FLIGHT TO IMPACT:
ECONOMIC AND WORKFORCE OUTCOMES FROM U.S. AAM INITIATIVES

DART

ADVANCED AVIATION ALIGNMENT

Flight to Impact:
Economic & Workforce Outcomes from U.S. Advanced Air Mobility (AAM) Initiatives

Presented By

Matt Beatty, MBA
Principal Consultant, Advanced Aviation Alignment (A3)

Acknowledgments

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We hope the findings herein serve to inform and inspire regional and statewide efforts to strengthen the Advanced Air Mobility (AAM) and Uncrewed Aircraft Systems (UAS) sectors in California and beyond.

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Key Definitions & Terminology

Aviation Technology Definitions and Terminology

Unless otherwise noted, this document will use terminology consistent with the ASTM F3341/F3341M − 24 “Standard Terminology for Unmanned Aircraft Systems”[1].

Advanced Air Mobility (AAM), n— a rapidly-emerging, new sector of the aerospace industry which aims to safely and efficiently integrate highly automated aircraft into the NAS. AAM is not a single technology but rather a collection of new and emerging technologies being applied to the aviation transportation system, particularly in new aircraft types. Notional AAM use cases include Urban Air Mobility (UAM), Regional Air Mobility (RAM), public services, large cargo delivery, and private or recreational vehicles.[2]

beyond visual line of sight, BVLOS, n—operation when the UA cannot be seen by the individuals responsible for see-and-avoid with unaided (other than corrective lenses or sunglasses, or both) vision, but where the location of the sUAis known through technological means without exceeding the performance capabilities of the C2 link.

detect and avoid, DAA, n—a subsystem within the UAS providing the situational awareness, alerting, and avoidance necessary to maintain safe BVLOS operation of the ownship in the presence of intruders. *(also see “sense-and-avoid” below)*

operator, n—the person or organization that applies for CAA approval to operate a UAS or who seeks operational approval for types of flight operations prohibited by a CAA for that UAS.

unmanned aircraft system, UAS, n—composed of unmanned aircraft and all required on-board subsystems, payload, control station, other required off-board subsystems, any required launch and recovery equipment, all required crew members, and command and control (C2) links between UA and the control station.

UAS traffic management (UTM), n—a federated set of services operated under regulatory oversight that support safe and compliant UAS operations.

vertical flight aircraft, VTOL/eVTOL, n—also referred to as “VTOL” or “vertical takeoff and landing aircraft,” aircraft capable of vertical or near-vertical takeoffs and landings.

[1] (F38 Committee)
[2] (U.S. Department of Transportation Federal Aviation Administration)

Key Findings at a Glance

Realizing Regional Benefits from AAM/UAS Integration

State-Level Leadership & Coordination

Government collaboration across transportation, labor, economic development, and education is essential for successful

Diverse Economic Incentives

Flexible state funded programs are critical to sustaining growth of early-stage AAM/US companies in a competitive landscape

Infrastructure for Operational Complexity

Investment in infrastructure is needed to support BVLOS operations and advanced AAM/UAS capabilities

Local Workforce & Academic Alignment

Targeted workforce initiatives ensure skilled labor pipelines from local communities to meet private sector demand

Community Engagement

Public understanding and acceptance of AAM/UAS technologies are improved through transparent engagement strategies

Startup Support Ecosystems

Incubators and innovation hubs help foster new AAM/UAS companies and drive regional technological leadership

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Executive Summary

The Advanced Air Mobility (AAM) Regional Public-Private Investment Economic and Workforce Impacts Overview Report was commissioned by Monterey Bay DART (Drone, Autonomy, and Robotics Technology) to survey the leading AAM and Uncrewed Aerial Systems (UAS) technology-enabled innovation hubs across the United States to better understand the associated investments made and the outcomes achieved. The context and scope of this report are not intended to be a technical review of these regions but rather a focus on the economic, workforce, and community outcomes that have resulted from concerted efforts to grow these technologies and ecosystems.

This review aims to assess the degree to which public investment catalyzes private investment and commitments to advance the benefits of AAM within a community (such as increased transportation network efficiency, reduced roadway congestion, enhanced connectivity, and environmentally and ecologically sustainable movement of people and goods) while creating economic growth and quality jobs.

Successful models for positive outcomes were found both from the formally established FAA UAS Test Sites and within regions that self-chartered their initiatives to integrate the AAM and UAS technologies into cooperative airspace with traditional aviation and make these revolutionary transportation technologies interwoven into their communities' broader multimodal transportation planning.

By thorough research, stakeholder interviews, and analysis, this report has established key findings valuable to any state or region to realize the benefits of integrating these technologies and services, which included coordinated investments in:

- **State-level Government Leadership, Coordination, and Funding** across the Department of Transportation, Aviation/Aeronautics, Economic Development, Labor, Higher Education, and Regional Development organizations targeting growth toward integration of AAM and autonomous transportation in general;
- **Diversity in Packaging State Funded AAM/UAS Economic Development Incentives** to help companies in a nascent industry sustain their growth and probability of success while staying in that region;
- **Infrastructure Development** enabling support for expanded AAM/UAS operational complexity and beyond visual line of sight (BVLOS) operations;
- **Targeted Workforce Development and Academia Initiatives** to ensure the private sector has access to the proper skilled labor sourced from within the local community;
- **Community Engagement** to improve understanding of the technologies and benefits;
- **AAM/UAS Focused on Startup Incubation** and Resources to cultivate and encourage innovation.

Methodology

The findings are based on reviewing and analyzing open-source literature, reports, interviews, articles, briefings, annual reports, government budgets, award announcements, and financial databases. Interviews were conducted with state, local, and non-profit economic development organizations, test site directors, operational personnel, and private industry manufacturers/operators. The analysis of these sources resulted in quantitative and qualitative observations that support these findings, which are noted and bibliographically cataloged.

Introduction and Background

The early 2000s saw the convergence of a myriad of technological advancements in areas such as autonomous systems, electrification, communications/connectivity, sensors, advanced navigation systems, computing power, and miniaturization that kicked off a significant wave of innovation in advanced aviation technologies and uncrewed aerial systems (UAS, and otherwise known as drones).[3] The Federal Aviation Administration (FAA) was mandated by the FAA Modernization and Reform Act of 2012 to officially establish seven UAS Test Sites to support the integration of UAS into the National Airspace System (NAS). These sites held the promise of becoming the epicenter of research, development, education, and industry advancement to realize all the promised benefits of integrating novel autonomous aircraft and technologies into the NAS and into the lives (and to the benefit) of those within the communities of these named test sites. These test sites became the focal point for UAS and AAM innovations within these states and regions, six were initially announced in December of 2013, with a seventh (New Mexico State University) was added in 2016[4]:

1. University of Alaska Fairbanks (AK)
2. North Dakota Department of Commerce (ND)
3. New Mexico State University (NM)
4. Griffiss International Airport (NY)
5. State of Nevada (NV)
6. Texas A&M University at Corpus Christi (TX)
7. Virginia Polytechnic Institute & State University (VA)

It was widely speculated, and still by many assumed, that these designated test sites would be the beneficiaries of sizable federal investments through direct congressional earmarked funding in subsequent FAA reauthorization bills, grants, and research programs. The reality is that funding that has provided for capital expenditures (CapEx) and operational expenditures (OpEx) necessary to make these test centers succeed (for those that have) has not come, to date, from Federal sources and has required significant state-local, and private investments. To be fair, these test sites carried much more credibility and probability of winning awards for contracts related to NASA, FAA, and Department of Defense (DoD) Research, Development, Training, and Education priorities. They did find modest contributions through these vehicles. However these awards fell well short of the necessary capital and resources needed. **Only roughly 13% of the public funds invested into these test sites from 2010 through 2024 have come from the Federal government (figure 1)**.

[3] (UP.Partners)
[4] (*UAS Test Site Program | Federal Aviation Administration*)

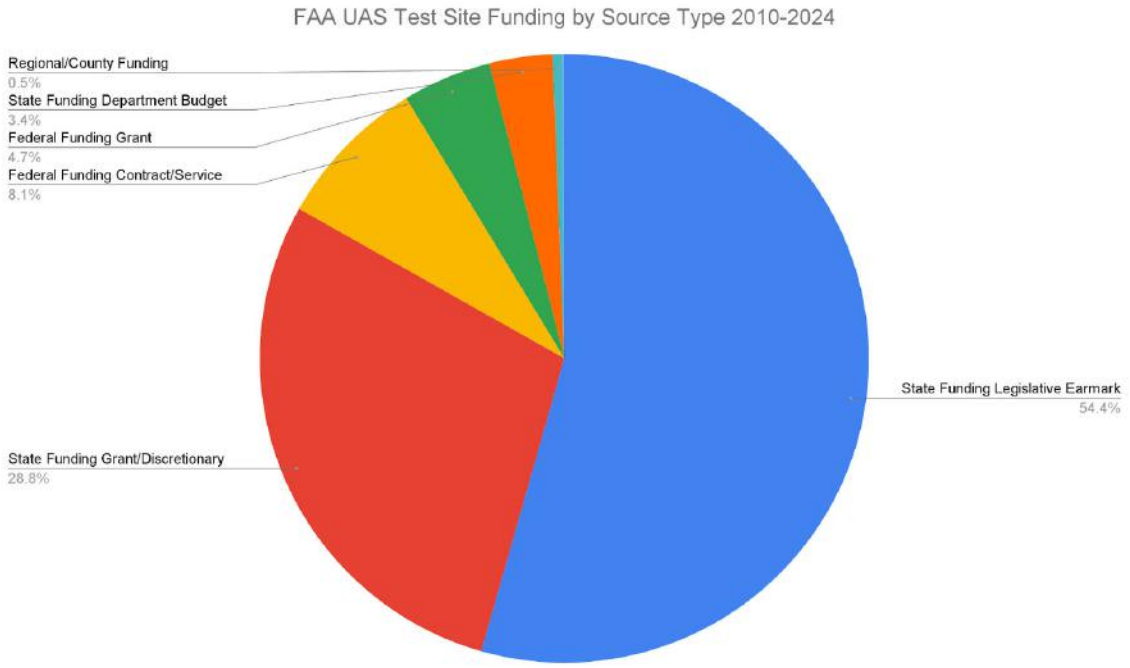

Figure 1: FAA UAS Test Site Funding by Source 2010-2024

Other states and regional concerns soon realized that the deck would not be stacked by a windfall of federal funds into the states and institutions designated an official FAA UAS Test Site. Many states and areas like Ohio (that had a long-standing defense, aviation technology, and manufacturing history) or Oklahoma (focused on diversifying their economies and expanding their aeronautical industrial base) determined they were not going to be left behind in the bids for leadership in the revolution of aviation technology.[5,6] While there have been many states and regions that have launched their initiatives and funding toward advancing AAM and UAS-enabled ecosystems, including the likes of Arizona, Florida, Massachusetts, North Carolina, Oregon, and Utah, the scope of this study will focus on details from the following states and regions for the quantifiable data reviewed, while reserving some key qualitative observations from a variety of concerns:

- Michigan
- Ohio
- Oklahoma

Ohio has seen the most consistent and determined investment since 2012, while Michigan and Oklahoma have seen strong and significant investments within the last five years, from 2019 to 2024.

