ADVANCED AIR MOBILITY

Will Law Lift or Ground a New Era of Transportation?

NSF Award Search: Award # 2232225 - Conference: Advanced Air Mobility: Will Law Lift or Ground a New Era of Human Transportation?

Conference White Paper in Fulfillment of National Science Law and Science Grant

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Introduction

The National Science Foundation's ("NSF") Law and Science ("LS") Program supports social scientific studies of the connections between law and law-like systems of rules, law and human behavior, as well as studies of how science and technology are applied in legal contexts. It considers proposals that address social scientific studies of law and law-like systems of rules, as well as studies of how science and technology are applied in legal contexts. The LS Program is inherently interdisciplinary and multi-methodological.

Given the LS Program's focus and objectives, researchers at the University of Central Florida submitted an invited proposal to the NSF LS, to the attention of Drs. Reggie Sheehan and Naomi M. Hall-Byers, Program Directors, to explore a new era of human mobility that is on the horizon. Indeed, investment is pouring into transformative airborne technologies referred to as advanced air mobility ("AAM")—the local, on-demand movement of people and goods by air using autonomous or uncrewed electric aircraft that take off and land vertically ("eVTOL").

Sarah Bush, Timothy M. Ravich, College of Community Innovation and Education Dean Grant Hayes, and Laurie O. Campbell

The advent of AAM and eVTOL—"Flying taxis"—and the concept of aerial ridesharing at traditional taxi prices portend a reduction in congestion and a radically improved urban mobility experience relative to heavy-infrastructure approaches such as roads, rails, bridges, and tunnels. AAM thus promises to democratize flight by offering affordable and environmentally sustainable transportation between places previously not served or underserved by aviation, including "rooftop-to-rooftop" suburban destinations.

Engineering challenges ostensibly present the highest hurdles to achieving clean, reliable, high-speed, air mobility networks, but in fact, legal and regulatory issues present the greatest headwinds. These include problems of property, jurisdiction and federalism, and safety and

security. Also implicated are auxiliary issues including cybersecurity, artificial intelligence, crime and policing, and social and economic equity where law and the "rules of the road" for new technologies are still indeterminate.

In this context, we set out to assemble multidisciplinary panels of invited speakers from the public and private sector for a global conference in Spring 2023 on the interplay of law/regulation and technological challenges and opportunities relative to AAM.

Florida was a particularly appropriate venue in the minds of the researchers (even apart from the researchers' affiliation with the University of Central Florida) as AAM today is reminiscent of the period following the Wright Brothers' historic first flight of a powered, heavier-than-air airplane in 1903—only 11 years after which, the first scheduled airline passenger flight in the United States departed — an 18-mile, 23-minute, one-passenger journey between Tampa and St. Petersburg for $5 one-way. Today, Miami, Ft. Lauderdale, Jacksonville, Orlando, and Tampa, among other locations around the state, are muscular staging areas for state-of-the-art cargo and commercial airplanes to quickly, routinely, and safely transit millions of passengers and tons of goods over domestic, transcontinental, and international routes for mere dollars. Florida again is uniquely positioned to stage the next mode of human travel and to lead an emerging space travel and tourism industry just as it facilitated modern commercial aviation.

Alongside its unique geographic position, the conference's purpose was to provide traction on challenging questions relating to an ongoing revolution in mobility by gathering perspectives across disciplines about how to (re)calibrate the legal-regulatory framework for civil air transport alongside extraordinary innovations in aeronautical engineering and technology.

Statement of Need

To realize the full transformative potential of UAM, formulating comprehensive and cohesive analysis addressing these and other matters is critical (and wanting), particularly the normative questions of whether and how technology and law can or should productively interact in the pioneering space of on-demand aviation along intracity and intercity corridors. This whitepaper is a result of the conference *NSF Advanced Air Mobility: Will Law Lift or Ground a New Era of Transportation?* – the goal of which was to generate new knowledge and identify further areas of inquiry with respect to the significance and feasibility of AAM so as to make concrete policy recommendations to the related questions of how law will (or should) apply to ongoing technological innovations in civil aviation, and in turn, how law can or should (or should not) change to accommodate a new age of transportation.

To provide greater specificity, conference organizers identified several opportunities to fill knowledge gaps in the emerging space of AAM and regulation and serve the need to both address important practical questions and raise overarching normative ones:

- ***Problem Solving and Information Exchange.*** Given the range of challenges involved in implementing AAM, from engineering and technical obstacles to legal and regulatory issues, a conference would provide a venue for professionals and experts in different fields to share knowledge, debate ideas, and work towards effective solutions. This facilitates the bridging of knowledge gaps and encourages innovative problem-solving.

- ***Policy Recommendations and Regulations***. The conference aimed to serve as a platform to draft and suggest relevant policies or regulations to govern this new mode of transportation. Legal and regulatory challenges are some of the most significant barriers to AAM. A conference could provide a forum for in-depth discussions on these challenges and the creation of actionable plans.

U.S. Senator Mark Warner (D. Va.) addressing the conference and discussing his bipartisan law, Increasing Competitiveness for American Drones Act of 2023

- ***Networking and Collaboration.*** The conference was designed to promote networking and partnerships among various stakeholders, including AAM firms, regulators, academics, and interested parties from around the world. Collaborations formed at the conference could lead to innovative public-private partnerships, a vital aspect for developing and implementing AAM technologies and services.

- ***Risk Management***. Safety, security, and risk management are key concerns with AAM technologies. A conference would bring together experts from these areas to discuss the risks and challenges and to devise comprehensive risk management strategies.

- ***Social and Economic Equity***. The conference would address broader societal implications of AAM, including its potential to democratize flight and provide transportation solutions to areas underserved by current aviation. The conference would be intentional in serving voices from a wide demographic continuum, thus contributing to the inclusive development of AAM.

Attendees ranged from CEOs to government representatives to undergraduate and graduate students at schools throughout the U.S.

- ***Setting Precedent for Future Technologies***. As AAM represents a pioneering shift in the transportation industry, the discussions, regulations, and frameworks established through a conference could set a precedent for future innovative technologies. This is crucial as new technologies often disrupt legal equilibria and require the creation of new rules and frameworks.

- ***Educational Opportunities***. Lastly, a conference provides educational opportunities for all attendees, from learning about the latest advancements in AAM technologies to understanding the legal, regulatory, and societal implications. This will be instrumental in shaping informed decisions as AAM continues to evolve.

Purpose

By bringing stakeholders together, this project was designed to facilitate robust exchange among AAM firms, regulators, academics, and other interested parties from around the world to collaboratively imagine a path forward for air taxis, including by fostering cooperation between and among government agencies; developing innovative public-private partnerships; adopting performance-based regulations; implementing forward-leaning risk management approaches; addressing local and national politics; and developing new methods that match the new face of aviation. In all, in addressing these and other matters in a new era of aviation, the reach of this project sought to extend beyond aviation as the findings it disseminates could benefit other scholarship at the intersection of science and law that seeks to understand how new technology disrupts legal equilibria, renders existing laws obsolete, and/or requires the creation of new rules and frameworks to account for pioneering inventions.

Meagan Villanueva of Supernal (l) with Yu Zhang of the University of South Florida on the First Panel, "The STEM of Air Mobility."

As important, whereas women and individuals from underrepresented groups had limited opportunities to participate in the development of transformative innovations in aviation, this project is intentional about featuring new voices from the broadest demographic continuum so as to include contributors historically excluded from traditional aviation, law, and science, thus affecting the core aspiration of AAM as an equalizer of access.

The conference through its programming, poster presentation, and networking centered around and explored the following overarching questions:

1. What are the possible immediate, intermediate, and long-term socio technological challenges relative to Advanced Air Mobility (AAM)?

2. What associations could potentially address some of the legal-scientific complexities that AAM field may need to address?

3. Who will (and will not) have the opportunity to participate in the next era of aerial transportation?

4. What legal innovations are possible to achieve the concept of operations of AAM? Relatedly, what technological solutions exist (or might exist) to resolve legal challenges associated with AAM?

Process

The process for the conference was organized to foster in-depth exploration and facilitate dialogue regarding AAM, its challenges, potential solutions, and its broad socio-technological impact. This involved several crucial steps:

1. ***Identify and Invite Participants.*** The process began by identifying and inviting a diverse array of stakeholders from various sectors—AAM firms, regulators, academics, and other interested parties, including individuals from underrepresented groups. The goal was to facilitate a rich exchange of ideas and viewpoints.

2. ***Designing a Comprehensive Program***. The program was developed to encourage discussion around four main overarching questions to comprehensively address the various aspects of AAM. This approach ensures that every critical area from socio-technological challenges to legal and regulatory considerations, participation, and inclusivity are all considered.

3. ***Creating Platforms for Collaboration***. The conference featured sessions that promoted collaboration and communication between participants. This included panel discussions and facilitated cooperation between and among government agencies, fostered innovative public-private partnerships, and addressed both local and national political considerations.

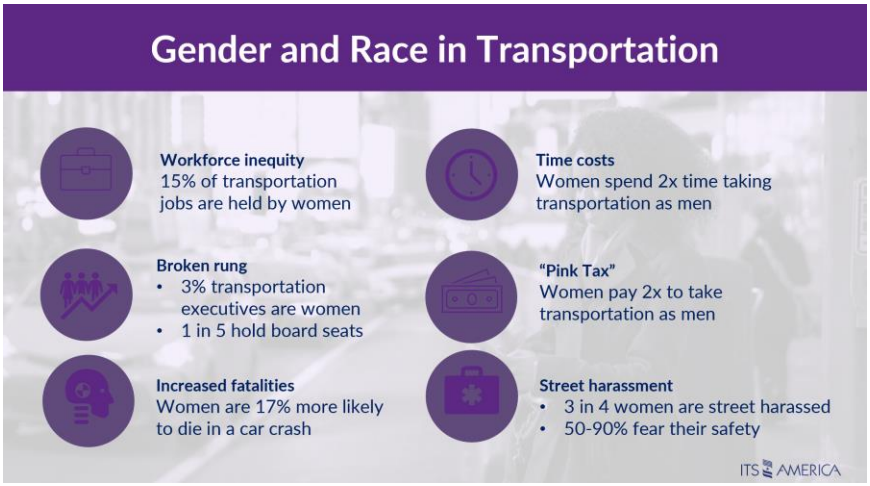
4. ***Poster Presentations***. The poster presentations at the conference allowed students to showcase their work, ideas, or research related to AAM. This served as an opportunity for attendees to get detailed insights into specific topics, technologies, or solutions.

See Appendix D Poster Session Abstracts

5. ***Networking Opportunities***. Networking sessions were planned to provide participants a chance to connect on a personal level, exchange ideas, and potentially form partnerships for future collaboration.

6. ***Exploring Legal and Technological Solutions***. The conference created an atmosphere and opportunity to dive into potential legal innovations and technological solutions that could support the concept of operations of AAM. This was designed to inspire creativity and problem-solving among participants.

7. ***Inclusivity and Diversity***. The conference was deliberately designed to include new voices, particularly from women and individuals from underrepresented groups. This was done to foster diversity and inclusion and to ensure that the opportunities of AAM are made accessible to everyone.



Data provided by Laura Chace, President and CEO, ITS America

8. ***Dissemination of Findings***. Following the conference, the findings and outcomes were disseminated to a wider audience, potentially benefiting scholarship at the intersection of science and law. This served to further extend the impact of the conference beyond the immediate participants and sectors involved.

Through each step of this process, the conference aimed to stimulate rich discussion, foster collaboration, inspire innovation, and promote inclusivity in shaping the future of AAM.

Methods of Data Collection

More than 200 attendees registered for the face-to-face event, with another 150 participating by remote option.

Organizationally, the proposal for the conference imagined a traditional face-to-face conference (with a virtual attendance option, too) in which regulators, policy makers, elected officials, sector leaders, and academics will present the salient social and regulatory issues in urban air mobility, while engineers, industry experts, and AAM manufacturers will present the latest scientific and technological approaches to achieving solutions to socio-legal challenges arising from AAM.

We specifically imagined and executed four (4) hour-long plenary panel sessions (of 4 speakers plus a moderator) followed by a keynote lunch presentation, featuring invited speakers selected to represent a breadth of disciplines (law, science, engineering, etc.) and topics pertinent to the new era of uncrewed aviation.

During the course of the conference, panelists had the opportunity to present their latest scientific, engineering, legal, or methodological work in either a spoken or a poster session occurring alongside the formal panel sessions. What is more, given the academic venue of the conference—a national, public university—the conference was open to the public to help inform public debate.

As to topics, panelists addressed two key areas related to the intersection of law and the science and technology underlying AAM: (1) "above the ground" issues, including an evaluation of known and anticipated legal and technical challenges in enabling the safe, secure, and efficient operation of an increasingly complex airspace; and (2) "on the ground" concerns including safety and security, governance challenges, the environment, and community acceptance and impact. Equitable and ethical considerations will permeate the conference as panelists will assess whether the central imagined benefit of AAM—inexpensive, green, on-demand aerial mobility—is inclusive and available across all social demographics.

To stimulate conversation and interaction between attendees and panelists, live polls were used throughout the proceeding:

Poll Everywhere

text *NSFAAM* to *22333*

https://www.polleverywhere.com/

Below are the questions asked of attendees, which questions were asked before and after corresponding panels:

1. Who are you? (CEO, Pilot, Student)?
2. What I find most interest about AAM is _____
3. How likely are you to take a journey on an eVTOL aircraft?
4. How confident are you in federal regulators to manage the emerging AAM space?
5. How confident are you in STATE/LOCAL regulators to manage the emerging AAM space?
6. Future Issues to Explore?

