



REPORT AND RECOMMENDATIONS OF THE Urban Air Mobility Advisory Committee



PREFACE

Advanced Air Mobility (AAM) is a next-generation transportation modality transforming America's regional and interregional connectivity for the movement of people and goods. AAM includes a broad range of innovative aeronautics technologies, including a large class of unmanned aerial systems, vertical take-off and landing (VTOL) aircraft, electric aircraft, and transformative air traffic management systems. Urban Air Mobility (UAM) is a subset of a complex AAM ecosystem that focuses on high-density automated aircraft operations over densely populated areas, especially aircraft operations below 4,000 feet.

The Texas Transportation Commission Urban Air Mobility Committee, constituted through the directive of SB 763, was tasked with assessing current state law regarding UAM and providing suggestions for potential changes, as well as providing guidance on the development of UAM operations and infrastructure for the State of Texas. The Committee embraced a broader interpretation of the directive to set a goal to identify and define the State's path to adopting this new transportation modality. The guiding vision of the Committee was to "Maximize Opportunity and Safety" and included four principles:

1. Texas will be the destination for the early adaptation and development of UAM Technologies.
2. UAM will provide extensive business and economic opportunities for our residents.
3. The adaptation of the UAM paradigm will create equitable upward social mobility for our residents.
4. Texas will be the national role model for the safe deployment of UAM.

Through four working groups (Technology, Airspace and Infrastructure, Safety and Security, and Commerce and Community Integration), the Committee explored the intersection of policy and technology doctrine to develop a set of recommendations to support the UAM ecosystem development for the State of Texas. The Committee collects and synthesizes information on (i) state, national, and global contexts, (ii) technology and maturation level, (iii) state and federal laws, and (iv) strategic advantage of our State in developing the recommendations. The recommendations are summarized in this report.

The Committee worked diligently to develop a robust set of recommendations that can be used as a foundation for developing new regulations (or potentially changing existing ones) that can facilitate the development of the State's UAM deployment and adaptation capabilities. However, due to the very short duration of the Committee, an extensive assessment of some of the important areas could not be done. Rapidly emerging AAM technologies and elasticity needed in the regulatory framework to address these evolving technology paradigms require much more in-depth analysis than those the Committee was able to provide. Regulatory impacts, challenges, and opportunities for high-density UAM, interoperability, cybersecurity, industry-regional government partnership, and workforce development issues must be fully considered before comprehensive UAM implementation guidelines can be developed. The Committee likely needs an additional 24 months of effort to provide more comprehensive assessments.

It was my privilege to serve as Chair of the Texas Transportation Commission Urban Air Mobility Committee and work with a group of very distinguished UAM stakeholders. Very special

appreciation to the Texas Department of Transportation leadership and the Texas A&M Transportation Institute team for their extensive support to the Committee.

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Suggested Citation:
Urban Air Mobility Advisory Committee. *Report and Recommendations of the Urban Air Mobility Advisory Committee: Executive Summary*. Texas Department of Transportation, September 2022.

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URBAN AIR MOBILITY ADVISORY COMMITTEE

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Chad Sparks, Bell, Vice Chair
Amanda Nelson, Bristow Group Inc.
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EXECUTIVE SUMMARY

BACKGROUND & PURPOSE

In spring 2021, the Texas Legislature passed Senate Bill 763 in the 87th Regular Session requiring the Texas Transportation Commission to establish the Urban Air Mobility Advisory Committee “to assess current state law and any potential changes to state law that are needed to facilitate the development of urban air mobility operations and infrastructure in this state.”

URBAN AIR MOBILITY (UAM) ADVISORY COMMITTEE GUIDING VISION

The UAM Advisory Committee established a vision that focused on maximizing opportunity and safety for the State of Texas. The core principles of this guiding vision are:

- Texas will be the destination for early adaptation and development of UAM Technologies.
- UAM will provide extensive business and economic opportunities for our residents.
- The adaptation of a UAM paradigm will create upward social mobility for our residents.
- Texas will be the national role model for the safe deployment of UAM.

Urban Air Mobility (UAM) envisions a safe and efficient aviation transportation system that will use highly automated aircraft that will operate and transport passengers or cargo at lower altitudes within urban and suburban areas.

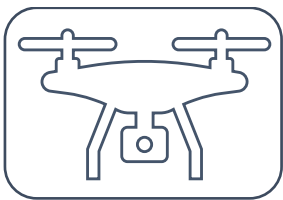
Advanced Air Mobility (AAM) builds upon the UAM concept by incorporating use cases not specific to operations in urban environments, such as:

- Commercial intercity.
- Cargo delivery.
- Public services.
- Private/recreational vehicles.

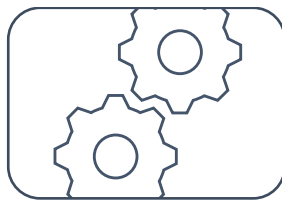
DEFINITIONS

UAM ADVISORY COMMITTEE MEETINGS

The Urban Air Mobility Advisory Committee held four public meetings which included opportunities for input from stakeholders and the general public. During the initial meetings, the committee identified four key areas for the success of UAM:



Technology



Airspace and Infrastructure



Safety and Security



Commerce and Community Integration

The working groups each held four meetings for a total of 16. All 20 of these meetings were posted in advance on the Texas Department of Transportation’s (TxDOT’s) website and were open to the public. Public comment was welcomed and received at all meetings. During the working group meetings, critical topics were established for each area based on the charge of the committee.



The discussions on these critical topics concluded with the development of recommendations that were reviewed and approved by the full committee. The first recommendation was put forth by multiple working groups.

URBAN AIR MOBILITY ADVISORY COMMITTEE RECOMMENDATIONS

- Extend the work of the Urban Air Mobility Advisory Committee beyond the sunset date of January 1, 2023, to continue working in key areas of this emerging and quickly evolving industry in order to remain responsive to the needs of Texas and ensure Texas’ role as a leader in this industry.

Technology

- Encourage the development of an urban air mobility/advanced air mobility sandbox by:
 - a) Directing the preparation of a feasibility study to understand the market, differentiating factors from similar existing facilities, potential market/players, funding sources, revenue opportunities, locations, necessary digital and physical infrastructure, and potential use cases; and
 - b) Pursuing the development of a facility that will provide opportunity for testing and commercialization that will attract business and move the industry and state forward.
 - c) Having the State take the initiative to work with industry to determine additional standards in terms of communications, technology, and environmental awareness systems to encourage consistency and harmony at all levels of government and stakeholders.
- Consider the initial funding for a UAM/AAM Sandbox Feasibility Study and ultimately its development along with an incentive program to attract industry with the ultimate

The committee’s discussion regarding a sandbox focused on the concept of a designated place, either geographical or digital, where new technologies can be tested under liberal rules for a predetermined duration before a commercial rollout to the public.

objective of using user fees to fund the ongoing operations and maintenance of the sandbox

- Encourage state agencies to adopt a technology-neutral/open architecture approach to the urban air mobility/advanced air mobility industry to allow easier adoption of new technologies and deployment into new regions.
- Identify areas where technology will drive standardizations.

Airspace and Infrastructure

- Provide consistency across Texas law by creating statutory uniformity and standard definitions pertaining to unmanned aircraft operations and urban air mobility/advanced air mobility.
- Develop an urban air mobility/advanced air mobility-centric research facility to test and evaluate technology, provide data collection opportunities, and coordinate with federal entities to share information and help guide data-driven public policy. The Texas Legislature is encouraged to consider the benefits of state funding for the successful development and operation of this facility.
- Develop a statewide plan, or integration within the Texas Airport System Plan, that addresses the potential locations for and classifications of vertiports and other associated infrastructure to help define the future operational environment of urban air mobility/advanced air mobility.
- Direct the State to work with municipalities to provide technical assistance to local governments in adapting and integrating urban air mobility/advanced air mobility in their communities.

Safety and Security

- In collaboration with the appropriate federal entities, the state will work to encourage the development of minimum standards/safety management systems for vertiport operations including passenger and goods movements and ground infrastructure.
- Recommend Texas law does not conflict with federal law.
- Encourage the Legislature remain an active participant in urban air mobility/advanced air mobility as the industry and technology will outpace current regulations and enable the appropriate state agency to lead and manage the regulatory concerns.
- Direct the Texas Department of Transportation to review existing state aviation standards and guidelines, airport facility planning, and compatibility guidance to ensure they apply to urban air mobility/advanced air mobility.

- Support the development of standardizations at the federal level and within industry as technology develops/changes so safety is prioritized as the technology matures.
- Encourage state-level cooperation with local governments to ensure appropriate preparation, training, and safety practices associated with vertiport operations including law enforcement, fire service, and emergency medical services associated with traditional aviation and advanced air mobility aircraft operations.

Commerce and Community Integration

- Direct all law enforcement and first responder agencies to adopt education and training recommendations as identified in *Unmanned Aircraft: Responding to and Recovering from Disasters* (State of Texas, November 2020), a report born out of House Bill 2340 (86R, 2019), establishing a small unmanned aircraft study group for a statewide response team.
- Create a statewide primary point of contact to direct urban air mobility/advanced air mobility workforce development efforts, lead public awareness and education efforts, and collaborate with local, regional, state, and federal entities to encourage more input and participation.
- Direct the State to provide resources and assistance on the use of urban air mobility/advanced air mobility technology infrastructure for cities, local and regional governments, transportation planning organizations, other entities, and industry to better identify what the different levels of government can do to integrate industry innovation and community vision and help promote urban air mobility/advanced air mobility technology.
- Direct the appropriate state agencies to jointly collaborate with local school districts, higher education institutions, and any interested private and/or public stakeholders on educational opportunities related to urban air mobility/advanced air mobility technologies.

IN CLOSING

The recommendations developed by this committee represent the culmination of many meetings and hours of discussion on how best to position our state to facilitate the emerging and quickly evolving advanced air mobility industry.

The committee recognizes that many of the recommendations may add additional workload to some agencies such as the TxDOT Aviation Division. The Aviation Division, which currently has responsibilities surrounding the planning, programming, and funding of airport projects across the state as well as some aviation education responsibilities, is likely to find itself as the focal point for several of these recommendations. The committee understands that many of the additional roles and responsibilities imbedded within its recommendations will be best addressed and carried out with appropriate accompanying resources.

The committee would like to thank the Texas Legislature and TxDOT for the opportunity to participate in this important work and their commitment to advanced air mobility.

INTRODUCTION

In spring 2021, the Texas Legislature passed Senate Bill 763 in the 87th regular session requiring the Texas Transportation Commission to establish the Urban Air Mobility Advisory Committee (1). The bill was passed in the Senate on April 20, 2021, and in the House on May 11, 2021. The governor signed the bill on June 14, 2021. The bill was authored by Sen. Beverly Powell and sponsored by Rep. David Cook.

TxDOT's Strategic Planning Division and Aviation Division began working with the Texas A&M Transportation Institute (TTI) in fall 2021 to provide support for the work of the Urban Air Mobility Advisory Committee upon its establishment. TTI assisted TxDOT by developing a literature review and background research for the committee as well as a review of activity in other states. TTI also provided supporting materials and assistance to the committee and TxDOT during the committee's work. Resource documents and meeting notes were maintained for the committee members' use in their work.