The scope of this report seeks to estimate the investments and impacts beyond the operations of “test sites” alone. Throughout the research, interviews, and analysis, it's clear that

[5] (Jason Pritchard)
[6] (Leshia Pearson, Director, Aerospace & Defense, Oklahoma Department of Commerce)

successfully advancing the AAM/UAS technologies within the communities of a region or state demands much more than facilities and airspace designated to operate. While infrastructure and technical enablement are critical components, coordination and collaboration across a myriad of stakeholders and concerns that include targeted economic development stimulus packages, skilled workforce development programs, investment in specific AAM higher education research and development, community engagement, startup, and venture capital tools and incentives are also part of what's required to realize the benefits and outcomes promised through these technologies.

Overview of AAM/UAS Initiatives

Initiatives Purpose and Design

Each state and region that has chosen to invest in promoting the integrations of AAM/UAS technologies has a tremendous amount of diversity in their motivations. They've ranged from Virginia's COVID-specific driven innovations for delivering better access to medical outcomes to rural areas[7] to Ohio's focus on forward-looking AAM cargo solutions to mitigate large surface transportation network operation and maintenance costs[8] to targeting a regionally depressed economy for stimulus growth as has been pursued by New York in the Central New York Rising[9], or Oklahoma's Aerospace Commerce Economic Services (ACES) Program that is focused on the diversification of a state's economic base[10]

Regardless of the diversity of motivations, these initiatives have general common goals and purposes. ***Unmanned and advanced aviation initiatives across the United States, including FAA-designated UAS Test Sites and regional efforts like DriveOhio and Oklahoma's Skyway36, share a unified goal: safely integrating UAS and AAM into the national airspace (NAS).*** These initiatives focus on addressing the technological and regulatory challenges necessary to ensure the safety of UAS operations in diverse environments, including urban settings and beyond visual line of sight (BVLOS) operations. Through testing and evaluating new technologies such as detect-and-avoid systems, communication protocols, and infrastructure, these programs contribute to a framework where UAS can safely coexist with manned aircraft. These efforts collectively advance the U.S. toward a future where UAS and AAM are integral components of the transportation ecosystem.

[Call out box - "**AAM/UAS Regional Initiatives Common Goals**"
1. Safety and Integration of UAS into National Airspace
2. Advanced Air Mobility (AAM) Development Incorporation into Transportation Infrastructure Planning
3. Economic Development and Innovation/Partnership with Private Sector
4. Applications for Community Good: Public Safety, Emergency Response, and Infrastructure Monitoring
5. Community and Environmental Impact

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[7] (oduvisa)
[8] (Davis et al.)
[9] (*Central NY Rising URI | Empire State Development*)
[10] ("ACES Program")

6. Testing and Certification of Emerging Technologies]

Distinction by State

Alaska

Alaska is highly dependent on general aviation to supply remote locations and has been a leader in working with traditional aircraft, like the Cessna 208 Caravan, enabled with fully autonomous flight.[11] Alaska's initiatives and test sites have pioneered drones for remote and Arctic region operations, allowing UAS to deliver goods, including medical supplies, to isolated communities. This remote-area focus highlights the ability of drones to bridge logistical gaps in rural and hard-to-reach areas, especially during emergencies. Specifically, the University of Alaska Fairbanks has been a leader in testing operations in extreme weather conditions, including remote areas of Alaska. These efforts are vital for enabling long-distance drone operations in challenging environments, which are critical for applications like pipeline inspection and remote deliveries.[12]

Key Stakeholders:

Government:

- Alaska Department of Transportation & Public Facilities: Supports UAS research and testing for infrastructure monitoring.

Industry:

- BP: Early adopter of drones for pipeline inspection.
- ConocoPhillips: Utilizes UAS for Arctic operations.

Higher Education:

- University of Alaska Fairbanks, Alaska Center for UAS Integration (ACUASI): Advances UAS research and applications and Operates the Pan-Pacific UAS Test Range Complex.

Community-Based:

- Alaska Native Corporations like Doyon, Limited are key stakeholders in remote delivery and resource monitoring.

North Dakota

North Dakota's legacy of hosting DoD UAS operations at Grand Forks has uniquely forged the state's approach. The state invested heavily with the classic and established aerospace and defense integrators and equipment manufacturers like L3Harris, Thales, and Collins Aerospace to build the physical and digital infrastructure to support their AAM/UAS ecosystem. North Dakota has developed Vantis, which represented the first statewide UAS network in the U.S., designed to provide infrastructure support and supplemental safety services for repeatable BVLOS flights.[13] The network integrates surveillance, communications, and UTM systems, ensuring safe and reliable drone operations over long distances. Their infrastructure includes a centralized state Mission and Network Operations Center (MNOC) located at the Grand Sky facility in Grand Forks.

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[11] (*Autonomous Flights Completed in Alaska Show Potential for Future of Air Cargo, Aviation*)
[12] ("Alaska Sets Another First in Unmanned Aircraft Testing")
[13] (*FAA Accepts Vantis for Safety Mitigation for Recurring BVLOS Operations*)

Key Stakeholders:

Government:

- North Dakota Department of Commerce: Manages the Northern Plains UAS Test Site.
- North Dakota Department of Transportation (NDDOT): Supports UAS integration into state infrastructure.

Industry:

- Northern Plains UAS Test Site (NPUASTS): Operator of the test site. Supports UAS technology and BVLOS development.
- Vantis: The state's UAS BVLOS network infrastructure includes their key partner, Thales.
- Xcel Energy: Partnering for UAS infrastructure inspections.
- GrandSky: Purpose-built, privately funded, and operated development adjacent to Grand Forks AFB

Non-Profit:

- Grand Forks Region Economic Development Corporation

Higher Education:

- University of North Dakota, The Center for UAS Research, Education, and Training: Research and Development with a specific focus on ASSURE (Alliance for System Safety of UAS through Research Excellence) focus areas

New Mexico

New Mexico's focus has not been as expansive as many other regions and has primarily focused on research rather than extending its objectives toward delivering commercialized AAM/UAS technologies throughout its communities. The test site at NMSU under their Physical Sciences Laboratory and is one of the core universities in the FAA UAS Center for Excellence as well as a member of the Alliance for System Safety of UAS through Research Excellence (ASSURE Group).[14] Regardless, their research on Detect and Avoid (DAA) technologies and access to High E class airspace (up to and above 60,000 ft) have significantly contributed to overall AAM/UAS progress.

Key Stakeholders:

Government:

- New Mexico Department of Transportation (NMDOT)

Industry:

- Sandia National Laboratories: Focuses on defense-related UAS technology.

Higher Education:

- New Mexico State University (NMSU): Operates the NMSU UAS Test Site.

New York

In 2019, New York made history by establishing approval for the first leg of an FAA-approved

[14] (*Unmanned Aerial Systems | New Mexico State University | BE BOLD. Shape the Future.*)

50-mile BVLOS test corridor between Rome and Syracuse.[15] This corridor allows drones to fly beyond the operator's visual line of sight without visual observers, a significant milestone for commercial drone operations. The corridor supports various drone applications, including delivery, agriculture, and public safety, and is critical for developing scalable commercial UAS operations. The State of New York enabled this corridor through massive investment in hardware sensors (such as ground-based radar) and integration of their data into a UAS Traffic Management (UTM) system and other services that, in combination, allow for strategic and tactical deconfliction and separation of UAS and traditional crewed aircraft, mitigating the highest risks and enhancing safety. Similar in concept to North Dakota's MNOC, this corridor boasts a robust Operations and Data Management Center that supports real-time situational awareness and data collection from these BVLOS operations and supports simultaneous advanced concepts of operations development. These capabilities have strengthened the attractiveness of the state's appeal to AAM/UAS start-ups. Combined with a strategic state-funded incubator and venture capital fund, GeniusNY has seen some leading technology innovators bring their work to Upstate New York. In a significant recent development, the New York City Police Department has partnered with Skydio to get approval from the FAA for shielded Drones as First Responder operations that allow the NYPD to fly UAS remotely and BVLOS within specific altitude limits with the aid of sensor data integration for detect and avoid.[16]

Key Stakeholders:

Government:

- New York State Office of Economic Development: This office supports UAS and drone investments, including the GeniusNY incubator and venture investments.
- Oneida County's Griffiss International Airport New York UAS Test Site: Owns and oversees drone test site and operations.

Industry:

- NUAIR Alliance: The industry leader in UAS traffic management.
- AX Enterprize: Provides UAS data solutions and operates the UAS Test Site.

Non-Profit:

- Mohawk Valley EDGE: Promotes UAS-related economic growth in upstate New York.

Higher Education:

- Syracuse University: Conducts UAS research in collaboration with NUAIR.

Nevada

Nevada's approach to advancing AAM/UAM has been focused primarily on higher education via specific organizations such as the Nevada Center for Applied Research (NCAR) under the University of Nevada framework. Early ambitions hosted partnerships with first mover industry commercial delivery drone service provider Flirtey and defense equipment manufacturer Insitsu. Nevada boasted one of the earliest urban commercial drone deliveries in 2016 through Flirtey and also hosted several trials for service providers through 2021 in support of COVID medical

[15] (*FAA Approves First Segment Of New York's 50-Mile Drone Corridor | Aero-News Network*)
[16] (*FAA Issues Revolutionary Approval to NYPD to Conduct Drone as First Responder (DFR) Operations*)

delivery research.[17,18] The test site itself hosted many of the leading companies that secured FAA and NASA funding in their research and development phases, the likes of MissionGo, American Robotics, Pyka, and Verizon, but lack of infrastructure investment and capital constraints excluded Nevada from growing on these engagements to court larger, more permanent business concerns from the organizations.[19] Largely the AAM/UAS research and workforce development is incorporated into the overarching work of NCAR.

Government:

- Governor's Office of Economic Development (GOED): Supports drone-related business development, workforce development, and research and development.

Industry:

- Skydrop (previously Flirtey): Key player in Nevada's drone delivery sector.

