of Sight (BVLOS) capabilities for UAS
 - **b.** Continue testing and implementation of the VA-FIX, a tool owned by the Commonwealth, that will allow state and local governments to share information among UAS operators and stakeholders
 - c. Development of a virtual UAS training program
 - d. Establishment of a Public Safety UxS Innovation Center
 - e. Maritime pilot project for port security
 - **f.** Encourage the development and deployment of automated vehicles to address transportation concerns (*ex: autonomous relay shuttle in Fairfax, VA*)
- **4.** Team with VEDP to assist efforts or create initiatives to recruit national and international companies seeking to expand or relocate
- **5.** Encourage state agencies to procure and implement UAS services/products with the use of the new DGS/NASPO
- **6.** Educate and inform industry verticals about the ability of UxS technologies to improve their products and services
- 7. Support grass roots networks/engagement to drive acceptance and adoption of UxS technologies
- **8.** Recognize and promote specialized capabilities and strengths among the Commonwealth's diverse regions

Strengthen industry connection to financial resources:

- **1.** Offer current federal, state, and local information and guidance regarding financial assistance such as grants, incentives, incubators, funding sources and connections to the investment community
- 2. Provide rationale for funding from the General Assembly

Foster entrepreneurial growth and R&D:

- 1. Transfer new technologies developed at of universities and laboratories into the marketplace
- 2. Support the creation of financial/mentoring support mechanisms such as C2IAS and VISA
- **3.** Capitalize on proximity to Washington, D.C. policy makers and agencies, (e.g.; Department of Commerce, FAA, NIST) and regional federal labs and program offices
- 4. Work with Small Business Development Centers (SBDC)

Virainia. Unmanned Systems Center_{at CIT}



STRATEGY 2:

Work with Academia to Support UxS Related Curriculums and Strengthen the Workforce and Innovation Pipelines

Workforce Development:

- **1.** Prepare and sustain a modern and adaptive workforce to meet critical needs through innovation and collaboration with academic, government and industry partners
- **2.** Collaborate with the Space Grant Consortium, which currently has a National Science Foundation grant for a Developing A Curriculum (DACUM) for UAS
- **3.** Identify similar educational opportunities for maritime, ground and space unmanned systems
- **4.** Support UxS program development in community colleges and universities as well as middle and high schools
- **5.** Identify and promote student participation in UxS and STEM-related academic competitions

Basic Research:

- **1.** Encourage collaboration among educators and researchers to pursue large federal research grants
- **2.** Recognize significant achievements in basic research by members of Virginia's academic community to emphasize its importance to the development of UxS technology
- **3.** Promote the role of basic research in UxS technologies to foster financial and professional support by the business community



Dominion Energy Relay



Boeing Aurora Flight Sciences



Huntington Ingalls



NASA Wallops Island







Applied Research

- **1.** Continue pre-seed investment to small companies and start-ups (continuing and improving on the work started with C2IAS)
- **2.** Encourage public matching funds for Virginia universities and research institutions that are applying for large federal grants in unmanned systems technologies
- **3.** Strive to increase use of private-public partnerships and other agreements for Virginia universities and research institutions to collaborate with federal and defense research in UxS technologies (e.g. U.S. Air Force's Agility Prime, NASA's Advanced Air Mobility)





STRATEGY 3:

Create and Incorporate a Robust Communications/ Marketing Plan in Collaboration with Virginia Stakeholder Organizations

Support UxS Objectives and Initiatives:

- **1.** Strengthen the position of UxS in Virginia by providing compelling and vital information to stakeholders and target audiences
- 2. Serve as the voice of Virginia's UxS industry to communicate its objectives and initiatives
- 3. Highlight successes and achievements from the Commonwealth's UxS community

Participate in networking and promotional events

- **1.** Create and support opportunities for engagement through stakeholder networks including businesses, innovators, educators and policy makers (*ex: establishment of UxS Stakeholder Network*)
- **2.** Provide strategic messaging to stakeholders to educate policy makers and expand their understanding of the UxS industry
- **3.** Sponsor key organizations including the three regional AUVSI chapters, VABA/NVTC/ NPSC and others
- 4. Produce and distribute a newsletter about the Virginia UxS industry
- 5. Arrange presentations for speakers bureau participants to key audiences
- **6.** Design and coordinate experience at the Virginia Pavilion at the international Xponential UxS industry conference to include sponsorship by key Virginia companies
- **7.** Leverage opportunities to promote Virginia UxS industry at state, national and international conventions / meetings





Director Tracy Tynan presents to UMS Stakeholders at its first meeting, Jan. 2020

Evaluate, update and innovate communication processes.