Findings by Question

The conference, through its programming, poster presentation, and networking centered around and explored the following overarching questions:

1. What are the possible immediate, intermediate, and long-term socio technological challenges relative to Advanced Air Mobility (AAM)?

2. What associations could potentially address some of the legal-scientific complexities that AAM field may need to address?

3. Who will (and will not) have the opportunity to participate in the next era of aerial transportation?

4. What legal innovations are possible to achieve the concept of operations of AAM? Relatedly, what technological solutions exist (or might exist) to resolve legal challenges associated with AAM?

Question 1

AAM represents a shift in the transportation ecosystem that could revolutionize the way goods and people move around. However, like any transformative technology, it faces various challenges, which can be categorized into immediate, intermediate, and long-term challenges.

Meredith Carroll, Professor, Florida Tech, Aviation Human Factors and Director, Advancing Technology-Interaction and Learning in Aviation Systems (ATLAS) Lab

Immediate Challenges:

1. ***Technical Feasibility***. The technologies that will enable AAM, such as autonomous flight, electric propulsion, and vertical take-off and landing

(VTOL), are still in development. Their performance, safety, and reliability need to be thoroughly tested and validated.

2. ***Safety Regulations***. Establishing safety standards and regulations that cover low-altitude urban airspace operations is crucial. Regulatory bodies like the FAA need to formulate new rules or adapt existing ones for these novel operations.

3. ***Public Acceptance***. There could be resistance from the public due to perceived safety risks, noise concerns, or privacy issues. This requires an initial focus on demonstrating safety, reliability, and societal benefits.

Intermediate Challenges

1. ***Infrastructure Development***. Infrastructure such as vertiports, charging stations, and air traffic control for low-altitude operations needs to be developed. These demand substantial capital investment and urban planning.

2. ***Air Traffic Management.*** AAM will drastically increase the number of aircraft in the sky, which necessitates a new air traffic management system to prevent congestion and ensure safety.

3. ***Skill Development***. As AAM technologies mature, there will be a need for a highly skilled workforce for operations, vehicle design, engineering, maintenance, and air traffic control.

Long-term Challenges

1. ***Sustainable and Efficient Operations***. Ensuring that AAM contributes to a more sustainable and energy-efficient transportation system is a long-term challenge. This includes reducing emissions, improving energy efficiency, and integrating with renewable energy grids.

2. ***Equity***. As AAM matures, addressing equity issues will become more critical. This includes ensuring access to AAM services across diverse socio-economic groups and avoiding disproportionate noise or other impacts on specific communities.

3. ***Integration***. AAM will need to be integrated seamlessly with other modes of transportation, ensuring a multimodal transport system that provides efficient, convenient, and cost-effective mobility. This requires long-term strategic planning and coordination across multiple stakeholders.

Question 2

The legal and scientific complexities in the field of AAM will likely require input from a number of professional organizations and associations to resolve.

Daniel Plaisance, Senior Associate, Tulsa Innovation Labs, AAM

Some potential organizations include:

- **Federal Aviation Administration (FAA)**. As the regulatory body for civil aviation within the United States, the FAA will have a major role in setting standards, regulations, and policy guidelines for AAM.
- **European Union Aviation Safety Agency (EASA)**. Similar to the FAA in Europe, EASA will be instrumental in the development and regulation of AAM technologies within the European Union.
- **International Civil Aviation Organization (ICAO)**. As a specialized agency of the United Nations, ICAO sets international standards and regulations for aviation safety, security, efficiency, and environmental protection.
- **National Aeronautics and Space Administration (NASA)**. NASA conducts research in aeronautics that may inform the scientific and technical aspects of AAM.
- **American Institute of Aeronautics and Astronautics (AIAA)**. AIAA provides a forum for the exchange of information and ideas on aerospace research and development. It can provide valuable insights into the technical aspects of AAM.
- **Association for Unmanned Vehicle Systems International (AUVSI)**. AUVSI represents companies and professionals in the unmanned systems and

robotics community, which will play a crucial role in the development of autonomous AAM.

- **Aerospace Industries Association (AIA)**. The AIA represents major aerospace manufacturers and suppliers and can offer valuable insights on manufacturing and supply chain aspects of AAM.

- **Air Line Pilots Association (ALPA)**. Representing pilots, ALPA could address issues related to pilot training, certification, and safety standards for AAM.

- **Aircraft Owners and Pilots Association (AOPA).** AOPA could provide perspectives from general aviation pilots, a community that will be directly affected by AAM developments.

- **American Bar Association's Forum on Air & Space Law.** This group could provide insights into the legal implications and complexities associated with AAM.

Each of these organizations brings unique expertise to the table, and it will likely require a collaborative approach to effectively address the legal-scientific complexities associated with AAM.

Question 3

The next era of aerial transportation, characterized by AAM, promises more efficient and versatile means of travel. This shift could affect various stakeholders and reshape the dynamics of participation in air travel, from industry players to consumers.

Who Will Have the Opportunity to Participate?

- ***Industry Players***. Aerospace manufacturers, software providers, service operators, and infrastructure developers are expected to be key participants in this era. These include established companies as well as startups entering with novel technologies and business models.

- ***Professionals & Workforce***. There will be demand for professionals in diverse fields such as engineering, air traffic control, maintenance, data analysis, cybersecurity, policymaking, and more. There's also the potential for creation of new roles that don't currently exist.

- ***Passengers & Consumers***. A wider demographic might have the opportunity to participate as passengers in the new age of aerial transport. As AAM aims to make air travel more accessible and affordable, this could open doors for people who previously couldn't access or afford such services.

- ***Governments & Regulatory Bodies***. Government agencies, like the Federal Aviation Administration (FAA) and the European Union Aviation Safety Agency (EASA), will play critical roles in regulating and shaping the landscape of this new era.

- ***Researchers & Academics***. This new era provides ample opportunities for research and academic study, including technical advancements, policy implications, social impact, environmental considerations, and more.

Who Might Not Have the Opportunity to Participate?

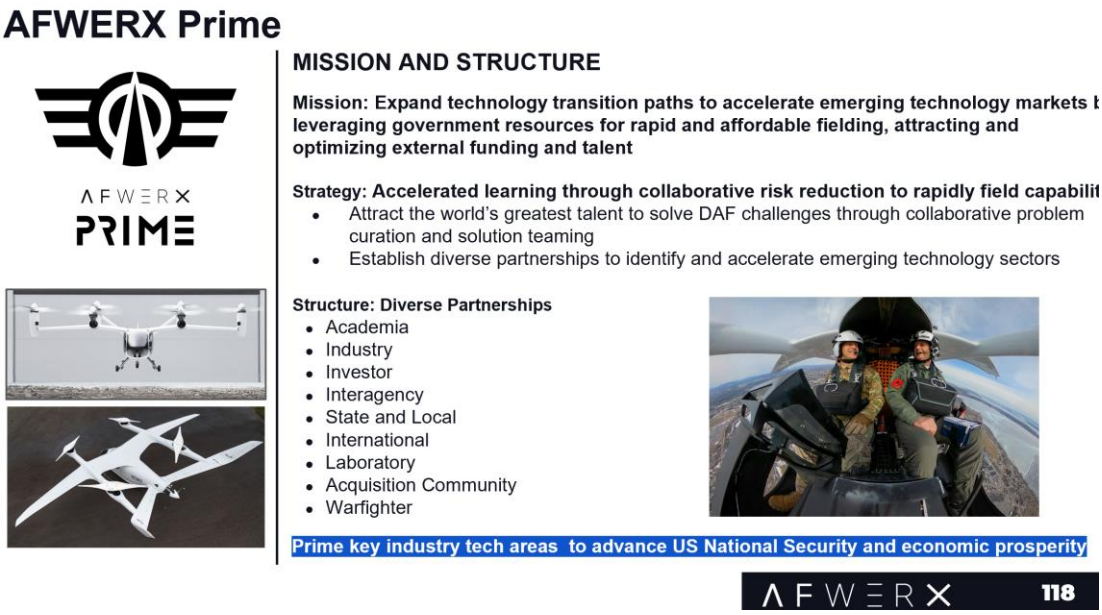
- ***Underprivileged Communities***. Despite the promise of greater accessibility, there could still be economic and geographical barriers that exclude underprivileged communities. For example, services might initially be deployed in affluent urban areas, leaving out rural or economically disadvantaged areas.

- ***People with Disabilities***. Depending on how AAM vehicles and infrastructure are designed, people with disabilities may face accessibility challenges.

- ***Privacy-Concerned Individuals***. Some people may opt out due to concerns about privacy, as AAM could entail increased surveillance and data collection.

- ***Workers in Disrupted Industries***. Certain job roles, particularly those in traditional aviation or transportation services, might face displacement due to automation or changes in industry structure.

The participation in this new era of aerial transportation will largely depend on how AAM evolves, the regulatory framework, the cost and accessibility of the technology, and the efforts to ensure inclusive and equitable participation.



Explaining "Agility Prime." Presentation by Keynote Speaker Darshan "Dash" Divarakan, Head of Airspace Innovation and Prime Partnerships

Question 4

Legal innovations and technological solutions will play a significant role in realizing the concept of operations for Advanced Aerial Mobility (AAM). These developments will have to address a multitude of challenges including safety, privacy, noise, airspace management, and infrastructure development.

Matthew Broffman
Head of Partnerships and Network, Lilium

Technological Solutions:

- ***Unmanned Traffic Management (UTM)***. A digital traffic management system to manage high-density urban air mobility operations could provide a solution to legal concerns regarding safety and airspace management. NASA is already developing a UTM system, which could inform regulations.

- ***Remote Identification (Remote ID)***. The FAA is working on rules for Remote ID, which would help identify and track unmanned aircraft. This could address legal issues related to accountability, safety, and privacy.

- ***Noise-Reduction Technologies***. Developing quieter aircraft and implementing noise-abatement flight procedures can help address noise regulations and public acceptance.

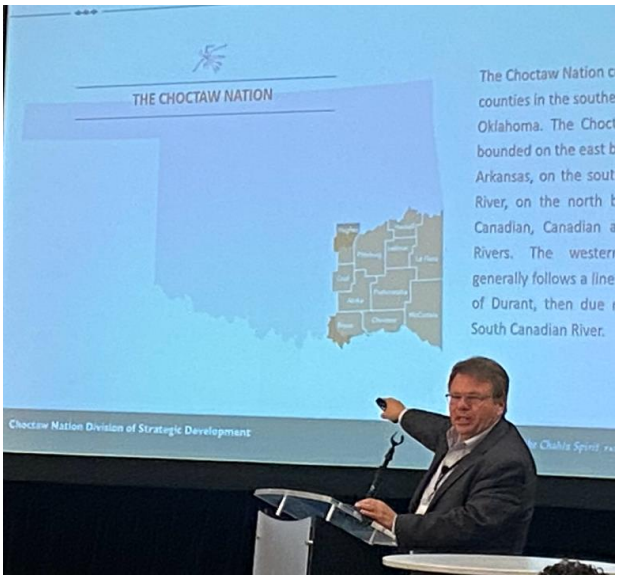
- ***Autonomous Flight Technologies***. Advanced autopilot systems, collision avoidance systems, and artificial intelligence can help increase the safety of AAM, addressing key legal concerns.

- ***Geo-fencing***. This technology could enforce no-fly zones and altitude limits, assisting compliance with regulations and protecting privacy.

- The interplay between legal and technological innovations will be vital for the success of AAM. As regulations evolve, they will drive the development of new technologies and vice versa.

Legal Innovations:

- ***New Regulatory Frameworks***. As AAM will involve low-altitude urban airspace operations and potentially autonomous vehicles, it will necessitate the creation of new regulations or the adaptation of existing ones. For example, the FAA and other international aviation bodies will need to establish safety and operational standards specifically for AAM.



James Grimsley, Executive Director, Advanced Technology Initiatives for Choctaw Nation of Oklahoma

- ***Airspace Rights***. Legal innovations may be needed to redefine airspace rights. Currently, the "navigable airspace" is considered a public highway. However, with AAM, there might be a need to legally redefine what constitutes navigable airspace and who has rights to use it.

- ***Privacy Laws***. With increased air traffic over residential areas, existing privacy laws may need to be adapted or new ones created to protect citizens from unwanted surveillance and noise.

- ***Liability Laws***. As AAM introduces new modes of transport, laws defining liability in the event of accidents or malfunctions may need to be updated or created. This could involve questions about product liability, operator liability, and insurance requirements.

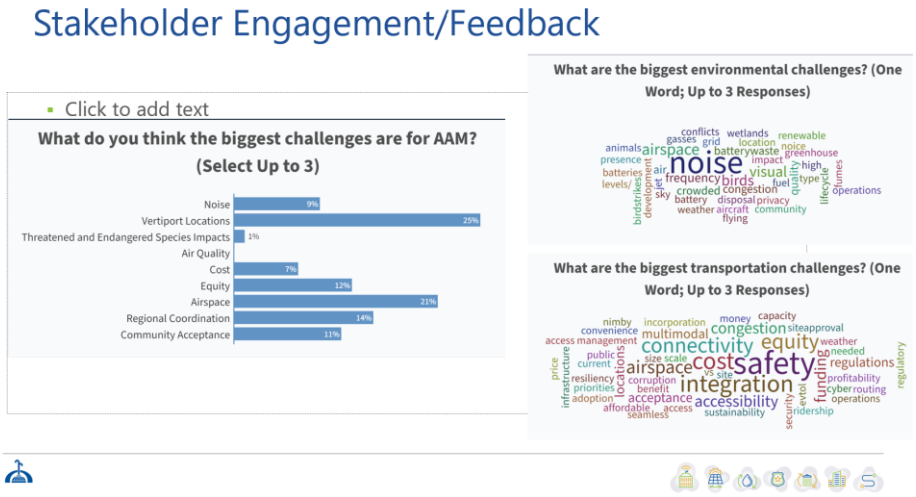
General

The NSF LS conference on AAM surfaced several key insights that are paramount in the future of aerial transportation. Central to these findings is the recognition that AAM should primarily serve the public good. This includes its crucial role in humanitarian, aeromedical, and emergency response uses to demonstrate AAM's societal benefits and foster broad public acceptance.