Higher Education:

- University of Nevada, Reno (UNR), Nevada Center for Applied Research (NCAR), Nevada Autonomous: Focuses on advanced autonomous systems. And promotes UAS industry and academia partnerships. Manages Nevada's Unmanned Aircraft Systems (UAS) Test Site activities statewide

Texas

Texas has represented an example of a strong mix of public investment at the SLTT level and significant private industry investments from the likes of Walmart and Hillwood. With major commercial concerns and investments, coupled with solid support in policy and zoning from the state and local governments, Texas has emerged as the epicenter in the United States for commercial drone operations within the Dallas-Fort Worth Metroplex, working with companies like Wing, Zipline, DroneUp, Flytrex, and Manna to explore urban drone delivery. In fact, the FAA has chosen this geography to partner with industry and NASA to prove a critical digital infrastructure component to enable multiple drone operations occurring within the same market and airspace in the form of interconnected UAS Traffic Management services. DFW is home to the FAA's UTM Key Site Evaluation.[20]

Key Stakeholders:

Government:

- Texas Department of Transportation (TxDOT): Engages in UAS operations for infrastructure inspections. Almost 100 certified remote pilots, manage and operate a fleet of nearly 100 drones incorporated into their own operations throughout the state.[21]
- North Central Texas Council of Governments: Metropolitan area transportation planning organization that has invested in coordinating stakeholders to incorporate AAM/UAS technology into the region and transportation infrastructure

[17] (*7-Eleven, Flirtey Make First FAA-Approved Drone Delivery to Home - GPS World : GPS World*)
[18] (Adami)
[19] (Jonathan Daniels, Principal Consultant/Founder &. CEO Praxis Aerospace Concepts International)
[20] (*Unmanned Aircraft System Traffic Management (UTM) | Federal Aviation Administration*)
[21] (Roman)

planning

Industry:

- Walmart: global retail leader, heavily invested in autonomous last-mile delivery
- Hillwood: Developer of industrial-logistics properties, founded, owns, and operates the AllianceTexas Mobility Innovation Zone (MIZ)
- Wing: Drone Delivery Services Provider
- DroneUp: Drone Delivery Services Provider
- Zipline: Drone Delivery Services Provider
- Flytrex: Drone Delivery Services Provider
- ANRA Technologies: Operator of a cloud-based drone operational platform
- Bell Textron: partnered with Hillwood's AllianceTexas Mobility Innovation Zone (MIZ) for medium to heavy lift cargo drone technology development

Higher Education:

- Texas A&M University-Corpus Christi, Lone Star UAS Center of Excellence & Innovation: Operates the Lone Star UAS Test Site.

Virginia

Virginia, through the Virginia Tech Mid-Atlantic Aviation Partnership (MAAP), is one of the FAA's UAS test sites and one of the first to secure a waiver for BVLOS testing. Both the test site and the state at large have committed resources and funds toward developing physical and digital infrastructure and data source exchanges to advance UAS traffic management for low-altitude UAS operations in fully integrated airspace. Alphabet's Wing, which is a frontrunner pioneer in commercial drone delivery services, invested heavily in their research, development, and concepts of operations in Virginia.[22] Other similar companies, such as DroneUp, are working with the Virginia Institute for Spaceflight & Autonomy to operationalize medical delivery via drone to remote and rural residents.[23]

Key Stakeholders:

Government:

- Virginia Department of Aviation: This department has funded and supported UAS and advanced air mobility initiatives, infrastructure development, and data services like the Virginia Flight Information Exchange (VAFIX).
- Virginia Innovation Partnership Corporation (VIPC): state-funded economic development entity that promotes drone technology development through investments, grants, and funding research and development projects focused on drone and AAM technologies throughout the state.

Industry:

- Wing: heavy investment into early development at the MAAP UAS Test Site and honed their commercial drone delivery concept of operations at sites in VA.
- Aurora Flight Sciences: Focuses on advanced UAS systems.
- DroneUp: headquartered in VA, is a leading drone delivery company that has created hundreds of full-time employees.

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[22] (*Alphabet's Wing to Make Walgreens' Drone Deliveries in Small Virginia Town | CNN Business*)
[23] (oduvisa)

Non-Profit:

- Mid-Atlantic Aviation Partnership (MAAP): Oversees UAS testing and research.

Higher Education:

- Virginia Tech: Hosts the MAAP test site and conducts extensive UAS research.

Organic regional initiatives, like those below, have, out of necessity, focused on the practical applications of UAS and AAM to develop innovative solutions for urban congestion, regional transportation, and the future of mobility.

Michigan

Michigan is another vital player, leveraging its automotive industry expertise through the Michigan Office of Future Mobility and Electrification to develop an AAM ecosystem that will transform urban and regional transportation. Michigan's focus and funding have targeted the policy, zoning, and physical infrastructure development of vertiports, upgrades to general aviation facilities to accommodate AAM technologies, and heavy investment in multimodal chargers.

Key Stakeholders:

Government:

- Michigan Department of Transportation (MDOT): Involved in UAS infrastructure testing.
- Michigan Department of Labor and Economic Opportunity, Office of Future Mobility and Electrification (OFME): This department promotes advanced air mobility.

Industry:

- Ford Motor Company: Developing drone and autonomous vehicle technologies.
- General Motors: Exploring drone integration with automotive systems.

Higher Education:

- University of Michigan: Researches UAS traffic management and advanced air mobility.

Ohio

In 2013, the Ohio Department of Transportation's DriveOhio - FlyOhio established the Ohio UAS Center, a state agency dedicated to the integration and advancement of UAS. This center supports research, development, testing, and operational projects for drones and advanced aviation technologies. The center has partnered with several key institutions, including the Air Force Research Laboratory (AFRL) and NASA, to foster innovation with a focus on UAS traffic management (UTM) and beyond visual line of sight (BVLOS) operations. They've worked with industry partner CAL Analytics to establish and roll out a statewide low-altitude air traffic management system for drones to integrate and enable UAS into state infrastructure projects, testing their use for traffic management, infrastructure monitoring, emergency first response, and cargo delivery.[24] Ohio's aviation manufacturing industrial base and history have given this state a sizable advantage when paired with the state governments' focused funding and

[24] (*Ohio Launches Traffic Management System for Drone Operations*)

resources toward AAM/UAS technology advancements and integration.

Key Stakeholders:

Government:

- Ohio Department of Transportation (ODOT), DriveOhio: State agency leading UAS and AAM initiatives and operating the Ohio UAS Center. Principal party to NASA Space Act Agreement advancing mutual research and development for AAM.

Industry:

- CAL Analytics: Develops UAS traffic management technologies.
- Joby Aviation: Joby Aviation Inc. is a transportation company developing electric air taxis for commercial passenger service. It has announced that it is establishing a production manufacturing facility in Ohio.
- GE Aviation: leading efforts in electrification and autonomous flight for future air vehicles

Non-Profit:

- JobsOhio: state's unique private economic development corporation that coordinates industry and state agency stakeholders like the Ohio Departments of Development, Commerce, Transportation, etc.

Higher Education:

- Ohio State University: Engages in UAS research, including the development of the SkyVision ground-based detection system.

Oklahoma

Oklahoma's initiative is focused on diversifying the state's economy by stoking the growth of its Aerospace and Defense Industrial base. Oklahoma has taken a deliberate approach to maximizing the opportunity for workforce development programs to provide the skilled labor necessary for this growth and also through creating packages of economic incentives and tools through their Department of Commerce team to Oklahoma's Tulsa Regional Advanced Mobility (TRAM) cluster that incorporates Oklahoma State Universities Oklahoma Aerospace Institute for Research and Education (OAIRE), the Skyway UAS Range and Skyway36. This consortium of initiatives represents an orchestrated collaboration between public, private, non-profit, tribal, and academic institutions. These projects have led to a LaunchPad Center for Advanced Air Mobility at Oklahoma State University (OSU) and the 114-nautical mile circumference Skyway UAS Range to connect the Osage Nation and its enterprises' Skyway36 Droneport in Tulsa with OSU and two additional nodes in the region.[25] Significant investments and leadership from the

Key Stakeholders:

Government:

- Cherokee Nation
- Choctaw Nation
- Osage Nation
- Oklahoma Department of Aerospace and Aeronautics: development of aviation

[25] (Stillwater et al.)

infrastructure and facilities, acting as the central resource point in state government for the up-and-coming Unmanned and Advanced Air Mobility sector
- Oklahoma's Department of Commerce, Aerospace Commerce Economic Services (ACES): growing the aerospace and defense industry in Oklahoma

Industry:
- Kratos Defense & Security Solutions: has a production facility for its unmanned jet drones in Oklahoma City and has announced an expansion to manufacture small, affordable drone engines.[26]
- Droneport Network: selected by Osage LLC to develop one of the first droneports in the United States. Skyway36 is the Osage Nation's aerospace technology innovation zone outside of Tulsa, OK.
- WindShape: a Swiss company, is building a 19,000-square-foot drone testing facility in Tulsa, Oklahoma, in partnership with the Osage Nation. The facility will be located at the Skyway36 Droneport and Technology Innovation Center.
- AirWise Solutions: drone geospatial and digital awareness software platform developer and provider.

Non-Profit:
- George Kaiser Family Foundation (GKFF): $50MM donor that launched the Tulsa Innovation Labs. Philanthropic organization focused on investing to promote the values and practices of diversity, equity, and inclusion.
- Tulsa Innovation Labs LLC (TIL): founded by the George Kaiser Family Foundation, economic development organization focused on Tulsa to develop a strategy that positions Tulsa as a tech hub and leader in the future of work
- Oklahoma's Tulsa Regional Advanced Mobility (TRAM): collaboration between public, private, non-profit, tribal, and academic institutions committed to creating a thriving and inclusive advanced mobility ecosystem in Tulsa funded by the US EDA Build Back Better Challenge award.
- Unmanned Aerial Systems Cluster Initiative (UASCI): enabling established companies and emerging entrepreneurs to connect, work together, and gain access to national technology, global capital, advanced business models, and global markets.

Higher Education:
- Oklahoma State Universities Oklahoma Aerospace Institute for Research and Education (OAIRE): developing solutions in unmanned aerial systems (UAS) and advanced air mobility (AAM) through research, workforce development, and collaboration with government, academia, and industry.
- University of Oklahoma, Oklahoma Aerospace and Defense Innovation Institute (OADII): aerospace, defense, and global security research and development.

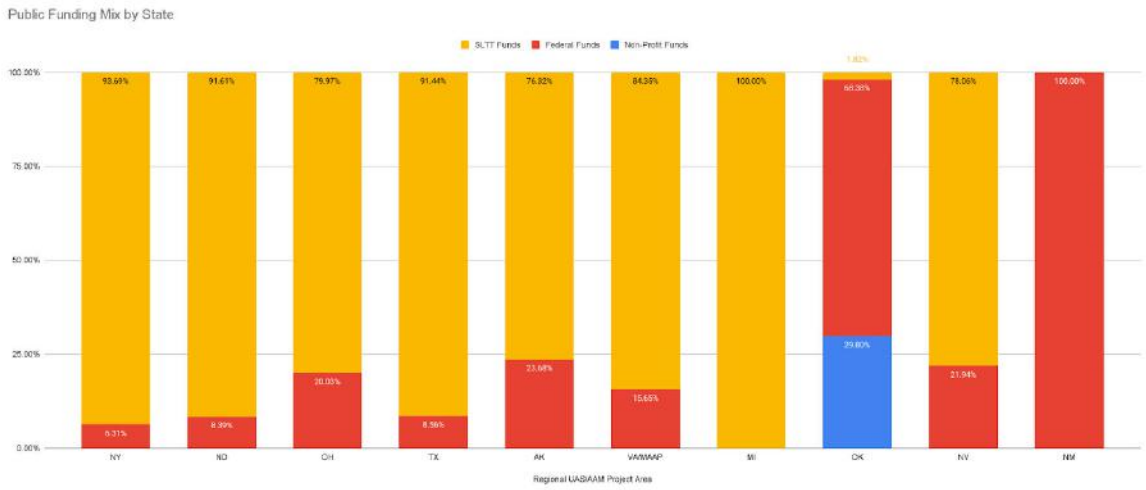
Public Investment Analysis

Among those states and regions that have emerged as leaders in advancing AAM/UAS technologies, whether designated as an FAA UAS Test Site or a state that seized on the opportunity to set the foundation for these technologies to grow, each has a myriad of reasons

[26] ("Defense Contractor with Oklahoma Ties Announces Small, Affordable Drone Engine Production")

why they've decided to invest. However, it can be observed that every state or region that's experienced positive economic impacts and is realizing a roadmap to enabling these technologies into their transportation networks has chosen to make focused, deliberate, and significant investments.