The primary charge and focus of the Urban Air Mobility Advisory Committee was to develop the recommendations found in the Key Areas in Urban Mobility section of this report, and the committee unanimously adopted the recommendations and accompanying report during a public meeting of the full committee on July 7, 2022. A draft report, as presented during the July 7th meeting, was posted to the committee's website for public comment; input provided during the public comment period is reflected as an appendix to the report.

COMMITTEE ESTABLISHMENT AND LEADERSHIP

The responsibility for establishing the Urban Air Mobility Advisory Committee fell to TxDOT and, more specifically, the Strategic Planning Division. TxDOT worked in late summer/early fall 2021 to identify and select members for the committee that met the representation requirements set forth in Senate Bill (SB) 763. Ultimately, 29 members were selected and approved by the Texas Transportation Commission at its November 2021 meeting. TxDOT was assisted by TTI in operating the committee, developing background resources, and facilitating the committee's work and public meetings.

At the committee's initial meeting in December 2021, a chair and vice chair were selected to lead the committee's activities. The committee elected Dr. Ahsan Choudhuri as the committee chair. Dr. Choudhuri currently serves as associate vice president and professor of aerospace engineering at The University of Texas at El Paso. He is the founding director of the university's Aerospace Center. The committee also elected Mr. Chad Sparks as the vice chair. Mr. Sparks is the director of strategy and enterprise growth alignment at Bell in Fort Worth, Texas.

During his first meeting as chair, Dr. Choudhuri shared his vision for how he saw the advisory committee working together going forward. Following discussion with the full committee, four working groups were established to allow the 29-member committee to begin addressing the multitude of issues and challenges that urban air mobility presents.

The four working groups, which are discussed in more detail later in this report, are:

1. Technology.
2. Airspace and Infrastructure.
3. Safety and Security.
4. Commerce and Community Integration.

Each working group was led by a lead facilitator who was selected by TxDOT following a request of the committee members to identify on which working group they would like to serve. The lead facilitators for the working groups were as follows:

1. Dr. Maruthi Akella, The University of Texas at Austin—Technology.
2. Mr. Nathan Trail, Supernal (Hyundai Motor Group)—Airspace and Infrastructure.
3. Mr. Ben Ivers, The Boeing Company—Safety and Security.
4. Mr. Michael Hill, Volatus Aerospace—Commerce and Community Integration.

The committee identified the topics and issues that fell under each of these areas, and the working groups used them as a starting point for their discussions. The working groups were charged with developing recommendations that fell within their group's purview.

Each of the working groups held four meetings and voted on the recommendations they developed on their fourth meeting. All working group recommendations were presented to the advisory committee as a whole at the June 14, 2022, meeting in Austin, Texas, where they were each discussed, amended if desired, and voted on. The committee adopted 20 recommendations that appear below under their respective working groups along with some additional context. This report of the Urban Air Mobility Advisory Committee was discussed and approved by the committee at its July 7, 2022, meeting in Austin, Texas.

COMMITTEE MEETINGS

The Urban Air Mobility Advisory Committee held four meetings between December 2021 and July 2022. The four working groups each held four meetings for a total of 16. Collectively, there were 20 meetings of the Urban Air Mobility Advisory Committee and its working groups. All meetings were posted in advance on TxDOT's website and were open to the public. Public comment was welcomed and received at all meetings, and the input was documented by TxDOT and TTI staff. There was a one-week public comment period following the committee's approval of the recommendations and report on June 14, 2022, and July 7, 2022, respectively. Figure 1 shows the timeline of the committee meetings.

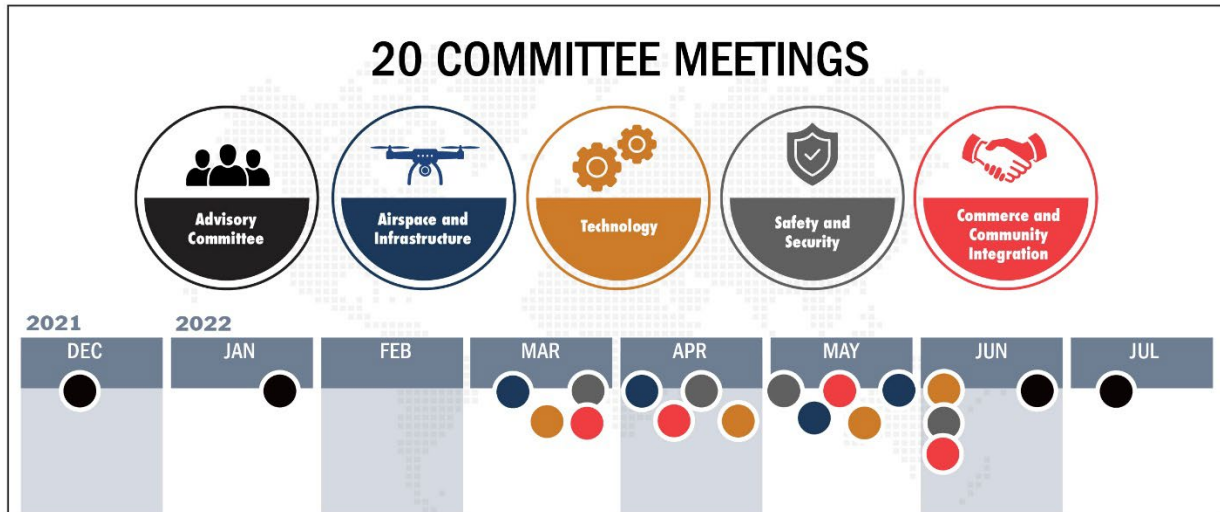


Figure 1. Timeline of Committee Meetings.

Notes and videos were taken for each of these meetings and are available at TxDOT’s Urban Air Mobility Advisory Committee website: <https://www.txdot.gov/inside-txdot/division/planning/urban-air-mobility-advisory-committee.html>.

PURPOSE

The purpose of the Urban Air Mobility Advisory Committee and its efforts is clearly laid out in the legislation. The advisory committee is “to assess current state law and any potential changes to state law that are needed to facilitate the development of urban air mobility operations and infrastructure in this state” (1). The entire text of the legislation can be found in Appendix A.

DEFINITIONS

Both the National Aeronautics and Space Administration (NASA) and the Federal Aviation Administration (FAA) have been involved in the early stages of urban air mobility. For the purposes of this research and the committee’s work, this report uses these entities’ definitions of urban air mobility. Further, the use of the term *urban air mobility* has been largely supplanted by the term *advanced air mobility* in an effort to be more inclusive and address these same technologies and services for areas beyond our urban areas. The use of these accepted terms and definitions will provide a common baseline and foundation from which the committee’s work can take place.

FAA provides the following definitions for urban air mobility and advanced air mobility (2).

Urban Air Mobility

UAM envisions a safe and efficient aviation transportation system that will use highly automated aircraft (crewed or uncrewed/self-flying) that will operate and transport passengers or cargo at lower altitudes within urban and suburban areas.

UAM will be composed of an ecosystem that considers the evolution and safety of the aircraft, the framework for operation, access to airspace, infrastructure development, and community engagement.

Advanced Air Mobility

Advanced air mobility (AAM) builds upon the UAM concept by incorporating use cases not specific to operations in urban environments, such as:

- Commercial intercity (longer range/thin haul).
- Cargo delivery.
- Public services.
- Private/recreational vehicles.

To build upon these definitions, NASA has developed a vision for advanced air mobility. Currently, it almost exclusively uses the term *advanced air mobility* to be inclusive of its work on urban air mobility.

NASA's vision for Advanced Air Mobility (AAM) Mission is to help emerging aviation markets to safely develop an air transportation system that moves people and cargo between places previously not served or underserved by aviation—local, regional, intraregional, urban—using revolutionary new aircraft that are only just now becoming possible. AAM includes NASA's work on Urban Air Mobility and will provide substantial benefit to U.S. industry and the public (3).

Aircraft and Airport

For the purpose of clarity, the definitions of *aircraft* and *airport* are provided as defined in the Texas Transportation Code. They are as follows.

“Aircraft” means a device that is invented, used, or designated for air navigation or flight, other than a parachute or other device used primarily as safety equipment (4).

“Airport” means: (A) an area used or intended for use for the landing and takeoff of aircraft; (B) an appurtenant area used or intended for use for an airport building or other airport facility or right-of-way; and (C) an airport building or facility located on an appurtenant area (5).

Unmanned Aircraft Systems

Unmanned aircraft system (UAS) is defined by the FAA Modernization and Reform Act of 2012 as follows.

The term “unmanned aircraft system” means an unmanned aircraft and associated elements (including communication links and the components that control the unmanned aircraft) that are required for the pilot in command to operate safely and efficiently in the national airspace system (6).

Some additional clarification is also warranted regarding the use of the term “unmanned” in this report. It is used in this document for clarity and consistency reasons. The industry has seen myriad terms used over the recent years to describe aircraft being flown without a pilot whether it is autonomously or remotely. “Unmanned aircraft” and “drones” are two terms that have been widely used and even adopted by governmental agencies, industry groups, and universities within their organizations and publications. There is a clear trend to replace “unmanned” with the more gender-neutral “uncrewed” across government, industry, and academia. While the FAA still uses “unmanned”, some universities, governmental agencies, and industry groups including AUVSI (Association for Uncrewed Vehicle Systems International), the largest non-profit organization committed to uncrewed systems, have already made this change. This report uses the historical term “unmanned” to avoid confusion regarding the documents it cites and the work that took place in developing the Committee’s recommendations. However, it is recognized that there are proposals to change this nomenclature and future reports will abide by such taxonomy once adopted by the FAA.

Automation and Autonomous Operations

There can also be some confusion when it comes to defining automation and describing what autonomous flight really looks like. The FAA, in its *Concept of Operations v1.0* document, refers to several levels of aircraft automation. According to the FAA, in a sort of evolution, there is Human-within-the-Loop (HWTL), Human-on-the-Loop (HOTL) and Human-over-the-Loop (HOVTL). With Human-within-the-Loop, a human is always in control of the automation. With Human-on-the-Loop, a human has supervisory control and actively monitors the systems and has the ability to take full control of the aircraft. With Human-Over-the-Loop, the human is informed by the automation system, passively monitors the system and is informed by the system if any action is required, and they are engaged by the automation system for any exceptions that are not reconcilable. The physical location of the pilot is expected to transition from onboard initially to remotely.