- **1.** Coordinate the Virginia Unmanned Systems Center at CIT with new VIPA branding to complement other organizations such as Virginia Tourism, DOAV, etc.
- 2. Develop and enhance video imagery and other communication assets for media engagement
- **3.** Share UxS messaging across strategic social media platforms including the support of announcements, innovations and business development opportunities
- 4. Engage in webinars/virtual outreach/online experience and other new media
- 5. Improve website navigation and provide timely updates and user engagement opportunities
- 6. Strategic distribution of news releases coordinated with administration officials as needed
- 7. Seek opportunities for featured coverage of Virginia's UxS story



Contact us if you'd like to be included in the Virginia Unmanned Stakeholder Dynamic Newsletter Click To Read More



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"Virginia Unmanned Systems 101" Telly Award Winner 2020 Click To Read More





"The Future of Unmanned Business in Virginia is Bright."

~Governor Ralph Northam



STRATEGY 4:

Leverage Virginia Thought Leaders to Identify and Engage in Emerging UxS Industry Trends

Position Virginia for the future

- Consult industry, government and academic thought leaders to prioritize technology and business trends in order to develop strategies which will enhance Virginia's role in the future of UxS
- **2.** Enhance infrastructure to support emerging opportunities including the expansion of Virginia's test range capabilities and other physical assets in all domains
- **3.** Establish a Virginia consortium to support the development and deployment of advanced air mobility systems
- 4. Maintain a supportive regulatory environment to ensure continued industry growth
- 5. Engage and support key UxS industry initiatives such as:
 - UAS Traffic Management (UTM)
 - Advanced Air Mobility (AAM)
 - Beyond Visual Line of Sight (BVLOS)
 - Urban planning
 - Port security
 - Counter UAS







Norfolk, Virginia

Appendix A Acronyms

AAM	Advanced Air Mobility
AUVSI	Association for Unmanned Vehicle Systems International
BEYOND	BVLOS Enhancing Your Operations Needing Drones
BVLOS	Beyond Visual Line of Sight
CCF	Commonwealth Commercialization Fund
CDA	Commercial Drone Alliance
C2IAS	Commonwealth Center of Innovation for Autonomous Systems
CIT	Center for Innovative Technology
DACUM	Developing a Curriculum
DGS	Department of General Services
DOAV	Department of Aviation - Virginia
DPSHS	Department of Public Safety and Homeland Security
FAA	Federal Aviation Administration
IPP	Integrated Pilot Program
MAAP	Mid-Atlantic Aviation Partnership
MARS	Mid-Atlantic Regional Spaceport
NASA	National Aeronautics and Space Administration
NIST	National Institute for Standards and Technology
NSF	National Science Foundation
NVTC	Northern Virginia Technical Council
SBDC	Small Business Development Center
TROF	Tobacco Region Revitalization Fund
UAM	Urban Air Mobility
UAS	Unmanned Aerial System
USAV	Unmanned Systems Association of Virginia
UTM	UAS Traffic Management
UxS	Unmanned Systems (generic, all domains)
VABA	Virginia Aviation Business Association
VA-FIX	Virginia Flight Information Exchange
VASBA	Virginia AeroSpace Business Association
VDEM	Virginia Department of Emergency Management
VDOT	Virginia Department of Transportation
VEDP	Virginia Economic Development Partnership
VFF	Virginia Founders Fund
VIMS	Virginia Institute of Marine Science
VIPA	Virginia Investment Partnership Authority
VISA	Virginia Institute for Spaceflight and Autonomy
VITA	Virginia Information Technology Agency
VTTI	Virginia Tech Transportation Institute
WIRA	Wallops Island Regional Association

Appendix B

Examples of a Current Inventory of Key Assets and Regional Capabilities Across Virginia

- 1. Mid-Atlantic Aviation Partnership (MAAP)
- 2. Virginia Tech Transportation Institute (VTTI)
- 3. BEYOND- FAA's new program with MAAP focused on Beyond Visual Line of Sight Initiatives
- 4. Virginia Smart Roads
- 5. Virginia Institute for Spaceflight and Autonomy (VISA)
- 6. Mid-Atlantic Regional Spaceport (MARS) and UAS runway
- 7. NASA Facilities (Langley Research Center and Wallops Flight Facility)
- 8. Blackstone Army Airfield
- 9. Port of Virginia
- 10.I-81 Corridor
- 11. Relevant FFRDCs include Mitre Corporation and The Aerospace Corporation
- 12. Significant concentration of defense facilities utilizing UxS
- 13. National Institute of Aerospace (NIA)
- 14. Navy's Combatant Craft Division (CCD) DoD's Center for Excellence
- 15. Huntington Ingalls Unmanned Systems Center of Excellence in Hampton
- 16.30 Military Installations
- 17. The Pentagon