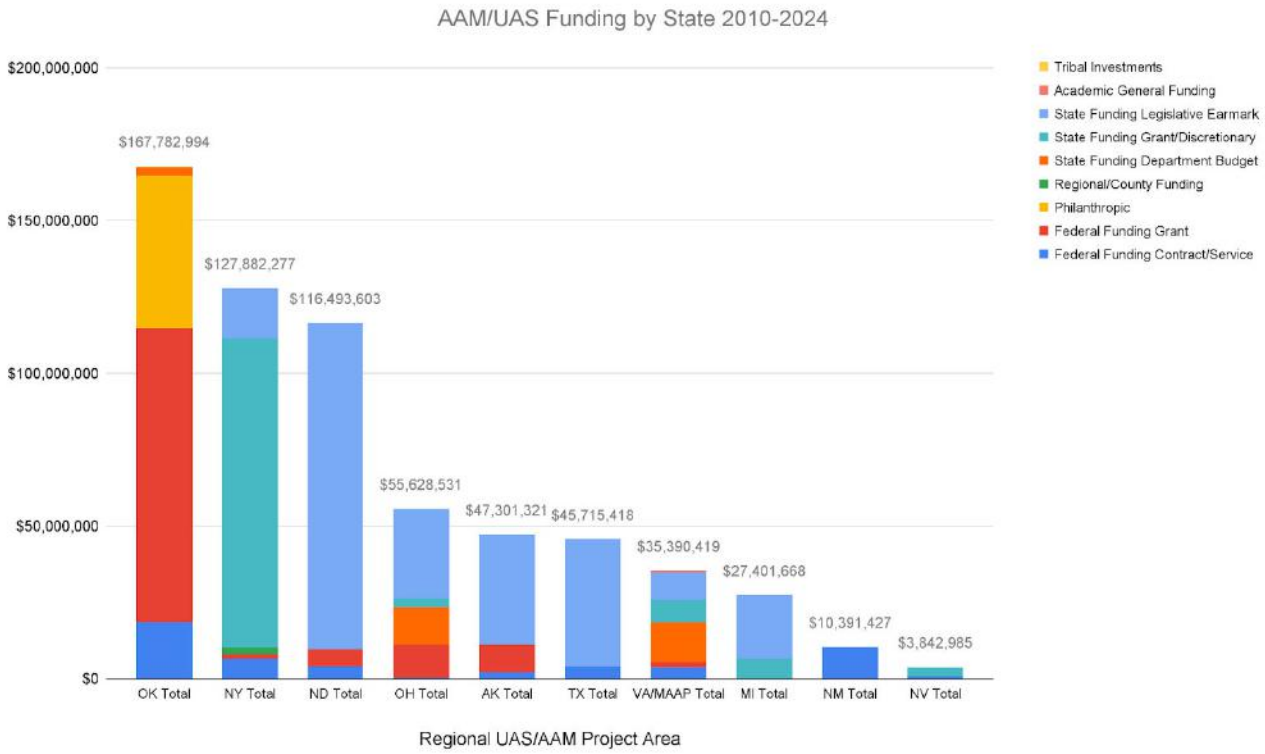
One notable exception observed in publicly available data is the state of Oklahoma, where a sizable amount of Federal Funding has been recently awarded, mainly through the US Department of Commerce Economic Development Agency (EDA) - Build Back Better Regional Challenge and the attainment of an EDA - 2023 Tech Hub Designee award. Regarding this exception, though, it is essential to note that significant investment by tribal governments (which data is not publicly accessible) coupled with a $50 million investment into the Tulsa Innovation Labs from the George Kaiser Family Foundation represented extensive State, Local, Territorial, and Tribal (SLTT) investments that grew the research, development, workforce, and infrastructure capabilities within the state and laid the foundations essential to winning these EDA funds.[27] In fact, tribal entities within the state of Oklahoma were estimated to have been awarded over $18 million in federal contract services in support of the National Oceanic and Atmospheric Administration (NOAA), Department of Defense, and FAA research and development priority programs from 2016 through 2020 before the EDA awards, building the capacity and reputation of the region as a leading innovation center in the AAM/UAS industry sector.



Another interesting observation comes from the available data for New Mexico and Nevada, which each hosted FAA-designated UAS Test Sites but have relied almost exclusively on the competition for federal contracts and funds for survival. With a nascent industrial base, none of these test sites could realize the short-term economic viability by serving private industry client needs. Jonathan Daniels, a University of Nevada professor and seasoned UAS professional with intimate knowledge of the Nevada test site operations, summarized the predicament in the context where there was no SLTT funding available by comparing the economically viable

[27] (*Tulsa Innovation Labs Releases City's Tech Niche Report & Commits to Initial $50 Million for Economic Development | Tulsa Innovation Labs*)

models of commercial and general aviation airports that depend on “residents” or tenant operators that have long term contracts for benefiting from the use of the facilities and services: “With the test site model, it functioned more like a hotel. We had success working with some of the major manufacturers and innovators, but they were guests… not residents. They would operate to the requirements of the test cards and leave. Airports aren’t economically feasible without residents; why would we expect differently for this aviation industry segment.”[28] Without the support of their state and investment into the infrastructure required to attract ongoing research and commercial expansion of the technologies, the AAM/UAS initiatives within these states have suffered stagnation compared to the outcomes experienced in the other states.



While public fund investment to encourage and promote economic growth within a specific industry is just one piece of the puzzle in spurring successful growth, it is critical. It is a strong signal to the industry, entrepreneurs, and investors that a state or region is committed to setting conditions for a thriving ecosystem in this industry segment.

Key Outcomes

While realizing the promised benefits of the AAM/UAS technology integration and proliferation is still very nascent, there are early indicators that can be observed to help identify which initiatives are trending more successfully. Outcomes from these state initiatives and investments can be broadly categorized into those impacts that can be quantified, such as the number of full-time

[28] (Jonathan Daniels, Principal Consultant/Founder &. CEO Praxis Aerospace Concepts International)

jobs created through new companies or expansion of existing companies associated with these technologies, and those impacts that are qualitative, such as the services provided through the enablement of public safety advanced operations leveraging these technologies to the benefit of the communities they serve.

Capturing a complete and comprehensive data source for every state based on public records is challenging. Some states report robust metrics that directly relate to their incentive programs, while others report this kind of data more opaquely.

This report will leverage three primary sources to review the observable outcomes for each of the included states to help assess the relative success of the AAM/UAS initiatives:

- **The U.S. Bureau of Labor and Statistics, Quarterly Census of Employment and Wages (QCEW) Annual Averages database specific to North American Industry Classification System (NAICS) 3364 "Aerospace product and parts manufacturing"**[29]: The AAM/UAS still has not been categorized and included formally into specific NAICS, and there are several NAICS categories that many of these AAM/UAS original equipment manufacturers are currently captured under. Just a few of the alternative NAICS private establishments are currently classified under include 541715 – Research and Development in the Physical, Engineering, and Life Sciences; 334511 – Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing; 4812 - Nonscheduled Air Transportation. It's important to understand this data also incorporates traditional aviation technologies. This report chooses to focus on the NAICS 3364 as the closest proxy to serve as a barometer for assessing state-wide growth of employment establishments, jobs, and salaries. The states are benchmarked against the U.S.-wide data for the same period of 2010-2024.
- **Venture Capital Deal Database:** data was provided in partnership with HawkTower, a venture capital firm that seeks early-stage investments in autonomy, including AAM/UAS technologies.[30] This data gave a count of AAM/UAM Companies that received initial venture capital funds investment, by year for each of the included states. It also gave an estimated count of employees at each company with headquarters in the included states. This data provides insight into the innovation dynamics and impacts from the investments within the states to give additional context in addition to the quantitative data from the broader QCEW.
- **Test Site and Economic Development Stakeholder Interviews and Volunteered Informational Materials:** The quantitative data affords many insights into the impacts and outcomes of state initiative AAM/UAS but still tells an incomplete story, especially in nascent industries. Anecdotal success stories and context to how collaborative success can be achieved in public-private partnerships toward the end of growing this industry are essential to understand.

[29] (Jobe)
[30] (*PitchBook Advanced Search - Companies & Deals*)

State-Level Aerospace Product and Parts Manufacturing (NAICS 3364)

The measures of this industry data help serve as a barometer toward assessing the state and regional goals of achieving the economic and workforce benefits from their AAM/UAS initiatives and investments and aeronautics overall. Again, it is essential to note that this data includes traditional aviation technology and reflects the expansion and retraction of those entities as well.

The first of these measures is the number of private employer establishments reported annually from 2010 through 2023. The net change between 2010 to 2023 in these number of establishments is expressed as a percentage to determine the overall growth or retraction of establishments within this industry. Each state in the report is benchmarked against the United States national reported growth in establishments nationwide within this industry during the time period:

SUM of annual_a | *area_title*

year	Alaska -- Statewide	Michigan -- Statewide	Nevada -- Statewide	New Mexico -- Statewide	New York -- Statewide	North Dakota -- Statewide	Ohio -- Statewide	Oklahoma -- Statewide	Texas -- Statewide	Virginia -- Statewide
2010	8	60	11	21	100	5	122	70	230	36
2011	7	60	13	22	98	5	125	67	225	33
2012	7	66	13	21	97	5	123	67	226	31
2013	7	68	14	20	93	4	128	63	218	30
2014	5	70	14	22	89	4	128	63	216	30
2015	6	73	14	22	86	4	132	63	223	35
2016	5	71	15	21	85	4	133	64	219	35
2017	10	66	18	22	84	5	134	64	218	42
2018	12	64	18	21	85	5	133	67	226	51
2019	10	64	17	19	81	5	152	69	235	51
2020	13	76	17	17	82	6	147	76	253	54
2021	14	98	19	16	83	7	150	83	264	62
2022	13	122	21	16	86	7	149	88	290	89
2023	14	146	23	18	93	6	158	89	301	100
Net New	6	86	12	-3	-7	1	36	19	71	64
Net % Change	75.00%	143.33%	109.09%	-14.29%	-7.00%	20.00%	29.51%	27.14%	30.87%	177.78%
Vs Benchmark	33.97%	102.31%	68.06%	-55.31%	-48.03%	-21.03%	-11.52%	-13.88%	-10.16%	136.75%

US Wide Benchmark
41.03%

There were some clear leaders in impacts based on this measure. Virginia saw the highest percentage of success, but in total Net New establishments, Michigan also led the pack. Texas and Ohio added a sizable number of establishments during this time. Still, they started from a larger count in 2010, finishing a bit below the benchmark growth percentage of 41% nationwide.