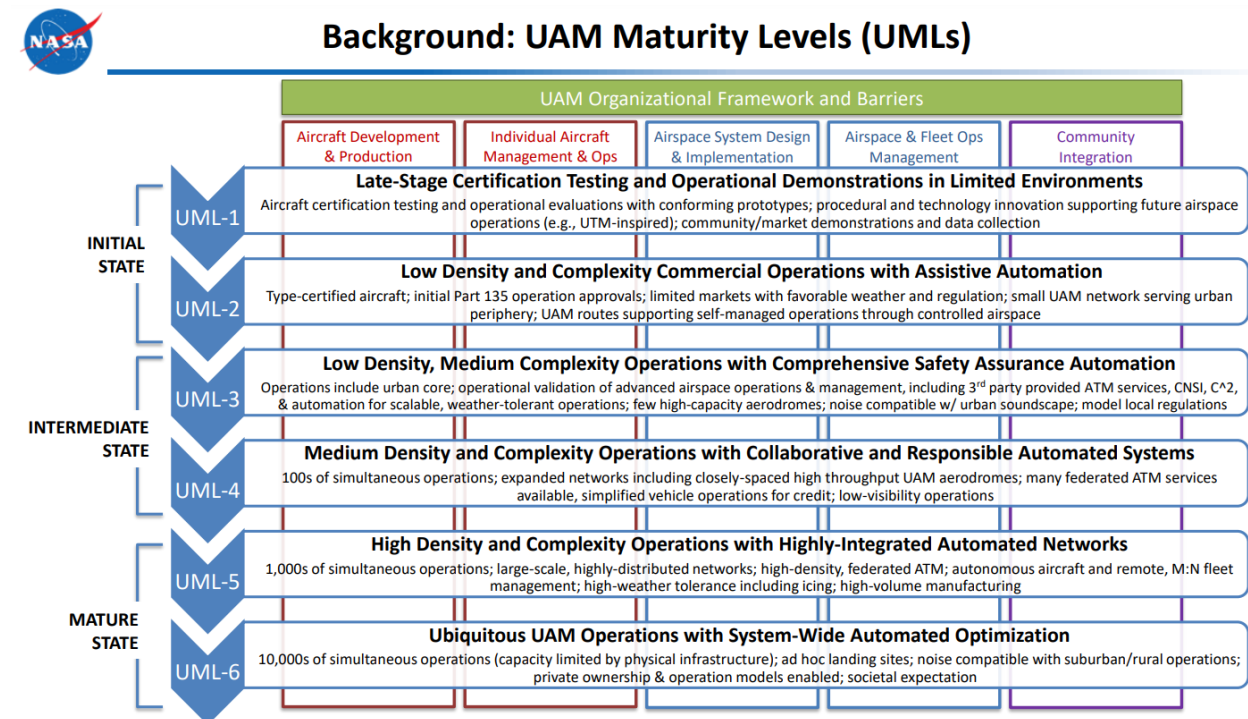
More advanced automation and piloting concepts are described by Garrow et. al. in their paper entitled *A Proposed Taxonomy for Advanced Air Mobility (7)*. Their discussion of autonomous flight ranges from simplified vehicle operations where automation assist a pilot by reducing the necessary skills and workload of operating an aircraft through a multi-aircraft supervisor where a remote human is responsible for multiple aircraft and a remote supervisory operation (RSO) where one or more multiple aircraft supervisors are overseeing many, automated flights. While this is beyond the scope of this study, it is worth noting there is an increasing level of automation and complexity involved with AAM.

EMERGING AND EVOLVING INDUSTRY

As defined above by NASA, UAM, or AAM as it is now more commonly referred, is a quickly emerging and evolving industry that has seen significant investment from the private sector and been the focus of significant time and resources from federal, state, and local governments. The industry is rapidly changing with respect to the technologies it uses and will require widespread coordination across all levels of government and partnerships with private industry. The industry will also require unprecedented levels of coordination and cooperation as the technology is deployed. It will require integration into many aspects of our everyday life, bringing new challenges that must be met head on.

In June 2020, FAA developed a concept of operations that described the operational environment FAA envisioned that would support this industry as it grows (8). According to FAA, “The envisioned future state for UAM operations includes increasing levels of autonomy and operational tempo across a range of environments including metropolitan areas and the surrounding suburbs.” This initial concept document specifically addresses engagement with NASA and industry stakeholders and defines the unmanned aircraft system (UAS) traffic management operating environment.

In the second concept-of-operations document, in an effort to articulate where this industry is headed and what the path toward wide-scale implementation may look like, NASA developed an organizational framework that illustrates what various maturity levels will look like (9). Figure 2 shows this framework.



Source: NASA (9)

Figure 2. UAM Organizational Framework and Barriers.

The maturity levels range from aircraft certification testing through full implementation and deployment of thousands of vehicles serving our urban, suburban, and rural populations. We are in the early stages of this complex and dynamic industry. Many of the issues outlined in this framework were the subject of significant thought and discussion by this advisory committee. This report documents the efforts of this committee over the last several months and includes the challenges and issues the committee considered and the recommendations that were developed for the state to consider in order to help facilitate advanced air mobility in Texas.

ORGANIZATION OF REPORT

This report begins with a regulatory overview of those issues most pertinent to urban air mobility. The report includes a regulatory overview that discusses recent legislation at the state level both in Texas and in other states across a number of issues including operations, privacy, noise abatement, electricity, and air rights. What follows is a discussion of the four key areas identified by the committee. Each of these four areas is served by a working group. The section is organized by working groups, and their respective subsections include background information on the associated topics, a summary of the activities and discussions of each group, and their recommendations. Each of the recommendations also has some additional context provided for clarity. The appendix includes the original legislation that established this committee as well as related state legislation from across the country.

REGULATORY OVERVIEW

The U.S. Government is given exclusive sovereignty of airspace in the United States in 49 USC § 40103(a)(1). This does not preclude states or local governments from passing any valid regulation within their traditional police powers, but courts generally recognize that Congress extensively controls much of the field. Where a state's exercise of police power infringes upon the federal government's regulation of aviation, state law is preempted. The FAA has been clear about the limitation of state and local police powers, but some grey areas may exist. The FAA has provided guidance on when to consult with the FAA as well as the FAA's authority in regulating drones (10, 11).

FAA was directed by Congress in the FAA Modernization and Reform Act of 2012 to “develop a comprehensive plan to safely accelerate the integration of civil unmanned aircraft systems into the national airspace system.” To this end, FAA developed 14 CFR Part 107 that applies to the “registration, airman certification, and operation of civil small, unmanned aircraft systems within the United States.” While the federal government has noted that states have limited authority to regulate aircraft operations under their police powers, states have attempted to delineate parameters for operation within Class G airspace.¹

RECENT LEGISLATIVE DEVELOPMENTS AT THE STATE LEVEL

There is recent development in state legislatures regarding AAM that shows an interest in the possible adoption of this new technology. In early 2022, bills were enacted in Michigan and Utah establishing a task force dedicated to exploring AAM opportunities for their state. Michigan passed SB 795 creating the advanced air mobility study committee comprised of 25 members (13). Similarly, Utah enacted SB 122 tasking its department of transportation to create a working group to study the feasibility of adopting AAM. This bill additionally defines what constitutes a criminal offense with respect to UAM; it is a crime to commit the offense using the aircraft or if the actor commits the offense by controlling the aircraft (14).

Other recent legislation prohibits local government from placing restrictions on AAM such as those enacted in Michigan and West Virginia. In addition to creating the AAM study committee, Michigan, through SB 796, prohibits the county, city, or any local government from owning aircraft or regulating AAM (15). West Virginia's HB 4667 contains similar language restricting local government jurisdiction over AAM, but the state has enacted additional instructions to draw in the industry. HB 4827, titled Promoting Public-Use Vertiports Act, is enacted by West Virginia to “promote the development of a network of vertiports that will provide equitable access to citizens of this State who may benefit from advanced air mobility operations for cargo and passenger service, and to avoid any vertiport monopolization or discrimination” (16). A more complete list of UAS state legislation is in Appendix B.

Florida statute 934.50 regarding the use of UASs or drones was updated in 2021 to reflect the current interest in this technology. Named the Freedom from Unwarranted Surveillance

¹ Per the GAO, “Class G airspace refers to uncontrolled airspace and generally extends from the surface to the base of Class E airspace, which in most areas is 1,200 feet above ground level, except for restricted or prohibited areas” (12).

Act, this law prohibits laws enforcement agencies from using drones to collect evidence or conduct surveillance. The statute does however include exceptions namely allowing the use of drones if there is high risk of a terrorist attack, if a search warrant was first obtained, and if quick action is needed (17). In late 2020, SB 44, Use of Drones by Government Agencies, was introduced and approved by the governor in June 2021 to amend this statute (18). Changes include expanding the use of drones by law enforcement to provide an aerial view of a crowd of more than 50 people, aid in traffic management except to issue citations, and facilitate the collection of evidence at a crime scene or traffic accident. Florida state agencies and political subdivisions may use a drone for the purposes of assessing damages caused by natural disasters and managing public vegetation and wildlife. The bill also introduces a security standard for drone use by a Florida agency. All Florida agencies are prohibited from using drones not on the Department of Management Services approved list. Additionally, starting July 1, 2022, all Florida agencies not using approved drones must submit a plan detailing how they will discontinue use of their drones. By January 1, 2023, all use of unapproved drones by a Florida agency must be discontinued.

THE TEXAS REGULATORY LANDSCAPE

The Texas legislative and regulatory environment has largely focused on the operations of small, unmanned aircraft systems to date, in terms of action at the state level. While unmanned aircraft is not explicitly defined in statute, Texas code regulates operations and privacy to a certain extent with protections also existing at the national level. Other portions of statute address some of the relevant issues related to UASs, such as noise abatement, electricity provision, and air rights. Table 1 provides an overview of the relevant legislation passed in Texas (19).

Table 1. Texas Legislation.

Year	State	Bill	Summary
1995	Texas	SB 971	This legislation requires a municipality to provide adequate soundproofing and noise reduction devices for each public building within the 65 or higher average day-night sound level contour as determined by the governing body in accordance with FAA Advisory Circulars for replacement airports (1995—recodification).
2013	Texas	HR 3035 SR 1084	Adopts two resolutions (House Resolution [HR] 3035 and Senate Resolution [SR] 1084) addressing legislative procedures needed to enact the new drone law.
2013	Texas	HB 912	Enumerates 19 lawful uses for unmanned aircraft. The law creates two new crimes, the illegal use of an unmanned aircraft to capture images and the offense of possessing or distributing the image. <i>Image</i> is defined in the law as any sound wave, thermal, ultraviolet, visible light, or other electromagnetic waves, odor, or other conditions existing on a property or an individual located on the property. Note: The previous provisions were impacted by <i>NPPA v. McCraw</i>. Additionally, the measure requires the Department of Public Safety to adopt rules for use of UASs by law enforcement and mandates that law enforcement agencies in communities of over 150,000 people make annual reports on UAS use. Texas House Concurrent Resolution (HCR) 217 altered reporting requirements from the original HB 912.

Year	State	Bill	Summary
2015	Texas	HB 1481	Makes it a Class B misdemeanor to operate UASs over a critical infrastructure facility if the UAS is not more than 400 feet off the ground. Note: This provision was struck down by <i>NPPA v. McCraw</i>.
2015	Texas	HB 2167	Permits individuals in certain professions to capture images used in those professions using UASs as long as no individual is identifiable in the image. Note: This provision was impacted by <i>NPPA v. McCraw</i>.
2015	Texas	HB 3628	Permits the creation of rules governing the use of UASs in the Capitol Complex and provides that a violation of those rules is a Class B misdemeanor.
2017	Texas	HB 1643	Adds structures used as part of telecommunications services, animal feeding operations, and a number of facilities related to oil and gas to the definition of critical infrastructure as it relates to UAS operation. Note: Portions of this legislation were struck down by <i>NPPA v. McCraw</i> except for the following provision: Prohibits localities from regulating UASs except during special events and when the UAS is used by the locality. The legislation defines <i>special event</i> .
2017	Texas	SB 840	Permits telecommunications providers to use UASs to capture images. Also specifies that only law enforcement may use UASs to capture images of real property that is within 25 miles of the U.S. border for border security purposes. The law also allows a UAS to be used to capture images by an insurance company for certain insurance purposes, as long as the operator is authorized by FAA. Note: These provisions were impacted by <i>NPPA v. McCraw</i>.
2017	Texas	HB 1424	Prohibits UAS operation over correctional and detention facilities. Also prohibits operation over a sports venue except in certain instances. The law defines <i>sports venue</i> as a location with a seating capacity of at least 30,000 people and that is used primarily for one or more professional or amateur sports or athletics events. An initial violation is a Class B misdemeanor, and subsequent violations are Class A misdemeanors. Note: This provision was struck down by <i>NPPA v. McCraw</i>.
2021	Texas	SB 1202	A <i>retail electric provider</i> does not include a person not otherwise a retail electric provider who owns or operates equipment used solely to provide electricity charging service for consumption by an alternatively fueled vehicle.