Virginia Tech Transportation Institute



Mid-Atlantic Aviation Partnership



Port of Virginia



NASA Langley Research Center



Virginia's Unmanned Systems Workforce is Robust

VIRGINIA'S UNMANNED SYSTEMS WORKFORCE IS ROBUST

	Virginia Employment	Virginia Median Salary (\$)
Aerospace Engineers	2,040	128,300
Electrical Engineers	5,980	106,090
Electronics Engineers, Except Computer	5,000	112,190
Mechanical Engineers	7,120	100,850
Electrical and Electronics Engineering Technicians	6,120	69,720
Electro-Mechanical Technicians	640	56,180
Mechanical Engineering Technicians	1,050	57,970
Software Developers, Systems Software	24,650	121,560
Computer Systems Analysts	27,760	100,090
Assemblers and Fabricators, All Other, Including Team Assemblers	19,590	31,310
Machinists	6,940	47,570
Welders, Cutters, Solderers, and Brazers	7,340	46,100

Source: BLS OES 2017

Virginia Economic Development Partnership



Appendix D

Virginia's Unmanned Systems Workforce is Competitively Priced

VIRGINIA'S UNMANNED SYSTEMS WORKFORCE IS COMPETITIVELY PRICED

Electro-Mechanical Technicians Average Salary (\$)





Software Developers, Applications

Source: BLS OES 2017 Virginia Economic Development Partnership



Appendix E

Virginia's Unmanned Systems Workforce Pipelines

VIRGINIA'S UNMANNED SYSTEMS WORKFORCE PIPELINE



Relevant Degrees*

* Program areas include: computer & information sciences, computer programming, computer systems analysis, computer science, computer software, computer systems networking & telecommunications, computer & information systems security, computer support specialist, engineering (general, computer, computer software, electrical & electronics, materials, mechanical, naval architecture & marine, ocean, industrial, manufacturing), engineering mechanics, engineering physics, engineering science, technology/technician (engineering, electrical/electronics & communications engineering, electrical & electronics, industrial production, mechanical engineering related, computer engineering, industrial electroics, automobile mechanics), engineering/industrial manufacturing engineering, industrial production, mechanical engineering related, computer engineering, industrial electronic operations & warfare, mathematics & computer science, oceanography (chemical & physical), physics, materials science, cyber/computer forensics & countererorism, geography, geographic info. science & cartography, mechanics & repairers, welder, precision metal working, industrial & product design, transportation/mobility management

Source: IPEDS 2016 Virginia Economic Development Partnership



Appendix F

Virginia's Stem Talent Pool Draws on a Wide Range of Universities, Many of them Top-Ranking

VIRGINIA'S STEM TALENT POOL DRAWS ON A WIDE RANGE OF UNIVERSITIES, MANY OF THEM TOP-RANKING

Top schools	STEM credentials	Total credentials	% STEM awards
Virginia Polytechnic Institute and State University	4,315	8,052	53.6%
George Mason University	2,557	9,077	28.2%
University of Virginia- Main Campus	2,044	6,753	30.3%
Virginia Commonwealth University	1,717	7,468	23.0%
George Washington University	1,592	9,187	17.3%
Northern Virginia Community College	1,378	7,216	19.1%
Georgetown University	996	6,543	15.2%
James Madison University	855	5,225	16.4%
College of William and Mary	584	2,541	23.0%
Stratford University	431	1,244	34.6%
Strayer University- Virginia	313	1,633	19.2%
Radford University	297	2,238	13.3%
University of Mary Washington	215	1,185	18.1%
Marymount University	149	992	15.0%
Germanna Community College	85	1,983	4.3%

Source: IPEDS 2016 - 2017 Virginia Economic Development Partnership #14 Most Innovative School (U.S. News and World Report, 2017)

NOVA

Northern Virginia Community College #1 Most Digital Community College (Digital Community College Awards, 2015)

> VIRGINIA TECH.

#13 Best Public Colleges #9 Undergraduate Engineering (U.S. News and World Report, 2017)

NIVERSITY

% VIRGINIA
#3 Top Public Schools
#25 National Universities
(U.S. News and World Report, 2017)



Appendix G

Virginia is Cost Competitive for Unmanned Systems

VIRGINIA IS COST COMPETITIVE FOR UNMANNED SYSTEMS



Source: Agency for Healthcare Research and Quality, NCCI, state websites, Research Institute of America, U.S. DOL, Census, BLS-QCEW-Based on 100 employees at the average industry salary Virginia Economic Development Partnership