The second of these measures is the average number of jobs reported annually from 2010 through 2023. The net change between 2010 to 2023 in these number of jobs is expressed as a percentage to determine the overall growth or retraction of jobs within this industry. Each state in the report is benchmarked against the United States national reported growth in jobs nationwide within this industry during the time period:

SUM of annual_a area_title										
year	Alaska -- Statewide	Michigan -- Statewide	Nevada -- Statewide	New Mexico -- Statewide	New York -- Statewide	North Dakota -- Statewide	Ohio -- Statewide	Oklahoma -- Statewide	Texas -- Statewide	Virginia -- Statewide
2010	44	2,930	688	1,075	7,016	595	15,220	5,030	48,029	1,601
2011	42	3,205	636	1,080	6,932	565	15,786	5,600	48,391	1,561
2012	46	3,758	552	1,063	6,717	605	16,124	6,218	47,940	1,599
2013	51	3,857	416	1,071	5,678	648	16,267	6,687	47,285	1,641
2014	63	3,705	439	1,056	5,311	701	16,597	7,085	44,698	1,650
2015	61	4,375	452	936	4,711	692	17,609	7,013	43,609	1,505
2016	60	4,476	421	899	4,689	720	18,603	7,132	44,639	1,576
2017	87	4,859	454	815	4,872	700	19,332	7,079	44,121	1,696
2018	94	5,375	489	734	5,050	742	19,238	13,004	46,060	1,764
2019	127	5,789	513	696	5,188	750	20,078	13,545	49,412	1,942
2020	124	5,171	430	687	4,848	758	17,935	12,994	48,978	1,991
2021	138	5,149	434	632	4,652	843	15,708	11,744	47,968	1,749
2022	157	5,475	501	637	4,893	907	16,948	11,690	47,672	1,766
2023	141	5,911	550	639	5,031	986	18,244	12,697	48,255	2,070
Net New	97	2,981	-138	-436	-1,985	391	3,024	7,667	226	469
Net % Change	220.45%	101.74%	-20.06%	-40.56%	-28.29%	65.71%	19.87%	152.43%	0.47%	29.29%
Vs Benchmark	207.43%	88.71%	-33.08%	-53.58%	-41.32%	52.69%	6.84%	139.40%	-12.56%	16.27%

US Wide Benchmark
13.03%

Most targeted states achieved growth that excelled or matched the nationwide benchmark, with a few exceptions. The leader of this measure, Oklahoma, demonstrated massive growth in jobs despite their employer establishments being under benchmark, indicating larger OEM expansions (such as Boeing, Pratt and Whitney, and defense drone company Kratos[31, 32]). While Ohio's count in net new jobs narrowly edged out Michigan, it's clear that Michigan's percentage of growth from 2010 was 5x of Ohio's. Both Virginia and North Dakota saw considerable growth and excelled against the benchmark, but it can be inferred from the previous table showing high establishment growth for Virginia and only one net new establishment for North Dakota that the majority of Virginia's growth was spurred from more employer establishments created over this period.

A third measure from this data source is the average annual salary for the jobs reported within the industry sector from 2010 through 2023. The net change between 2010 to 2023 in average salary is expressed as a percentage to determine the overall growth or retraction of earning potential from jobs within this industry. Each state in the report is benchmarked against the United States national reported growth in establishments nationwide within this industry during the time period. While benchmarking against the nationwide data may remove the question of inflationary impact in evaluating these changes, this data does not account for regional cost of living fluctuations:

[31] (Howie)
[32] (*Kratos to Increase Production Capacity, Employment in OKC | GreaterOKC*)

A	B	C	D	E	F	G	H	I	J	K
SUM of avg_ann	*area_title*									
year	Alaska -- Statewide	Michigan -- Statewide	Nevada -- Statewide	New Mexico -- Statewide	New York -- Statewide	North Dakota -- Statewide	Ohio -- Statewide	Oklahoma -- Statewide	Texas -- Statewide	Virginia -- Statewide
2010	$44,568.00	$63,169.00	$57,089.00	$70,766.00	$74,606.00	$54,896.00	$82,634.00	$60,317.00	$85,888.00	$67,588.00
2011	$46,896.00	$65,839.00	$57,342.00	$77,022.00	$77,621.00	$55,917.00	$86,710.00	$64,505.00	$88,167.00	$70,412.00
2012	$48,720.00	$63,664.00	$60,592.00	$79,837.00	$79,587.00	$58,951.00	$89,602.00	$66,107.00	$89,334.00	$75,292.00
2013	$48,360.00	$63,891.00	$63,384.00	$80,192.00	$83,027.00	$55,668.00	$92,226.00	$69,535.00	$93,391.00	$76,485.00
2014	$41,955.00	$67,553.00	$62,207.00	$84,675.00	$83,909.00	$55,572.00	$95,986.00	$72,479.00	$94,995.00	$76,986.00
2015	$49,788.00	$68,776.00	$65,438.00	$100,718.00	$77,483.00	$60,312.00	$96,768.00	$75,995.00	$99,618.00	$80,627.00
2016	$0.00	$71,013.00	$62,076.00	$88,362.00	$77,982.00	$59,592.00	$100,825.00	$75,711.00	$103,503.00	$83,034.00
2017	$52,822.00	$70,875.00	$65,476.00	$87,013.00	$79,440.00	$61,872.00	$101,778.00	$78,445.00	$104,552.00	$88,846.00
2018	$54,548.00	$72,550.00	$67,736.00	$93,064.00	$80,566.00	$63,900.00	$99,989.00	$88,454.00	$108,269.00	$87,209.00
2019	$52,440.00	$75,019.00	$67,734.00	$95,388.00	$80,855.00	$68,676.00	$106,341.00	$87,388.00	$111,737.00	$90,363.00
2020	$55,088.00	$77,141.00	$62,703.00	$98,123.00	$83,221.00	$66,660.00	$108,024.00	$91,067.00	$112,614.00	$91,476.00
2021	$59,276.00	$79,660.00	$69,238.00	$99,876.00	$84,612.00	$70,668.00	$106,519.00	$95,101.00	$114,914.00	$96,026.00
2022	$62,274.00	$85,299.00	$73,573.00	$109,594.00	$86,724.00	$78,060.00	$112,306.00	$96,525.00	$119,734.00	$107,376.00
2023	$65,582.00	$90,718.00	$73,108.00	$128,607.00	$90,687.00	$0.00	$121,162.00	$100,302.00	$126,721.00	$118,286.00
Net New	$21,014.00	$27,549.00	$16,019.00	$57,841.00	$16,081.00	$23,164.00	$38,528.00	$39,985.00	$40,833.00	$50,698.00
Net % Change	47.15%	43.61%	28.06%	81.74%	21.55%	42.20%	46.62%	66.29%	47.54%	75.01%
Vs Benchmark	4.98%	1.44%	-14.11%	39.56%	-20.62%	0.02%	4.45%	24.12%	5.37%	32.84%
US Wide Benchmark										
42.17%										

Without adjusting factors to account for regional cost of living variability from this period, this measure cannot be weighed within the same esteem as the previous measures. However, all states, except for two, saw growth that either paced or exceeded the nationwide benchmark. What is important to note about these average annual salaries is that they are in almost all states (except Alaska and Nevada) more than the median household incomes for those states and represent quality employment.[33]

	Census Median	2023 Avg Salary	vs Median
Alaska (AK)	$86,631	$65,582	-24.30%
Michigan (MI)	$69,183	$90,718	31.13%
Nevada (NV)	$76,364	$73,108	-4.26%
New Mexico (NM)	$62,268	$128,607	106.54%
New York (NY)	$82,095	$90,687	10.47%
North Dakota (ND)	$76,525	$78,060	2.01%
Ohio (OH)	$67,769	$121,162	78.79%
Oklahoma (OK)	$62,138	$100,302	61.42%
Texas (TX)	$75,780	$126,721	67.22%
Virginia (VA)	$89,931	$118,286	31.53%