Source: National Conference of State Legislatures (19).

In March 2022 a ruling in the case of *NPPA v. McCraw* determined that parts of Texas’s UAS law under Chapter 423 were unconstitutional as they violated the First and Fourteenth Amendments. The ruling struck down parts 423.002, 423.003, 423.004, 423.0045, 423.0046, and 423.006. The parts struck down by the ruling related to lawful uses of UAS, created offenses relating to unlawful uses, such as surveillance and operation over critical infrastructure and sporting venues. This ruling has removed certain provisions under Texas law and has therefore limited the regulatory environment for UAS within Texas. The remaining parts of Chapter 423 cover illegally or incidentally captured images not subject to disclosure, rules for use and reporting by law enforcement and regulation of unmanned aircraft by political subdivisions. The following sections provide an overview of laws relating

to UAS and UAM in Texas noting where the court ruling has altered the regulatory landscape in Texas.

OPERATIONS

As it pertains to unmanned aircraft, Texas statute previously laid out multiple situations in which the use of UASs is prohibited. Within Texas Government Code Chapter 423, the operation of an unmanned aircraft was prohibited above a correctional facility, detention facility, or critical infrastructure facility. The types of facilities that qualified under these facility terms are defined within the statute and range from county jails to electrical power-generating facilities and many other things. The use of unmanned aircraft was also prohibited above sport event venues that have a seating capacity of 30,000 people or more and were primarily used for one or more professional or amateur sports or athletics events (20).

The caveat for unmanned aircraft operation in the situations mentioned is that operation was allowed if at a height of 400 feet or higher. However, a recent court ruling, *NPPA v. McCraw*, struck down the majority of Chapter 423 as unconstitutional under the 1st and 14th Amendments (21). This ruling will likely impact any proposed legislation or legislative changes related to UAM regulation of unmanned aircraft by political subdivisions. Section 423.009 does remain in effect and restricts the adoption of ordinances by political subdivisions, except for special events, use by the political subdivision, and use near property owned by the political subdivision (22).

PRIVACY

Previously, Texas Government Code Chapter 423 addressed the use of unmanned aircraft to capture images and creates penalties for doing so (23). It is illegal to use an unmanned aircraft to capture an image of an individual or privately owned real property in this state with the intent to conduct surveillance on the individual or property captured in the image. An offense is a Class C misdemeanor. However, a recent court ruling struck down the majority of Chapter 423 as unconstitutional under the 1st and 14th Amendments (21).

While the provisions noted above under Chapter 423 no longer apply, Texas recognizes a common law right to privacy. These violations include intrusion upon one's solitude or private affairs, public disclosure of private facts, and wrongful appropriation of one's name or likeness. All three of these violations are treated as civil torts and not criminal offenses. The Texas penal code does address specific crimes that violate a person's reasonable expectation of privacy, but these are narrow and tailored to the specific issues such as wiretaps or invasive or inappropriate photography. Any privacy legislation will have to consider the 1st Amendment implications as well as whether current statutes provide adequate protection already.

NOISE ABATEMENT

While not specific to UAS operations, the Texas Transportation Code contains requirements for noise abatement for county and municipal airports (24). The governing body of a municipality that owns an airport and has a grant agreement with FAA for the planning, design, and acquisition of land for a replacement airport is required to provide adequate

soundproofing and noise reduction devices for each public building within the 65 DNL or higher average day-night sound-level contour. The municipality must also comply with the Aviation Safety and Noise Abatement Act of 1979 in federal code. Although this statute is limited to airports, there are potential implications in noise abatement for UAS facilities and operations.

ELECTRICITY PROVISION

Legislation passed in the 2019 session amended utilities code to exempt a person who owns or operates equipment used solely to provide electricity charging service for consumption by an alternatively fueled vehicle from consideration as an electric utility or retail electric provider (25). The bill also added text that allows the utilities commission to exempt from the definition of *retail electric utility* a provider who owns or operates equipment used solely to provide electricity charging service for a mode of transportation. While this addition to code captures a lot of activity currently related to alternatively fueled vehicles, this section could impact electricity provision for UAS operations as well.

AIR RIGHTS

The Texas Government Code acknowledges the existence of air rights and defines air rights as a piece of “real property,” but air rights are not explicitly defined in Texas Code (26). Air rights have been established within case law, and Chapter 263 of the Local Government Code does acknowledge the leasing of air rights above certain property (27).

FAA and local zoning ordinances have traditionally regulated airspace for travel, and airspace above a property is subject to reasonable air traffic. Reasonable air traffic and specific air rights are not defined in statute, and questions related to the use of airspace above property may arise with increased UAS operations.

Although questions remain on authority to regulate certain areas within aviation and UAM, new or updated regulations at the federal and state level may be required in certain key areas to enable UAM, such as:

- Safety.
- Equipment.
- Operations.
- Airspace.
- Land use.
- Privacy.
- Environment.

KEY AREAS IN URBAN AIR MOBILITY

The urban air mobility ecosystem has several components that may need additional regulation, legislation, or infrastructure in order to operate safely and efficiently. The chair, Dr. Choudhuri, identified four key areas for the advancement of UAM in Texas that should drive the committee's initial work. These areas were technology, airspace and infrastructure, safety and security, and commerce and community integration. Figure 3 provides an overview of the topics involved with each key issue. The four key areas formed the basis of the working groups developed by the committee. Each area included potential topics for consideration, which served as a starting point for the working group discussion. Each working group began with these topics and, in the course of their discussions, identified those that the working group should focus on and be the subject of meaningful recommendations. Those focused topics identified for discussion by each working group are discussed later in this section.

This section of the report provides an overview of current research on each key areas before presenting the discussion by the working group and finally the recommendations developed along with their rationale.

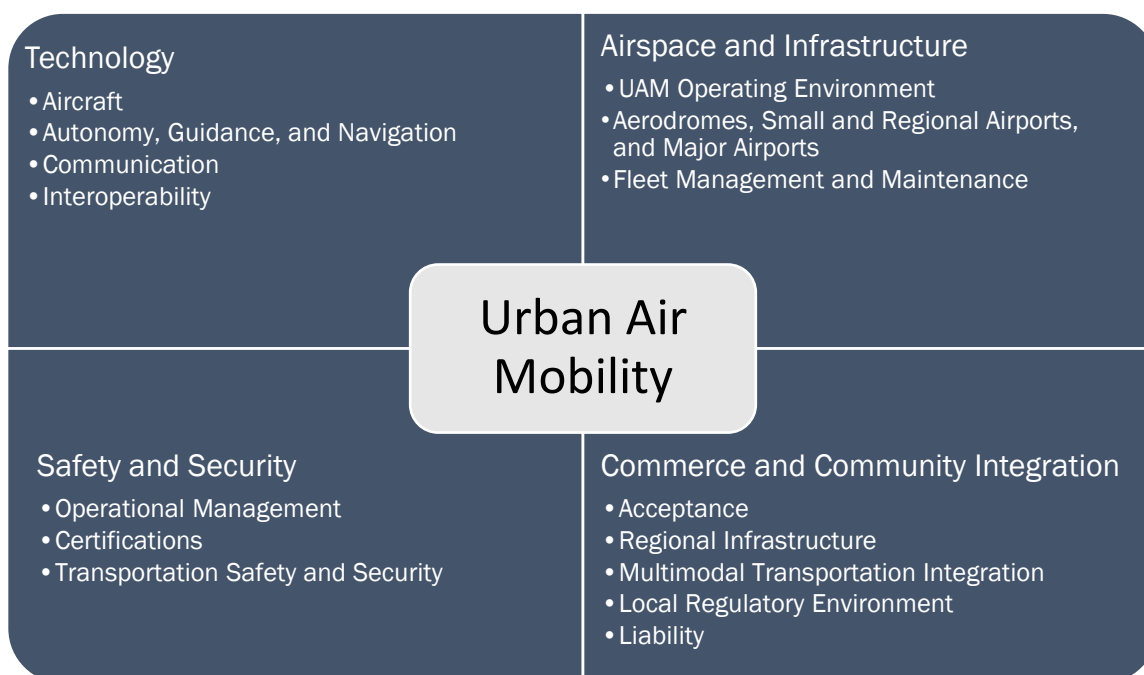


Figure 3. Key Issues for Urban Air Mobility.

TECHNOLOGY

When it comes to UAM and AAM technology, the working group decided on prioritizing airspace monitoring and testing sites, or sandboxes. Airspace monitoring technology includes from how the aircraft maneuvers around the airspace, how it communicates with other aircraft and surrounding environment, and how the aircraft itself is built, to name a few. The facility where this technology can be tested also needs to be considered to help launch UAM/AAM into commercialization. Aside from providing a controlled environment

where tests can be conducted safely, these testing facilities may help attract industry leaders as well as promote the collaboration between the public and private sectors. This section discusses critical technical components needed in UAM/AAM and provides more insight into the work conducted at several of the testing sites across the United States. Additionally, the Technology Working Group's meeting is summarized including the topics discussed and those voted to become part of the recommendations.

Literature Review

UAM technology can encompass a variety of components, but some of the most critical in a system architecture are those responsible for airspace monitoring such as communication, navigation, and surveillance (CNS). The UAM aircraft will need to communicate with ground pilots through command and control (C2). A communication network must therefore enable various aircraft to communicate with one another through an unmanned air traffic management (UTM) system. For navigation, advancement in detect-and-avoid (DAA), or sense-and-avoid, technology can improve how the aircraft processes its surroundings with minimal human intervention. In situations where visibility is low, DAA is being refined to better detect its surroundings while simultaneously avoiding obstructions, following the designated routes, and spacing itself from other aircraft. In the context of traditional aircraft operations, sense-and-avoid technology uses a vision-based approach to maneuver the aircraft, whereas UAM technology can phase out manual operations in favor of electronic separation (28). Beyond-visual-line-of-sight (BVLOS) technology is likewise being adapted for UAM and AAM purposes, requiring the advancement of visual technology and remote operation. Wireless communication options such as 5G and GPS can be adapted to assist with surveillance at lower altitudes (29).

The surrounding landscape and environment influence the early adoption of UAM and AAM to such a degree that it is a concern discussed in CNS, weather tracking, and selection of suitable cities. Where UAM aircraft can fly is limited by their surroundings, which means they are subjected to flight restrictions such as no-fly zones. UAM and AAS aircraft are prohibited from flying through an airspace if obstructions and other dangers are present at lower altitudes. A no-fly zone is determined by several factors and are classified according to the following four categories:

- Safety related.
- Social.
- Operational based on system.
- Operational based on aircraft.