Safety was underscored as a cardinal concern in AAM. This concern is particularly acute for low-altitude urban operations, with significant issues identified around airworthiness, operations, electric propulsion, pilot standards, and low-altitude air traffic control. Resolving these issues is critical to avoid a possible wave of disapproval that could follow a single accident.

In tandem with safety, the conference highlighted the need for an integrated, multimodal approach. This approach is essential to keep pace with rapidly evolving technology and to incorporate AAM seamlessly into existing ground and air transportation networks. Furthermore, the conference shed light on the electrification challenges, such as grid capacity, aircraft range, charging downtime, lifecycle impacts, and battery recycling. Given these complexities, there was a strong call to examine alternative fuels as part of the solution.

A significant outcome of the conference was recognizing the potential of AAM to generate new technical jobs. This development necessitates specialized training programs in a variety of areas, including operations, engineering, vehicle design, business and financial operations, quality control, medical and travel services, and hospitality. Interestingly, the conference distinguished between public acceptance and community engagement. Rather than merely informing and consulting the public, a successful approach to AAM would involve collaborating with communities and empowering them to influence decisions about AAM implementation.



Findings by Jacques Coulon, Mobility Innovation Manager, City of Orlando

Equity in AAM emerged as a multifaceted concept with varied interpretations among stakeholders. While pilots, air carriers, and manufacturers might focus on equitable airspace access, the public is likely more concerned with the fair distribution of benefits and impacts. The conference emphasized the need for both fair process and outcomes in AAM, which involves integrating environmental justice principles into decision-making processes.

The conference concluded with the recognition that successful planning and implementation of AAM require multi-level government cooperation. Federal, state, and local governments must collaborate to ensure safety, sustainability, and equitable outcomes of AAM operations.

These key insights underline that AAM's successful deployment depends on addressing a complex array of interconnected challenges. Tackling these issues is crucial for unleashing the full potential of AAM, enhancing transportation efficiency, and ensuring that all sectors of society can share in the benefits of this transformative technology.

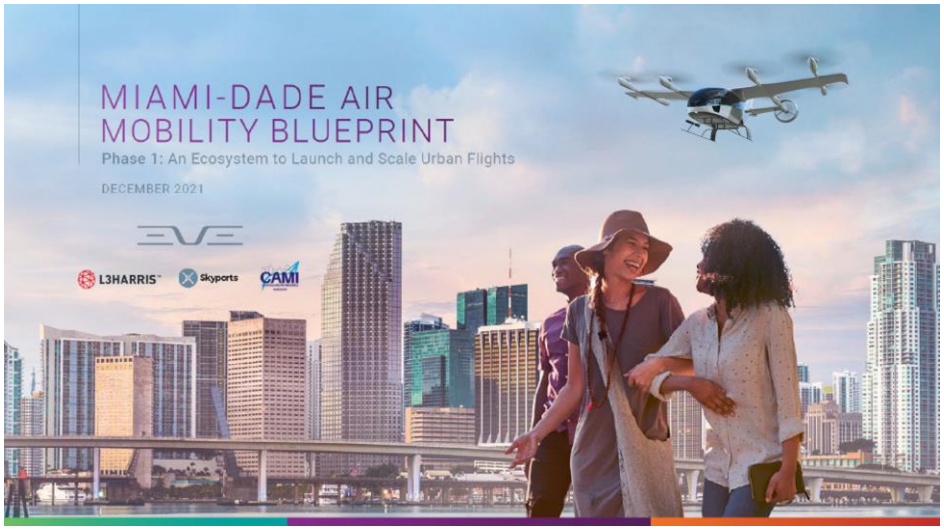
Affordances

AAM promises to revolutionize transportation through several key affordances. One of its major advantages is speed and efficiency. By utilizing vertical takeoff and landing aircraft, AAM has the potential to drastically reduce travel time, especially in densely populated urban areas with high traffic congestion. Moreover, AAM can make remote and hard-to-reach locations more accessible, proving invaluable for delivering essential goods or medical supplies to rural or isolated areas.

AAM is also a beacon of sustainable mobility, primarily employing electric or hybrid-electric propulsion systems, which significantly lower CO2 emissions compared to conventional aircraft that run on fossil fuels. This push for green technology aligns AAM with global efforts to combat climate change and foster sustainability.

Additionally, AAM's development could stimulate economic growth by creating new job opportunities in manufacturing, operations, maintenance, air traffic management, and infrastructure development. This next-generation mode of transportation can drive innovation and entrepreneurship in the aviation sector, laying the groundwork for a thriving economic landscape.

The potential applications of AAM extend to critical areas like emergency services, allowing for quicker response times during crises and enabling access to areas difficult for ground vehicles to reach. Alongside this, AAM is poised to redefine urban planning. The integration of vertiports into existing infrastructure could lead to innovative urban designs and potentially reduce reliance on terrestrial road networks.



From presentation by Eve Air Mobility

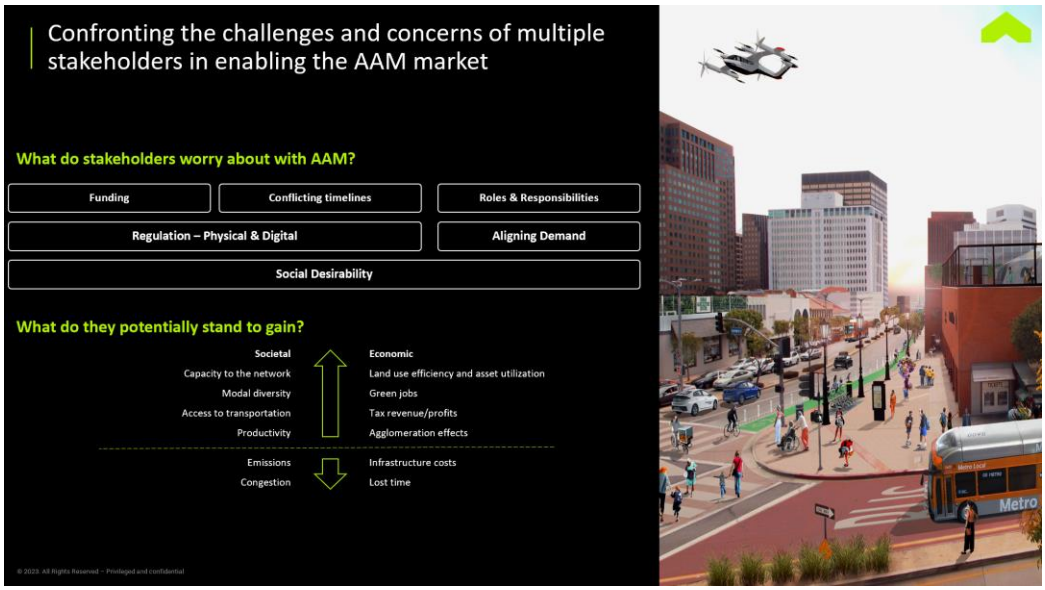
AAM is seen not as a replacement but as an additional mode of transport that can integrate seamlessly with existing ground transportation systems, delivering a multimodal transport

solution. The vision for on-demand mobility, analogous to current ride-hailing services, could also revolutionize personal travel, offering unprecedented convenience.

Finally, AAM has the potential to alleviate ground traffic congestion by relocating a portion of transportation into the air. This paradigm shift could make ground transportation more efficient and cities more livable.

Barriers

Advanced Aerial Mobility (AAM) is confronted with significant barriers that must be addressed to realize its potential. One of the foremost hurdles is regulatory. The existing aviation regulatory frameworks are ill-equipped to accommodate the unique demands of AAM, especially concerning low-altitude flights, autonomous aircraft, and unmanned traffic management. Regulatory bodies like the Federal Aviation Administration and the European Union Aviation Safety Agency need to devise comprehensive regulations encompassing safety, noise, privacy, and certification of new aircraft and technologies.



Presentation of Adrienne C. Lindgren, Head of City Activation, Supernal, LLC (Hyundai)

Safety is another paramount concern. The development of robust air traffic control systems for dense, low-altitude operations, reliable autonomous systems, and collision-avoidance mechanisms is crucial. Coupled with this, ensuring the physical safety of passengers onboard and individuals on the ground presents a significant challenge.

Technological limitations also pose barriers to AAM's development. Current battery technology, for example, restricts the range and capacity of electric aircraft. Enhancements in energy density, power management systems, and the provision of widespread charging infrastructure are necessary. Concurrently, the development of quiet, efficient, and reliable electric propulsion systems also poses a considerable challenge.

Moreover, AAM requires a distinctive infrastructure, including urban vertiports, charging facilities, and maintenance stations. The seamless integration of these infrastructural elements into existing urban environments is a substantial task. Environmental concerns, particularly noise pollution, are another crucial aspect to address. Although electric aircraft tend

to generate less noise than traditional planes, they still produce a level of noise pollution that could affect public acceptance and regulatory approval.

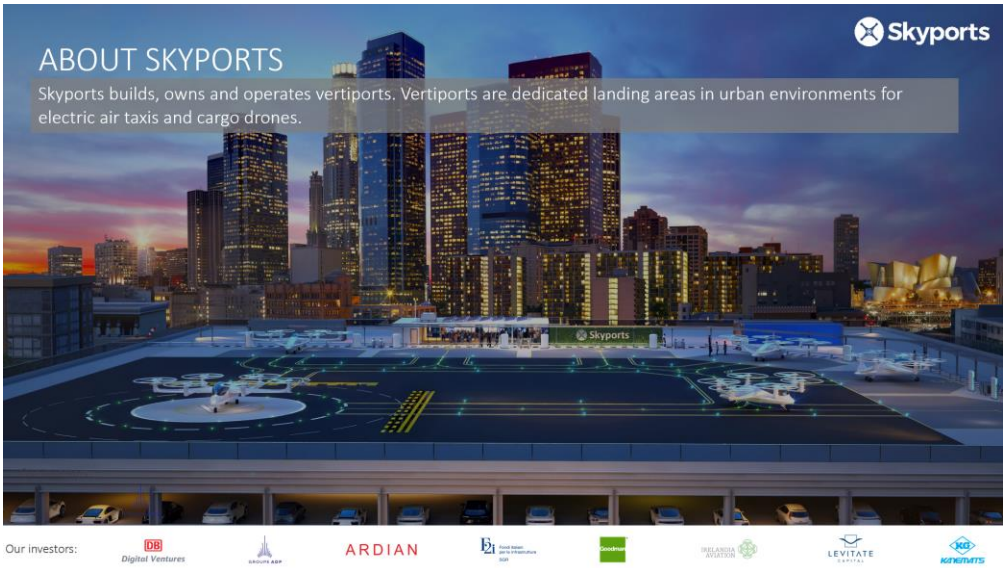
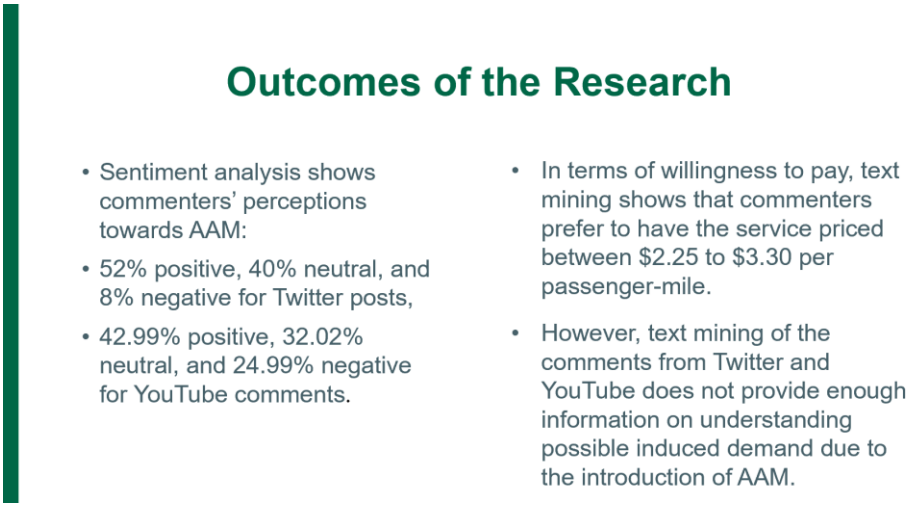


Illustration of "vertiports" presented by Philip Brady, Skyports, Partnerships and Acquisition Manager, East Coast

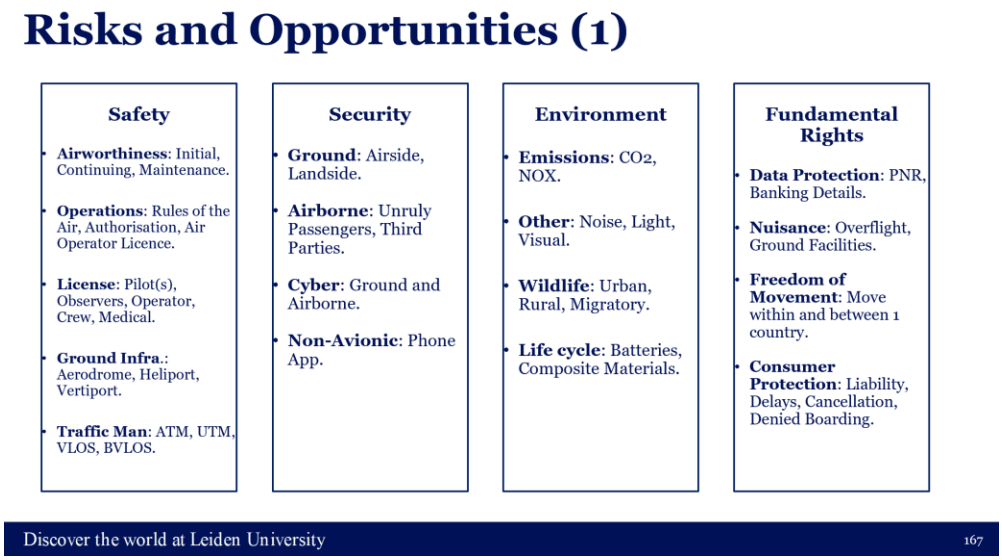
The issue of public acceptance is crucial to AAM's success. Building public trust and assuaging concerns around safety, noise, privacy, and visual impact from increased air traffic are vital. Additionally, achieving equitable access to AAM is an essential socio-economic challenge. There are valid concerns that AAM could reinforce social inequalities if not implemented thoughtfully and inclusively.