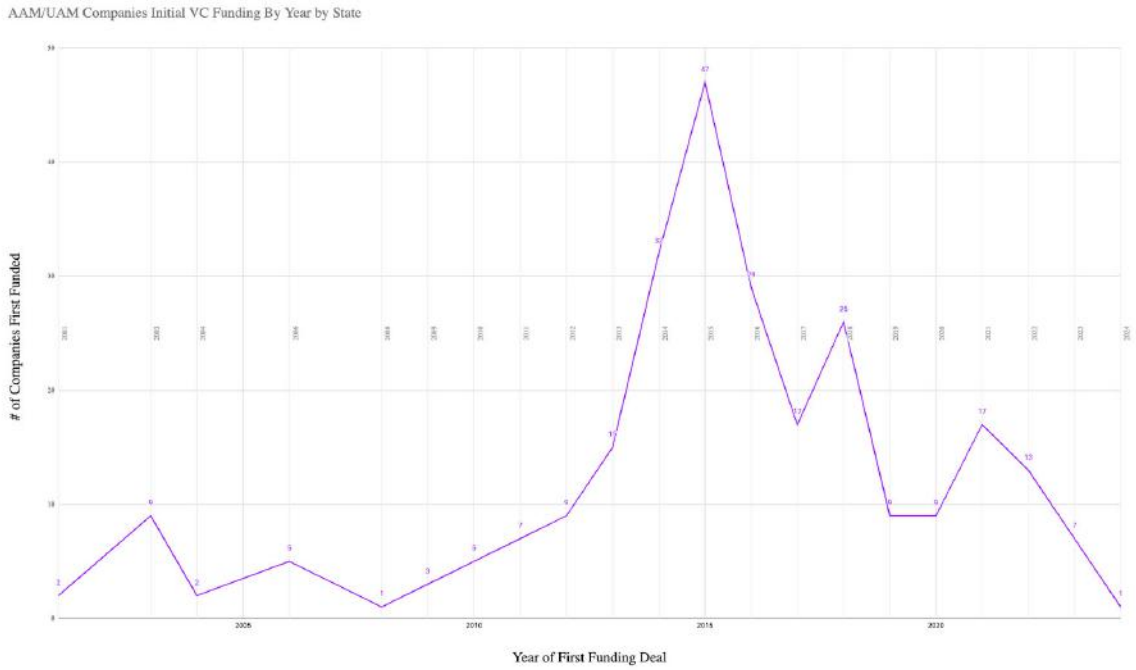
Venture Capital Deal Database

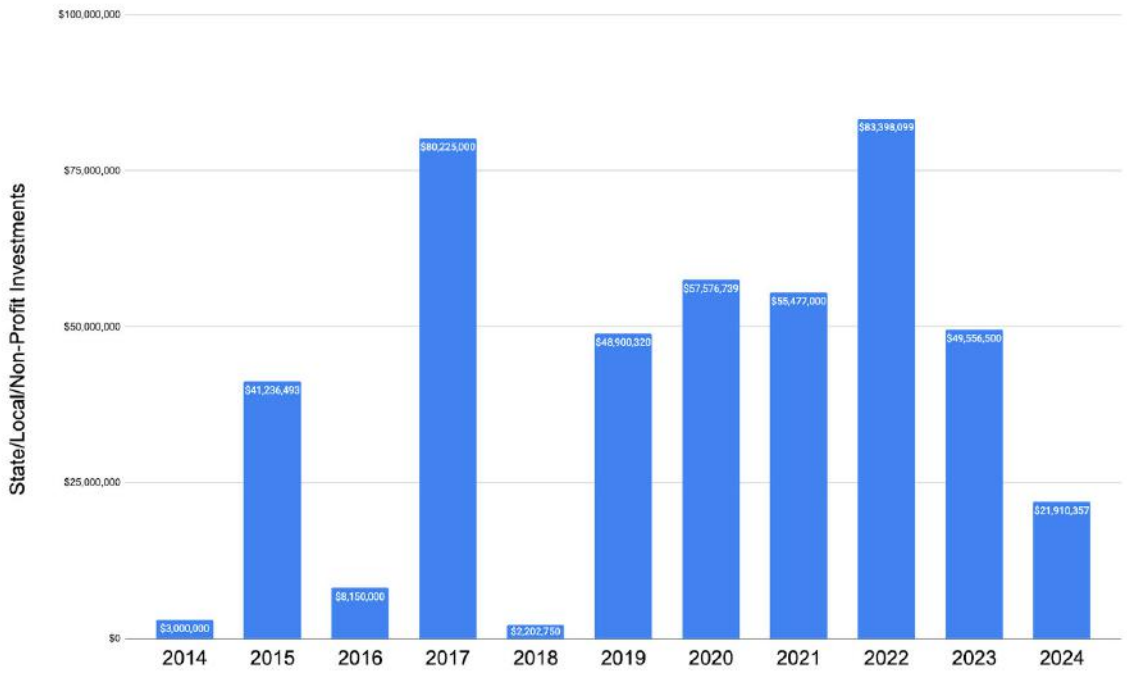
The measures below are the output from data provided in partnership with HawkTower, a venture capital firm seeking early-stage investments in autonomy, including AAM/UAS technologies. These data were filtered, parsed, and reviewed for AAM/UAS-specific terminology and manually reviewed to validate industry alignment. These data affords insight into how investments within the states have spurred innovation and entrepreneurship. This is an important dimension to review in counterbalance to the overall industry data above to help identify initiatives that proliferate the next generation of aviation technologies. It's important to note that these data do not filter exclusively on NAICS 3364, as many startups have generalized industry codes, or fall into a myriad of categories previously reviewed. This results in jobs

[33] (*S1901: Income in the Past 12 Months ... - Census Bureau Table*)

created and startups funded in some cases exceeding the numbers reported in the NAICS 3364 data.

The first measure from this analysis is the number of AAM/UAS Companies that received initial venture capital funds investment, by year for each of the included states. It's further charted and reviewed in a time series to help analyze the correlation of investments to the timing of these initial rounds of funding:





From 2013 through 2021 there was a major tide of initial venture capital deals with companies headquartered in all of the targeted states. This surge correlates directly with the spike observed in the funding from State, Local, Tribal, Territorial, and Non-Profit entities from 2014 through 2024. Overall across the 10 target states, it can be inferred that 1) the advent of the FAA UAS Test Sites signaled to industry there would be infrastructure, policy, and partnership with the government to advance AAM/UAS industry integration and 2) State/regional/non-profit economic development incentive and infrastructure investments triggered healthy private investment into AAM/UAS startups.

In order to better understand the impact per dollar invested in the AAM/UAS initiatives toward creating startup jobs, it is beneficial to compare the State, Local, Territorial, Tribal, and Non-Profit Investment per Startup Job Created:

State	Total with Fed	Total SLTTNP	Total Startups	# Total Startup Employees	Investment per Startup Job Created
VA	$35,390,419	$29,852,563	41	1,537	$19,423
TX	$45,715,418	$41,800,000	89	1,712	$24,416
MI	$27,401,668	$27,401,668	22	529	$51,799
NY	$127,882,277	$119,809,838	52	703	$170,427
OH	$55,628,531	$44,485,500	23	241	$184,587
OK	$167,782,994	$53,058,689	8	199	$266,627
ND	$116,493,603	$106,725,000	9	154	$693,019

This reveals that some state's initiatives have been potentially more effective than others in maximizing the returns on their investments if their objective is to spur a startup ecosystem and job creation. Virginia emerges as a clear leader in this category. New York has seen considerable startup entity growth and employment due to a deep focus on funding their startup

incubator GeniusNY and their UAS Central Job Fund to the tune of over $40 million of their overall investments during this period. Two significant caveats to understand when viewing the measure of investment per startup job created: 1) This doesn't account for the impact of the SLTT & and Non-Profit investment that helps secure Federal matches and grants, as is the case in Oklahoma where early investments have yielded recent EDA awards in 2022 and 2024 securing its place as a highly funded Tech Hub with major future startup potential from those investments yet to be realized, and 2) Future committed workforce growth, like Joby Aviation's forecast to add up to 2,000 jobs in Dayton, Ohio for its production facility are not reflected and represent major economic growth that will be reflected in the future U.S. Bureau of Labor and Statistics QCEW data.[34]

Qualitative and Anecdotal Observations from Test Site and Economic Development Stakeholder Interviews and Volunteered Informational Materials

Multiple interviews with key executive leadership from multiple UAS test sites, both FAA-appointed and otherwise, confirm there is no highly profitable business model in the current landscape and timing of the AAM/UAS industry. Most sites are in a consistent scramble to pursue federal research grants, secure state or academic funding, or seek to consult with other states or regions with their technical expertise in helping enable airspace and operations within that state or region.[35, 36] One key source put the plight of the test site's economic viability as "Vacillate between surviving and scraping by." Many of them have relied heavily on subsidized funding from their state governments.

These states and regions view the massive investments made into the infrastructure capital expenditures and operational costs of these test sites' equipment, facilities, staff, and operations as long-term investments. They've realized that regardless of whether they are an official FAA-designated test site, a part of the NASA Space Act agreements, or a partner with the FAA on other key programs like their UTM Key Site, they've recognized the enablement of integrating these technologies into the airspace above their jurisdiction and inclusion into their overall transportation network planning is crucial to for not only the long term economic benefits, but the environmental, and equity of access to public services and transportation. For example, Ohio was not selected as one of the FAA Test Sites but "...Focused on how do we enable the Industry from the Governor's Office down," and they subsequently embarked on an initiative that included over $10 million invested in establishing the capabilities of their UAS Center to address how they could do this. The key initially was the investments that addressed a core need from the industry: "What is the enabling capability we need to have?: Really, it's that traffic management system… led to Skyvision and Detective and Avoid System".[37]

From the earlier quantifiable data, one can observe that these investments have signaled a welcome ecosystem and encouraged growth. The states that consistently underperformed against the benchmark numbers or rankings invested very little in public funds.

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[34] (*Joby Selects Dayton, Ohio, Birthplace of Aviation, for First Scaled Manufacturing Facility | Joby*)
[35] (Jonathan Daniels, Principal Consultant/Founder &. CEO Praxis Aerospace Concepts International)
[36] (Tucker)
[37] (Jason Pritchard)

Other benefits that can't be readily captured in quantitative dollars are the public services enabled by promoting the integration of AAM/UAS technologies into communities and their airspace. For example, the Commonwealth of Virginia has invested in and facilitated the engagement of a global organization called DRONERESPONDERS, which is a 501(c)3 non-profit program that is setting the standards for first responders, emergency managers, and search and rescue specialists under a unified organization to help learn, train, and test with one another with the ultimate objective of maximizing drone operations for public safety.[38] Their work to promote the safe, effective, and efficient use of these technologies in Public Safety is yielding results constantly in locating people lost in austere environments, providing first responders with timely and accurate information before arriving on the scene, etc.

In North Carolina (though not a target state of this study) it was revealed that there are 30 to 40% vacancy rate in the local police departments' manpower. Through investments to enable Beyond Visual Line of Site with infrastructure to support more sophisticated drone operations, they plan to leverage Drones as a First Responder (DFR) in multiple locations within their enablement airspace to help relieve this shortfall and improve public safety. This serves in many ways to improve the service of responding police overall by providing them with information and context prior to arrival on the scene, which can drastically change their tactical approach to the situation. It also captures the broader context of the encounters and is capable of collecting visual evidence even if responding officers never make contact or an arrest in the initial response.[39] In Virginia, they've used their work and investments to position themselves for Federal funding to improve health care outcomes in rural areas through this technology. Virginia Innovation Partnership Corporation (VIPC), Riverside Health System, and VISA, in collaboration with DroneUp, have launched a medical drone delivery project to improve access to medications for underserved communities on Virginia's Eastern Shore. The initiative, funded by the U.S. Department of Transportation's SMART Grants Program, aims to deliver critical medications like hypertension drugs directly to patients' homes, reducing transportation barriers and enhancing healthcare access. The project is currently in the prototyping phase and will expand to more remote areas such as Tangier Island.[40] How does one quantify a life saved through either of these use cases enabled?

States like Florida have invested in making drone technologies critical to their natural disaster and ecological disaster responses. The state's Department of Emergency Management has taken a proactive and lead role in cooperation with Florida State University's Center for Disaster Risk Policy to create effective coordination across jurisdictions and stakeholders in the Florida UAS Working Group. The working group and the operations that have been enabled have greatly improved response and recovery in terms of area coverage and reducing risk for responders.[41]

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[38] (Tynan et al.)
[39] (Yap)
[40] (oduvisa)
[41] (*Florida UAS Working Group – UAS in Emergency Management and Public Safety*)

Recommendations and Next Steps

State Initiative Characteristics Summary

While these state AAM/UAS initiatives have many similarities, it's helpful to summarize their distinctions to identify some of the characteristics that have proven to be unique advantages or, in combination with other traits, have improved the success realized to date in terms of economic and quality job growth.