The most noticeable of these factors, for example, are buildings, but wind patterns fluctuate when in close proximity to these structures, adding another layer of complexity to acceptable airspace navigation (29). Other factors that comprise a no-fly zone can include privacy and noise considerations, which are restrictions created through regulations. Therefore, CNS technologies must have the ability to more granularly process their surroundings to avoid obstacles that would not normally be present at higher altitudes.

Weather

The weather, in addition to physical structures, also affects the development of technology. Some efforts focus exclusively on weather tracking and visibility, while others focus on weather barriers and identifying optimal locations. Technology typically used for commercial planes may not be completely applicable to UAM. For instance, UAM aircraft flying at lower altitudes experience a greater fluctuation of wind patterns caused by high rises and must observe a variety of thermal readings from surface landmarks. Weather patterns also differ across the country, requiring the aircraft to be customized with that specific location in mind (30).

Meeting the demands of UAM will require improvements in how the data are collected and processed. Standards will also need to be adapted to the unique conditions of UAM such as acceptable crosswinds or turbulence (30). To help understand weather in relation to suitable UAM sites, one report analyzed 10 urban areas across the United States, each experiencing unique weather patterns. Using weather data obtained from different sources, hourly weather conditions were scored from 1 to 10 according to severity, with drizzle being 1 to volcanic ash scoring a 10. It was found that urban areas located in the west exhibit favorable UAM weather conditions, which experience low scoring, high temperature, and instrument flight rule (IFR) conditions (31). This study is an example of how variable weather can be all over the United States and highlights how not all aircraft designs may be applicable across the country.

Aircraft

CNS is not the only technological advancement. Aircraft themselves are being modified to be lighter, more fuel efficient, and quieter than the standard aircraft. How the aircraft is designed depends on several factors such as seat capacity, cruise speed, noise levels, emissions, fuel source, and costs (32). In contrast to traditional aircraft already in service, UAM aircraft such as electrical vertical takeoff and landing (eVTOL) or short takeoff and landing (STOL) are switching from a combustion to a fully electric or hybrid-electric distributed propulsion system. The installation of multiple low-noise rotors, as opposed to the traditionally more expensive aircraft, will also help in noise reduction (30). Currently, several eVTOL designs are being tested, including a vectored thrust, lift and cruise, multicopters, and rotorcrafts. All of these concepts are essentially attempting to find a compatible means to lifting the aircraft off the ground and switching over to cruise once it is ready to move toward its destination (33). UAM/AAM takes advantage of a number of new, innovative, and emerging technologies. This includes advances and continuing improvements in battery technology, the advancement of electric propulsion, and lightweight airframes. It also relies on new and innovative flight control systems, sensor technology, and communications systems that will eventually allow operations to evolve on the autonomous maturity spectrum and be integrated into the existing National Airspace System.

Airworthiness standards and certification for equipment and new aircraft types are needed to ensure safety and industry standards without slowing production or increasing costs. As identified in the GAO report, GAO-22-105020, one of the significant challenges faced by stakeholders is certifying this new technology (34). According to Uber Elevate, the target noise level produced by an UAM aircraft should be no greater than what the current smallest four-seat helicopter produces, which influences the aircraft's design (35). This trend toward

APPENDIX B: UAS STATE LEGISLATION

For the last several years, legislation concerning unmanned aircraft systems (UASs), or drones, has been introduced in different states. Even more recently, decisions on advanced air mobility bills have been approved that could encourage other states to enact similar laws. The following set of tables describe states that enacted and updated UAS legislation. For more information, please see the National Conference of State Legislatures' Current Unmanned Aircraft State Law Landscape (19).

In 2013, 12 states enacted laws or created resolutions to define and restrict certain activities related to unmanned aerial vehicles.

Table 2. Legislation by Other States: 2013.

Year	State	Bill	Title
2013	Idaho	SB 1134	An Act relating to Aeronautics; to Define a Term, to Establish Provisions Relating to Restrictions on the Use of Unmanned Aircraft Systems, to Provide Exceptions, to Provide for a Civil Cause of Action, to Provide for Certain Damages and to Provide that an Owner of Certain Facilities Shall Not Be Prohibited from Using and Unmanned Aircraft System to Inspect Such Facilities
2013	Illinois	HB 1652	An Act Concerning Wildlife
2013	Illinois	SB 1587	An Act Concerning Criminal Law
2013	Indiana	SR 27	Study committee on unmanned aerial vehicles.
2013	Maryland	HB 100	An Act concerning Budget Bill
2013	Montana	SB 196	An Act limiting the use of Unmanned Aerial Vehicles by law enforcement; and prohibiting the use of unlawfully obtained information as evidence in court
2013	Nevada	AB 507	An Act relating to state financial administration
2013	North Carolina	SB 402	An act to make base budget appropriations for current operations of state departments, institutions, and agencies, and for other purposes
2013	North Dakota	SB 2018	An Act to provide an appropriation for defraying the expenses of the department of commerce
2013	Oregon	HB 2710	An Act relating to drones; and declaring an emergency
2013	Pennsylvania	HR 172	A resolution beseeching the United States Department of Defense to reconsider the order of precedence for the newly created Distinguished Warfare Medal
2013	Tennessee	SB 796	An Act to amend Tennessee Code Annotated, Title 29 and Title 39, relative to surveillance
2013	Virginia	HB 2012 SB 1331	Drones; moratorium on use of unmanned aircraft systems by state or local government department, etc.

Ten states created legislation in 2014 to further define law enforcement uses or other prohibitions against unmanned aircraft operations. The states also began creating criminal offenses for certain conduct.

Table 3. Legislation by Other States: 2014.

Year	State	Bill	Title
2014	Alaska	HB 255	An Act relating to unmanned aircraft systems; and relating to images captured by an unmanned aircraft system
2014	Alaska	HCR 15	Relating to the task force on Unmanned Aircraft Systems
2014	Illinois	SB 2937	An Act concerning criminal law
2014	Indiana	HB 1009	Surveillance and privacy
2014	Iowa	HF 2289	An Act relating to the regulation and use of Unmanned Ariel Vehicles
2014	Louisiana	HB 1029	An Act to enact R.S. 14:336 and 337, relative to offenses against the public; to create the crimes of unlawful aiming of a laser at an aircraft and unlawful use of an unmanned aircraft system
2014	North Carolina	SB 744	An Act to make base budget appropriations for current operations of state departments, institutions, and agencies, and for other purposes.
2014	Ohio	HB 292	An Act to enact section 122.98 of the Revised Code to create the Ohio Aerospace and Aviation Technology Committee.
2014	Tennessee	SB 1777	An Act to amend Tennessee Code Annotated, Title 70, Chapter 4, Part 3, relative to hunter protection
2014	Tennessee	SB 1892	An Act to amend Tennessee Code Annotated, Title 29, and Title 39, relative to the protection of privacy
2014	Utah	SB 167	Establishes provisions for the appropriate use of an unmanned aerial vehicle
2014	Wisconsin	SB 196	An Act to amend 114.04; and to create 175.55, 941.10 and 972.113 of the statutes; Relating to: restricting the use of drones and providing a penalty

2015 saw the expansion of state authority to institute prohibitions and use parameters for unmanned aircraft.

Table 4. Legislation by Other States: 2015.

Year	State	Bill	Title
2015	Nevada	AB 239	Regulates operators of unmanned aerial vehicles in this State
2015	New Hampshire	SB 222	An Act relative to harassment of hunting, fishing, or trapping
2015	North Carolina	SB 446	Clarify that agents or agencies of the State or political subdivision of the State shall have authority to procure and operate unmanned aircraft systems upon approval of the State Chief Information Officer and to modify the regulation of Unmanned Aircraft Systems to conform to FAA Guidelines
2015	North Dakota	HB 1328	An Act to provide for limitations on the use of unmanned aerial vehicle for surveillance
2015	Oregon	HB 2354	An Act relating to unmanned aerial systems
2015	Oregon	HB 2534	Relating to the regulation of drones by the State Fish and Wildlife Commission

2015	Tennessee	HB 153	An Act to amend Tennessee Code Annotated, Title 39, relative to criminal offenses
2015	Utah	HB 296	Government use of Unmanned Aerial Vehicles.
2015	Virginia	HB 2125 SB 1301	An Act to amend the Code of Virginia by adding in Chapter 5 of <i>Title 19.2</i> a section numbered 19.2-60.1, relating to use of unmanned aircraft systems by public bodies; search warrant required. Unmanned aircraft systems; use by public bodies during execution of a search warrant, exception.
2015	West Virginia	HB 2515	Relating to elk restoration

In 2016, there was an uptick in states enacting unmanned aircraft legislation. Twenty states passed 32 bills or resolutions. As time progresses, the legislation becomes more specific with bills specifying law enforcement activities, flights over correctional facilities, emergency management related to wildfires, and other more granular issues.

Table 5. Legislation by Other States: 2016.

Year	State	Bill	Title
2016	Alaska	AB 1680	An act making appropriations for the operating and loan program expenses of state government and for certain programs
2016	Arizona	SB 807	Unlawful operation of model or unmanned aircraft; state preemption; classification; definitions
2016	California	HB 195	An act to amend Section 402 of the Penal Code, relating to crimes
2016	California	Executive Order	An act to add Section 43.101 to the Civil Code, and to add Chapter 4.5 (commencing with Section 853) to Part 2 of Division 3.6 of Title 1 of the Government Code, relating to unmanned aircraft systems
2016	Delaware	SB 1213	An act to amend Title 11 of the Delaware code relating to Unmanned Aircraft Systems
2016	Georgia	HB 5808	That a Commission on Unmanned Aircraft Technology appointed by the Governor is hereby created to make state-level recommendations to the Governor consistent with current FAA regulations as well as the State's business and public safety interests
2016	Idaho	HB 1013	An Act relating to fish and game; amending section 36-1101, Idaho Code, to prohibit the use of Unmanned Aircraft Systems for hunting, molesting or locating game animals, game birds and furbearing animals
2016	Illinois	HB 1246	The Unmanned Aerial System Oversight Task Force Act is amended by changing Sections 15 and 20
2016	Indiana	SB 319	An Act to amend the Indiana Code concerning criminal law and procedure
2016	Indiana	SB 249	An Act to amend the Indiana Code Concerning criminal law and procedure