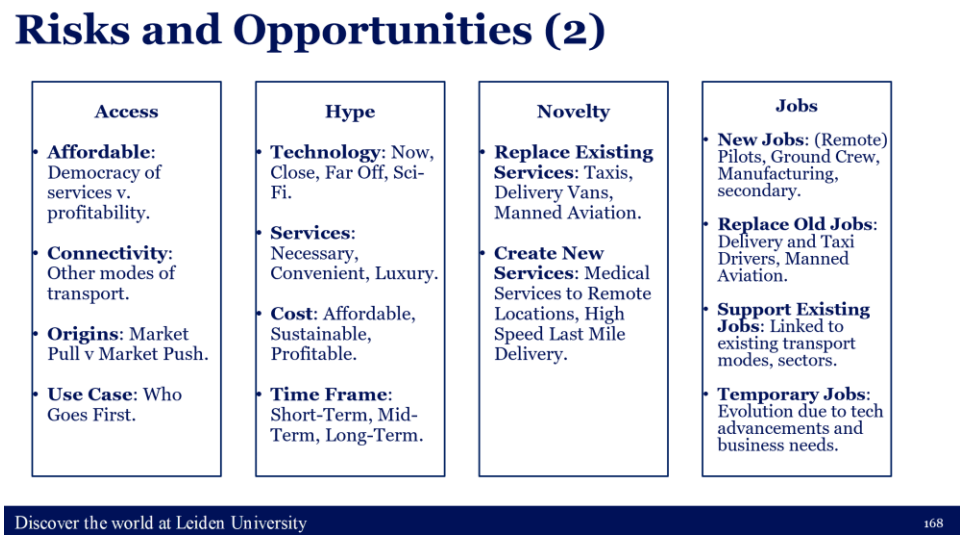


Findings discussed by Yu Zhang, Ph.D, Professor, Department of Civil and Environmental Engineering, University of South Florida

With the rise of digitalization and potential for autonomous operations, cybersecurity becomes a significant concern. Protecting AAM systems from cyber threats is a daunting but

necessary task. Finally, ensuring the economic viability of AAM is crucial. The current costs associated with AAM technologies, including development, operation, and maintenance, are high, posing challenges to making AAM an economically feasible transportation mode. Overcoming these barriers will necessitate a concerted effort from industry stakeholders, regulatory bodies, and governments, in addition to significant technological advancements and this also holds true internationally:





Findings by Professor Benjamyn Scott, Assistant Professor, Institute of Air and Space Law, Leiden University (Netherlands)

Challenges

The emerging AAM space faces a unique set of legal, regulatory, and other challenges as it strives to transform aerial transportation.

One of the most significant challenges is regulatory. AAM operates in a space that traditional aviation laws do not adequately cover. Key regulatory issues include the certification of new aircraft and technologies, determining the standards for airworthiness, and establishing operational guidelines for low-altitude flights, particularly in urban areas. The lack of clear regulations regarding unmanned and autonomous aircraft, as well as air traffic management for high-density, low-altitude operations, compounds these challenges.

Legal complexities are another formidable challenge. Questions of liability in the event of accidents, especially for autonomous or remotely piloted aircraft, remain unresolved. Furthermore, issues of privacy, noise pollution, and airspace rights pose significant legal challenges. Striking a balance between the needs of AAM operators and protecting the rights of individuals and communities will be a considerable task.

Safety concerns pose another significant hurdle. Developing robust, reliable, and scalable air traffic management systems to ensure safe operations in dense, low-altitude urban airspace is a crucial challenge. Additionally, ensuring the safety of both passengers and people on the ground under these new operational paradigms is paramount.

Technological challenges also abound. Current battery technology limits the range and capacity of electric aircraft, a core component of many AAM concepts. Innovations in energy storage and charging infrastructure, alongside the development of efficient, reliable electric propulsion systems, are much needed.

AAM's infrastructure demands are also significant. This includes not only the physical infrastructure like vertiports and charging stations but also the digital infrastructure for traffic management, communications, and navigation. Integrating these systems into existing urban environments will require considerable planning and investment.

Finally, public acceptance is a vital challenge. While AAM promises many benefits, it also brings concerns around safety, noise, privacy, and visual impact. Building public trust and acceptance while mitigating these concerns is an essential task for the successful realization of AAM. To this end, fostering an ongoing dialogue with communities and stakeholders to address their concerns and incorporate their feedback into AAM development and deployment plans is crucial.

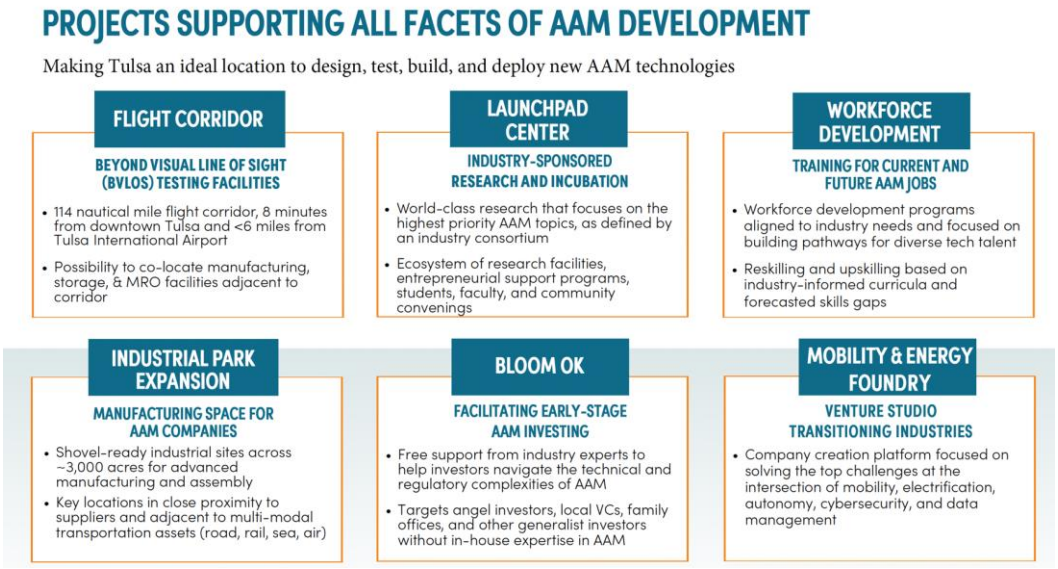
Overall, these legal, regulatory, and other challenges represent significant hurdles for the emerging AAM space. Addressing them requires a comprehensive, collaborative approach that involves industry stakeholders, regulatory bodies, communities, and governments.

Opportunities

The emerging Advanced Air Mobility (AAM) space presents a wide array of opportunities that could revolutionize the way we perceive and experience aerial transportation, with significant implications for economies, businesses, and society at large.

From an economic perspective, AAM holds the potential to generate substantial growth and create new jobs. The development, production, and maintenance of new types of aircraft and infrastructure could spur innovation and investment, leading to job creation in fields such as engineering, manufacturing, and aviation services. Moreover, the enhanced connectivity and reduced travel times promised by AAM could lead to broader economic benefits by increasing productivity and facilitating commerce.

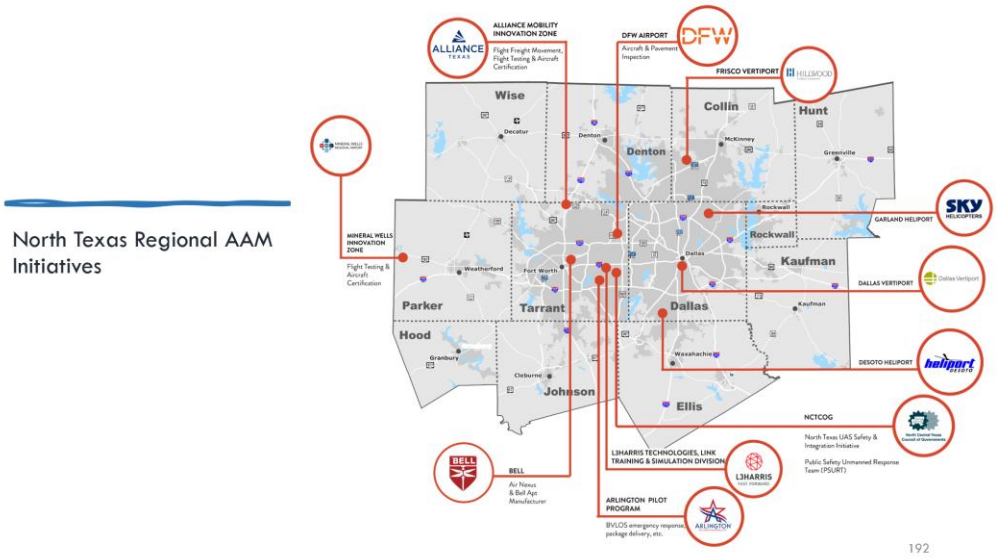
Business opportunities abound in this novel sector. For the aviation industry, AAM represents a new frontier with the potential for expansion and diversification. The need for new types of aircraft, infrastructure, and services offers opportunities for both existing companies and startups. Beyond aviation, businesses in sectors like real estate, logistics, and hospitality could also benefit from AAM. For instance, AAM could transform logistics by enabling rapid, on-demand deliveries, while real estate could be reshaped by the development of vertiports and the increased accessibility of remote areas.



Presentation by Daniel Plaisance, Senior Associate, Tulsa Innovation Labs, AAM

The socio-technological implications of AAM are also significant. By reducing reliance on ground transportation, AAM could alleviate road congestion and contribute to more sustainable, efficient cities. The integration of AAM into public transportation networks could increase mobility, particularly in underserved or hard-to-reach areas. Additionally, AAM has the potential to transform emergency services by enabling faster response times, and humanitarian efforts by facilitating access to remote or disaster-stricken areas.

Public services stand to benefit as well. AAM can provide quicker and more efficient solutions for emergency responses, such as transporting patients to hospitals or delivering supplies during natural disasters. This could save lives and greatly improve public safety in urban environments.



Presentation by Ernest Huffman, North Central Texas Council on Governments on role or metropolitan planning organizations ("mpo")

However, the realization of these opportunities hinges on overcoming the significant challenges faced by the AAM sector. Regulatory hurdles, safety considerations, technological limitations, infrastructure needs, and public acceptance are all areas that require considerable attention. Through a concerted, collaborative effort among all stakeholders, it is possible to harness the full potential of AAM, bringing about a new era of aerial transportation that benefits society as a whole.

Perceived Benefits Intellectual Merit Realized
Broader Impacts Realized

Attendees at NSF LS AAM Conference 2023

The subject conference, by facilitating discussion of the opportunities, challenges, and complexities of AAM offered numerous benefits and possessed significant intellectual merit.

From an intellectual perspective, the conference facilitated an exchange of ideas, insights, and experiences between leading figures from industry, academia, and government. By bringing together diverse perspectives, the conference fostered a holistic understanding of AAM. It enabled the exploration of topics that ranged from technological innovation and regulatory hurdles to socio-economic impacts and public acceptance. This interdisciplinary discourse was vital for navigating the complexities of AAM and catalyzing innovation and progress in this emerging field.

The conference also acted as a platform for knowledge dissemination. By showcasing the latest research, technological advancements, and regulatory developments, the conference kept participants abreast of the state-of-the-art in AAM. This shared knowledge base was key for identifying opportunities, mitigating challenges, and steering the AAM sector towards a safe, sustainable, and equitable future.

In terms of broader impacts, the conference helped shape the direction of AAM. The collective insights gleaned from the conference could guide the development of technology, influence policy and regulatory decisions, and shape public opinion. By fostering dialogue and consensus-building, the conference helped align the diverse interests and expectations of stakeholders. This accelerated the deployment of AAM and ensured that its benefits were maximized and widely shared. Furthermore, the conference facilitated networking and collaboration. The connections made at the conference led to partnerships, collaborative projects, and other synergies. These relationships were crucial for tackling the multifaceted challenges of AAM, which required coordinated efforts across disciplines and sectors.