To that end, it is helpful when comparing these initiatives to create a framework for evaluating the relative progress each initiative has realized so far in common categories that are essential to the continued success of integrating these technologies into their respective communities. Based on the quantitative and qualitative data collected throughout this analysis, a rubric was constructed that allows for this comparison:

Rubric				
	4	**3**	**2**	**1**
Formal State Government Agency Engagement	-State Dept of Transportation led initiative -Strong formalized partnership with the State Dept of Commerce/Economic Development -Direct Governor Engagement and statements in the AAM initiative -Legislative Earmarked funding, favorable proactive policy toward AAM	-State Dept of Transportation AAM incorporated into state aviation plan and infrastructure priorities -High degree of State DOT adoption and integration of UAS into operations -Dept of Commerce/EDA incorporation of AAM into existing programs and activities, actively recruiting private industry -Legislative bills supporting research and exploration of AAM infrastructure needs	-State Dept of Transportation researching potential and considering impacts of AAM technologies without formalized programs, commitment, or staffing -State Dept of Commerce/EDA uncertain of AAM investments -No Governor priority on incorporating AAM -Little to no Legislative proactive bills or committee activity on AAM	-State Dept of Transportation prioritizing traditional aviation investments and dismissive of AAM technologies -State Dept of Commerce/EDA unaware or disinterested in AAM growth -No Governor priority on incorporating AAM -Negative or prohibitive Legislative bills or committee activity regarding AAM technologies
Higher Education Engagement	State-funded University system initiated, actively engaged, or actively operating test site(s) or AAM enablement areas with ongoing research and support to the FAA, NASA, SDOs, and Industry	State-funded University system has robust aeronautics and engineering programs specifically funded and focused on AAM technologies and workforce skills development	State-funded University system has incorporated AAM technologies and workforce skills development into existing aeronautics and autonomy engineering programs	State-funded University system informal incorporation of AAM into general curriculum development

Private Industry Engagement	-Multiple commercial operators executing advanced BVLOS commercial operations within enabled airspace -High rate of growth of industry vs national benchmark	-Multiple commercial operators executing commercial operations within enabled airspace -Healthy rate of growth of industry vs national benchmark	-Few commercial operators executing commercial operations within enabled airspace -Rate of growth of industry on pace vs national benchmark	-Smaller commercial operators with local standard drone data collection services -Negative rate of growth of industry vs national benchmark
Non-Profit/CBO Engagement/Advocacy	A formalized consortium of multiple Non-Profit or CBOs early and advocacy groups (ie active AUVSI chapters)	Nonprofits/CBOs cooperating with industry or government for community engagement and/or advocacy groups (ie active AUVSI chapters)	Non-profits/CBOs open to exploring and consulting with industry or government for community engagement	Key Non-Profits/CBOs openly opposed to AAM industry or government initiatives
Integration AAM Public Safety/Emerg Response	-State adoption and coordination of emergency and natural disaster response use of AAM tech -Multiple Drones as a First Responder enabled LE jurisdictions	- AAM tech used regionally or within most LE jurisdictions -AAM tech leveraged in formalized programs within state-level public safety organizations and active participation in global AAM tactics, techniques, and procedures development for public safety	-Most public safety within the state enabled to use the AAM tech as budget allow -Most jurisdictions rely on volunteer services from community groups or professional drone pilots	-Little adoption of AAM tech for public safety -Many jurisdiction or state-level policies highly restrictive of utilization for privacy concerns
Startup/Innovation Ecosystem	-State-funded Venture Capital investments into AAM tech companies paired with a state-funded incubator or accelerator focused explicitly on AAM tech --High rate of growth in AAM tech startup companies & Employment	-State-funded Venture Capital investments into AAM tech companies -High-med rate of growth in AAM tech startup companies & employment	-Med rate of growth in AAM tech startup companies or employment	-Low rate of growth in AAM tech startup companies and employment

Economic Incentives	-Targeted AAM and Aeronautics diverse mix and bundling of incentives available, including grants, employment tax rebates, state tax incentives, favorable facilities and site location assistance, zoning and policy support	-Healthy general industry incentives available, including grants, employment tax rebates, state tax incentives, favorable facilities and site location assistance, zoning and policy support	-General industry incentives, mostly available in the form of corporate tax incentives	-Few industry incentives -High corporate tax
SLTT Infrastructure Funding	>$50MM State, Local, Territorial, or Tribal funds invested directly into AAM tech sensors, data exchanges, integration, and/or services available to commercial operators	$25-50MM State, Local, Territorial, or Tribal funds invested directly into AAM tech sensors, data exchanges, integration, and/or services available to commercial operators	<$25MM State, Local, Territorial, or Tribal funds invested directly into AAM tech sensors, data exchanges, integration, and/or services available to commercial operators	No documented State, Local, Territorial, or Tribal funds invested directly into AAM tech sensors, data exchanges, integration, and/or services available to commercial operators
Operational Enablement	Advanced BVLOS enabled in integrated controlled airspace being used for commercial operations	High Cadence of Advanced BVLOS Testing Facilities, Research and Development and/or enabled airspace in low ground risk and airspace risk areas	Few unique and specific waivers for advanced or BVLOS R&D, Commercial, and Public Operations	There are little to no documented repeated operations outside of standard Part 107 rules

Analysis from the quantitative and qualitative sources applied against this rubric provides scoring for each State/Region initiative within each category and an overall score that lends itself to classifying the initiative as a Leader, Growth, or Niche. This analysis is limited to these specific State/Regional initiatives. However, this rubric and framework could be used to analyze other initiatives and provide insights into growth opportunities, allowing for quicker adoption and integration of these technologies, along with positive economic and workforce impacts.

State	State Gov Eng	Higher Ed Eng	Indust Eng	Non Profit CBO Advoc	Public Safety/ Emerg Adopt	Startup/ Innovate EcoSys	Econ Incents	SLTT Infra Funding	Adv Ops Enable	Total	Category
Texas	3	4	4	4	4	4	3	3	4	33	Leader
Virginia	4	4	4	4	4	4	3	3	3	33	Leader
North Dakota	4	4	3	3	2	2	3	4	4	29	Growth
New York	4	2	2	4	3	4	4	4	3	30	Growth
Oklahoma	3	4	3	4	3	2	4	4	3	30	Growth
Ohio	4	3	3	3	3	2	4	2	3	27	Growth
Michigan	4	2	4	3	2	3	3	3	3	27	Growth
Alaska	3	4	4	2	2	2	2	2	3	24	Niche
Nevada	2	4	2	2	4	3	3	2	2	24	Niche
New Mexico	2	4	1	2	2	2	2	2	2	19	Niche

Without belaboring a review of each state and each category, some common trends can be observed from the states that have positioned themselves for success. These states have a high level of formalized State Department of Transportation, Economic Development, and Governor-level support for integrating these technologies into the overall state and community planning for multi-modal transportation. This leadership from the front has led to prioritizing investments in those regions in the form of both infrastructure projects to support research, development, and commercialization of the technologies within the state and targeted economic incentives to attract and retain the innovative companies within this sector. Many of these states have helped to foster advanced ecosystems of technology OEMs, operators, and researchers through state-funded grants and technology accelerator programs that integrate deeply into higher education institutions and non-profit advocacy groups.

California Characteristics Summary and Recommendations

Applying this rubric to assess where the state of California stands today reveals multiple opportunities for growth to help the state accelerate the benefits of these technologies:

State	State Gov Eng	Higher Ed Eng	Indust Eng	Non Profit CBO Advoc	Public Safety/ Emerg Adopt	Startup/ Innovate EcoSys	Econ Incents	SLTT Infra Funding	Adv Ops Enable	Total	Category
California	2	3	3	3	3	2	1	1	2	20	Niche

State Government Engagement: 2

California has commissioned and funded a study on Advanced Air Mobility with Mead and Hunt to assist the CalTrans Division of Research, Innovation, and System Information along with the Division of Aeronautics in understanding what considerations need to be accounted for in the next iteration of the California Aviation System Plan. This study has been a work in progress for nearly 2 years without any release of findings publicly available. The final report was set for completion in September of 2024. The legislature passed Senate Bill 800 and it was signed into law in October of 2023, "Advanced Air Mobility, Zero-Emission, and Electrification Aviation Advisory Panel", with the purpose of the established panel "to assess the feasibility and readiness of existing infrastructure, the development of a 3-year prioritized workplan, and pathways for promoting equity of access to advanced air mobility infrastructure, as specified". The activities of this panel have been opaque, but there is a required January 1, 2025 report due to the California state legislature.[42] While close to pushing into the "3" within the rubric, formally speaking, California is still very much in an exploratory phase and moving slower, further behind the leading initiatives.

Recommendations: Formalize AAM infrastructure improvement statewide plan led by CalSta and CalTrans Aeronautics. Progress legislation that prioritizes resources and funding for investments that will integrate these technologies into the broader multimodal state-wide transportation plans. Consider how this AAM infrastructure network of vertiports can enable Urban Air Mobility and Regional Air Mobility to integrate with existing sustainable transportation initiatives like the High-Speed Rail project to deliver throughput to major metro destinations much sooner than currently projected and for less necessary investment.

Higher Education Engagement: 3

California's public university system, particularly through the University of California (UC) and California State Universities (CSU), has been making significant strides in developing AAM technologies, especially in research, workforce development, and private industry collaboration. An emerging major effort in this effort is UC Berkeley, which is actively engaged in aerospace research through initiatives and Joint Ventures with industries like the Space Center at Ames. The Space Center, housed at NASA Ames Research Center, serves as a hub for the development of cutting-edge aviation technologies, including those related to AAM. Research clusters at the UC Berkeley Space Center focus on a wide range of aerospace topics, from unmanned aerial systems (UAS) to advanced air traffic management systems, with one key focus at the center being urban air mobility. The Space Center works in collaboration with both governmental bodies (such as NASA and the FAA) and private industry leaders to explore the future of aviation, including solutions for airspace integration, safety protocols, and the development of sustainable aviation systems.

Additionally, CITRIS Research Initiatives for aviation technologies and the CIDER (Center for Drone Education and Research) is a collaboration between the University of California campuses at Santa Cruz, Merced, Berkeley, and Davis, advancing California's efforts to lead in AAM research. CIDER at UC Santa Cruz is part of the broader CITRIS initiative, focusing on

[42] (*SB 800- CHAPTERED*)

applying information technology to enhance the effectiveness and safety of AAM systems, particularly in drone integration, autonomy, and environmental monitoring. CITRIS CIDER is a key driver of research on autonomous systems, which is central to AAM applications. The AAM Challenge, another initiative that engages UC campuses, encourages students and researchers to develop innovative solutions to real-world problems facing the AAM industry. This includes working on challenges related to urban air mobility, regulatory frameworks, public safety, and environmental impacts. Through these programs, California's higher education institutions are actively contributing to AAM's technological and workforce advancements, positioning the state as a potential leader in AAM technologies.

Recommendations: California legislature should earmark UC and CSU funding for AAM-related research and workforce development within its public universities, particularly in programs such as CITRIS Aviation Research Initiatives, CIDER, and the Space Center at Ames. This funding should support specific research on airspace integration, UAS technologies, autonomous systems, and AAM infrastructure development. UCs and CSUs continue to strengthen collaboration between UC campuses and private industry to foster innovation. Create additional funding programs that enable UC Berkeley and other public universities to lead AAM technology development and prepare a future workforce equipped with the skills necessary to support the growing AAM sector. These efforts should focus on building a sustainable AAM ecosystem, promoting environmental sustainability, and ensuring equity in access to AAM technologies.

Industry Engagement: 3

California historically has enjoyed a strong aerospace product and parts manufacturing sector, which now includes a variety of companies involved in UAS and AAM technologies research and development. As measured by employment growth in the NAICS Aerospace Product and Parts Manufacturing category, the state's overall performance in this sector is solid. It has paced close to the national benchmarks. The state misses out on many of the manufacturing and production job growth opportunities due to the high cost of living and high state corporate taxes, limiting the potential to outpace the overall industry growth. The state has realized the benefits of some industry enterprises employing advanced technologies in rural, or low ground and air risk areas. A major example of contributors to this growth includes PG&E (Pacific Gas and Electric), which has been a major adopter of advanced UAS technologies, particularly for Beyond Visual Line of Sight (BVLOS) operations. The utility's adoption of these technologies demonstrates how large industries are increasingly integrating drones into their operations, signaling a growing market for AAM/UAS technologies across diverse sectors. Despite these successes, California's regulatory landscape for drones and AAM technologies remains fragmented, creating uncertainty for private companies looking to invest in infrastructure and operations. The lack of a harmonized approach to zoning, coding, and regulations across local, state, and federal levels adds complexity and inefficiency to the business environment. These challenges may deter new investments, particularly from smaller firms or startups, and may delay the broader adoption of drones for medical, public safety, and commercial use cases.