Year	State	Bill	Title
2016	Kansas	HB 335	An Act concerning civil procedure; enacting the public speech protection act; relating to habeas corpus; the protection from stalking act; venue under the small claims procedure act
2016	Kansas	SB 73	An Act making and concerning appropriations for fiscal years ending June 30, 2016, June 30, 2017, and June 30, 2018, for state agencies
2016	Louisiana	HB 635	An Act to amend and reenact R.S. 3:43(A)(2) and to enact R.S. 3:48, relative to fees for unmanned aerial systems; to establish a registration fee for unmanned aerial systems; to establish an agricultural education and safety training course fee for operators of unmanned aerial systems; and to provide for related matters
2016	Louisiana	HB 19	An Act to enact R.S. 14:108(B)(1)(e), relative to the crime of resisting an officer; to add the knowing interference with a police cordon to the definition of "obstruction of" an officer; to provide additional definitions; and to provide for related matters
2016	Louisiana	SB 141	An Act to amend and reenact R.S. 14:283(A)(1), 283.1(A), and 284(B) and to enact R.S. 14:283(G), 283.1(C), and 284(D), relative to crimes affecting public morals; to amend crimes involving the observation and invasion of privacy of another to include the use of unmanned aircraft systems; to define unmanned aircraft systems; and to provide for related matters
2016	Louisiana	SB 992	An Act to amend and reenact R.S. 14:337(A), (D), and (E) and to enact R.S. 14:337(B)(3)(d) and (4)(e), relative to unlawful use of an unmanned aircraft system
2016	Louisiana	Executive Order	An Act to amend and reenact R.S. 14:63(B) and (C) and 337(D), relative to crimes involving unmanned aircraft systems
2016	Michigan	HB 2599	An Act to provide for the operation and regulation of unmanned aircraft systems in this state
2016	North Dakota	HB 4066	Amends UAS Test Site Authority
2016	Oklahoma	SB 5702	An Act relating to unmanned aircraft; defining terms; prohibiting operation of an unmanned aircraft over a critical infrastructure facility; excepting conduct of specified entities or persons; prescribing punishment for violation; providing for codification; and providing an effective date.
2016	Oregon	HB 7511 SB 3099	An Act relating to unmanned aircraft systems; creating new provisions
2016	Oregon	HB 2376	Relating to state financial administration; and declaring an emergency.
2016	Rhode Island	SB 2106	Unpiloted Aerial Vehicle Regulation. Relating to aeronautics – unpiloted aerial vehicle regulation
2016	Tennessee	HB 126	An Act to amend Tennessee Code Annotated, Title 39, Chapter 13, relative to unmanned aircraft
2016	Tennessee	HB 3003	An Act to amend Tennessee Code Annotated, Title 39 and Title 40, relative to criminal offenses

Year	State	Bill	Title
2016	Utah	SB 155	Unmanned Aircraft Revisions
2016	Utah	HB 29 , HB 30	Unmanned Aircraft Amendments
2016	Vermont	HB 412	An Act relating to privacy protection and a code of administrative rules
2016	Virginia	SB 670	Budget Bill
2016	Virginia	SB 338	An Act to amend the Code of Virginia by adding in Article 1 of chapter 9 of Title 15.2 a section numbered 15.2-926.3, relating to local regulation of certain aircraft
2016	Wisconsin	AB 1680	An Act to amend 114.04; and to create 114.045 of the statutes; relating to: the operation of drones over correctional institutions and providing a penalty
2016	Wisconsin	SB 807	An Act relating to: interfering with hunting, fishing, and trapping and providing criminal penalties

The trend continues into 2017 with 19 states enacting 24 bills or resolutions.

Table 6. Legislation by Other States: 2017.

Year	State	Bill	Title
2017	Alaska	SCR 4	Relating to the Task Force on Unmanned Aircraft Systems
2017	Colorado	HB 1070	Concerning the use of unmanned aircraft systems to perform government functions relating to certain public-safety functions, and, in connection therewith, requiring the center of excellence within the department of public safety to perform a study and operate a pilot program
2017	Connecticut	SB 975	An Act concerning municipalities and unmanned aircraft
2017	Florida	HB 1027	Unmanned Devices
2017	Georgia	HB 481	An Act to amend Chapter 1 of Title 6 of the Official Code of Georgia Annotated, relating to general provisions regarding aviation, so as to provide for preemption for unmanned aircraft systems
2017	Indiana	SB 299	An Act to amend the Indiana Code concerning criminal laws and procedure
2017	Kentucky	HB 540	An Act relating to aviation safety
2017	Louisiana	SB 69	An Act to enact R.S. 2:2, relative to unmanned aircraft
2017	Minnesota	SF 550	An Act relating to natural resources
2017	Montana	HB 644	An Act revising laws relating to wildfires and unmanned aerial vehicle systems
2017	Nevada	AB 11	An Act relating to unmanned aerial vehicles
2017	New Jersey	SB 3370	An Act concerning the operation of unmanned aircraft systems and amending and supplementing various parts of the statutory law
2017	North Carolina	HB 337	An Act to make various revisions to the laws governing the use of Unmanned Aircraft Systems

Year	State	Bill	Title
2017	North Carolina	HB 128	An Act to prohibit the use of an Unmanned Aircraft System near a local confinement facility or state or federal correctional facility
2017	North Dakota	SCR 4014	A concurrent resolution supporting the development of the unmanned aircraft systems industry in North Dakota and throughout the United States, congratulating the Federal Aviation Administration on the first Beyond Visual Line of Sight Certificate of Authorization in the United States, and encouraging further cooperation with the Federal Aviation Administration to safely integrate unmanned aircraft systems into the national airspace
2017	Oregon	HB 3047	An Act elating to unmanned aircraft systems; and declaring an emergency
2017	South Dakota	SB 80	Regulate the use of drones under certain conditions and to provide a penalty therefor
2017	South Dakota	SB 22	An Act to exempt certain unmanned aircraft systems from the requirement to be registered as aircraft
2017	Utah	HCR 21	Concurrent resolution encouraging NASA to consider Tooele County for a test facility
2017	Utah	SB 111	Unmanned Aircraft Amendments
2017	Utah	HB 217	Livestock Harassment
2017	Virginia	SB 873	An Act to amend and reenact § 27-15.1 of the Code of Virginia, relating to the authority of a fire chief over unmanned aircraft at a fire, explosion, or other hazardous situation
2017	Virginia	HB 2350	An Act to amend the Code of Virginia by adding a section numbered 18.2-130.1, relating to use of electronic device to trespass; peeping into dwelling or occupied building; penalty
2017	Wyoming	SF 170	An Act relating to aeronautics; authorizing the Wyoming aeronautics commission to promulgate rules related to unmanned aircraft

Both Michigan and Virginia passed several laws in 2018 related to unmanned aircraft operations. Additionally, several states new to UAS legislation enacted bills either defining terms or creating limitations.

Table 7. Legislation by Other States: 2018.

Year	State	Bill	Title
2018	Arizona	2018 Ariz. Laws, Ch. 116	Amending section 26-314, Arizona Revised Statutes; Relating to Emergency Management
2018	California	2018 Cal. Stats., Ch. 333	Unmanned aircraft systems: correctional facilities
2018	Colorado	2018 Colo., Sess. Laws, Ch. 385	Concerning prohibiting the use of unmanned aircraft systems to obstruct public safety operations.
2018	Delaware	2018 Del. Laws, Ch. 264	An Act to amend title 11 of the Delaware code relating to unmanned aircraft systems
2018	Kansas	2018 Kansas SR 1759	A resolution urging the Federal Aviation Administration to accept Kansas' application for the

Year	State	Bill	Title
			Unmanned Aerial Systems Integration Pilot Program.
2018	Kentucky	2018 Ky. Acts, Ch.26	An Act relating to public safety
2018	Kentucky	2018 Ky. Acts, Ch.168	An Act relating to trespass
2018	Louisiana	La. Acts 2018, 630	An Act to amend and reenact R.S. 14:283(A)(1) and to enact R.S. 14:283(H), relative to offenses affecting public morals; to provide relative to the crimes of video voyeurism; and to provide for related matters
2018	Michigan	2018 Mich. Pub. Acts, Act 444	An Act to provide for the operation and regulation of unmanned aircraft systems in this state; to create the unmanned aircraft systems task force; to provide for the powers and duties of state and local governmental officers and entities; and to prohibit conduct related to the operation of unmanned aircraft systems and prescribe penalties
2018	Michigan	2018 Mich. Pub. Acts, Act 468	An Act to provide for the operation and regulation of unmanned aircraft systems in this state; to create the unmanned aircraft systems task force; to provide for the powers and duties of state and local governmental officers and entities; and to prohibit conduct related to the operation of unmanned aircraft systems and prescribe penalties
2018	Michigan	2018 Mich. Pub. Acts, Act 445	An Act to revise, consolidate, and codify the laws relating to criminal procedure and to define the jurisdiction, powers, and duties of courts, judges, and other officers of the court under the provisions of this act
2018	Michigan	2018 Mich. Pub. Acts, Act 469	An Act to revise, consolidate, and codify the laws relating to criminal procedure and to define the jurisdiction, powers, and duties of courts, judges, and other officers of the court under the provisions of this act
2018	New Jersey	2018 N.J. AR 29	Urges Congress and President to fund FAA Drone Test Site Program
2018	Oregon	2018 Or. Laws, Ch. 120	Relating to public safety; creating new provisions
2018	Pennsylvania	2018 Pa. Laws, Act 78	Unlawful use of unmanned aircraft and prohibiting local regulation of unmanned aircraft
2018	South Carolina	2018 S.C. Acts, Act 184	Drones, unlawful operation at corrections and local detention facilities
2018	South Dakota	2018 S.D. Sess. Laws, Ch. 269	An Act to revise certain provisions regarding aviation
2018	Tennessee	2018 Tenn. Pub. Acts, Ch. 970	An Act to amend Tennessee Code Annotated, Title 39 and Title 40, relative to unmanned aircraft
2018	Utah	2018 Utah Laws, Ch. 40	This bill prohibits certain operations of an unmanned aircraft system related to correctional facilities

Year	State	Bill	Title
2018	Vermont	2018 Vt. Acts, Act 101	An Act relating to prohibiting the use of drones near correctional facilities
2018	Virginia	2018 Va. Acts, Ch. 654	An Act to amend and reenact § 19.2-60.1 of the Code of Virginia, relating to use of unmanned aircraft systems by public bodies; search warrant required; exception
2018	Virginia	2018 Va. Acts, Ch. 2	An Act for all appropriations of the Budget
2018	Virginia	2018 Va. Acts, Ch. 851	An Act to amend and reenact § 15.2-926.3 of the Code of Virginia, to amend the Code of Virginia by adding a section numbered 18.2-121.3 and by adding in Article 8 of Chapter 7 of Title 18.2 a section numbered 18.2-324.2, and to repeal the second enactment of Chapter 451 of the Acts of Assembly of 2016, relating to trespass; unmanned aircraft system; penalty
2018	Virginia	2018 Va. Acts, Ch. 419	An Act to amend and reenact § 19.2-60.1 of the Code of Virginia, relating to use of unmanned aircraft by a locality; search warrant; exception
2018	Virginia	2018 Va. Acts, Ch. 546	An Act to amend and reenact § 19.2-60.1 of the Code of Virginia, relating to use of unmanned aircraft systems by public bodies; search warrant required; exception
2018	Virginia	2018 Va. Acts, Ch. 617	An Act to amend and reenact § 5.1-1 of the Code of Virginia, relating to the Department of Aviation; unmanned aircraft systems
2018	West Virginia	2018 W.Va. Acts, Ch. 61	An Act to amend the Code of West Virginia, 1931, as amended, by adding thereto a new article, designated §61-14-1 and §61-14-2, all relating to regulation of unmanned aircraft systems
2018	West Virginia	2018 W.Va. Acts, Ch. 168	Unlawful methods of hunting and fishing and other unlawful acts; Sunday hunting
2018	West Virginia	2018 W.Va. Acts, Ch. 175	Powers of the director with respect to the section of parks and recreation
2018	Wisconsin	2018 Wis. Laws, Act 322	An Act to renumber and amend 114.105; to amend 114.04 and 175.55 (1) (a); and to create 114.105 (1), 114.105 (3) and 114.105 (4) (b) of the statutes; relating to: the operation and regulation of unmanned aircraft and providing a penalty

Many of the bills enacted in 2019 created criminal offenses for violations to state laws regarding unmanned aircraft. Additionally, several states appropriated money to purchase UAS equipment or to study or continue UAS programs.