In summary, the conference discussing AAM offered rich intellectual benefits and wider societal impacts. It served as a nexus of knowledge, innovation, and collaboration, playing a pivotal role in shaping the future of aerial mobility. Through the exchange of ideas and the forging of partnerships, the conference contributed to the realization of AAM's promise to revolutionize transportation, enhance economic growth, and improve societal well-being.

Information by Matthew Land, Government Relations and Public Policy, Eve Air Mobility

Recommendations

Drawing from the key insights and discussions of the conference, several recommendations can be made for stakeholders interested in making Advanced Air Mobility (AAM) a reality.

First, the AAM sector should foster strong cross-sector collaboration. Given the complexity and multi-disciplinary nature of AAM, it is important to cultivate partnerships across industry, academia, government, and community groups. This could be achieved through establishing dedicated collaboration platforms, joint research and development programs, and public-private partnership models.

Second, concerted efforts should be made to raise public awareness and understanding of AAM. This could include public education campaigns, open days, and demonstration flights. Ensuring transparency about the safety measures, potential benefits and challenges of AAM would help build trust and acceptance.

Third, there's a need to develop comprehensive and adaptive regulatory frameworks that can keep pace with technological advancements in AAM. This could involve close coordination between regulatory bodies across different levels of government, as well as engagement with industry and academia. The creation of sandbox environments where new technologies and operational concepts could be tested in a controlled manner might also be beneficial.

Fourth, dedicated research and development programs should be initiated to address the technical challenges associated with AAM. This might include research into alternative fuels, battery technology, air traffic management systems, and noise reduction techniques. Collaborative research involving industry, academia and government could accelerate technological progress.

Fifth, there should be a focus on developing the necessary workforce for AAM. This could involve the creation of specialized training programs and qualifications, in collaboration with educational institutions, industry, and professional bodies. The sector could also engage in outreach activities to attract diverse talent into the field.

"Transforming Communities: Democracy, Access, and Equity in AAM" panel moderated by Chris Fernando, Hovecon, Principal

Lastly, the integration of environmental and social considerations into the planning and implementation of AAM should be prioritized. This could involve the application of environmental justice principles, the consideration of socio-economic impacts, and the engagement of communities in decision-making processes.

By adopting these recommendations, stakeholders in the AAM sector can contribute to the safe, equitable, and successful realization of AAM.

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Appendix A Schedule

NATIONAL SCIENCE FOUNDATION

Advanced Air Mobility (AAM): Will Law Lift or Ground a New Era of Transportation?

University of Central Florida, Orlando, Florida, March 10, 2023

Agenda

Registration. Breakfast. 8:00 AM – 9:00 AM

I. **Welcome** **9:00 AM – 9:30 AM**

Timothy M. Ravich, *Principal Investigator and Associate Professor, UCF*
Mark Warner, *U.S. Senator (D. Va.) [Recorded]*
Grant Hayes, *Dean, UCF College of Community Innovation and Education*

II. **The STEM of Advanced Air Mobility** **9:30 AM – 10:45 AM**

- **Adan Vela**, *Assistant Professor, UCF College of Engineering and Computer Science*
- **Matthew Broffman,** *Head of Partnerships and Network, Lilium*
- **Yu Zhang, Ph.D.,** *Professor, University of South Florida, Department of Civil and Environmental Engineering*
- **Meagan Villanueva**, *Senior Manager Propulsion & Dynamic Systems, Supernal*
- **Meredith Carroll**, Professor, *Florida Tech, Aviation Human Factors and Director, Advancing Technology-Interaction and Learning in Aviation Systems (ATLAS) Lab*

Break. 10:45 AM – 11:00 AM

III. **Law and Driver and Inhibitor:**
AAM Regulatory and Governance Challenges **11:00 AM – 12:00 PM**

- **Ryan Naru,** *Joby Government Affairs Aviation*
- **Basil Yap**, *Aero-X Ventures*
- **Daniel Plaisance**, *Senior Associate, Tulsa Innovation Labs, AAM*
- **James Grimsley**, *Executive Director, Advanced Technology Initiatives for the Choctaw Nation of Oklahoma*

IV. **Lunch – Networking and Presentation** **12:00 PM – 1:30 PM**

- Darshan "Dash" Divakaran
  AFWERX, Head of Airspace Innovation and Prime Partnerships

NATIONAL SCIENCE FOUNDATION

Advanced Air Mobility (AAM): Will Law Lift or Ground a New Era of Transportation?

University of Central Florida, Orlando, Florida, March 10, 2023

Agenda (cont'd)

V. **Environment: "Vertiports," Safety, and Security** **1:45 PM – 2:45 PM**

- **Greg Dyer**, *Woolpert*
- **Gina Evans,** Director, *Government Affairs, (Hillsborough County Aviation Authority) Tampa International Airport*
- **Jacques Coulon**, *Mobility Innovation Manager, City of Orlando*
- **Philip Brady**, *Skyports, Partnerships and Acquisitions Manager, East Coast*

Break. 2:45 PM – 3:00 PM

VI. **International Perspective** **3:00 PM – 3:15 PM**

Benjamyn Scott, *Assistant Professor*
Institute of Air and Space Law, Leiden University (Netherlands)

Student Posters Displayed. 3:15 PM

VII. **Transforming Communities: Democracy, Access, and Equity in AAM** **3:30-4:30 PM**

- **Chris Fernando**, *Hovecon, Principal*
- **Adrienne C. Lindgren**, *Supernal LLC, Head of City Activation (Hyundai)*
- **Ernest Huffman**, *North Central Texas Council of Governments*
- **Laura Chace**, *President and CEO, ITS America*
- **Matthew Land**, *Government Relations and Public Policy, Eve Air Mobility*

VIII. **Closing Remarks and Next Steps** **4:30 PM**

IX. **Poster Presentations and Reflections** **4:30 PM – 5:00 PM**

Join Post-Conference Debrief and Refreshments

Appendix B Participants

Sixty-five percent of attendees self-identified as women, with ten attended identifying as CEO or President. Forty-five percent of attendees were drawn from academia with twenty-eight percent from the private sector and nine percent from the government.

Drawing more than 200 attendees, states from which attendees traveled to the conference or attended remotely include California, Colorado, Connecticut, Florida, Georgia, Hawaii, Illinois, Iowa, Kentucky, Maryland, New Jersey, New York, Ohio, Pennsylvania, Tennessee, Texas, Utah, Virginia, Washington, Washington, D.C.

Attendees were drawn from international locations, including Argentina, Belgium, France, Germany, Great Britain, Holland, India, Israel, Portugal, South Africa, and Spain, Turkey

As to interests or why they attended the conference, attendees identified their primary areas of interest as follows (secondary area of interest in parentheses)

1. Legal and Regulatory Issues, 49.5%
2. Technology and Engineering, 23%
3. Community, Acceptance, Access Equity, 15%
4. Operational Matters: Safety and Sustainability, 12%

Appendix C Speaker and Bios

The STEM of Advanced Air Mobility

9:30 AM – 10:45 AM

Adan Vela, *Assistant Professor, UCF College of Engineering and Computer Science*

Dr. Adan Vela serves as an Assistant Professor in the Department of Industrial Engineering and Management Systems at the University of Central Florida. In his role as director of the Analytics, Decision, and Control Lab Dr. Vela leads a group of post-doc, graduate, and undergraduate researchers in conducting research across a variety of applied domains, including: Air transportation, Education Analytics, Human-Machine Teaming, and Homeland Security. His research efforts are supported by grants from the National Science Foundation, the Department of Homeland Security, the National Aeronautics and Space Administration, and the Department of Defense. Prior to joining UCF, he served as a Technical Staff member in the Homeland Protection and Air Traffic Control division at MIT Lincoln Laboratory. Dr. Vela's primary research interests involve modeling, simulating, and optimizing human-in-the-loop control and decision systems. Over the years Dr. Vela has made significant contributions that include next-generation collision avoidance systems; safety analysis of UAV and NextGen concepts; and agent-based simulations of air transportation systems.

Matthew Broffman, *Head of Partnerships and Network, Lilium*

Matt Broffman is the Head of Partnerships and Network Development, Americas at Lilium Aviation, developer of the first all-electric vertical take-off and landing ("eVTOL") jet. In his role, Broffman is focused on aligning all of the elements necessary for Lilium's US launch. Broffman previously served as Director of Innovation for Orlando Mayor Buddy Dyer. He was responsible for creating and leading the city's innovation portfolio and team, including Orlando's Advanced Air Mobility work. Matt has more than two decades of experience building products and services that help organizations and communities take advantage of emerging innovations.

Yu Zhang, Ph.D., *Professor*

University of South Florida, Department of Civil and Environmental Engineering

Dr. Yu Zhang is a Professor in the USF College of Engineering, leading the Smart Urban Mobility Laboratory (SUM Lab) and the Advanced Air Mobility (AAM) Research Program at the Center for Urban Transportation Research (CUTR). Dr. Zhang is also serving as the Director of National Insitute of Congestion Reduction (NICR), a USDOT National University Research Center. Her expertise lies in developing cutting-edge mathematical programming and solution algorithms, simulation tools, and machine learning/deep learning methods to create innovative solutions that enable the development of more efficient, resilient, and sustainable multimodal transportation systems. Dr. Zhang has published extensively on Air Traffic Management, Advanced Air Mobility/Urban Air Mobility, sharing mobility and equity issues of emerging transportation modes. She is serving as associate editor for several prestigious transportation/aerospace journals and chairing TRB Standing Committee of Airfield and Airspace Performance (AV060) (2017–present).

Meagan Villanueva

Senior Manager Propulsion & Dynamic Systems, Supernal

Meagan Villanueva started her engineering career with Textron in the Leadership Development Program, working for multiple businesses in different areas of engineering for the first 3 years of her career. After the program, she went to work for Bell Helicopter as a Systems Design Engineer for the Bell 505 program. She participated in design, qualification, flight test, certification, and production activities for several systems, including Fuel, Oil, Hydraulics, Flight Controls, and Propulsion. After the certification of the 505, she moved over to Bell's Innovation team, where she explored, developed, and integrated hybrid-electric and all-electric powertrains on the Bell Nexus eVTOL. She decided to make a change 3 years ago to became a founding member of Hyundai Motor Group's venture into Advanced Air Mobility, now known as Supernal. Meagan is the Senior Manager of Propulsion & Dynamic Systems and is responsible for the strategic and technical direction of the electric power unit, rotor systems, and powertrain integration.

Meredith Carroll, Professor, *Florida Tech,*
Aviation Human Factors and Director, Advancing Technology-Interaction and Learning in Aviation Systems (ATLAS) Lab

Dr. Meredith Carroll is a Professor of Aviation Human Factors and Director of the Advancing Technology-interaction and Learning in Aviation Systems (ATLAS) Lab at Florida Institute of Technology's College of Aeronautics. She has nearly 20 years of experience studying human/team performance and training in complex systems. Her research focuses on decision making in complex systems, cognition and learning, human-machine teaming, performance assessment and adoptive training. She has been funded by the Federal Aviation Administration (FAA), the Air Force Research Laboratory (AFRL), the Air Force Office of Scientific Research (AFOSR), the Office of Naval Research (ONR), and the Army Research Laboratory (ARL) to study different facets of these areas. She is currently studying the human factors aspects of advanced air mobility such as implications for the design of autonomy, pilot and operator interfaces, and training. She received her Bachelor's degree in Aerospace Engineering from the University of Virginia, her Master's degree in Aviation Science from Florida Institute of Technology and her Ph.D. in Applied Experimental Psychology and Human Factors from the University of Central Florida.

Break. 10:45 AM – 11:00 AM

Law and Driver and Inhibitor:
AAM Regulatory and Governance Challenges

11:00 AM – 12:00 PM

Ryan Naru, *Joby Government Affairs Aviation*

Joby Aviation is a California-based company developing revolutionary electric vertical take-off and landing aircraft that it intends to operate as a commercial passenger service. Founded in 2009, Joby has completed more than 1,000 test flights across multiple generations of prototype aircraft. Having demonstrating a range of up to 150 miles and a noise profile far quieter than traditional helicopter, Joby has begun production of its type conforming aircraft. Last year, Joby also received an air carrier operators certificate, which it will use to develop and demonstrate its customer facing software ahead of eVTOL certification

Joby intends to bring its electric aerial ridesharing service to cities and communities around the world starting in 2025.

Ryan NARU is a senior government affairs specialist with Joby Aviation. His primary focus is on aviation rulemaking and policy development activities.

Before joining Joby, Ryan worked for two years with the Uber Elevate project.
Ryan studied aerospace engineering at Georgia Tech and Economics at the State University of New York in Binghamton.

Basil Yap, *Aero-X Ventures*

Basil Yap is a partner at Aero X Ventures, an Aerospace and Defense venture fund focused on emerging markets, including AAM. He also is a founding member and President of AeroX, a non-profit focused on building an AAM ecosystem in North Carolina with a recently awarded $5 million from the state legislature. Basil is also Vice President of HoveCon, an AAM-focused consulting firm. He has filled various roles in transportation at North Carolina's Department of Transportation, including highway construction, airport development, and most recently, led their UAS Program, which included participation in both the FAA UAS Integration Pilot Program and FAA BEYOND Program.

Daniel Plaisance
Senior Associate, Tulsa Innovation Labs, AAM

Daniel Plaisance leads the Advanced Air Mobility portfolio at Tulsa Innovation Labs (TIL), a tech-led economic development organization based in Tulsa, OK. In this role, Daniel oversees program development and strategic investments in research & development, testing infrastructure, and workforce development initiatives that build upon the Tulsa region's competitive advantage in aerospace and AAM.