Recommendations: California must streamline and harmonize its zoning, coding, and regulatory approach to AAM technologies at the state level. This includes creating consistent policies promoting investment in both urban and rural areas for commercial, medical, and public

drone use cases. By ensuring that state-level regulations are clear and consistent, California can reduce uncertainty for private companies, attract new investment, and enable seamless integration of drones into both public and private sectors. This could include integrating AAM into State and Regional Transportation Plans and reducing the time it takes for companies to navigate the permitting process.

Non-Profit/CBO Engagement/Advocacy: 3

California has seen significant contributions from non-profit organizations and community-based groups advocating for AAM integration, particularly through regional efforts. Monterey Bay DART (Drone, Autonomy, and Robotics Technology) is a prime example, which has been at the forefront of advancing AAM technologies within the region. The Monterey Bay DART collaborates closely with local businesses, higher education institutions, community-based organizations, and government agencies to foster innovation and accelerate the adoption of AAM systems. Another key organization, the Monterey Bay Economic Partnership (MBEP), has been instrumental in promoting the economic benefits of AAM technologies. MBEP has played a significant role in building partnerships focused on equitable job creation, workforce development, and regional infrastructure planning, which includes advancing AAM initiatives. These organizations and others have spearheaded the Monterey Bay Tech Hub Consortium, which intends to expand and enhance the region's AAM tech ecosystem and opportunities. This consortium brings together local governments, businesses, academic institutions, and non-profits to create a thriving environment for technology innovation. The Monterey Bay area's growing emphasis on AAM technologies has made it a critical hub for research, workforce training, and testing of AAM systems. However, these efforts are currently focused on the Monterey Bay region, and while they have had a significant impact on local economic development and innovation, the broader state of California could benefit from a more expansive, statewide engagement platform.

Recommendation: California should leverage the successes of regional efforts like Monterey Bay DART, MBEP, and the Monterey Bay Tech Hub Consortium and work to expand their impact statewide. This could be achieved through the creation of a statewide AAM advocacy network, in partnership with formalized and funded support from the California state government. The network would aim to connect non-profits, community organizations, and local governments across California to collaborate on statewide AAM policies, funding initiatives, and infrastructure development. With formal support from the state government, this platform could promote AAM technologies throughout California, ensuring that all regions have access to the economic and workforce benefits associated with AAM.

Integration AAM Public Safety/Emergency Response: 3

Some local communities like Chula Vista, Campbell, and Elk Grove Police Departments have forged the path of using advanced drone operations like Drone as a First Responder (DFR) in California. These along with CalFire's work with NASA on wildfire use cases showcase promising progress toward integrating AAM technologies into public safety, particularly in rural and disaster-prone regions. However, these efforts are still in the pilot phases, and full

integration has yet to occur statewide. The use of drones in emergency services, such as medical deliveries, disaster cargo delivery, and firefighting, is still very limited in scope.
Recommendation: Expand funding for CalFire, CalTrans, and other state departments to leverage AAM technologies in public safety, particularly in wildfire response, medical supply delivery, alternative emergency cargo delivery, and search-and-rescue operations. California should also establish a state-level emergency response drone network to ensure quick and efficient deployment across high-need areas.

Startup/Innovation Ecosystem: 2
California has long been a global startup and innovation ecosystem leader, supported by a robust venture capital network, a strong engineering workforce pipeline, and world-class research institutions. The state has naturally fostered a thriving environment for technology development, particularly in the aerospace and AAM sectors. Prominent AAM startups such as Joby Aviation and Skydio have emerged from California's startup ecosystem, contributing to the state's position as an early adopter and innovator in AAM technologies.

Despite this strength, there has been a concerning trend in recent years: initial funding for AAM-related startups in California has dropped significantly. Over the past few years, the state has seen a decline in venture capital investments specifically targeting seed and early-stage AAM technologies, which has now fallen to the same levels as other states. This slowdown in funding, coupled with the challenges faced by new startups in scaling their operations, has meant that California is no longer the unchallenged leader in nurturing early-stage AAM companies.

At the same time, many quality production and manufacturing jobs that later-stage AAM companies generate and that are promising for upward economic mobility are slipping out of California. This loss can be attributed to factors such as rising operational costs, regulatory hurdles, and competition from other states offering more attractive incentives and lower costs of doing business. As a result, while California still hosts many AAM innovators, many choose to relocate their manufacturing facilities and production capacity to other states with more favorable conditions for scaling production.
Recommendation: California needs to refocus on revitalizing its AAM early startup ecosystem by providing targeted funding opportunities, including venture capital tax incentives, grants, and direct investments for new AAM startups similar to New York and Virginia. Additionally, California should support funding for an AAM incubator that helps startups bridge the gap between early-stage development and scaling, with particular attention to maintaining production and manufacturing jobs within the state. Furthermore, California should expand targeted policies that encourage aerospace and AAM technology manufacturing retention.

Economic Incentives: 1
California's CalCompetes Tax Credit (CalCompetes) has supported various industries, including AAM companies like Joby Aviation, but the program offers general incentives that are not specifically tailored to the AAM sector. While a few AAM companies have received support, the broad nature of CalCompetes means that many early-stage AAM startups miss out on targeted

opportunities. Additionally, California's high corporate tax rates can be a deterrent for companies looking to scale operations in the state, especially when competing with other regions offering more attractive incentives. This lack of specific incentives for the AAM industry has contributed to a slowdown in investment, with many companies relocating to states providing more focused support for AAM technologies and manufacturing.
Recommendation: California should create targeted economic incentives for AAM companies, including specialized grants, tax credits, and funding opportunities for research, development, and production. These incentives should focus on all-stage startups, workforce development, and manufacturing retention to ensure California remains a leader in AAM innovation and attracts more investment into this growing sector.

SLTT Infrastructure Funding: 1
California has not made significant, documented investments in AAM infrastructure, particularly for large-scale operations. While some small projects have been funded through federal programs, such as the construction site progress monitoring Drone-in-a-Box stations with CalTrans, these efforts are limited in scope. The funding for these projects has primarily come from Federal SMART Grant funding, leaving a gap in the infrastructure needed to support the full growth of AAM technologies. As a result, California lags behind other states that have made larger investments in AAM-specific infrastructure, such as sensors, safety augmentation data services, UAS traffic management systems, vertiports, and integrated airspace infrastructure.
Recommendation: California should significantly increase its aeronautics infrastructure investments to support these UAS and broader AAM technologies through focused milestones and funding in support of the next California Aviation System Plan (CASP) and the State Airport Capital Improvement Plan (CIP), focusing on developing comprehensive sensor and digital services, vertiports, electrical upgrades, and airspace integration tools. This would ensure that California has the necessary infrastructure to support the widespread adoption and commercialization of AAM technologies, attracting investment and enabling the growth of both public and private sector use cases.

Operational Enablement: 2
California's Operational Enablement score is primarily driven by a combination of PG&E's BVLOS asset inspections, which have advanced the use of drones in utility maintenance and wildfire monitoring, CalTrans' construction progress monitoring through drone-in-a-box systems, and a handful of community police departments utilizing Drone as a First Responder (DFR) programs. These efforts have shown disparate examples of the potential of integrating drones into infrastructure maintenance, public safety, and emergency response. However, large-scale and widespread deployment of Advanced BVLOS operations is still in its infancy, and the commercial use of BVLOS for public safety, including heavy-lift drones for emergency supply deliveries, remains limited.
Recommendation: To improve in this area, California should prioritize supporting the expansion of advanced BVLOS operations throughout the state and assist operators in building infrastructure and services to help operators achieve means of compliance with FAA regulations (like the coming Part 108). The state should work on integrating these technologies into natural disaster and emergency plans at the state and local level, spearheaded by the California Office

of Emergency Services and CalFire. This would help to unlock use cases like heavy-lift medium-range cargo drones to operate for emergency supply deliveries during natural disasters. In conjunction with the aforementioned infrastructure investments, California will enable the large-scale deployment of drones for critical commercial and public safety applications, enhancing disaster response and improving infrastructure resilience.

Despite being the birthplace of so much innovation in tech and aerospace, California does not currently rank in the "Leader" category based on both quantitative and qualitative assessments. The gap between California and other states in the "Growth" and "Leader" categories is not due to a lack of potential, but rather a failure to prioritize and accelerate the investments necessary to execute the implementation, integration, and scaling of advanced airspace technologies that deliver tangible community benefits. With its unmatched position as the global hub for technology innovation, a legacy steeped in aerospace development, and one of the largest economies in the world, California possesses all the essential elements to rapidly rise to the top in this sector. By focusing on state-level leadership and prioritizing these critical recommendations, California has the unique opportunity to not only lead the innovation of AAM technologies but to fully operationalize their benefits (such as increased transportation network efficiency, reduced roadway congestion, enhanced connectivity, and environmentally and ecologically sustainable movement of people and goods) while creating economic growth and quality jobs, creating a lasting impact for its communities.

Full Technical Definitions & Terminology

Advanced Air Mobility (AAM), n— a rapidly-emerging, new sector of the aerospace industry which aims to safely and efficiently integrate highly automated aircraft into the NAS. AAM is not a single technology but rather a collection of new and emerging technologies being applied to the aviation transportation system, particularly in new aircraft types. Notional AAM use cases include Urban Air Mobility (UAM), Regional Air Mobility (RAM), public services, large cargo delivery, and private or recreational vehicles.[43]

beyond visual line of sight, BVLOS, n—operation when the UA cannot be seen by the individuals responsible for see-and-avoid with unaided (other than corrective lenses or sunglasses, or both) vision, but where the location of the sUAis known through technological means without exceeding the performance capabilities of the C2 link.

controlled airspace, n—an airspace of defined dimensions within which air traffic control service is provided in accordance with the airspace classification. F3442/F3442M DISCUSSION—For example, in the United States, Classes A, B, C, D, and E airspace.

detect and avoid, DAA, n—a subsystem within the UAS providing the situational awareness, alerting, and avoidance necessary to maintain safe BVLOS operation of the ownship in the presence of intruders. *(also see "sense-and-avoid" below)*

original equipment manufacturer, n—the person or organization who first produced that product or article. An OEM may also be an operator.

operator, n—the person or organization that applies for CAA approval to operate a UAS or who seeks operational approval for types of flight operations prohibited by a CAA for that UAS.

unmanned aircraft system, UAS, n—composed of unmanned aircraft and all required on-board subsystems, payload, control station, other required off-board subsystems, any required launch and recovery equipment, all required crew members, and command and control (C2) links between UA and the control station.

UAS traffic management (UTM), n—a federated set of services operated under regulatory oversight that support safe and compliant UAS operations.

visual range, n—distance that unaided (except for normal prescription eyewear) human vision can effectively monitor and provide deconfliction during a UAS operation.

[43] (U.S. Department of Transportation Federal Aviation Administration)

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