Table 8. Legislation by Other States: 2019.

Year	State	Bill	Title
2019	Alaska	2019 Alaska Sess. Laws, Ch. 2	An Act making a special appropriation from the earnings reserve account for the payment of permanent fund dividends; and providing for an effective date
2019	Arkansas	2019 Ark. Acts, Act 508	An Act concerning the offense of unlawful use of an unmanned aircraft system; to amend the definitions of "critical infrastructure" and "unmanned aircraft system"; and for other purposes.
2019	Arkansas	2019 Ark. Acts, Act 1000	An Act concerning the offense of unlawful use of an unmanned aircraft system; to amend the definition of "critical infrastructure"; and for other purposes
2019	California	2019 Cal. Stats., Ch. 749	An Act to amend Section 647 of the Penal Code, relating to privacy
2019	Delaware	Vol. 82, Del. Laws, Ch. 190	An Act to amend title 11 of the Delaware code relating to unmanned aircraft systems
2019	Georgia	2019 Ga. Laws, Ch. 67	Correctional Institutions of the State and Counties; use of unmanned aircraft systems to deliver or attempt to deliver contraband to a place of incarceration; prohibit
2019	Hawaii	2019 Hawaii Sess. Laws, Act 248	A bill for an Act relating to fireworks
2019	Indiana	2019 Ind. Acts, P.L. 136	An Act to amend the Indiana code concerning criminal law and procedure
2019	Kentucky	2019 Ky. Acts, Ch.61	An Act relating to drones
2019	Michigan	2019 Mich. Pub. Acts, Ch. 32	An Act to amend 2016 PA 436, entitled "An act to provide for the operation and regulation of unmanned aircraft systems in this state"
2019	Montana	2019 Mont. Laws, Ch. 178	An Act allowing information collected by an unmanned aerial vehicle investigating a motor vehicle crash scene to be admitted into evidence or used to obtain search warrants
2019	Nevada	2019 Nev. Stats., Ch. 551	An Act relating to aeronautics; requiring the establishment and carrying out of a program relating to certain unmanned aircraft systems; making an appropriation; and providing other matters properly relating thereto
2019	New Jersey	2019 N.J. Laws, Ch. 153	An Act concerning medical cannabis, revising various parts of the statutory law, and supplementing P.L.2009, c.307
2019	New Jersey	2019 N.J. Laws, Ch. 150	An Act making appropriations for the support of the State Government and the several public 9 purposes for the fiscal year ending June 30, 2020 and regulating the disbursement thereof

Year	State	Bill	Title
2019	North Carolina	2019 N.C. Sess. Laws, Ch. 231	An Act, consistent with house bill 966 of the 2019 regular session, to enact a budget for the department of transportation, to make additional appropriations, transfers, and reductions to the department, and to make other modifications related to the operations of the department.
2019	Ohio	Vol. 10, 2019 Ohio Laws, HB 166	Creates FY 2020-2021 operating budget
2019	Oregon	2019 Or. Laws, Ch. 337	Relating to unmanned aircraft systems; creating new provisions; and amending ORS 837.360 and 837.374
2019	Tennessee	2019 Tenn. Pub. Acts, Ch. 40	An Act to amend Tennessee Code Annotated, Title 39, Chapter 13, relative to unmanned aircraft
2019	Tennessee	2019 Tenn. Pub. Acts, Ch. 60	An Act to amend Tennessee Code Annotated, Title 39, relative to unmanned aircraft
2019	Virginia	2019 Va. Acts, Ch. 781	An Act to amend and reenact § 19.2-60.1 of the Code of Virginia, relating to use of unmanned aircraft systems by law-enforcement officers; persons sought for arrest
2019	Virginia	2019 Va. Acts, Ch. 612	An Act to amend and reenact § 18.2-121.3 of the Code of Virginia, relating to trespass; unmanned aircraft system; penalty
2019	Washington	2019 Wash. Laws, Ch. 415	An Act relating to fiscal matters

By 2020, many states were refining and adding criminal offenses to their existing unmanned aircraft laws.

Table 9. Legislation by Other States: 2020.

Year	State	Bill	Title
2020	Florida	HB 5001	General Appropriations Act
2020	Florida	HB 659	Drones
2020	Idaho	HB 486	An Act relating to restrictions on the use of unmanned aircraft systems
2020	Massachusetts	HB 5164	An Act making appropriations for the fiscal year 2021 for the maintenance of the departments, boards, commissions, institutions and certain activities of the commonwealth, for interest, sinking fund and serial bond requirements and for certain permanent improvements
2020	Minnesota	SF 3072	Use of Unmanned Aerial Vehicles
2020	Minnesota	SF 3258	Unmanned Aerial Vehicle Prohibition
2020	Minnesota	HB 1963	Modifies provisions relating to Transportation
2020	South Dakota	HB 1059	Revise certain provisions regarding hunting with drones
2020	South Dakota	HB 1065	Revise drone surveillance protections

Year	State	Bill	Title
2020	South Dakota	SB 124	An Act relating to governmental structures protecting the public health, safety and welfare
2020	Virginia	HB 30	Budget bill
2020	Virginia	HB 742	Unmanned aircraft; political subdivision may regulate take-off and landing of system, etc.
2020	Virginia	HB 1017	Commonwealth of Virginia Innovation Partnership Authority; created

By 2021 and 2022, legislation related to advanced air mobility was introduced.

Table 10. Legislation by Other States: 2021 and 2022.

Year	State	Bill	Title
2021	Florida	SB 44	Use of Drones by Government Agencies
2022	Michigan	SB 795	A bill to amend 1945 PA 327, entitled "Aeronautics code of the state of Michigan," (MCL 259.1 to 259.208) by adding section 207.
2022	Michigan	SB 796	A bill to amend 1945 PA 327, entitled "Aeronautics code of the state of Michigan," (MCL 259.1 to 259.208) by adding section 206a
2022	Utah	72-14-103	Preemption of local ordinance
2022	Utah	SB-0122	Unmanned Aircraft Amendments
2022	West Virginia	HB 4667	Use of Unmanned Aircraft Systems
2022	West Virginia	HB 4827	Promoting Public-Use Vertiports Act

APPENDIX C: PUBLIC COMMENT

As noted in the report, the primary charge and focus of the committee was to develop the recommendations found in the Key Areas in Urban Mobility section of this report. The report was put out for public comment from July 7 to July 14, 2022, and, recognizing some members of the committee and/or members of the public may hold individual, differing opinions from that of the report, all public input provided during the public comment period is included in the following appendix. These public comments are not part of the Recommendations and Report as voted out by the Urban Air Mobility Advisory Committee but may reflect the separate opinions of members of the committee and or the public.



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Comments of the UAS and AAM industries on Texas Transportation Commission Advisory Committee Report and Recommendations

General comments

The UAS and AAM industries offer extensive safety, sustainability, economic, and other benefits of these technologies. We are pleased that the Texas Transportation Commission has recognized these benefits, and we are grateful for the opportunity to work with the state to be a leader in these technologies for the benefit of its constituents. While some of our members participated in the Advisory Committee, we do not believe that the draft Report and Recommendations (the “Report”) reflects a consensus view of the Committee. Over the course of the past year, those members have explained in detail their concerns with the perspective voiced by some Committee members of a restrictive view of FAA’s regulatory authority and the suggestion – in our view, wholly erroneous – that property owners maintain rights in the airspace above their land that allows them to exclude or prevent aircraft overflight. We had hoped that the Report would reflect these concerns and would set out a narrative and framework on which the full Advisory Committee could agree.

Instead, the Report recites several positions that are at best controversial interpretations of disputed areas of law and at worse flatly inaccurate statements. We therefore provide the following comments on the Report, with the hope that the final Report can still be amended to reflect a consensus view of the entire Advisory Committee.

Our main concern is with the analysis on pages 11-12 entitled “Regulatory Overview.” As set forth below, this analysis is replete with imprecise and, in some cases incorrect, statements of the law and, as such, would require a substantial overhaul at a minimum to address these fundamental flaws. This Regulatory Overview is also superfluous and beyond the scope of the Committee’s charge under its enabling legislation to assess current Texas law and whether there is any need to change Texas law. The Regulatory Overview injects the Advisory Committee into a debate about the scope of airspace regulation on which it simply need not take a position. Because this section is not necessary as a basis for the rest of the Report and Recommendations, we believe that the simplest way to mitigate our concerns is to delete this section of the Report in its entirety. If staff believes that the final Report must contain a Regulatory Overview section, we urge that changes be made to address the following issues.

[Specific comments on Regulatory Overview](#)

The Regulatory Overview repeatedly employs the concept of “surface airspace,” a term that appears to have been very recently coined by certain property rights activists based on outdated court decisions from a century or more ago, long before enactment of the Federal Aviation Act of 1958. The term betrays a bias in favor of a state and local police power role over navigable airspace, a role that does not exist under our constitutional system, in which Congress has vested the Federal Aviation Administration (“FAA”) with exclusive authority over navigable airspace. Because there is no actual legal concept of “surface airspace,” this term should be removed from the Report.

The Regulatory Overview should also be removed because portions appear to be taken nearly verbatim from a 2020 Mercatus Working Paper, without attribution to this paper. Moreover, statements in the Regulatory Overview are contradicted by statements in other portions of the Report.

The first paragraph (page 11) claims that the “biggest legal question seems to be who has authority to regulate” and that “Congress has not clarified the division between federal and state roles regarding airspace issued [sic].” Neither

proposition is correct. In fact, Congress has very clearly delineated federal and state roles regarding airspace issues. The Report (page 11) recognizes that Congress has granted the federal government exclusive sovereignty over U.S. airspace. As the Supreme Court put it in *Causby*, “the air is a public highway.” *United States v. Causby*, 328 U.S. 256, 261 (1946). Congress has also given plenary authority to the FAA to define and regulate the navigable airspace, as the Report elsewhere acknowledges (“the FAA’s full regulatory authority over the airspace”) (page 28). “Navigable airspace” in the Federal Aviation Act includes not just the airspace above FAA-set minimum safe altitudes, but also any airspace necessary for takeoff and landing of aircraft, and the definition of “aircraft” includes UAS (or drones) and eVTOL aircraft.

Further, the FAA has been regulating the operations of UAS for more than a decade. In its Part 107 rule adopted in 2016, the FAA has clearly established that small UAS operations should—and, indeed, in nearly all circumstances *must*—take place below 400 feet above the ground, which of necessity means that the “navigable airspace” for small UAS is from 0 to 400 feet. *See* 14 C.F.R. § 107.51. Based on the foregoing, there is no state or local role in regulating aircraft operations in the navigable airspace, and thus there is no “division” of roles for Congress to clarify. *See* Report at 28.

The Regulatory Overview also incorrectly states at page 11 that the “federal government has not stated its legal position.” The FAA’s position was stated in its December 2015 Fact Sheet, *see* State and Local Regulation of Unmanned Aircraft Systems, (UAS) Fact Sheet, https://www.faa.gov/uas/resources/policy_library/media/UAS_Fact_Sheet_Final.pdf, and its Busting Myths document on its website: “The FAA is responsible for the safety of U.S. airspace from the ground up.”

Simply put, state and local police powers are limited to designating landing and takeoff areas and protecting citizens from torts such as invasions of privacy, aerial trespass, and nuisance. They do not extend to regulating flight operations themselves.