Recently, Daniel spearheaded the development of three projects for TIL as part of the Tulsa Region's Build Back Better Regional Challenge application, which was selected by the US Economic Development Administration as one of 21 winning applications from 529 initial applicants, resulting in ~$70M in funding to develop a world-class advanced mobility ecosystem in Tulsa.

Prior to joining Tulsa Innovation Labs, Daniel has worked on innovative economic and workforce development initiatives for the New York City Economic Development Corporation and the City of Providence, Rhode Island.

James Grimsley
Executive Director, Advanced Technology Initiatives for the Choctaw Nation of Oklahoma

James Grimsley serves as the Executive Director for Advanced Technology Initiatives with the Choctaw Nation of Oklahoma. Mr. Grimsley also serves as an Oklahoma Transportation Commissioner with oversight and governance responsibilities for the Oklahoma Department of Transportation. Mr. Grimsley currently serves on the Board of Directors for the Commercial Drone Alliance (CDA) as well as a variety of other boards and advisory groups. As part of Mr. Grimsley's Choctaw Nation duties, he currently manages the FAA BEYOND Program (the Choctaw Nation of Oklahoma is the only tribal lead participant in the BEYOND program), and previously managed the FAA Integration Pilot Program (IPP) for the Choctaw Nation. In October 2022 U.S. Secretary of Transportation Pete Buttigieg appointed Mr. Grimsley to the FAA's Advanced Aviation Advisory Council (AAAC). Mr. Grimsley's undergraduate and graduate degrees are in aerospace and mechanical engineering. Mr. Grimsley has more than 33 years of professional experience in the aviation and defense industries including corporate executive experience as well as being an Associate Vice President for Research at the University of Oklahoma.

Lunch – Networking and Presentation

12:00 PM – 1:30 PM

Darshan "Dash" Divakaran
AFWERX, Head of Airspace Innovation and Prime Partnerships

AFWERX is the innovation arm of the Department of the Air Force connecting innovators across government, industry, and academia. Prime, a division within AFWERX, expands technology transition paths to accelerate emerging dual-use technology markets by leveraging government resources for rapid and affordable fielding, attracting, and optimizing external funding and talent.

Currently Prime has many efforts across the nation, some focused in Eglin AFB, Edwards AFB and Springfield, Ohio. At Eglin Air Force Base the efforts are focused on eVTOL flight testing under Agility Prime and setting up an autonomy proving grounds by end of this year under Autonomy Prime. To support both Prime branches in their airspace integration efforts a new program was created early this year called Airspace Innovation. The focus of this program is airspace integration, management and security for future of air mobility using both COTs and DoD systems. Future efforts are focused on beyond line-of-sight (BVLOS) operations, and dual use airspace management.

Early this year Darshan "Dash" Divakaran was promoted to Head of Airspace Innovation & Prime Partnerships. In addition to his role leading Airspace Innovation program he also leads the AFWERX Prime partnerships & outreach efforts. Dash works closely with the military, federal, state and academia on the future of air mobility and accelerating innovation.

Dash is an aerospace intrapreneur and technology evangelist with expertise in uncrewed aviation, aviation development, military innovation, geospatial analysis, emerging technologies, and program management. His areas of expertise are in uncrewed aviation, autonomy and related emerging technologies. In his previous roles he led many efforts to work with the public and private sector to develop, integrate and manage national programs and initiatives. He is also an FAA certified commercial pilot with multi engine rating and holds a FAA part 107 remote pilot certificate.

Environment: "Vertiports," Safety, and Security

1:45 PM – 2:45 PM

Greg Dyer, *Woolpert*

Greg currently is with Woolpert and supports airport clients, state clients and airlines across the U.S.. He began his career with 35 years in the FAA where he began as an air traffic controller and held many positions with an emphasis on Airspace & Procedures, and Traffic Management. His management experience included the Rocky Mountain Terminal District with 20 air traffic control facilities. He lives in Denver, CO with his spouse and has two adult sons.

Gina Evans,
Director, *Government Affairs, (Hillsborough County Aviation Authority) Tampa International Airport*

Gina Evans Dew has served as the Director of Government and Community Relations for the Hillsborough County Aviation Authority since December of 2012. In this role, Mrs. Dew represents the Authority's four airports at the local, state, and federal level while managing the airport's community efforts. She Co-Chairs the Authority's internal committee on Advanced Air Mobility and during this time, she has secured record funding for capital projects as well as focused on policy issues.

In addition to her duties at the Authority, Mrs. Dew serves on several boards in the community including Chair of the Development Committee for the Museum of Science and Industry, Policy Committee member for the Crisis Center of Tampa Bay, member of the Hillsborough Transportation Policy Organization and is a member a of both The Junior League of Tampa and Florida Blue Key.

Mrs. Dew earned her Bachelor of Science in Public Relations and Master of Arts in Mass Communications degrees from the University of Florida. She was named one of Tampa Bay Business Journal's Up and Comers for 2015, Top 10 under 40 for South Tampa Magazine in 2019 and is a graduate of Leadership Tampa Class of 2019.

Jacques Coulon, *Mobility Innovation Manager, City of Orlando*

Jacques Coulon has had the pleasure of working with the City of Orlando since 2015. He currently leads the City's efforts on preparing for emerging transportation technologies such as Advanced Air Mobility (AAM) and Connected Autonomous Vehicles (CAV) and works on a variety of transportation planning efforts including the City's planned Lake Highland/Alden Road realignment project and Edgewater Drive Complete Street project. In his current role with the City's Transportation Department Jacques also serves as the lead for transportation focused issues and items for all major proposed developments within the City. Jacques is a proud graduate of the University of Central Florida where he earned a bachelor's degree in Public Administration and a master's degree in Urban and Regional Planning.

Philip Brady, *Skyports, Partnerships and Acquisitions Manager, East Coast*

Philip Brady is a Partnerships and Acquisitions Manager for Skyports Infrastructure. Philip heads up the company's efforts in the east of the US, where he leads on the acquisition, design & build, and operation of vertiports for air taxis. Philip's team addresses real estate agreements, local stakeholder engagement, regulatory approvals, airport planning, operational procedures, and enabling technology required to develop and operate safe, efficient, passenger-friendly vertiport infrastructure. Philip began his career as a tenant broker with Savills in Washington, D.C. Following that, he worked in property management and construction at industry leading companies, including Gilbane Building Company. Philip holds a Masters in Real Estate Development from George Mason University.

Break. 2:45 PM – 3:00 PM

International Perspective

3:00 PM – 3:15 PM

Benjamyn Scott, *Assistant Professor*
Institute of Air and Space Law, Leiden University (Netherlands)

Benjamyn I. Scott is an Assistant Professor at the Institute of Air and Space Law, and eLaw – Center for Law and Digital Technologies at Leiden University. His research is focused on legal aspects involving developing and emerging aviation technologies, where he has concentrated on unmanned aircraft systems, urban air mobility and cybersecurity. Before joining Leiden University, he worked for both a regulator and for industry. Finally, he has supported different EU and international stakeholder groups, presented at conferences around the world, published journal articles and books, and lectured at different universities.

Student Posters Displayed. 3:15 PM

Transforming Communities: Democracy, Access, and Equity in AAM

3:30-4:30 PM

Chris Fernando
Hovecon, Principal

Chris Fernando is an experienced researcher and aviation consultant with more than 20 years of experience in the industry. His primary background is in aviation operations and airports with a focus on emerging aviation technologies, policy development, and airport and environmental planning. He is a recognized subject matter expert in these fields and his expertise in Advanced Air Mobility (AAM), urban air mobility (UAM) and unmanned aircraft systems (UAS) has resulted in multiple engagements with Federal clients and multiple airports in the U.S. to support integration efforts. He has an extensive network and strategic partnerships with industry and has leveraged these relationships to plan and host successful workshops, stakeholder engagement roundtables, and conferences related to the future of aviation.

He is currently a Principal at Hovecon in Raleigh, NC, an advisor to the mobility group at Ernst and Young, an AAM consultant to the FAA and NASA, and an adjunct professor at Florida Institute of Technology where he teaches a graduate course on the UAM Ecosystem. He is also the co-host of the No U-Turn Podcast, which is a podcast focused on the future of transportation, emerging technologies, and the workforce of the future. He holds a Bachelor of Science degree in Aviation Management from Florida Institute of Technology.

Adrienne C. Lindgren
Supernal LLC, Head of City Activation (Hyundai)

Adrienne Lindgren is a trained urban planner and economic development professional, with a focus on integrating advanced transportation technology into the built environment to enhance urban and regional mobility outcomes. Adrienne joined Hyundai Motor Group in 2020 and now serves as the Head of City Activation; in this capacity, Adrienne and her team partner with entities across the globe to better understand how AAM technology can deliver universal, affordable, and human-centered cities, while driving and supporting initiatives that increase capacity for UAM solutions in a multi-modal mobility environment. Her work is guided by principles of equity, accessibility, and ecological and fiscal sustainability. Prior to joining Supernal (Hyundai Motor Group), Adrienne worked for WSP USA, an engineering services firm, where she assisted transportation owners and operators in delivering innovative transportation technology programs, while leading a new practice in aviation innovation. She has worked with international transportation and aviation authorities, airports, DOTs, and local planning entities across the US, Canada, Australia, and the UK/EU. Before moving into the private sector, Adrienne spent time in local government under the Garcetti administration in the City of Los Angeles; she continues to serve local government as a private citizen through her local planning commission.

Ernest Huffman
North Central Texas Council of Governments

Ernest Huffman was born and raised in Syracuse New York and received his Bachelors in Aeronautical Science from Dowling College and his Master's in Aviation from Florida Institute of Technology. With over 21 years in the industry Mr. Huffman has worked all over the country as an Aviation Consultant. Included in that is his work as an Airline Technical Representative and managed the building of the Chicago O'Hare Airport. His current role is the Aviation Planning and Education Program Manager for the North Central Texas Council of Governments. There he has different duties that include managing the Aviation Education Initiative, Regional Aviation System Plan and the North Texas UAS Safety and Integration Initiative. Ernest is also leading the regions efforts at integrating Advanced Air Mobility.

Laura Chace
President and CEO, The Intelligent Transportation Society of America (ITS)

Laura Chace was named President and CEO of ITS America in August, 2021. Previously, she served as the association's Chief Operating Officer. In her role as COO and now as President and CEO, her focus is to promote policies that advance the development and safe deployment of intelligent transportation technologies throughout the United States in support of safer, greener, smarter mobility for all. Chace has extensive experience in strategic planning, operations, communications and advocacy, and a proven track record of implementing complex initiatives with strong engagement and collaboration among stakeholders. As COO, she led operations across ITS America with a focus on technology's ability to save lives and reduce crashes on U.S. roadways, reduce congestion, minimize transportation's carbon footprint, and provide seamless mobility and transportation choices for all Americans. Chace serves on the External Advisory Board for the U.S. Department of Energy's SMART Mobility Lab consortium under the Officer of Energy Efficiency and Renewable Energy (EERE). She is passionate and speaks often about the need to include more female and diverse voices in the transportation workforce to create better outcomes for all who use the transportation system. Chace is a founding member of the MobilityXX initiative, which is focused on increasing the number of women in transportation by 10 percent in 10 years. Chace brings 15 years in trade association management to her new role, having previously worked at USTelecom and the American Trucking Association. Early in her career, she served in the Clinton Administration at the U.S. Department of Justice Office and in the White House. She holds a Bachelor of Art's degree from Colgate University.

Matthew Land
Government Relations and Public Policy, Eve Air Mobility

Matthew Land leads Government Relations and Public Policy for Eve Air Mobility focused on issues at the federal, state, and local level throughout the United States while providing strategic political support globally. Eve is an independent company that recently spun off from Embraer and dedicated to accelerating the Urban Air Mobility (UAM) ecosystem through an advanced electric vertical takeoff and landing vehicle (eVTOL) project, a comprehensive global services and support network, and a unique air traffic management solution. He has worked in various capacities in politics for more than fifteen years including working on campaigns and as a lobbyist before municipalities throughout Florida and before the Florida Legislature.

Appendix D (Representative) Poster Session Abstracts

Summary of "Flying Taxis? A New Era of Transportation… (and Regulation)!"

As the advanced air mobility industry emerges, the government must enforce existing regulations and create new laws in order to ensure safety and viability. That is the main idea of the poster, which explains some of the government agencies that regulate this industry, as well as laws that have been created in order to address this new form of technology. The poster also focuses on areas the government will have to address.

Because advanced air mobility is a relatively new concept and the technology is largely still under development, it is important for the appropriate government departments to address the technology before it becomes mainstream. The Federal Aviation Administration is in charge of regulating civil airspace in the United States, including the emerging advanced air mobility industry. Vehicles and pilots must be certified in order to guarantee safety. Congress is also able to create laws regarding the industry, which they demonstrated by passing the Advanced Air Mobility Coordination and Leadership Act in 2022.

While certain aspects of the industry are currently being addressed legally, the government still has much to take care of. For instance, it must be determined how AAM aircraft will affect property laws as they intend to use the airspace of private and public lands. There also needs to be cooperation between different branches and agencies of government as they begin to regulate this new form of transportation.

In summation, the advanced air mobility industry is an exciting new technological advancement that will primarily be regulated by the Federal Aviation Administration, but also by national congress and state lawmakers. While there are currently some laws and guidelines that must be adhered to, it is important the government addresses every aspect of the industry as it morphs into a commonplace, new form of transportation.

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Sarkar, Mrinmoy et al. "A Comprehensive eVTOL Performance Evaluation Framework in Urban Air Mobility." *Intelligent Systems and Applications*. Vol. 542. Switzerland: Springer International Publishing, 2022. 459–474.