While there have been proposals in Congress and by non-government organizations to create a line in the sky, below which state or local authorities would govern drone and eVTOL aircraft operations, these efforts have to date not been adopted and should not purport to reflect current law.

Indeed, while the first paragraph of the Regulatory Overview section refers to “influential law drafters” to include the Uniform Law Commission (“ULC”) and the American Law Institute’s (“ALI”) draft “airspace trespass” provision, neither body has yet produced an operative text in this area. After studying the matter for two years, the ULC elected not to adopt a drone tort law and is currently not engaged on this matter. And while the ALI is in the process of drafting the Restatement (Fourth) of Property, the ALI’s charter is to *restate* the law and not draft new law. The drone industry raised this very issue in opposing ALI’s proposed “trespass-by-overflight” provision. At this point there is no clear indication of what the Restatement might say on this point when and if a draft is ultimately adopted. In any event, whatever the contours of an aerial trespass or trespass-by-overflight provision, the FAA’s authority over aircraft operations in the navigable airspace is clear. Lastly, the citation links to an FAA page about Urban Air Mobility and Advanced Air Mobility; the cite is wrong and instead should likely reference the 2020 Mercatus Working Paper by Brent Skorup identified in note 14.

Furthermore, the preemption law discussion is muddled at best and suffers from several incorrect assertions. Rather than cite to a law review or state bar association article, the Report should cite solely to judicial precedent.

The Regulatory Overview also incorrectly states that the Supremacy Clause “requires that federal laws preempt any conflicting state or local regulations” (page 11). A federal law may permit a conflicting state or local regulation if that statute so provides. The Supremacy Clause declares that federal law is the supreme law of the land. It operates to invalidate state or local laws, not federal laws. It is not a command to Congress to enact preemption statutes. The sentence should be deleted.

The next sentence should be revised to state: “Congress does not need to explicitly state a purpose to preempt; a court may infer preemption from the federal law, in which case a court concludes that Congress has impliedly preempted state law.”

It is also not correct that “[t]here are two types of preemption: Field preemption and Conflict preemption” (page 11). These are two types of *implied* preemption, as opposed to express preemption, where Congress uses express language to prohibit state and local regulation. In the aviation context, for example, Congress has expressly preempted a range of state and local powers in the Airline Deregulation

Act, which prohibits these governments from regulating prices, routes, and services of an air carrier providing air transportation.

Notably, the FAA explicitly referenced field preemption in its 2015 Fact Sheet when it explained that a “patchwork quilt” of differing state and local restrictions could hamper FAA flexibility in promoting safe and efficient air traffic flow. Fact Sheet at 2. The Report is too quick to dismiss the importance of field preemption in aviation safety, given the FAA’s insistence that “[a] navigable airspace free from inconsistent state and local restrictions is essential to the maintenance of a safe and sound air transportation system.” *Id.* (collecting cases). Quoting from the Supreme Court decision in *Arizona v. U.S.*, 567 U.S. 387, 401 (2012), the Fact Sheet stated “Where Congress occupies an entire field . . . even complementary state regulation is impermissible. Field preemption reflects a congressional decision to foreclose any state regulation in the area, even if it is parallel to federal standards.” *Id.* at 2-3.

The statement (page 11) that conflict preemption “is when compliance with both state and federal regulations is impossible” is too narrow. Where compliance with both federal and state law is impossible, that indeed poses a conflict. But so-called “impossibility preemption” is only one type of conflict preemption. A conflict may also exist where a state law imposes an additional requirement than the federal law. For instance, a state may seek to require eVTOL aircraft to be equipped with ADS-B, even though the FAA has not so required. That would be a conflict, but it would not be impossible to comply with both federal and state law. A third type of conflict preemption is “obstacle” preemption, where the state or local law stands as an obstacle to the objects and purposes of federal law.

Moreover, the use of “regulations” in the text quoted above is underinclusive. Federal law preempts inconsistent state or local law no matter what form either takes. That is true whether the federal law is a provision in the federal Constitution, a federal statute, or a regulation.

The Report’s statement that the court in *Singer v. City of Newton* “found that FAA explicitly contemplates state or local regulation of pilotless aircraft” (page 11) is taken out of context. The *Singer* court was referencing the FAA’s 2015 Fact Sheet, which distinguishes “any regulation of the navigable airspace” from traditional police powers. If the final Report references *Singer*, it should explain that the court ultimately found that the city’s drone ordinance *was* preempted, because its restrictions on drone use below 400 feet conflicted with federal law.

The next paragraph contains another general statement of preemption. This statement is an amalgam of express and implied preemption principles. It is largely duplicative of the preceding text, without classifying the preemption principles as a court decision would do. It would be preferable to quote from a court decision rather than a secondary source. The first category, “(1) Congress expresses a clear intent to preempt state law[,]” may be intended to describe “express preemption,” although that doctrine follows the *words* in a statute or regulation, as this is how a “clear” expression of “intent” is shown.

Furthermore, it is incorrect to state that *Causby* “set the stage for future trespass and privacy cases involving airspace above private property” (page 12). First, *Causby* is a Takings Clause decision premised on interference with the use of property rather than rights to airspace above private property. *Causby* did set the stage for the *aerial* trespass tort in section 159 of the Restatement (Second) of Torts (1965). There is no reference to aerial trespass in the entire “Regulatory Overview,” and yet it is the aerial trespass tort (as opposed to a traditional trespass tort) that is the progeny of *Causby*. Second, the *Causby* decision has had no effect on privacy law.

The statement “Surface airspace has typically been treated as real property by the courts” (page 12) is simply wrong—indeed, as noted above, *Causby* led to the creation of a specific “aerial trespass” tort that was distinct from traditional trespass precisely because courts and commentators recognized that there is a difference between traversing property on the surface and flying over the same property. As a result, aerial trespass contains elements of both property and nuisance law. While a property owner can prove trespass on the surface by merely showing that the tortfeasor intruded on her property, to prove *aerial* trespass the property holder must demonstrate that the aircraft substantially interfered with her use and enjoyment of the land. This additional element in the aerial trespass tort exists to acknowledge the reality, as *Causby* held, that the sky is a public highway and that aircraft are entitled to make use of it, so long as they do not engage in flights that are so low and frequent as to cause injury to those below. *See Causby* at 266.

Moreover, the source for this statement also appears to be incorrect. It likely should be another reference to the Skorup article at note 14, not an FAA document. As noted above, “surface airspace” is a wholly invented term and not one that has any meaning in the case law. A reading of that Working Paper does not show any

court decision in which the term “surface airspace” was used. And using the passive present perfect tense (“has typically been treated”) disguises the fact that all the court decisions cited by the Working Paper antedate the Federal Aviation Act of 1958 by decades. They have no relevance in determining whether a state has jurisdiction over any airspace. At most, they concern a landowner’s property rights, but the Court in *Causby* also stated that the airspace is a public highway, adding that *ad coelum* doctrine upon which many earlier cases relied “has no place in the modern world.” *Causby* at 261.

It is also not correct to state that *Causby* “created an upper and lower airspace” (page 12). The citation incorrectly points to a NextGen document. It is likely instead a quote from a state bar association publication (note 18). The quoted passage refers to a 500-foot altitude, which is not part of *Causby*, but appears to be taken from a comment on Restatement (Second) of Torts 159. And while 500 feet is set by the FAA as the minimum safe altitude in many circumstances, it is not a universal dividing line. Helicopters routinely fly below 500 feet. Small UAS are generally limited by rule to less than 400 feet. And all aircraft, no matter how large or small, must “navigate” the airspace below 500 feet to take off and land.

Moreover, even if 500 feet could be said to be a dividing line between navigable and non-navigable airspace (and it cannot), the Report does correctly note that *Griggs* held that a taking of an easement can occur even in the navigable airspace. So where is this purported division between upper and lower airspace? Neither *Causby* nor *Griggs* “created” this upper-lower division, as it simply does not exist.

Finally, the quotation from the Michigan Court of Appeals decision in *Long Lake Township v. Maxon* should be removed as the Michigan Supreme Court on May 20, 2022, vacated the judgment of the Court of Appeals and remanded the case for further proceedings. It would be inappropriate at this point to rely on the reasoning in *Maxon*.

[Specific comments on other portions of the Report](#)

Page 15, the fact that Texas’s attempt to regulate small UAS flights has been struck down on First Amendment grounds warrants substantially more discussion than a single, throw-away sentence.

Page 16, “Air Rights.” The reference to the Texas administrative code provision on leasing of air rights should not be taken as a general license for the state to lease air

rights. Serious constitutional questions would be raised with any attempt to lease airspace.

Page 17 states that new rules may be needed in several enumerated areas, without noting that Texas may have no lawful role in promulgating rules in the first four subjects.

Pages 24-25. The concept of “airspace monitoring” is nebulous and should be clarified.

Pages 28-29, Airspace Design and Regulatory Environment. This section should be revised to clarify the limited authority for state and local governments to play a role “in airspace design.” Zoning, noise, and land use may well inform airspace design, but that does not mean that states would be allowed to “govern” advanced air mobility operations in the navigable airspace, even if limited to the conceptual UAM Operating Environment (UOE), as the Report correctly notes the “FAA’s full regulatory authority over the airspace.”

Page 30. The statement at bottom of page 30 – “Potential state or local regulation would cover landing areas and space requirements or separations from residential areas, airspace and the potential need for traffic management at lower altitudes.” – goes too far as we have explained. State and local governments may not regulate the airspace or engage in traffic management at any altitude.

Pages 31-32. The reference to leasing airspace does not appear to be relevant to the subject of placement, policy, and permitting of infrastructure considerations. It refers to an airspace leasing proposal, the legality and efficacy of which are very much in doubt. It also refers to the Scorecard of state laws published by Brent Skorup of the Mercatus Center. The UAS industry has developed a rejoinder to this Scorecard, which is attached to these comments. The paragraph ending on page 31 and continuing onto page 32 should be removed from the sentence beginning with “A proposed solution.”

Page 34. The need to align with the FAA is stated three times, and these statements are necessary. Therefore, the statement that alignment with the FAA “will require both state and federal oversight of operations under local jurisdictions” is unclear and should be clarified.

Page 38, Operational Safety. The first sentence on federal and state roles is unobjectionable. The next statement – that “airspace is a more complex area for

regulation” – is not correct. Airspace regulation is within the FAA’s purview, not the purview of state or local governments.

In sum, for the reasons explained above, the “Regulatory Overview” section should be removed from the Report in its entirety. In addition, the issues and inaccuracies identified in other sections of the Report should be addressed.

We hope that these comments are helpful in laying out the sources of disagreement and potential controversy in the Report, and that they also help illuminate some of the factual and legal errors in the Report as currently drafted. The commercial UAS and AAM industries look forward to continuing to work productively with the Advisory Committee to the extent that the Committee’s mandate is extended. We believe it is imperative, however, that the final Report adopt the suggested revisions above to reflect the consensus of the Committee’s members and be considered as a trusted, neutral source of information for Texas regulators and lawmakers.

Association of Uncrewed Systems International

Commercial Drone Alliance

Consumer Technology Association

Small UAV Coalition

July 14, 2022

Attachment

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REPORT AND RECOMMENDATIONS OF THE Urban Air Mobility Advisory Committee

PREPARED FOR THE
Texas Transportation Commission and the Texas Legislature



FOR MORE INFORMATION

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