The Future of the Flying Taxi Industry and its Emergence around the World

The following paper and presentation will discuss the future of the flying taxi along with its emergence around different parts of the world. I will also discuss 3 different cases in different places around the world that provide evidence to my opinion that the law and regulatory environment is helping the emerging flying taxi industry. The three places around the world that will be discussed are South Korea, America, and Europe.

First, I will discuss a particular case in which flying taxi's are actually being pushed forward in a particular country. This first can be seen in South Korea where the South Korean telecommunications giant SK Telecome is planning to launch a flying taxi service in 2025, expecting it to generate "significant" revenue going forward (*SK Telecom to Launch Flying Taxis in 2025, Expects Big Future Revenue*, 2023). The South Korean government is pushing forward with trying to commercialize air taxis by 2025. The second case that will discussed during my presentation are new proposals in America being pushed forward in regards to Flying Taxi's. On November 21, 2022, the United States Federal Aviation Administration on Monday proposed new rules that would help pave the way for commercial air taxi operations by around the middle of the decade. The eVTOL, standing for the Electrical vertical takeoff and landing aircraft has been touted as flying taxis that could be the future of urban air mobility (Shepardson, 2022). Recently, the low altitude urban air mobility aircraft has drawn intense interest around the world as a generous amount of the eVTOL companies have gone public. Lastly it is predicted in Europe that they could see the first flying taxis enter service as early as 2024 as stated by the region's top aviation regulator in May of 2021 (Hepher, 2021). More than half a dozen European firms have announced developments of Urban Air mobility vehicles for passenger use or for unmanned cargo sorties such as delivering medical supplies.

Ultimately, with the evidence provided, I believe that the law and regulatory environment is helping and encouraging the emerging flying taxi industry. With evidence from the three places with different forms of governments around the world South Korea, America, and Europe encouraging the introduction of Flying Taxi's, in my opinion it is evident that their emergence is being strongly encouraged more than anything else.

Advanced Air Mobility: Regulatory and Governance

Introduction

Advanced air mobility (AAM) is an emerging industry and a novel innovation in aviation technology that is predicted to change the course of urban transportation and emergency and disaster response. We know that the evolution of metropolitan transportation will be marked by advanced air mobility in the years to come. Most of the issues regarding advanced air mobility arise out of a concern for safety, functionality, and productivity. We must develop the right regulatory framework for efficient and safe management of the common airspace.

AAM Regulatory and Governance

The goal of codifying the standards for advanced air mobility is to guarantee that the aviation industry has all it needs to run a reliable, scalable, and risk-free business. This presents an opening for the growth of interconnected services, allowing for the more efficient and environmentally friendly combination of available energy and transportation in metropolitan and interurban areas. From a regulatory perspective, we have the FAA, NASA, the Department of Defense (DoD), and airport authorities working together to ensure the safety, security, and practicality of new aircraft. In order to ensure the safe and effective introduction of new significant aviation technology, a regulatory framework that takes on the accountability and responsibility of regulating the development of new aircraft must be established.

Conclusion

In conclusion, this paper provides a summary of the concepts that were discussed and analyzed in the poster presentation. Specifically, the presentation addresses the questions of who, what, and how in relation to the regulatory framework and government actors involved in the development of advanced air mobility policy and procedural rules. In addition, the presentation will discuss anticipated issues with the recently developed technology, as well as the ways in which robust governance might mitigate anticipated worries about the technology's safety, security, and economic feasibility.

Citations

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The Rise of Urban Air Mobility—Assets and Liabilities

Urban air mobility (UAM) is the practice of providing transportation services within urban or suburban regions using aircraft, including helicopters and electric vertical takeoff and landing (eVTOL) vehicles. UAM vehicles can operate in places where standard aviation or ground transit alternatives may be limited since they are built to take off and land vertically.

The creation of UAM vehicles, like flying taxis, has the potential to revolutionize urban and suburban transportation. Compared to conventional ground transportation methods, UAM vehicles may help to ease traffic congestion, offer speedier mobility, and lower pollution.

The United States has built a regulatory framework to guarantee the secure and effective operation of UAM vehicles because it is one of the leading nations in the development of the developing flying taxi business. In the US, the Federal Aviation Administration (FAA) is the principal regulatory organization in charge of regulating UAM operations. The FAA has defined standards for the safe operation of UAM vehicles and developed a certification procedure for them. Compared to conventional ground transportation, flying taxis have the potential to be a faster, more effective, and more environmentally friendly means of transportation. Even though there are still important technical, governmental, and safety issues to be resolved, the advancement of this technology could have a positive influence on how we travel and live in cities. However the creation and use of UAM vehicles is fraught with difficulties, such as those related to safety, noise pollution, air traffic control, and regulations. To ensure the safe and responsible development of this technology, stakeholders including regulators, legislators, and industry professionals will need to collaborate.

In conclusion, Urban air mobility (UAM) is the practice of providing transportation services within urban or suburban regions using aircraft, such as helicopters and electric vertical takeoff and landing (eVTOL) vehicles. Compared to conventional ground transportation, UAM has the potential to lessen traffic congestion, offer speedier mobility, and reduce emissions. Yet, some issues need to be resolved about safety, noise pollution, and air traffic control. To support the safe and responsible development of this technology, regulators and policymakers are collaborating with industry stakeholders to set standards and regulations for UAM vehicles, including airworthiness criteria, pilot certification standards, and airspace management systems.

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Urban Air Mobility (UAM) market size, share & covid-19 impact analysis, by Vehicle Type (Air Taxi, Air Metro, Air Ambulance, last-mile delivery, and other), by range (Intercity, and intracity), by Operation (piloted, autonomous, and hybrid), by end user (ride-sharing companies, scheduled operators, e-commerce companies, hospitals, and medical agencies and private operators), Regional Forecast, 2021-2028. Urban Air Mobility Market Size, Share and Growth Report [2028]. (n.d.). Retrieved March 1, 2023, from https://www.fortunebusinessinsights.com/urban-air-mobility-uam-market-106344

Appendix E Workshop Project Team/Roles/Bios

NSF BIOGRAPHICAL SKETCH

NAME: Ravich, Timothy

POSITION TITLE & INSTITUTION: Associate Professor and Chair (Interim), Department of Legal Studies, University of Central Florida

(a) PROFESSIONAL PREPARATION

INSTITUTION	LOCATION	MAJOR/AREA OF STUDY	DEGREE (if applicable)	YEAR YYYY
Brandeis University/ Florida International University	Waltham, MA; Miami, FL	History and Political Science	B.A., B.A.	1996
Embry-Riddle Aeronautical University	Daytona Beach, FL	Aviation Planning and Policy	M.B.A.	2008
University of Miami	Coral Gables, FL	Law	J.D.	1999
University of Central Florida	Orlando, FL	Security Studies	Ph.D. (Candidate)	2025
University of Virginia School of Law	Charlottesville, VA	National Security (Law Institute for Professors and Government Practitioners)		2015

(b) APPOINTMENTS

2021 – present	Chair (Interim), Department of Legal Studies, University of Central Florida, FL
2020 – present	Associate Professor, University of Central Florida, FL
2014 – 2019	Assistant Professor, University of Central Florida, FL
2006 – 2014	Adjunct Professor, University of Miami School of Law, Coral Gables, FL

(c) PRODUCTS

Products Most Closely Related to the Proposed Project

1. Ravich, T. Governance Challenges of Urban Air Mobility ("UAM"), Pennsylvania State Law Review. 2020; 124(3):657-689
2. Ravich T. Grounding Innovation: How Ex-Ante Prohibitions and Ex-Post Allowances Impede Commercial Drone Use, Columbia Business Law Review. 2018; 2018(2):495-585.

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3. Ravich, T. Emerging Technologies and Enforcement Problems: The Federal Aviation Administration and Drones as a Case Study, Journal of Regulatory Compliance. 2018:34-62.
4. Airports, Droneports, and the New Urban Airspace. Fordham Urban Law Journal. 2017. 44(2017):587-621.
5. Ravich, T. Courts in the Drone Age. University of North Dakota Law Review. The Integration of Unmanned Aerial Vehicles into the National Airspace. 2009. 85(3):597-622.

Other Significant Products, Whether or Not Related to the Proposed Project

1. Ravich, T. Law and Emerging Technology. West Academic Publishing, forthcoming 2022.
2. Ravich, T. Privacy Law in the Drone Age: Lowering (Reasonable) Expectations. American Bar Association, 2020.
3. Ravich, T. Introduction to Aviation Law. West Academic Publishing, 2020.
4. Ravich, T. Commercial Drone Law: Digest of U.S. and Global UAS Rules, Policies, and Practices. American Bar Association, 2017.
5. Ravich, T. Courts in the Drone Age. Northern Kentucky Law Review. 2015; 42(2):161-190.

(d) SYNERGISTICS ACTIVITIES

1. Keynote speaker for FAA-sponsored conference at the Kent State University College of Aeronautics and Engineering (2020)

2. Peer Reviewer, Editorial Board, Annals of Air and Space Law, McGill University Institute of Air and Space Law (2019)

3. Served as Principal Investigator for National Academies of Sciences, Engineering, and Medicine to conduct research and author 100+page research related to unmanned aerial systems at airports (2018)

4. Developed Law and Technology course with a team of faculty from various institutions.

5. Served as Chair of the Florida Bar Aviation Law Committee

NSF BIOGRAPHICAL SKETCH

NAME: Bush, Sarah

POSITION TITLE & INSTITUTION: Professor of K-12 STEM Education, University of Central Florida

(a) PROFESSIONAL PREPARATION

INSTITUTION	LOCATION	MAJOR / AREA OF STUDY	DEGREE (if applicable)	YEAR YYYY
Indiana University Southeast	New Albany, IN	Secondary Education, Mathematics Education	BS	2005
Indiana Wesleyan University	Marion, IN	Curriculum and Instruction	MED	2008
University of Louisville	Louisville, KY	Curriculum and Instruction, Mathematics Education	PHD	2011

(b) APPOINTMENTS

2021 - present Professor of K-12 STEM Education, University of Central Florida, FL
2017 - 2021 Associate Professor of K-12 STEM Education, University of Central Florida, FL
2015 - 2017 Associate Dean of School of Education, Bellarmine University, KY
2015 - 2017 Associate Professor of Mathematics Education, Bellarmine University, KY
2011 - 2015 Assistant Professor of Mathematics Education, Bellarmine University, KY
2005 - 2011 Middle School Mathematics Teacher, New Albany-Floyd County Schools, IN

(c) PRODUCTS

Products Most Closely Related to the Proposed Project

1. Bush S, Mohr-Schroeder M, Cook KL., Rakes CR., Ronau RN., Saderholm J. Structuring integrated STEM education professional development. Electronic Journal for Research in Science & Mathematics Education. 2020; 24(1):26-55.
2. Cook KL, Bush SB, Cox R, Edelen D. Development of elementary teachers' STEAM planning practices. School Science and Mathematics. 2020; 120(4):197-208. DOI: https://doi.org/10.1111/ssm.12400
3. Maiorca C, Roberts T, Jackson C, Bush SB, Delaney A, Mohr-Schroeder M, Yao Soledad S. Informal learning environments and impact on interest in STEM careers. International Journal of Science and Mathematics Education. 2020. DOI: https://doi.org/10.1007/s10763-019-10038-9
4. Bush SB, Cook KL. Step into STEAM: Your standards-based action plan for deepening mathematics and science learning. Thousand Oaks, CA: Corwin and Reston, VA: National Council of Teachers of Mathematics.; 2019.
5. Roberts OT, Jackson C, Mohr-Schroeder MJ, Bush SB, Maiorca C, Cavalcanti M, Schroeder DC, Delaney A, Putman L, Cremeans C. Students' perceptions of STEM learning after participating in a summer informal learning experience. International Journal of STEM Education. 2018; 5(35):1-14. DOI: 10.1186/s40594-018-0133-4

Other Significant Products, Whether or Not Related to the Proposed Project

1. Mohr-Schroeder M, Bush SB, Maiorca C, Nickels M, Johnson C, Moore T, English L.

Handbook of Research on STEM Education. 1st ed. New York, NY: Routledge; 2020. Moving toward an equity- based approach for STEM literacy. 29-38p.

2. McCurdy RP, Nickels M, Bush SB. Problem-based design thinking tasks: Engaging student empathy in STEM. Electronic Journal for Research in Science & Mathematics Education. 2020; 24(2):22-55.
3. Cook KL, Bush SB. Design thinking in integrated STEAM learning: Surveying the landscape and exploring exemplars in elementary grades. School Science and Mathematics. 2018; 118(3-4):93-103. DOI: 10.1111/ssm.12268
4. Bush SB, Cook KL, Edelen D, Cox R. Elementary students' STEAM perceptions: Extending frames of reference through transformative learning experiences. Elementary School Journal. 2020; 120(4):692-714. DOI: https://doi.org/10.1086/708642
5. Jackson C, Mohr-Schroeder MJ, Bush SB, Maiorca C, Roberts T, Yost C, Fowler A. Equity-oriented conceptual framework for K-12 STEM literacy. International Journal of STEM Education. 2021; 8(38):1-16.

(d) SYNERGISTIC ACTIVITIES

1. Serves as a member of the National Council of Teachers of Mathematics Board of Directors (2019-2022).
2. Writing team chair and lead author of the National Council of Teachers of Mathematics Catalyzing Change in Middle School Mathematics: Initiating Critical Conversations (2020).
3. Developed the Professional Development: Research, Implementation, and Evaluation (PrimeD) Framework with a team of faculty from various institutions.
4. Developed the MathTech Quality Framework with a team of faculty from various institutions.
5. Implemented more than 150 hours of professional development and workshops for educators related to integrated STEM and STEAM instruction pedagogy.

NSF BIOGRAPHICAL SKETCH

NAME: Campbell, Laurie O

NSF ID: 000641509@nsf.gov
ORCID: 0000-0001-7313-5457

POSITION TITLE & INSTITUTION: Associate Professor, University of Central Florida

(a) PROFESSIONAL PREPARATION -(see PAPPG Chapter II.C.2.f.(a))

INSTITUTION	LOCATION	MAJOR / AREA OF STUDY	DEGREE (if applicable)	YEAR YYYY
Palm Beach Atlantic University	West Palm Beach, FL	Org. Management	BS	1998
University of South Florida	Tampa, FL	Instructional Design & Technology	MED	1999
Regent University	Virginia Beach, VA	Educational Psychology	EDD	2009
Adams State University	Alamosa, CO	Science Education	Postdoctoral Fellow	2009 - 2012
University of Central Florida	Orlando , FL	Urban Education Certification	Other training	2012 - 2015

(b) APPOINTMENTS -(see PAPPG Chapter II.C.2.f.(b))

2021 - present Associate Professor, University of Central Florida, Orlando, FL
2015 - 2021 Assistant Professor, University of Central Florida, Orlando, FL
2012 - 2015 Visiting Lecturer, University of Central Florida, Orlando, FL
2009 - 2012 Asst. Clinical and Director of UG, Southern Methodist University, Dallas, TX
2008 - 2009 Lecturer, Southern Methodist University, Dallas, TX

(c) PRODUCTS -(see PAPPG Chapter II.C.2.f.(c))

Products Most Closely Related to the Proposed Project

1. Campbell LO, Kelchner VP. Engaging children and families with STEM-based expressive therapy. Journal of Creativity in Mental Health.. 2020. Available from: https://doi.org/10.1080/15401383.2020.1820927
2. Digitally-Mediated Team Learning: Foundations and Perspectives. Campbell LO, Hartshorne R, DeMara R, editors. In Press: Springer; 2021.
3. Campbell LO, Heller S. An investigation of a Design Space among underserved and underrepresented high school learners.. American Educational Research Association (AERA) International Conference 2019.; 2019; , United States.
4. DeMara R, Campbell LO, Hartshorne R, Spiegel S. Report from the NSF synthesis and design workshop: Digitally-mediated team learning, , September 24, 2019.. 2019 September.

Other Significant Products, Whether or Not Related to the Proposed Project

1. Campbell LO, Heller S, Laguardia E, DeMara RD. Faculty's Intention for Valuing Individuals' Culture to build Course Community.. EdMedia + Innovate Learning 2021 Conference; 2021; Online.

2. DeMara R, Campbell LO. Methods and outcomes of the NSF project on synthesizing environments for digitally-mediated team learning. ASEE 126th Annual Conference & Exposition; 2019; Tampa, FL.

(d) SYNERGISTIC ACTIVITIES -(see PAPPG Chapter II.C.2.f.(d))

1. AERA Chair for the AERA Computer & Internet Applications in Education Program (2021-2022).
2. Founder and leader of three student, post-doctoral, and early career writing groups that have yielded 9 publication (i.e. one consisting of Holmes Scholars).
3. Book Editor of Foundations of Digitally Mediated Team Learning (a collection of chapters on computer supported collaborative learning in STEM).
4. DMTL Workshop Poster Presentations 75 early scholars
5. Co-Director for Behavioral Indicator Training (BIT): A teacher awareness program to recognize students in crisis.

Appendix F Resources including links to online presence and social media

[NSF Award Search: Award # 2232225 - Conference: Advanced Air Mobility: Will Law Lift or Ground a New Era of Human Transportation?]

[Advanced Air Mobility Conference Takes Flight at UCF | University of Central Florida News]

[Advanced Air Mobility - College of Community Innovation and Education (ucf.edu)]

Will Law Lift or Ground a New Era of Human Transportation?

A new era of human mobility is on the horizon as investment pours into transformative airborne technologies referred to as advanced air mobility (AAM) — the local, on-demand movement of people and goods by air using autonomous or uncrewed electric aircraft that take off and land vertically (eVTOL). "Flying taxis" and the concept of aerial ridesharing at traditional taxi prices portend a reduction in congestion and a radically improved urban mobility experience relative to heavy-infrastructure approaches such as roads, rails, bridges and tunnels.

This conference seeks to generate new knowledge and identify further areas of inquiry with respect to the significance and feasibility of AAM. Its goal is to provide traction on challenging questions relating to an ongoing revolution in mobility by gathering perspectives from across disciplines about how to (re)calibrate the legal-regulatory framework for civil air transport alongside extraordinary breakthroughs in aeronautical engineering. This conference will explore both "above the ground" issues, including an evaluation of known and anticipated legal and technical challenges in enabling the safe, secure and efficient operation of an increasingly complex airspace and it will examine "on the ground" concerns including safety and security, governance challenges, the environment, and community impact.

Equitable and ethical considerations will permeate the conference as panelists will assess whether the central imagined benefit of AAM—inexpensive, green, on-demand aerial mobility—is inclusive and accessible across all social demographics. Relatedly, whereas women and individuals from underrepresented groups have had limited opportunities to participate in the development of transformative innovations in aviation, law and science historically. This project is intentional about featuring new voices from the broadest demographic continuum so as to effect the core aspiration of AAM as an equalizer of access.

By exploring the intersection of legal and technological innovation in a new era of aviation, the reach of this conference will extend beyond aviation as the findings it disseminates could benefit other scholarship at the intersection of science and law that seeks to understand how new technology disrupts legal equilibria, renders existing laws obsolete, and/or requires the creation of new rules and frameworks to account for pioneering inventions.

NSF

Sponsored by: National Science Foundation (NSF) Division of Law & Science, Award Abstract # 2232225. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the project team and do not necessarily reflect the views of the National Science Foundation

UCF TODAY

SECTIONS

RESEARCH

Advanced Air Mobility Conference Takes Flight at UCF

The NSF-funded conference on Friday will explore how laws could lift or ground the use of autonomous, uncrewed aircraft to move people and goods.

By Danielle Hendrix '15
March 7, 2023

Advanced air mobility technology could help reduce congestion and change the landscape of urban mobility. Image credit: Adobe Stock

Imagine being able to take your commute from the highways to the skies by hailing your own flying taxi. It's a possibility that could become reality as researchers and stakeholders invest in transformative airborne technologies known as advanced air mobility (AAM).

This technology includes the concept of aerial ridesharing, and is defined as the local, on-demand movement of people and goods through use of autonomous, uncrewed aircraft that take off and land vertically.

To help explore this vision of the future, the University of Central Florida is hosting the Advanced Air Mobility Conference on Friday, March 10 at the Celeste Hotel.

The goal of the U.S. National Science Foundation-funded conference is to generate knowledge and identify further areas of inquiry with respect to the significance and feasibility of AAM. Its central theme questions whether law will lift or ground a new era of human transportation.

Advocates of AAM say the technology could help reduce congestion and change the landscape of the urban mobility experience relative to heavy-infrastructure approaches like roads, rails, bridges and tunnels. By offering aerial ridesharing at traditional taxi prices, AAM would offer an affordable and environmentally sustainable transportation modality between places previously not served via aviation.

Tim Ravich, associate professor in the College of Community Innovation and Education's Department of Legal Studies, is the principal investigator of the conference project.

An aviation lawyer himself, Ravich is intrigued not only by the idea of AAM but also by the intersection of law and science that accompanies it — as well as the innovative transportation modality's potential.

Ravich is working with fellow college researchers and co-principal investigators, Sarah Bush and Laurie Campbell, to bring the conference to life.

Conference speakers include:

- Faculty from UCF's College of Engineering and Computer Science
- Aviation consultants from Woolpert and Hovecon
- Local and state government representatives, including the City of Orlando
- National leaders like U.S. Senator Mark Warner
- "Vertiport" companies like Skyports and Ferrovial
- Global manufacturers of the electric vertical take-off-and-landing airplanes (eVTOL) at the center of the AAM revolution such as by Supernal (Hyundai), Lilium (Germany) and Joby (U.S.)

"Various stakeholders are coalescing the concept of AAM to simply mean that flight from one point to another in a localized area might be available to a wide swath of the population that were previously unserved or underserved," he says. "The idea that you could take a flight in the same fashion that you might take a taxi is new. The idea that you could fly from one part of town to another does not exist, and it might benefit a broader range of people who have never used aviation."

Aside from engineering challenges, Ravich says AAM is also not without a host of legal and regulatory implications including property law, jurisdiction, safety and security, community acceptance, cybersecurity, crime and policing, and social and economic equity.

"We're focused on an understanding of how the law can drive or inhibit these technical challenges," Ravich says. "During this conference, we want to talk about these issues so that we can identify problems and resolve them where possible. On one side, there are the scientific and engineering constraints — making sure these aircraft fly economically, reliably and safely with limited noise. There's the legal aspect, which is still in development and includes property law and airspace jurisdiction. Then there are constraints related to issues of social equity. Would this be inclusive and accessible across all social demographics?"

Ravich adds that women and other underrepresented groups historically have received limited opportunities to participate in the development of some innovative technologies in aviation, law and science. This conference will be intentional in elevating voices from across a broad demographic spectrum, which can help inform AAM's aspiration to be accessible.

"UCF is a great platform for this type of work," he says. "Many universities and institutions are focusing on this, but I do think UCF and Florida, specifically, are globally leading places as a testbed for this innovation."

Those interested in attending the UCF Advanced Air Mobility Conference can reserve their in-person or remote spot by registering through Eventbrite. Registration is free, but in-person space is limited.

Research Team Credentials

Ravich joined UCF in 2014 as an assistant professor and served as the Department of Legal Studies' interim chair from 2021 to 2022. He earned his MBA in aviation planning and policy from Embry-Riddle Aeronautical University and his juris doctorate degree from the University of Miami School of Law. His research interests include aviation and space law, civil procedure, and technology and law.

Bush is co-principal investigator and a professor of K-12 STEM education in the School of Teacher Education, which she joined in 2017. She earned her doctorate in curriculum and instruction for mathematics education from the University of Louisville. She has received more than $6.3 million in externally funded projects since 2015.

Campbell is co-principal investigator and an associate professor in the Department of Learning Sciences and Educational Research. She earned her doctorate in educational psychology from Regent University. Campbell joined UCF in 2012. She has received over $2 million in federal funding and $17 million in external funding.

MORE TOPICS

College of Community Innovation and Education | Department of Legal Studies | Learning Sciences | School of Teacher Education

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RELATED STORIES

Appendix G Recruitment Materials

NSF Advanced Air Mobility:
Will Law Lift or Ground a New Era of Transportation?

Friday, March 10, 2023 - Conference Date

Face-to-face Poster Participation Guidelines:

Those interested in showcasing their Aviation and Law or related work at the conference event may present a poster. To participate, please provide the following: (a) an 8-16 word title, (b) the 25-50 word abstract of the presentation, (c) 2-5 keywords describing your poster, and (d) a one-to-two-page summary of the presentation. Upload at: https://forms.gle/Q5oX5Yo9hGBALdyy8

Poster Presentation Paper Due Date - March 1, 2023

Poster Award:

Every face-to-face participants' poster may be eligible to receive an award. The best poster award will be voted on by face-to face participants.

Physical Poster Requirements:

- Posters Size for Poster Presentation
  Posters can be landscape or portrait.
  Posters should measure 22" x 28" but no larger than 24" x 36"
- All Posters should include a title and the presenters' name and affiliation.
- Posters should be prepared as a single poster rather than multiple posters or papers pieced together.

Poster Set-Up:

Posters may be put up beginning one half hour prior to the beginning of the event. Please bring your own supplies to display the poster.

Presentation:

Be prepared to speak about your posters to session attendees in a short concise manner (1-2 minutes). There will not be a formal presentation time. Session attendees will walk from poster to poster before the conference and at a designated break.

Online Option: For those who are interested but are unable to attend in person, there will be an asynchronous online option that will go live the day of the conference. Please follow all of the same paper guidelines as indicated below and apply using the same online form. Once your

paper has been received, you will receive a followup email with the instructions for uploading using the approved online poster template.

Should you have additional questions please contact:
Dr. Timothy Ravich - timothy.ravich@ucf.edu
or Dr. Laurie O. Campbell - locampbell@ucf.edu

Paper Guidelines

When uploading your paper you will need (a) an 8-16 word title, (b) the 25-50 word abstract of your presentation, (c) 2-5 keywords describing your poster, and (d) a one to two page summary of the presentation. Upload at: https://forms.gle/Q5oX5Yo9hGBALdyy8

The paper will be a one-to-two-page summary of your poster. The paper submitted should have a Title, Introduction, Body, Conclusion, and References. Citations and references should conform to either APA, the BlueBook, or IEEE depending on your discipline. The paper should be doubled-spaced but not over two pages. Some papers abstracts may be chosen to be published in the outcomes of the conference.

Conference Overarching Questions

1. What are the possible immediate, intermediate, and long-term socio-technological challenges relative to Advanced Air Mobility (AAM)?
2. What associations could potentially address some of the legal-scientific complexities that AAM field may need to address?
3. Who will (and will not) have the opportunity to participate in the next era of aerial transportation?
4. What legal innovations are possible to achieve the concept of operations of AAM? Relatedly, what technological solutions exist (or might exist) to resolve legal challenges associated with AAM?